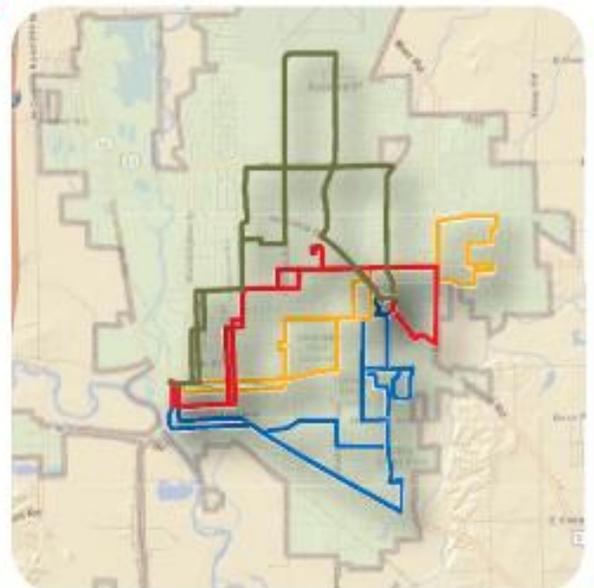


# ColumBUS

TRANSIT IMPROVEMENT  
& EXPANSION PLAN



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## **1: Introduction**

This document provides the analysis and recommendations associated with the 2013-14 update of the City of Columbus, IN Transit Plan for its transit service system, named “ColumBUS”.

The Columbus Transit Plan was developed using original boarding data collected using GPS units, so that location and time of activity was accurately marked. Citizen input was extensive, with a public meeting, and five web-based surveys being disseminated. A Transit Advisory Committee (TAC) consisting of representatives from government, public advocacy groups, and other interested stakeholders oversaw the development of the Plan.

Members of the TAC include the following:

- Alicia McCreary, United Way 2-1-1
- Bob Oxley, Transit user
- Bob Pitman, Mill Race Center
- Brandon Shumaker, Developmental Services, Inc.
- Eric Frey, Administrative Resources Association
- Jackie Combest, Transit user
- Tom Heller, Citizen
- John Roberts, Ivy Tech Community College
- Paul Amiot, Cummins Inc.

Development of the Plan was managed by Laurence Brown, Director of the Columbus Area Metropolitan Planning Organization, and Cindy Setser, General Manager of ColumBUS. Assistance was provided by the consulting firm of Parsons Brinckerhoff, in particular its Indianapolis, Cincinnati, and Cleveland offices.

The remainder of this document is divided into three sections. A community profile is provided in Chapter 2. Chapter 3 discusses the existing transit service and outlines and applies performance measures for its evaluation. Based on these performance measures, alternatives for system provision are explored and critiqued. Chapter 4 provides recommendations for system development.

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## 2: Community Profile

The City of ColumBUS provides public transportation services for the benefit of its citizens. Transit performance is therefore measured relative to the needs of its citizens. This Chapter outlines some of the characteristics of the community that are relevant to the provision of public transit service.

### Transit System (ColumBUS)

The system consists of four fixed routes, which combined, span nearly 50 route miles. All four routes begin at the main transit hub at the Mill Race Center, located just northwest of the Central Business District (CBD). The system is a timed-transfer “pulse” system that has all routes converging at the Mill Race Transit Center every 60 minutes; a second timed transfer takes place at the Target store on US 31. This latter site is subject to Target’s ongoing acquiescence with the stop; there is no formal agreement between ColumBUS and the Target store for use of this off-street location as a bus stop and transfer point. The existing system is shown in Figure 1.

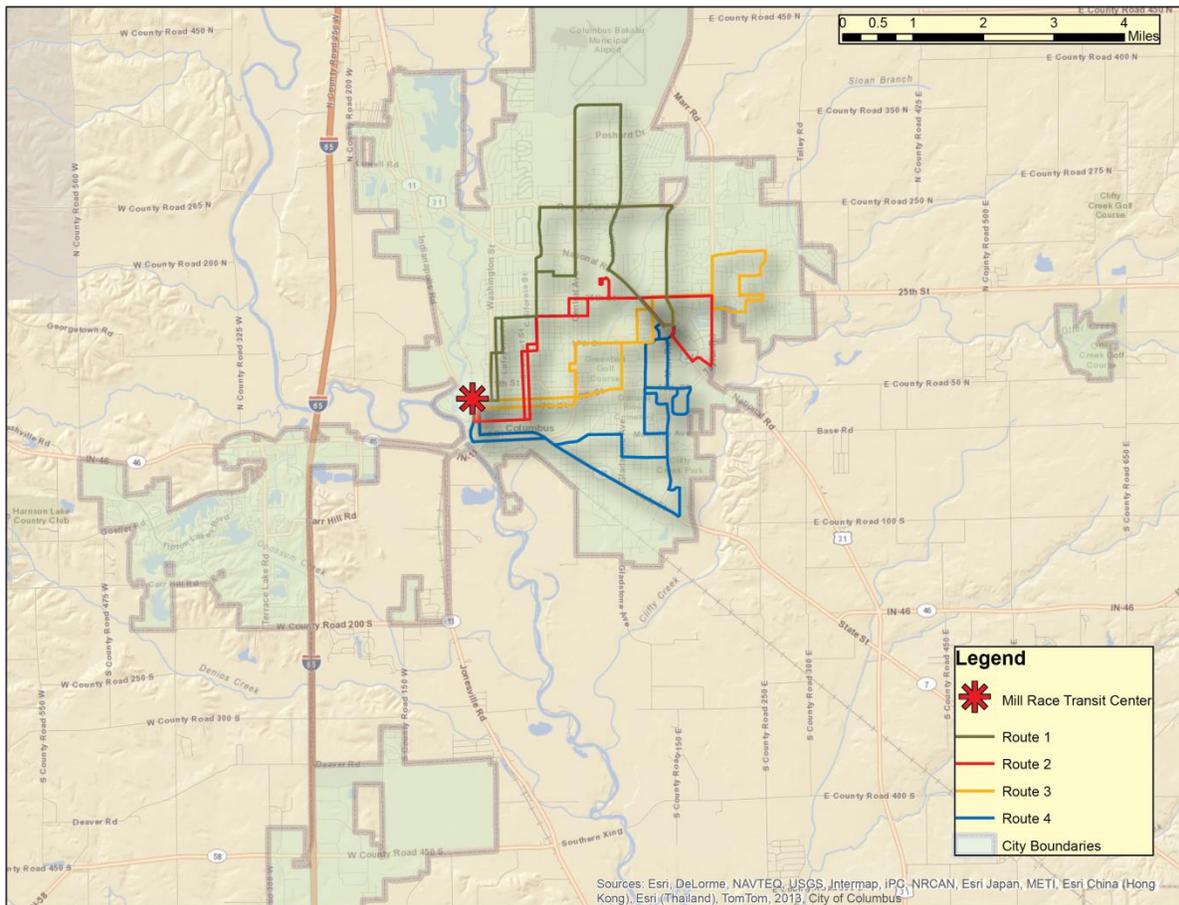


Figure 1: Existing ColumBUS Fixed Route System

The relationship of ColumBUS’s service area to the City’s incorporated area is noteworthy. The central City consists of the older areas surrounding the Central Business District as well as newer contiguous areas east of the White River that have developed around US 31. ColumBUS’s service operates entirely within this portion of the City. The City’s incorporated area also includes several non- or partially-contiguous areas of significant size, including the region around the I-65/SR46 interchange (sometimes referred to as “Tipton Lakes”, although the actual Tipton Lakes subdivision is only a portion of this area), the area around the I-65/SR58 interchange (which has several industrial parks), and an area to the east

of the City's main portion around Otter Creek golf course. These newer incorporated areas currently are unserved by the fixed route system.

The location of the Mill Race Transit Center poses several challenges to efficient bus operation. Significantly, the Center is not centrally located in the current service area. Since all routes begin and end at the Center, and the Center is located on the extreme southwest boundary of the current service area, busses must travel significant distances just to begin their route coverage. These travel distances result in the requirement for a 60 minute trip schedule. Additionally, the Center is separated from the roadway system by the Louisville and Indiana Railroad, and recent and anticipated increases in train traffic have engendered concerns about buses being temporarily stranded on the wrong side of the tracks. Finally, the Center is not located conveniently relative to desired destinations, such as the Central Business District.

.ColumBUS maintains a "Call-a-Bus" paratransit service that operates citywide for eligible<sup>1</sup> riders. A significant number of these rides are to the commercial areas along the portion of SR 46 west of the city, which is not served currently by fixed-route bus service.

### Community Profile

Columbus, IN is incorporated as an Indiana Class II City, with a 2010 Census population of 44,061. The City is located within the Columbus (IN) Metropolitan Statistical Area (MSA), which was formed after the 2000 Census. The MSA consists solely of Bartholomew County, which has a 2010 population of 76,794. In addition to the City of Columbus, Bartholomew County contains seven other municipalities: the Towns of Clifford, Edinburgh, Elizabethtown, Hartsville, Hope, Jonesville, and Taylorsville.

Population and employment distributions are shown in the following Figure 2; distributions of transit-dependent populations are shown in Figure 3. As no formal data sets containing transit-dependent populations have been compiled for other areas, Figure 3 focuses on the existing transit service area. Based on information obtained through stakeholder interviews (outlined below), a large number of foreign-born workers with generally low levels of automobile ownership live in concentrated neighborhoods both within and outside of the service area.I-65.

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<sup>1</sup> Call-a-BUS provides curb-to-curb service anywhere within the city for persons who, because of disability, age or injury are unable to use the ColumBUS fixed route buses. Riders are required to submit two questionnaires: an applicant's questionnaire and medical professional's questionnaire. Based on the information provided in the questionnaires, ColumBUS Transit staff determines eligibility.

