

# Virtual BRT for Northwest Arkansas: An Essential First Step



**December 20<sup>th</sup> 2017**  
**Presented to:**  
**Ozark Regional Transit**  
**by: The KFH Group, Inc.**



## The Agenda

1. Introduction
2. Study Goals and Process
3. Understanding the Service Area
4. Outreach
5. Review of Existing Services
6. Demographics and Travel Patterns
7. Surveys
8. Needs
9. Introducing BRT Concepts
10. Potential Costs and Sustainability
11. Next Steps



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## Introduction

- KFH Group, Inc.
  - 22 years experience focusing on small urban transit
  - Experience in 25 states - many years in Arkansas
  - Bus Rapid Transit experience
  - Hundreds of Transit Development Plans completed



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## The Study

- Determine feasibility of a BRT type service
- Develop a pilot project implementation plan for a BRT type service
- We are now in the “menu of strategies” phase to reach consensus on the approach forward
- Once consensus is reached:
  - Develop draft plan
  - Costs, funding, ridership and other issues to be determined



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## Study Goals

- Identify the needs in the entire corridor:
  - Commuter, students, local and visitors
  - Provide for extensive outreach
- Development of alternatives:
  - Realistic based on current and near term future needs
  - Cost – benefit analysis
  - Selection
- Implementation Plan



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## The Process

- Outreach and Stakeholder Input
- Demographic Review
- Review of Existing Services
- Assessment of Needs
- Selection of Alternatives
- Draft and Final Plan



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## Purpose of the Today's Meeting

- Inform Board of study progress
- Discuss key issues related to the project
- Reach consensus on path forward
- The guidance provided today will allow the consultants to develop the draft plan



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## Northwest Arkansas: Evidence of Need

- Review of Comparable Urban Area Number of Buses:
  - Des Moines – 94 peak (no major university)
  - Knoxville – 59 peak (separate university system)
  - Wichita – 38 peak (separate university system)
  - NW Arkansas – 15 - 20 peak (separate university system)
- Comparable Urban Areas – Ridership Per Capita (Excluding university system)
  - Ann Arbor – 22.1 one way trips per capita
  - Des Moines – 9.9 trips per capita
  - Knoxville – 6.7 trips per capita
  - Wichita – 4.6 trips per capita
  - NW Arkansas – 1.0 trip per capita



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## The Disadvantage and the Need

- **The Disadvantage – Having no dominant city or dedicated funding source(s) are major disadvantages by any measure. You are not alone.**
- The need for city to city transit service is critical:
  - One can drive, ride a bike on the greenway or even walk between all cities in the region
  - But one often can't take transit



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## Potential Service Area Attributes

- Major concentrations of employees throughout the service area:
  - Unusual number of affluent responses to surveys
  - Potential two way commute
- Large numbers of commuters without cars or desire not to use one:
  - Very diverse urban area with people from all over the world – they expect transit
  - Connectivity with the Razorback Greenway
- Growing, dynamic community where transit needs to “catch up” based on any review of peers



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## Outreach

- Community public meetings – Four public meetings were held in April 2017.
- Stakeholder interviews – Interviews were conducted with cities, large businesses, chambers of commerce, planning agencies, transit systems and other interested parties.
- Public and business surveys – Over 1000 public surveys were completed and more than 40 business/human service agency surveys were completed.
- Advisory Committee – All technical memoranda will be reviewed by the advisory committee.



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## Existing Services

- ORT operates a series of predominantly local routes in each major community in the service area
  - Most service is local in nature
  - Not conducive for travel between cities
  - Far less service than comparable cities, can't meet needs at this level of funding
- Razorback Transit
  - Covers Fayetteville with service targeted for the university
  - Operates seasonal/semester with reductions in service for extensive periods



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## Demographics and Travel Patterns

- Population in general and transit dependent spread throughout 30 mile corridor.
- Very high concentrations of employees throughout service area.
- Number of total trips daily of all types:
  - Intra-city: 444,600
  - Inter-city 209,000
  - Over 650,000 trips taken daily
- Inter-city
  - Bentonville Rogers
  - Fayetteville – Springdale
  - Rogers - Springdale