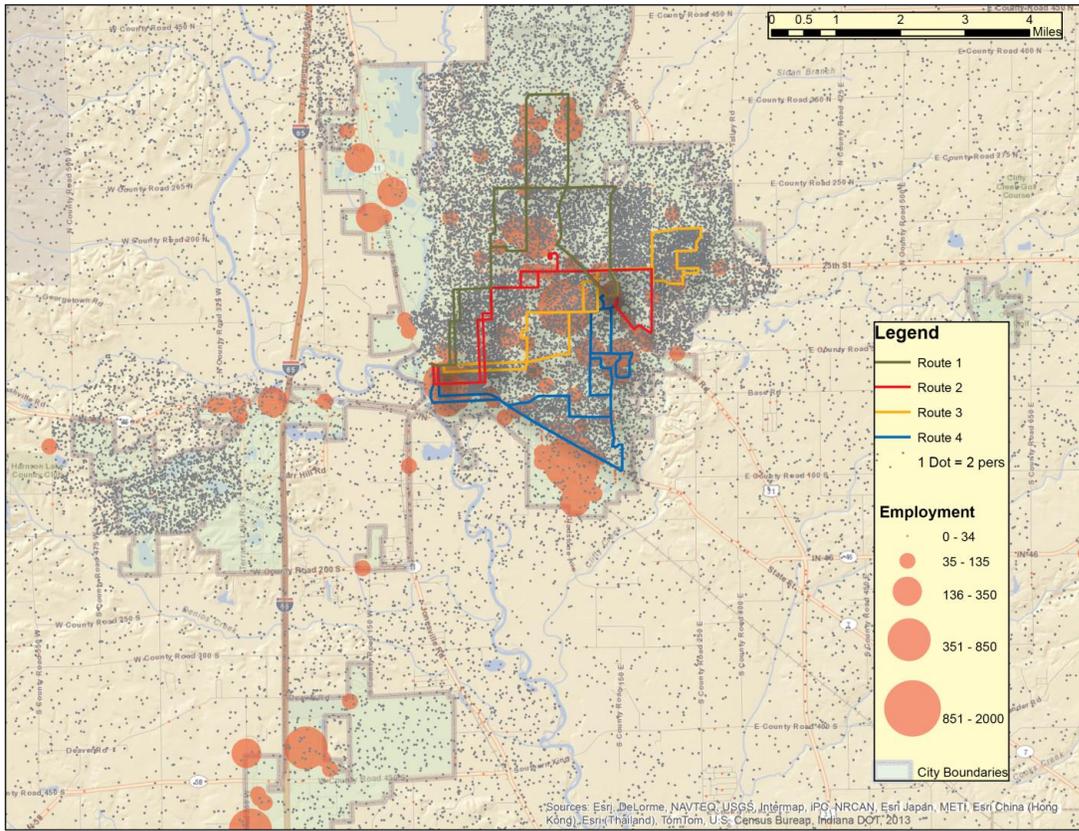


Figure 2: Population and Employment Distribution

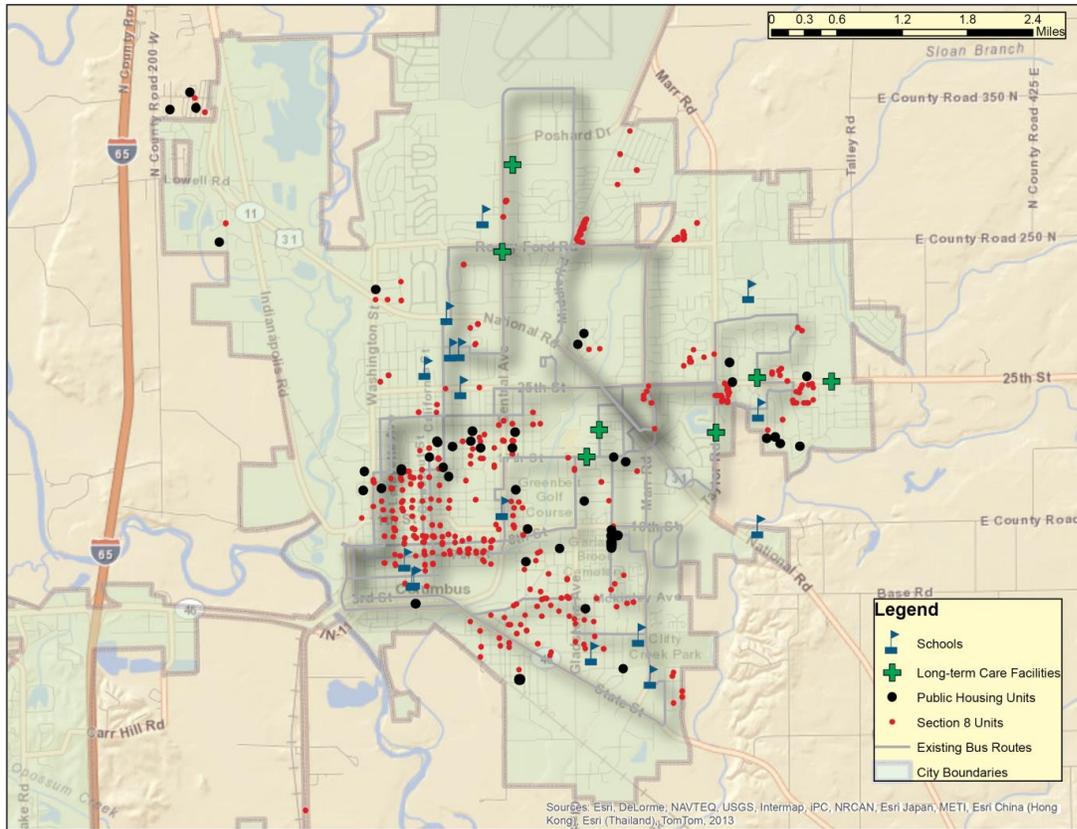


Figure 3: Transit-Dependent Populations

Nearly every transit trip involves non-motorized (i.e., pedestrian or bicycle) connections at one or both ends. Supportive bicycle/pedestrian infrastructure such as sidewalks and bike lanes are therefore important to the transit system’s success. Figure 4 shows the location of sidewalks relative to the existing transit route system.

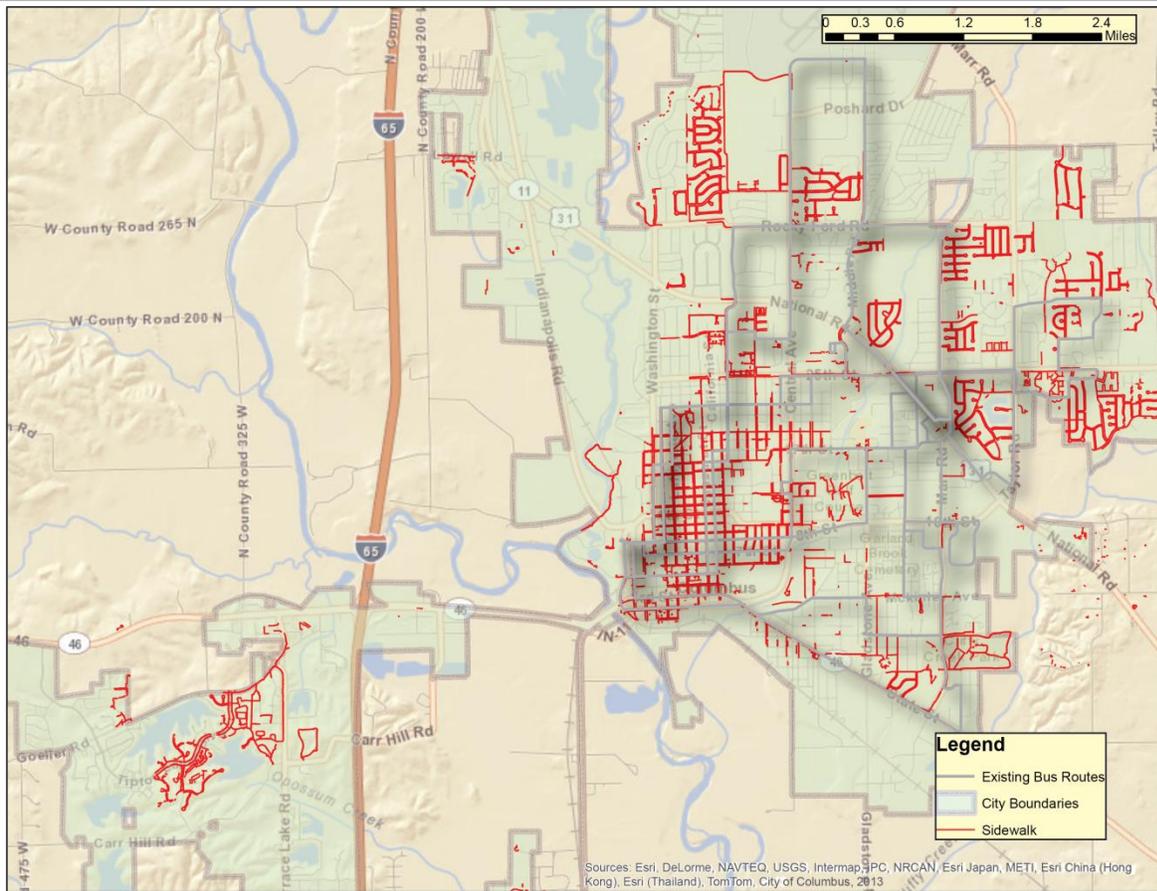


Figure 4: Sidewalks (Source: City of Columbus)

Most (38 miles, or 80%) of the existing transit routes are within a reasonable walking distance (defined here as 0.125 miles) of a sidewalk. Significant gaps in sidewalk accessibility are present around Ivy Tech/IUPUC on the north side of the City, and around Marr Road on the east side of the City.

## Transit System Profile

### Passenger count

A passenger count was performed in April of 2013 to complement existing data sources on transit system performance. Project team members rode all active routes at all operating weekday time periods over a two-day period, creating a composite service day including boardings and alightings. The locations of boardings and alightings were recorded using global positioning satellite (GPS) technology. Figure 5 (below) displays some of the resulting data.

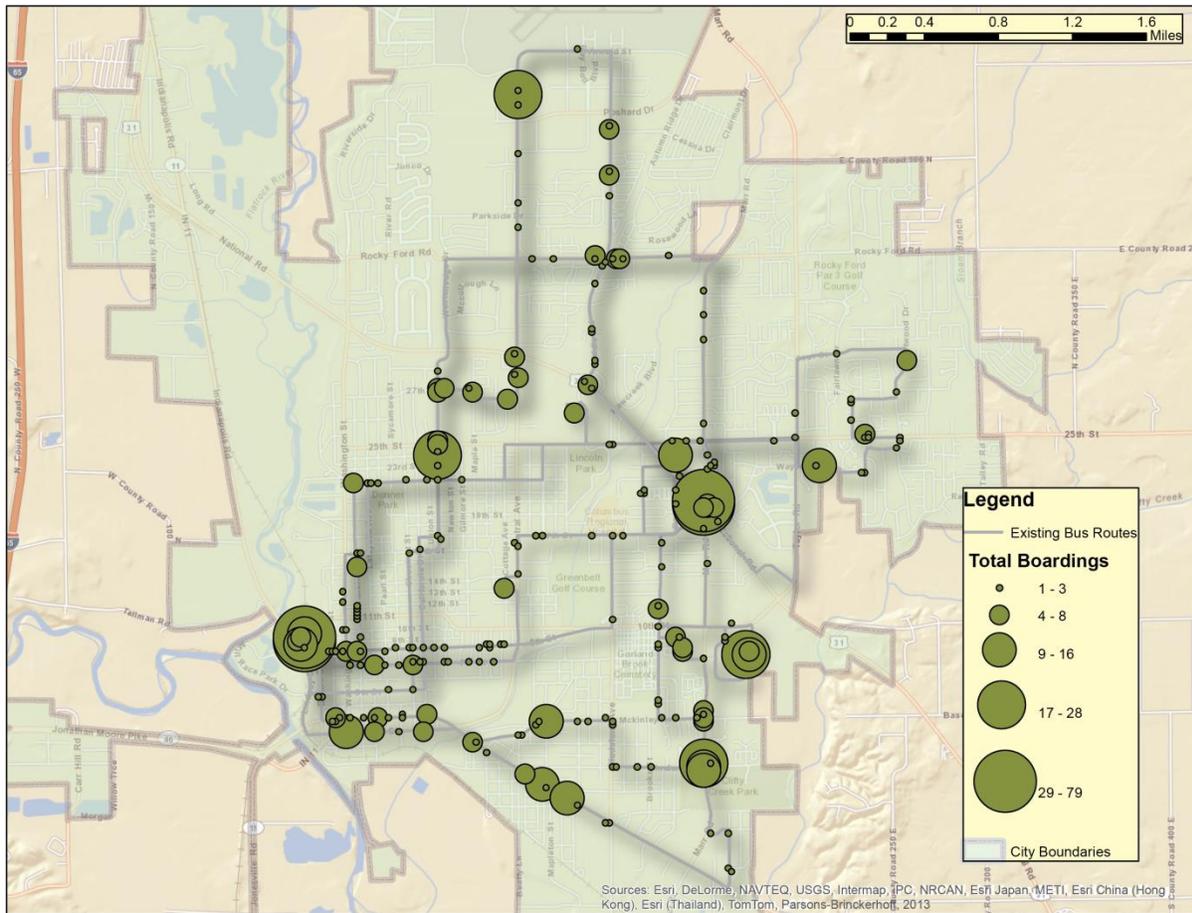


Figure 5: Typical Service Day in April 2013

The two strongest areas for boardings and alightings activity were the Mill Race Transit Center on the west side of the service area, and the informal transfer point at Target on US 31. Based on responses written into the on-board survey, an estimated 40% of riders depend on transfers as part of their larger trip. Other strong areas of ridership interest include the two high schools (Columbus North and Columbus East), the Walmart on the east side of town, and IUPUC/Ivy Tech at the north end of the service area.

Overall, during the typical April service day a total of 647 boardings were recorded. Some of these are duplicates, as a single person boarding two buses for a single trip (as would be the case with a transfer) would be counted as two boardings. If it is assumed that all of the (combined) 185 boardings at the two transfer points are indeed transfers (a conservative assumption), it can be concluded that daily ridership is at least 462 (linked) person-trips, with a transfer rate of about 40%. This figure likely includes a sizable proportion of persons making multiple trips on the transit system; i.e., a morning journey to work is counted as one person-trip, while the return journey home in the afternoon constitutes a second trip. If it is assumed that all 462 person-trips involved an initial journey and return trip, then about 230 people, or about 0.5% of the City’s population, utilized the transit service during the recorded service day.

Hourly activity of the system is shown in Figure 6.

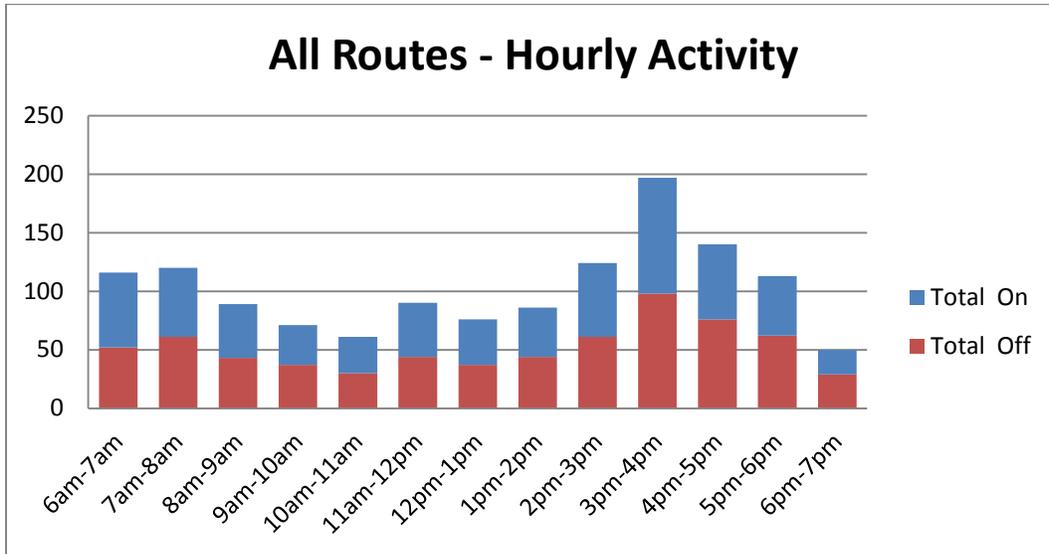


Figure 6: Boardings (ON) and Alightings (OFF) by Hour

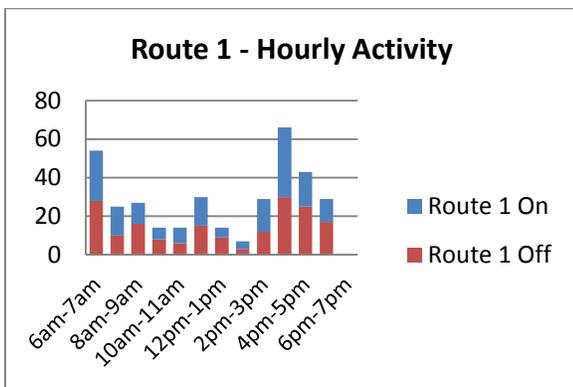


Figure 7: Route 1 Boardings and Alightings

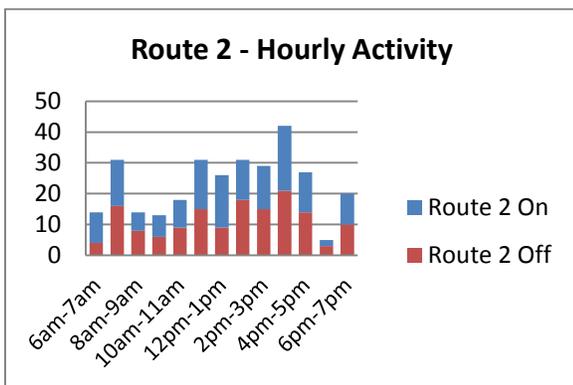


Figure 8: Route 2 Boardings and Alightings

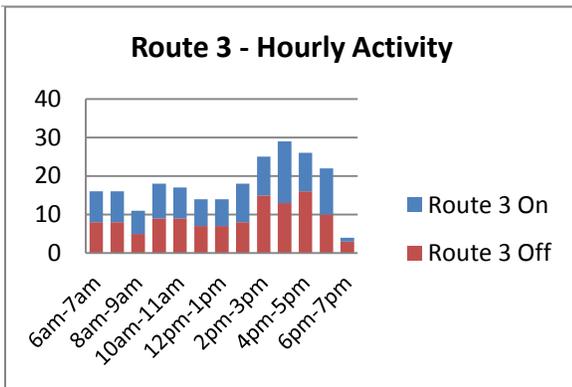


Figure 9: Route 3 Boardings and Alightings

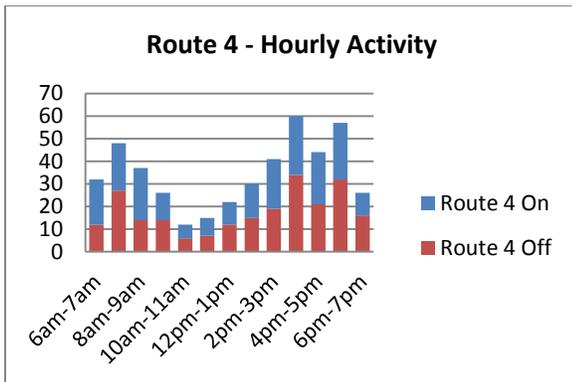


Figure 10: Route 4 Boardings and Alightings

There is strong activity in the morning and afternoon peak hours, with particularly strong activity in the 3-4pm block; this perhaps reflects the strong base of student ridership. It should be noted that the last service hour is truncated, with only the outbound half of typical service being provided, so activity during that period should not be interpreted too strongly; indeed, the strong contrast of the 6-7pm block with the period that immediately precedes it suggests that there is latent (unsatisfied) demand for transit service during that final hour, and perhaps even later.