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## Surveys

- Three rounds of surveys were conducted:
  - The public at large
  - Commuters, targeting major employers
  - Businesses
- Results were similar for both public surveys:
  - Two thirds of respondents state they would use the service
  - Unusually high number of affluent (over \$100,000) responses (25 – 35 percent)
  - Most important – Fast frequent service, real time information, clean vehicles, safety and a phone app
  - Origins and Destinations City to City: Springdale-Fayetteville, Rogers - Bentonville



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## US 71B Corridor: Potential Service Area Needs

- Two directional commuter needs:
  - Opportunities exist for service in two directions with multiple origins and destinations: Bentonville, Rogers, Lowell, Springdale, and Fayetteville
  - Seasonal needs
- Local residents - other needs:
  - Residents of cities and communities can access shopping and medical destinations throughout corridor



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## Virtual Bus Rapid Transit

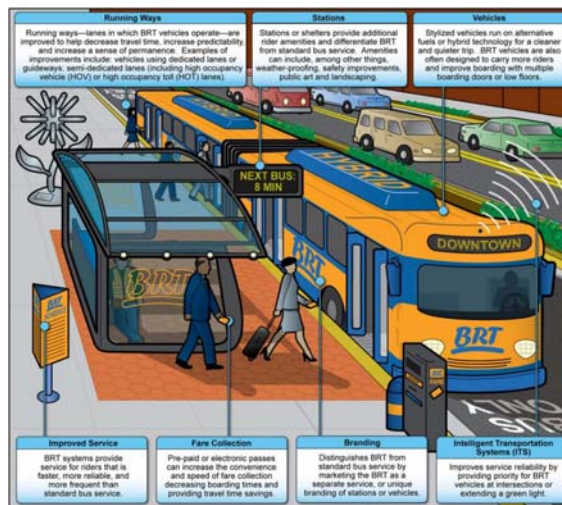
- BRT is designed to speed up bus service and offer greater comfort without the expense of rail.
- At the high end, the buses travel in dedicated lanes or right of way.
- More typical is a Virtual BRT where the vehicle operates in traffic, but has many BRT features:
  - Rapid service with higher frequency
  - Vehicles: All use large capacity vehicles with large doors
  - Stations – Limited stops with permanent shelters, raised platforms, using electronic signage and fare payment systems
  - Signal Prioritization – The ability to sustain a green light
  - Branding: Service is typically branded separately



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## Bus Rapid Transit



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## BRT Lite



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## BRT Lite



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## Pilot Project Issues – Decision Points

- The nature of a pilot project requires a balance of costs and service:
  - Capital needs: appropriate vehicles, stations and technology
  - Spend enough to do it right and attract new riders
  - Designed so that infrastructure and some level of service can continue if the project is not renewed



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## Virtual BRT

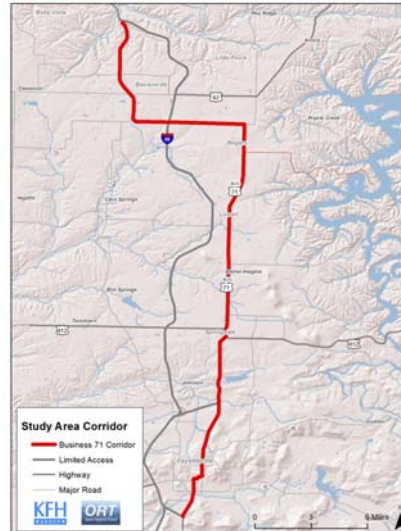
- BRT can be the backbone of ORT service:
  - Can connect each community to newly designed neighborhood service
  - Connecting routes should have timed meets where feasible
  - Fast, easy to use service
  - High frequency
  - Park and Ride connections



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## Potential Route



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## The Need for Speed

- Signal Prioritization
- Limited stations
  - Fully accessible and well lit
  - Raised platforms
  - Free fare or prepay for ride
- Rapid acceleration
- Signage to ensure rapid vehicle movement



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## Vehicles

- There are two types of vehicles under consideration (The Federal government may pay for 80 percent of the cost):
    - Low floor medium duty bus - \$250-300,000\*
      - One-half the price of heavy duty bus
      - Three quarters the capacity (30 seated) of heavy duty bus
      - Delivery in less time
    - Heavy duty low floor bus – \$450,000-600,000\*
      - Seats 40
      - More comfortable ride
      - Lasts longer
- \*Price and delivery time will vary based on features, timing and procurement factors.