The 52 hours of daily vehicle service produce 624 daily vehicle-miles. Assuming that the 647 boarding counts collected for the simulated service day are typical, productivity is about 12.4 boardings per vehicle hour, or 1.03 boardings per vehicle-mile. Using the derived 462 daily person-trips figure calculated above, productivity measures are 8.9 passenger trips per vehicle hour, or 0.75 passenger trips per vehicle mile.

The next two figures compare COLUMBUS’s productivity statistics to other Indiana transit systems of comparable size. The statistics come from the Federal Transit Administration’s National Transit Database (NTD) for 2011<sup>2</sup>, the most recent year for which data are available. Note that the NTD statistics for Columbus are comparable to those collected in the 2013 ridecheck.

<sup>2</sup> It should be noted that 2013 passenger count boardings indicate significantly higher productivity than the 2011 figures listed in the NTD, suggesting the productivity has seen a sharp upturn in the past two years.

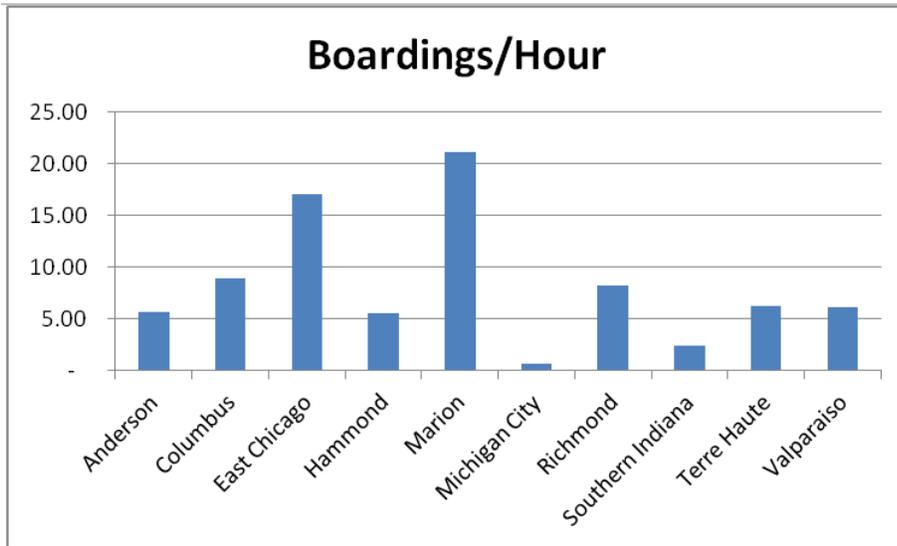


Figure 11: National Transit Database hourly productivity for Indiana transit systems

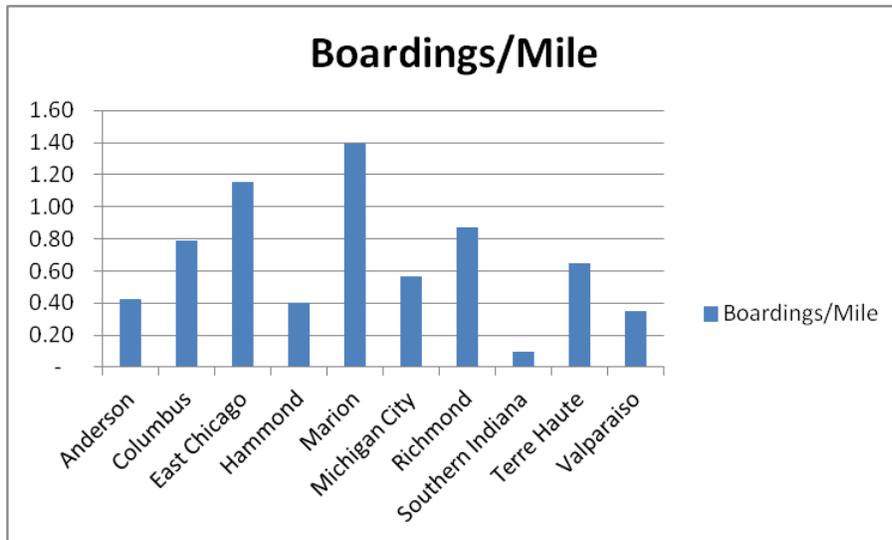


Figure 12: National Transit Database mileage productivity for Indiana transit systems

The productivity of ColumBUS Transit compares favorably to peer systems in Indiana; as previously noted, this comparison does not consider the productivity improvements that have occurred since then.

### Web Surveys

Another tool used for garnering public input was the development, application, and publicizing of web surveys. The advantages of this tool include the low cost and the ability to target particular groups, such as employees of a particular firm such as Cummins, in addition to the public at-large. A disadvantage is that such surveys are typically prone to self-selection bias; that is, no controls were administered to ensure that the responses are statistically representative of the group being queried, but a majority of all respondents were not current transit riders.

### Community Survey

A general public survey was conducted in April-May 2013 via a Survey Monkey link on the CAMPO website. Responses totaled 111. Response was strongest in the northside and northeast sections of

Columbus. Over 40% of respondents are 46-64 years of age. Nearly three-fourths indicated that they have two or more cars in their household. Just under 10% have no cars in their household.

The majority of respondents are not ColumBUS riders but about one-fourth indicated that they ride the bus at least occasionally. Nearly 11% of respondents are daily riders; 5% ride a few times a week while 9% ride a few times a month. Nearly 20% indicated that someone else in their household uses ColumBUS Transit, just over half of whom are children. Only a few respondents said they use the Call-a-Bus service. Nearly 60% said they did not use Call-A-Bus while over one third indicated that they do not know what Call-A-Bus is. Very few respondents (3%) said that another member of their household uses Call-a-Bus.

The survey results indicate that the primary reason most respondents do not ride ColumBUS Transit is because they own a car. Many respondents cited flexibility, no nearby bus stops, destinations unserved, lack of nighttime service, lack of route directness, and current service frequency as significant reasons for not riding transit.

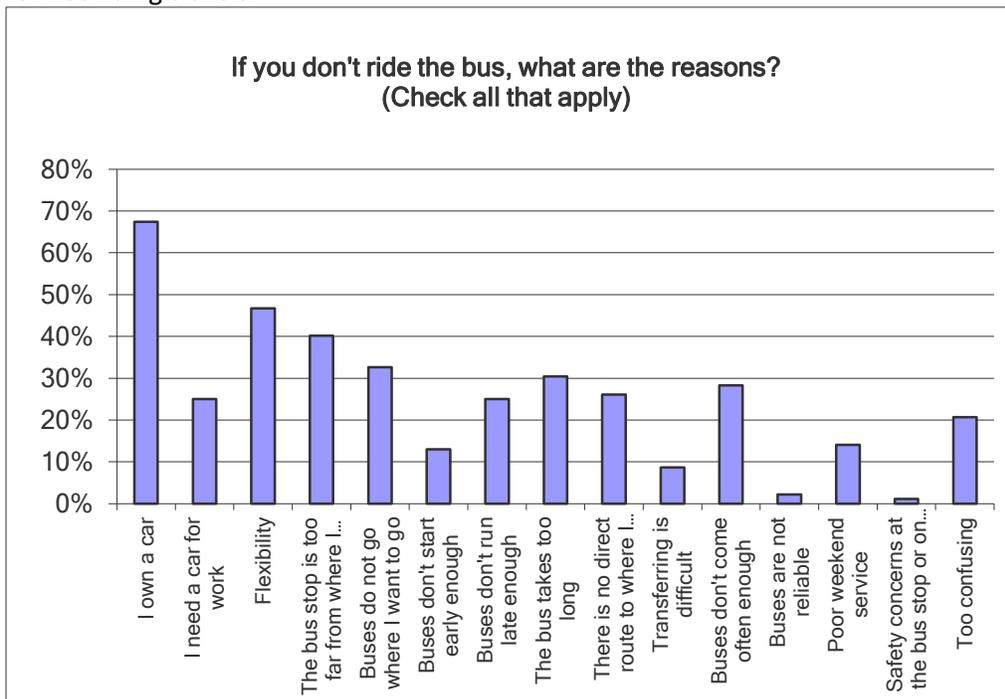


Figure 13: Survey Question Results

When asked what improvements to ColumBUS Transit are desired, half cited the need for service to the City's west side and the S.R. 46 commercial/residential corridor as the highest priority. Faster and more direct service to downtown and throughout the City, earlier morning and later night service, and more weekend service were cited by about 40%.

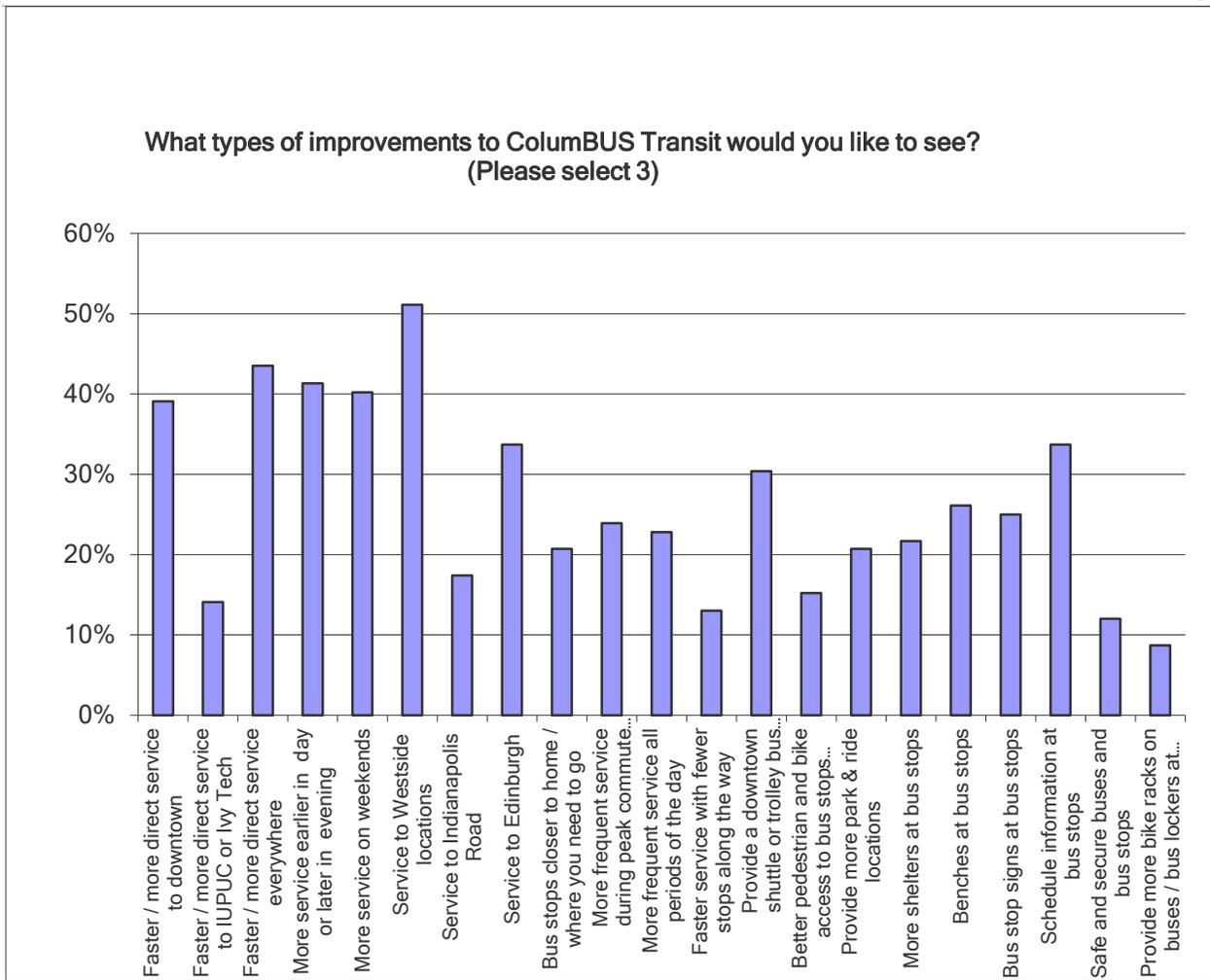


Figure 14: Survey Question Results

Of those who ride ColumBUS Transit, usage is fairly evenly distributed among the system’s four routes, although Route 4 is used by more riders than the other three. Most riders transfer from one bus to reach their destination. The mid-city transfer point at Target is used by more riders than the west side Mill Race Transit Center, 37% to 27% (respectively) among respondents who ride the bus. A few riders (7% of bus riding respondents) transfer elsewhere.

Walk distances to and from bus stops vary. About 30% of all respondents indicated that they live five or more minutes from a bus stop. Over one-fourth live very close (1-2 minutes) to a bus stop and just under one fourth live 2-5 minutes from a stop. Nearly 20% of all respondents indicated that they do not know how far the nearest bus stop is from their home.

Among those who ride the ColumBUS Transit, nearly 30% indicated that they occasionally take a bicycle to reach their bus stop. ColumBUS Transit buses are equipped with a bike rack mounted on the front of the bus.

Among all respondents, trip purposes on the bus vary considerably. Respondents were asked to note all of the types of reasons they use the bus. While about 70% do not ride the bus, 18% of respondents said they take the bus to run errands or go shopping, closely followed by 17% who take the bus to work. Other trip purposes were medical visits (9%), parks (8%) and school (7%).

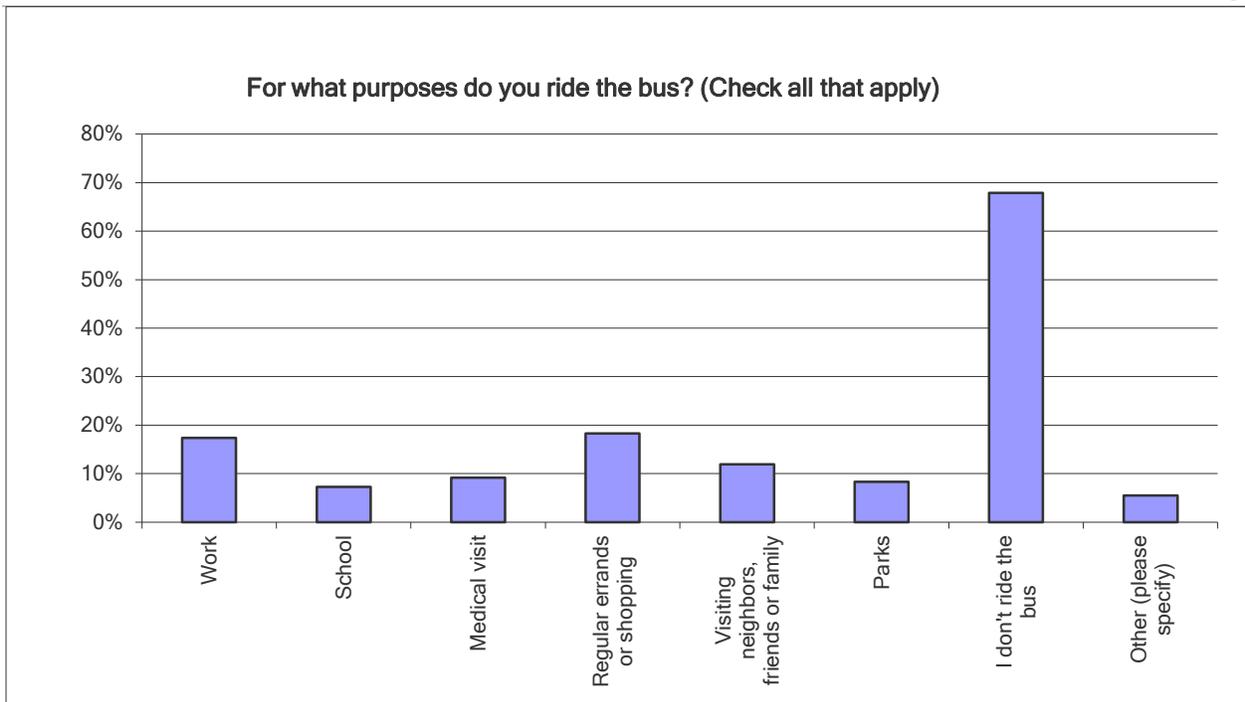


Figure 15: Survey Question Results

Of those who use ColumBUS Transit, respondents were asked to note all of the locations where they travel by bus. While nearly all (87%) identified downtown Columbus among their destinations, the following locations were also identified as significant transit destinations (20%-50%):

- Columbus Center shopping center/Target: 46%
- Fair Oaks Mall: 38%
- Creekview shopping center/Walmart/Kohls: 30%
- Donner Center and Park: 30%
- IUPUC: 27%
- Columbus Regional Hospital: 27%
- Clover Center shopping center/Marsh: 22%