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## Medium Duty Bus



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## BRT Vehicle Types



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## Stations: BRT's Front Door

- About every 1 – 2 miles, typical of this type service
- About 50 stations
- 3 types of stations
  - Minimal – Accessible pathways and shelter
  - Major Station – Accessible, raised platform, real time information, fare payment kiosk
  - Transfer and/or Park and Ride – Space for multiple buses and amenities of a major station



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## Stations

- Accessible and Safe:
  - Pathways
  - Crosswalks
  - Safe and well lit
  - Appropriate landing pad
- Amenities depending on need:
  - Shelters
  - Raised platforms
  - Real-Time information



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## Bus Rapid Transit



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## Bus Rapid Transit



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## BRT Lite: Rapid Ride



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## Rapid Ride



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## Austin



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## Technology

ORT will combine a number of technologies to help reduce travel time:

- Signal Prioritization – For five cities
- Fare Payment
  - Telephone app
  - Fare vending machines
  - Smart card
  - Accepting cash
  - Farebox
  - Vault and software
- Automatic Vehicle Locator (AVL)
- Real-Time Information - At stations and on a telephone app
- Digital Communications
- Active Monitoring of Service



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## It's Still The People!

- Highly trained staff to ensure service stays on time:
  - Vehicle operators - over 30 new operators will have to be trained
  - Service supervisors
  - Dispatchers
- Customers
  - Understanding how service operates
- Other drivers
  - No standing or stopping in the right lane
  - Vehicle may stop at far side of street
  - Relax and take the bus



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## Educating the Public

- The public needs to be informed that there should be no stopping or standing on the outer lanes. Signage may also be needed.
- Buses will stop at stations just past the intersections (far side) – it will be important for other drivers to stay back at least 75 feet or they may get stuck blocking an intersection.
- Understanding that this service can save time, be comfortable and allow passengers to be productive or to relax at the end of a long day.



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## Fares

- The higher the fare, the lower the ridership and the lower the fare the higher the ridership.
- The thought was that a pilot project would be free for X period of time to generate ridership.
- Fares are purchased at the station (up to 50 stations) or on line so that passengers can board rapidly:
  - Fare vending machines will be expensive and will have to take credit cards.
  - This will require significantly upgraded stations and security.
- On board fare boxes will increase ride time significantly.
  - Fare boxes should have card readers and accept credit cards.



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## FTA Small Starts?

- Not appropriate for a pilot project
- Corridor based BRT:
  - Short headways of 15 minutes throughout the day or 10 minute peak and 20 minute off peak
  - Signal priority as a minimum
  - Defined stations that offer shelter, information on schedules and fully accessible
  - Separate brand
  - Heavy duty buses would be recommended
- Major cost issues are stations and headways, both would require an increase in service and additional costs per station.
- Takes a number of years
- There are often other sources of capital funding available.
- To be addressed in the plan



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## Recommended Service

- Virtual BRT:
  - Using technology, training and close monitoring to move rapidly through the corridor
  - Medium duty buses - CNG
  - 10 minute peak and 30 minute off-peak service
  - Signal prioritization
  - Significant infrastructure – stations and park and ride
  - Revise existing routes to feed BRT
  - Weekdays to start, then expand as appropriate



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## Potential Ridership

- Multiple approaches to ridership estimation
- The region is far below its potential when:
  - Looking at peers
  - Considering the community
- Demand Model used by NWARPC deemed unreliable



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## NWARPC Transportation Demand Model

- Stated throughout by the study authors - Northwest Arkansas Transportation Alternatives Analysis (Pg. 2):

*“While the model has served the area well for automobile-based planning of the regional street and highway plan, it is extremely limited in its ability to estimate demand for alternative transit facilities.”*

- Consequently the extremely low number of trips generated by the model (300) should be ignored until the model is updated for transit as stated in the report.



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## Demand Estimation

- Realistic expectations
- Assuming rapid service, signal prioritization, accessible stations, 10 minute headways during peak hours and free fare for 6 to 12 months.
- Used four approaches to ridership estimation:
  - Comparative analysis – what happened to other cities when implementing a similar service?
  - Mode split – Percentage of trips taken by each mode
  - Service elasticities – How service levels affect ridership
  - Per capita ridership – a look at the overall level of transit.
- Estimates of about 3,000 to 5,000 one way trips daily after 1- 2 years with a productivity of over 30 one way trips per vehicle hour and 750,000 to 1.25M annual trips.



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## Ridership – Using Local Data

- Data supplied by the NWARPC from 2014
  - Using mode split:
    - 208,928 inter-city trips daily within a shed of each city:
      - Assuming a conservative 1% split = 2,089 daily one way trips
    - 444,601 Intra-City :
      - Mode split of .25% = 1,111 one way trips
- A very conservative mode split yields 3,200 one way daily trips.**
- If we adjust for 3% growth per year – 12% anticipating a 2018 start – **3,584 one way trips**



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## Operating Costs

- \$85 per vehicle hour for estimate purposes, based on current ORT costs plus added costs related to BRT.

	15	12.5	10	
Peak Headways	Minute	Minute	Minute	
Annual Operating Costs	\$2.47 Million	\$2.83 Million	\$3.57 Million	



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## Staffing Needs

- As ORT's service will more than double, additional staff will be needed, however per hour costs can be reduced due to greater economies of scale.
- Operations:
  - BRT manager
  - 4 supervisors
  - Additional vehicle operators
  - Maintenance manager
  - 3 maintenance technicians
  - 2 bus cleaners (PT), 1 maintenance support
  - 1 H.R., 1 payroll
  - 1 marketing specialist



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## Start-Up Costs

- Operator Training (\$105,000):
  - 35 operators at \$3,000 each
- Planning, Architectural, Engineering and Technical Support (\$2 Million):
  - Detailed service plan with routes changed to complement the BRT – schedules, run cuts, new routes
  - Architectural and engineering of 50 stations
  - Technical support – signal prioritization of multiple systems, AVL, communications, fare technology
- Marketing and Promotion (\$350,000):
  - Branding
  - TV, Radio, billboards, newspaper, grass roots prior to and for a period of time after implementation



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## Station Costs

- Many BRT systems have stations that cost \$200,000 and much more.
- For purposes of the pilot project, station improvements at the low end (a pad, short stretch of sidewalk) will cost \$5,000 each, while major transfer facilities may cost \$50,000.
- Estimated total costs for basic stations is about \$500,000 up to \$1.6 Million. Fare vending machines are extra.
- Small Starts would require shelters and accessible pathways at each stop – over \$1 Million.



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## Capital Costs - Infrastructure

Stations		Virtual BRT No Kiosks	Virtual BRT With Kiosks	Full BRT
	Station costs	\$1,615,000	\$2,055,000	\$4,410,000



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## Capital Costs – Buses and On Board Technology

	13 Vehicles	18 Vehicles	21 Vehicles	26 Vehicles
Total Base Vehicle Cost	\$4,290,000	\$5,940,000	\$6,930,000	\$8,580,000
CAD AVL	\$52,000	\$72,000	\$84,000	\$104,000
Signal Preemption	\$234,000	\$324,000	\$378,000	\$468,000
Digital Communication	\$117,000	\$162,000	\$189,000	\$234,000
Fare Boxes	\$195,000	\$270,000	\$315,000	\$390,000
<b>Fully Loaded Vehicle Costs</b>	<b>\$4,888,000</b>	<b>\$6,768,000</b>	<b>\$7,896,000</b>	<b>\$9,776,000</b>
<b>Total Vehicle Costs W/O Fare Boxes</b>	<b>\$4,693,000</b>	<b>\$6,498,000</b>	<b>\$7,581,000</b>	<b>\$9,386,000</b>

- Fare vault and software - \$500,000



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## Summary Overall Costs

Assuming 10/30 headways and Virtual BRT:

- **Operating Costs:** **\$3,650,000 annually**
- One Time Start-Up: \$2,455,000
- Vehicles: \$6,930,000
- On Board Technology: \$ 963,000
- Vault and Software: \$ 500,000
- Station Infrastructure: \$1,615,000 - \$500,000
- **Total Start-Up/Capital: \$12,463,000 – \$11,348,000**



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## Sustainability

- Everyone loves a winner:
  - Success breeds sustainability
  - Potential Federal Small Starts or other funding
  - Local funding – pay to play according to an allocation formula
  - Fare revenue - about 10 – 20 percent of operating costs
  - Sponsors – private sector P3
  - Dedicated revenue source(s) – The only way to grow if no local government commitments



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## Next Steps

- Selection of most appropriate strategies
- Development of implementation plan
  - Costs
  - Funding options
  - Service levels
  - Vehicles
  - Stations
  - Step by step action plan



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