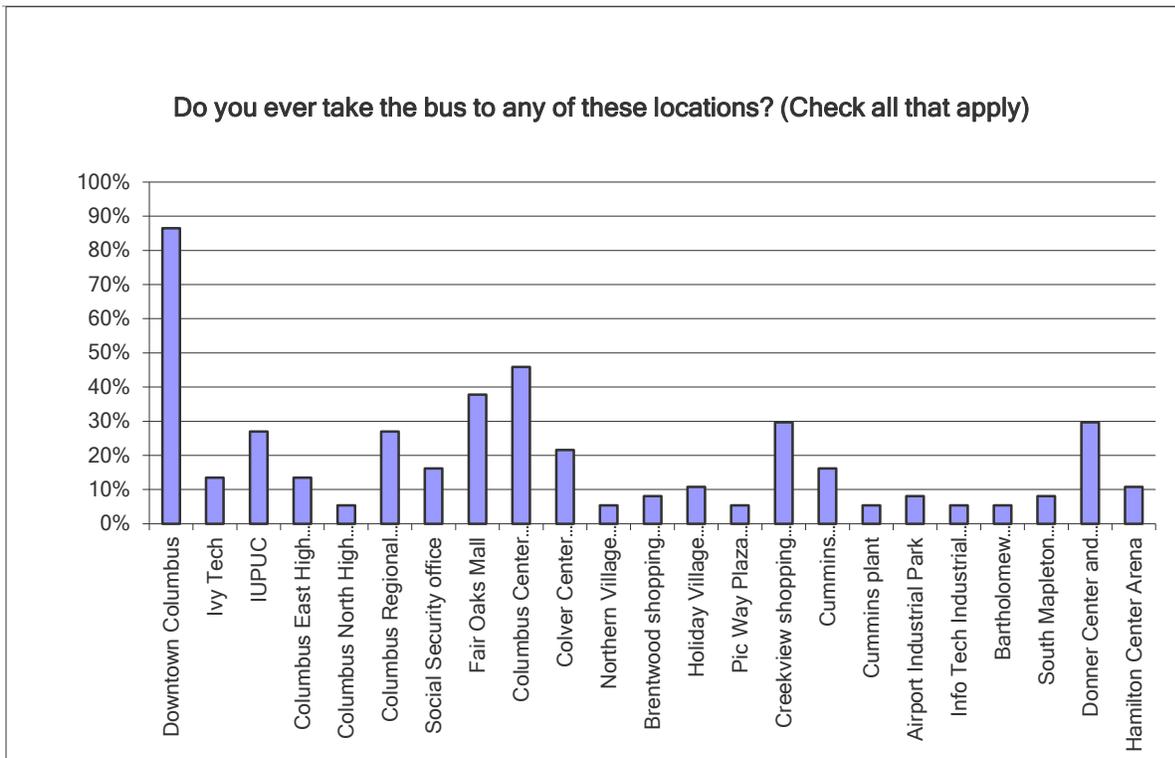


Figure 16: Survey Question Results

The Cummins headquarters building in downtown Columbus was cited by 16% as one of their destinations, along with 5% to a Cummins plant.

Respondents were asked their opinions of ColumBUS Transit and how they thought it could be improved. Most respondents view the transit service positively and value the service. Among all respondents, about 90% think that ColumBUS Transit is important to Columbus, its economy, and in creating a more livable city; they also feel that ColumBUS should provide all citizens—regardless of auto ownership- with a high quality mass transit option and feel it should be a more prominent part of the city’s transportation system. Nearly 80% said that fares should be kept as low as possible.

Nearly three-fourths of respondents said that they would use ColumBUS Transit if it were more convenient. However, only about one-third thinks that ColumBUS Transit does an effective job of serving the city. Of all respondents, 32% that ColumBUS Transit is doing an inadequate job in terms of existing bus routes, service frequency, and service hours. More than half of those expressing an opinion gave positive marks for system efficiency, bus stop facilities, accessibility, and accessibility along with the system map and webpage. Several respondents expressed no opinion on eight of the 11 categories.

**Employer-specific surveys**

A survey was conducted of employees of Cummins. Its format and questions were similar to the general public survey. Cummins agreed to host the survey and encouraged employees to fill out the questionnaire. ColumBUS Transit and the consultant team appreciated the support and cooperation of Cummins, which resulted in 1,213 completed surveys. Over half of respondents are engineers; nearly 70% are full-time (“exempt”) employees.

About one-third travel between Cummins facilities 1-4 times per week as part of their job. Nearly 10% travel between facilities every day while 9% never travel between facilities. The typical travel time between facilities is 6-15 minutes (65%). Just over 20% have a 16-30 minute inter-facility travel time. Most respondents (86%) drive alone to work. Carpooling accounts for 6% while only 2.5% said they take ColumBUS Transit to work. Of those at Cummins who take the bus to work, nearly half (47%) ride Route 4. The other half are evenly distributed among routes 1, 2, and 3.

As to why employees do not take ColumBUS Transit to work, over half cited that they own a car and that flexibility is a significant issue. Bus stops too far from where they live, lack of service to their desired destinations, and lack of direct routes to their destinations were cited by 25%-40% of respondents. Just over half said they are generally familiar with ColumBUS Transit but do not know much else about it; another fourth said they are not familiar at all with the transit system. Only 6% said that they are very familiar with ColumBUS Transit.

Just over 56% of respondents said that they would commute- if even occasionally—by bus if were improved. Direct service to where they work was cited by nearly half of the respondents. Other desired improvements include:

- Bus stops closer to home and work: 44%
- More frequent service: 36%
- Schedule information at bus stops: 34%
- Downtown shuttle or trolley bus service: 34%
- Earlier morning or later evening service: 30%

### Stakeholder Meetings

A series of stakeholder meetings was conducted in April 2013 to engage targeted members of the community on transit issues, identify unmet mobility needs, and discuss potential solutions.

Many comments and suggestions involved the perceived need to extend service into the later evening and nighttime hours on weekdays. Extending hours to 9 pm or 10 pm would help attract more ridership and better served lower income people access jobs. Sunday service and more frequent service were also noted but less frequently. It was noted that there are substantial Hispanic and international (primarily Indian) communities in Columbus that do not have cars, or do not drive, or have special needs.

The need to extend ColumBUS service to areas currently unserved by transit was noted by many stakeholders. The SR 46 corridor was cited most often. Other areas included the fringes of Columbus (particularly mobile home parks), Edinburg, Woodside Industrial Park, social service agencies located in rural communities, and Indianapolis.

The comments and suggestions offered at the stakeholder meetings are summarized as follows:

#### City of Columbus Staff

Attendees represented the City's planning, operations, engineering, parks and recreation and public works offices. Comments and suggestions included:

- Mill Race Transit Center is too separated from downtown.
- Is transit where it needs to be in the community?
- Transit is seen more as a social service than as a mode of choice.

- Service is needed to the west side. Many Cummins employees live on the west side and take taxis to work.
- Later night service should be considered. Because service ends after the pm peak, people can't rely on using the bus because of their schedules.
- Fares have been too low for too long.
- Need to get the word out that buses are clean and safe.
- It may be possible to move equipment out of the City garage so that buses can be stored inside.
- Transit apps and Wi-Fi should be considered.
- The City is considering an emergency signal priority system.

### Columbus Chamber of Commerce

Most attendees primarily represented employment and social service. Comments and suggestions included:

- There is a desire for countywide service, but understanding that this is unlikely to be realized in the near future.
- Many major employers do not consider transit as an option.
- It is a challenge to place people with jobs because later hours are needed but transit does not operate at night. Not everyone works an 8-5 job.
- Longer hours of service are preferred over more frequent service.
- Need better knowledge of where stops are.
- Entry level jobs tend to be 2<sup>nd</sup> and 3<sup>rd</sup> shifts.
- There are many low wage jobs such as stocking, housekeeping, and janitorial that would benefit from improved transportation.
- Many lower income families are coming from the east side.
- There is a significant Hispanic population that resides in trailer parks.
- Fares could possibly be raised to \$0.75 or \$1.00 if it could help fund additional service.
- Job centers where there is a need for transportation include:
  - Serving S.R. 46 is important because of the jobs located there.
  - Factories in Walesboro; Walesboro/Woodside is the number one area in terms of job placement.
  - Edinburgh outlet mall.
  - Toyota.

### Columbus Social Service Agencies

Comments and suggestions included:

- Independent Living serves the entire county.
- Human Services is located on Clifford; there is no transit or bike access. Employers in Walesboro tend to pay "sort of a living wage;" many clients end up riding their bicycles there.
- Hope is another community in need of service.
- Transients are a big issue.
- Call-a-Bus is a very valuable service but there are limitations on who qualifies.
- Some new Cummins employees ride the bus.
- There was a request for free fares.
- There is a significant elderly population at The Villas, on Taylorsville Road beyond Walmart.

United Way

This meeting was organized to listen to and address the needs of Columbus' Hispanic/Latino community. Comments and suggestions included:

- There is a very significant and established Hispanic community in Columbus.
- Spanish-language information on transit would be very helpful.
- Transit information could be disseminated at churches and Mexican-owned convenience stores.
- System seems confusing.
- Many citizens are highly dependent on ColumBUS Transit.
- Later night hours of service, to 9 or 10 pm, would be very helpful, especially for workers and people looking for jobs.
- Sunday service is desired.
- It would be helpful if service is extended to the following areas:
  - Service is needed on SR 11 south of town.
  - Service is needed to SR 46 west of town.
  - Woodside Industrial Park.
  - Indianapolis for medical-related trips.
  - Greenwood (possibly just once a week).
  - Taylorsville.
  - Garden City.
  - Clifty Creek.
  - Trailer parks.

Cummins

Two representatives of Cummins' Corporate Facilities department attended the meeting. Points of discussion included:

- Plant shifts are 7 am-3 pm, 3 pm-11 pm, 11 pm-7 am (if the plant has a 3<sup>rd</sup> shift).
- There is a lot of traffic coming into the office area at 9 am. People who use ColumBUS Transit tend to arrive between 9 am and 9:30 am.
- Janitorial work hours are a mix of overnight and daytime shifts.
- Cummins previously operates a shuttle service between its facilities.
- Cummins works with Commuter Connect for vanpools. There are currently nine vans from the Indianapolis area (funding is derived through the non-attainment air quality status of the Indianapolis area).
- It is anticipated that the garage at The Commons will reach capacity in 2015.
- It can be a 20 minute walk from the parking lot to the Tech Center.
- Ideas for a potential Cummins shuttle:
  - A plant-to-plant shuttle might work; arrival times would need to be at least 5 minutes before start times.
  - A 30-minute loop is envisioned.
  - Non-cash payment options.

Columbus Regional Hospital

Comments and suggestions included:

- The hospital is the 2<sup>nd</sup> largest in Columbus, with 1,700 employees.
- Two thirds of employees are first shift workers.
- The most likely employees to need transit are:
  - Housekeeping (7 am-4 pm and 4pm-11 pm shifts).
  - Food service (many start at 5 am).
- More staff would use transit if it can get there on time.
- Most who would need transit would be lower income persons.
- Many people who live in rural parts of the county have to move in order to access services.
- However, there are federally Medicaid-qualified health clinics in Hope and Edinburgh-areas not served by ColumBUS Transit.

ColumBUS Transit Advisory Committee (TAC)

The TAC meets monthly; consultant staff attended several meetings during the course of the study between April and September 2013. Discussion points included:

- There are many international residents, especially from India, who work for Cummins and live in apartments on the city’s southeastern and southwestern areas. Many women and families living in these areas do not drive.
- Potentially emphasize “transit corridors.”
- Potentially use fewer bus stops.
- Woodside Industrial Park might be served during peak periods only; however, there are different shifts at the industries which may make this area difficult to serve.
- Some industries do not get to the root problem of turnover.
- Employees probably have a lot of transportation issues that may not be recognized by employers.
- It will be a “rough sell” to get employers to leverage dollars for public transportation.
- The “bike and rack” program should be better coordinated.

ColumBUS Drivers and Staff

Meetings were held at the Mill Race Transit Center at the outset and during the mid-point of the study. Several comments and ideas were generated, including:

- Overall operations and ridership performance:
- At the first of the month the system “gets slammed,” and also at the end of the month, possibly due to receipt of paychecks and federal program disbursements to households.
- Route 1:
  - The Route 1 schedule is tight in the afternoon.
  - There are some workers riding the route in the early morning; ridership has picked up recently, in part to Cessna and the mobile home parks.
  - There is a visibility problem at Washington and 12<sup>th</sup> (Coca Cola).
- Route 2:
  - It is the least favorite route to drive.
  - Would be nice to have a stop at Aldi.
- Route 3:
  - Outbound schedule is tight.

- Route 4:
  - Many Cummins employees of foreign descent (and without cars) ride.
  - It seems to take “all day” to get to Walmart.
- Potential new service areas/times:
  - Areas west and east of Route 1.
  - Edinburgh.
  - Connections to Johnson County Access.
  - There are some requests for night and Sunday service.

**Passenger Survey**

Because of resource limitations, origins and destinations of travelers were not recorded, so average transit trip length is not available. However, a short survey distributed to passengers allows for some conclusions. The survey form is included in Appendix A of this report and was designed with the response environment in mind (i.e., respondents were writing down responses in a moving vehicle). A total of 250 responses were collected, which represents 19.3% of boardings and 55.4% of (estimated, using the methodology above) unduplicated travelers; these are excellent response rates for a survey of this type.

The age distribution of survey respondents is listed in Figure 9.

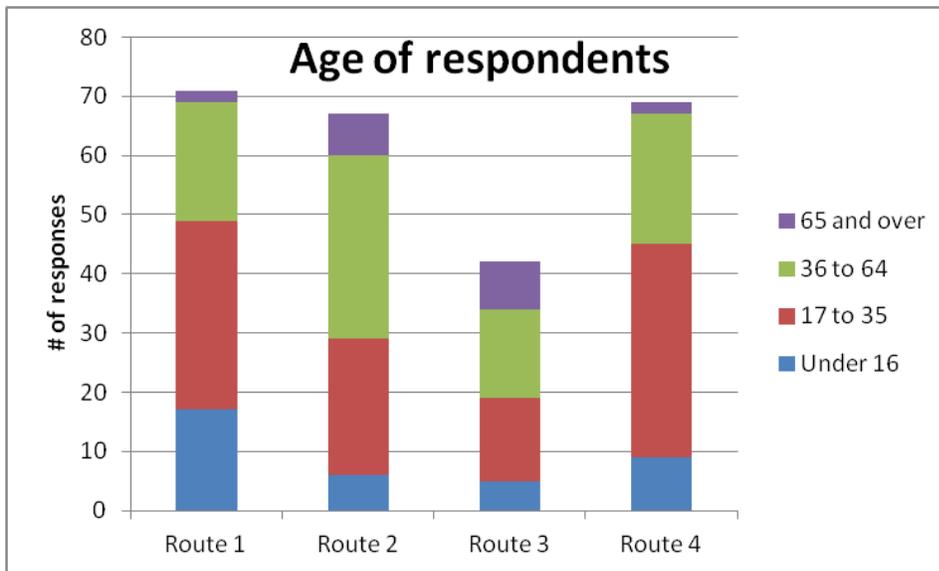


Figure 17: Age of Passenger Survey Respondents

Respondents were asked the trip purposes for which they used the ColumBUS system. General responses are listed in Figure 10.

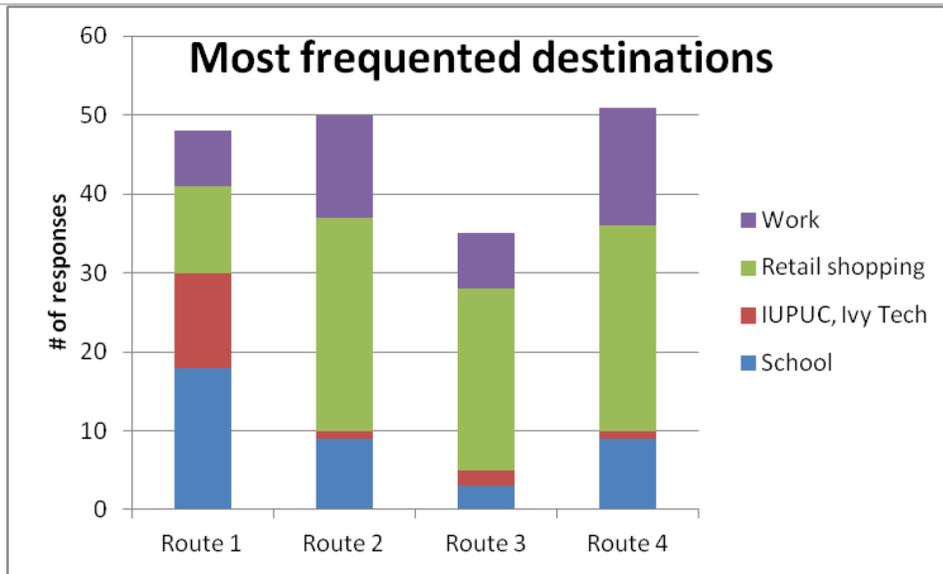


Figure 18: Reported Trip Purposes of Passenger Survey Responses

Respondents were also asked to list the types of service improvements they would like to see, given their trip purposes. General responses are listed in Figure 11.

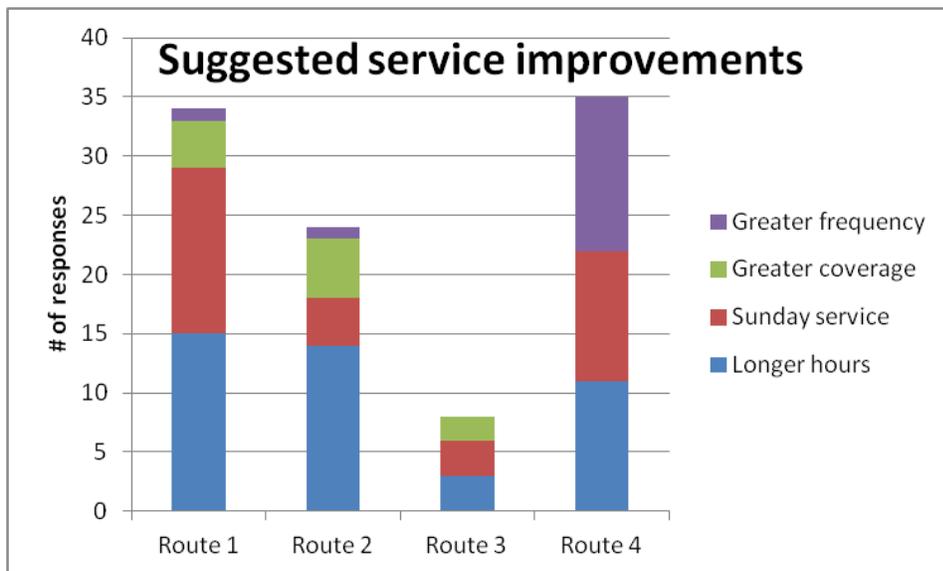


Figure 19: Service Recommendations of Passenger Survey Respondents

Respondents were also asked to identify areas not currently served by ColumBUS where they would like to see fixed route service extended. General responses are shown in Figure 12:

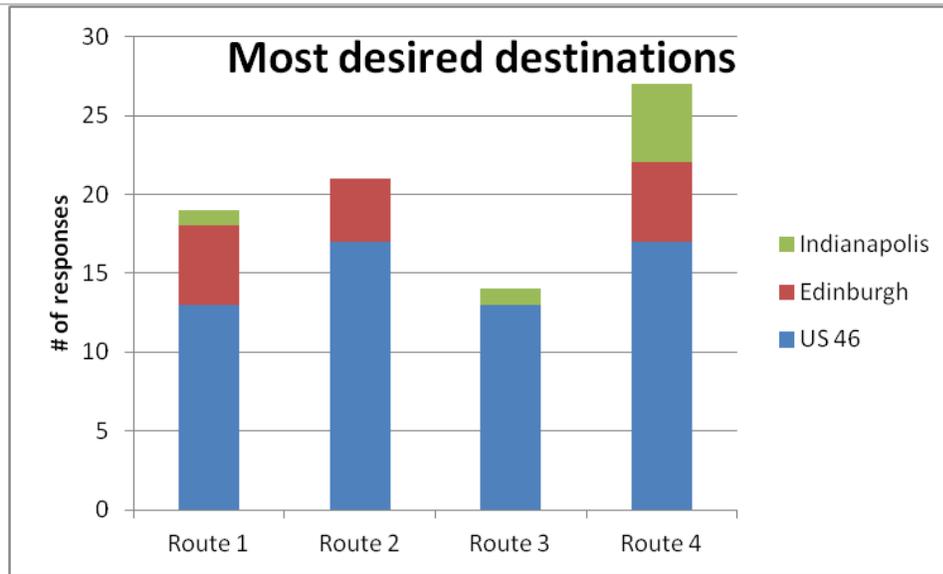


Figure 20: Recommended New Destinations by route

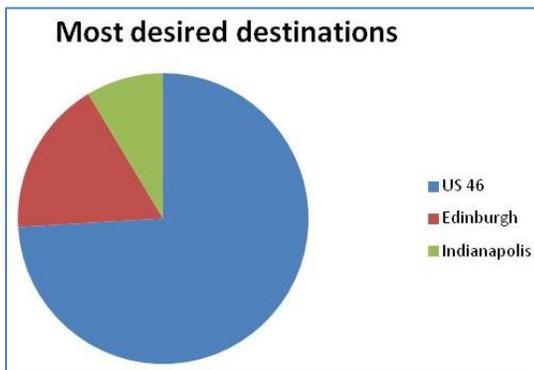


Figure 21: Recommended New Destinations (all respondents)

### Public Meeting

A public meeting was held on Wednesday, April 10, 2013 from 4 pm to 7 pm in the atrium of The Commons in downtown Columbus. The meeting was held at the request of CAMPO to solicit opinions and ideas from the general public. Approximately 30 people attended. The open house format consisted of a series of exhibits at which attendees to learn about the ColumBUS system and provide ideas for service improvements.

Table 1 lists the comments, which are collated by general category. The largest number of comments and suggestions involved service to areas that are currently not served by ColumBUS Transit; within that category, service to the city’s west side, specifically the SR 46 commercial corridor and adjacent residential complexes was the most noted potential service area. Some attendees noted that Columbus has a significant Hispanic and international community with special mobility needs and challenges due to limited service coverage and hours. There were also a few comments suggesting expansion of the service period further into the late evening hours.

CATEGORY	NO. OF COMMENTS	COMMENT/REQUEST	NO. OF COMMENTS
New service destinations	29	SR 46/West Side	11
		Indianapolis	4
		Marr Road	3
		Woodside Industrial Park area	2
		SR 11/South Side	1
		Fairgrounds	1
		Edinburgh	1
		Bloomington	1
		Louisville	1
		Fringe areas/trailer parks	1
		DMV	1
		Walesboro	1
		Clifty Drive	1
		Hope	1
Poshard/Kelly (Medicaid)	1		
Service Design	9	Better Frequency	3
		Later Hours	3
		System Too Complicated	1
		Focus on State Street Corridor	1
		Park & Ride on SR 46	1
Pedestrian & Bicycle Access	6	Promote "Ride to work, Bike to Home"	
		Edinburgh can be serve by bike	1
		Create transit-safe bike boulevards on Home & Western edge	1
		Bike lanes are needed for safety; paint bike lanes lime green	1
		Pedestrian crossings will be needed on SR 46	1
Sidewalk need on Poshard to connect bus route with Medicaid office	1		
Passenger Amenities & Comfort	5	Need more shelters	1
		Shelter at State & Center	1
		Shelters at Indiana Ave.	1
		Shelter at Columbus East H.S.	1
		Shelters at Mill Race transit station are too open; seats get wet; add north-facing panels to protect passengers from rain	1
Information, Marketing & Technology	4	Smart phone transit apps	1
		Need to know where buses are	1
		Implement "Try Transit" program	
		Implement "Poetry in Motion" program	1
Operations	3	Buses seem to be idling too much	1
		Drivers are great	1
		Buses are in good shape	1
Fares	2	Inexpensive	1
		Too low	1
Other	2	Free parking discourages transit use; charge for parking	1
		Campus area should be mixed use to accommodate transit	1

Table 1: Survey Comments

## Analysis and Conclusions

Based on the data, information and input received over the course of the study, conclusions are derived and organized based on the identification of **Strengths**, **Limitations**, **Challenges** and **Opportunities**.

### Strengths:

- ColumBUS Transit enjoys relatively good ridership levels for a city and system of its size. Ridership varies by route and time of day but is fairly consistent. The small buses used by ColumBUS Transit are appropriately-sized and minimize public perceptions of “empty buses.
- Geographic coverage is good. Although some fringe areas are beyond ¼ mile walking distance of a bus stop, most contiguously developed areas are served. The major exception is the S.R. 46 corridor on the west side.
- The 60-minute schedule is consistent and easy to remember.
- All routes “pulse” at the same time at the Mill Race Transit Center and Target, allowing for potential transit connections for residents and workers throughout the service area.
- Most Section 8 and public housing clusters are well-served by transit and generate riders.
- Most employment areas within the City of Columbus are served including Columbus Regional Hospital and the Cummins facilities.
- There is a high rate customer satisfaction with and appreciation of the service and its employees.
- There is a strong customer orientation among ColumBUS transit management and employees.
- Management employs a continuous improvement ideology.
- The fleet is clean and well-maintained.
- The Mill Race Transit Center is a high quality, well-maintained and utilized operating facility.
- The second system transfer point, at Target, provides additional opportunities for riders to access different parts of the community. It also provides front door service to Target and other stores within the shopping center.
- Nearly all major shopping centers are served.
- Both city high schools and both institutions of higher learning (Ivy Tech, IUPUC) are served.
- There is an FTA 5307 reserve available if approval of additional service and capital improvements is authorized.
- ColumBUS Transit has good relationships with other City departments, agencies, community organizations.
- ColumBUS Transit is responsive to its customers and request for service changes and improvements within its service and financial constraints.

### Limitations:

- The city’s growing west side (SR 46, Indianapolis Road), which includes a number of regionally important employment and retail sites as well as a significant transit-dependent population, is currently unserved.
- Limited service hours provide a barrier to transit use, especially for persons working during evening hours, trying to access jobs, and persons occasionally working late.
- Although it is designed to serve as the central transfer hub of the system, the Mill Race Transit Center is situated on the far western edge of the service area, resulting in lengthy and out-of-direction travel for many riders.
- The Mill Race Transit Center is relatively inaccessible for pedestrian and is considerably removed from downtown Columbus.
- The system design is largely based on a series on one-way loops that provide good geographic coverage but can require lengthy and inconvenient travel to complete a round trip.

- There is no sinking fund for capital replacement
- The system has heavy route utilization of lower functional-class streets, which tend to offer lower travel speeds for buses.
- Few bus stops are identified by signs
- There are few shelters or other amenities to provide for passenger comfort or safety.
- Routes are relatively circuitous and have low frequency with 1-hour headways.
- Has only five fixed-route buses, of which four can be deployed, and limited resources for expansion.
- The Target location is a non-binding, friendly agreement with Target to allow the second transfer point.
- English-only informational materials (map, timetables, web site) limit the ability of non-English language residents, particularly members of the foreign-born communities, to understand and use the system.

### Challenges:

- As with most U.S. cities, the urban form of Columbus is uneven, with low density residential areas, sprawling shopping centers and employment sites set back from the street and separated by wide expanses of parking.
- Growing areas lack pedestrian and bicycle access (and by extension, transit access).
- Major job sites located on I-65 South corridor, including the Woodside Industrial Park, are difficult to serve. They are located several miles south of the current transit service area, spread out, set back from streets, and lack pedestrian amenities
- There is no locally-dedicated funding for transit: ColumBUS is funded through an annual general fund appropriation from City Council which can vary depending on the economy and present attitudes toward transit.
- More convenient bidirectional service can be provided but it may come at the expense of some geographic coverage.
- The State of Indiana restricts transit amenities on its jurisdictional roadways.
- There remains a perception of “empty buses” among some stakeholders and public officials.
- There is tenuous reliability of the important second transfer point at Target. ColumBUS has no control or agreement that secures the use of this location.
- Matching transient/limited English proficiency (LEP) households with employment opportunities is an oft-cited need of many stakeholders.
- There is significant demand for (higher per-trip cost) Call-a-Bus service which not only served elderly and disable persons but is used to fill gaps where fixed route service does not exist.

### Opportunities:

- There is a significant amount of interest in the need for effective transit service in Columbus.
- The potential exists to attract some current Call-a-Bus riders to less expensive fixed route service.
- Bidirectional service would provide more convenient service with shorter travel times.
- There is significant demand for service to SR 46. This corridor is growing in terms of employment and residences, including a significant population of lower income and transit dependent households.
- Columbus has numerous multi-family housing complexes with the population density to generate transit trips throughout the day
- There is significant demand for expanded service hours.

- Cummins has indicated a need and desire for better connections between its facilities, including possible transit connections.
- The opportunity exists for a more centrally-located transfer hub while retaining the operational base and transfer capabilities of the Mill Race Transit Center.
- There are clusters of similar industries along US 31, SR 46, I-65, and State Street.
- Columbus has a very healthy downtown, especially in terms of employment (with Cummins as its anchor), community attractions, and retail/dining. There are numerous downtown parcels that can accommodate new development.
- Downtown is experiencing an increase in residential development.
- With the exception of Fair Oaks Mall, there is little retail strip center abandonment or vacancies that are prevalent in many other urban areas.
- Overall, Columbus enjoys a stable employment base.
- The fare is very low and could potentially be increased with a limited negative impact on existing riders.

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### 3. System Alternatives

Designing a transit route system is not a linear process; in order to explore the interplay between transit system elements, several alternatives were developed. Performance metrics (defined in further detail below) were developed for each of the alternatives to allow for quantifiable comparisons. Variables that were altered include the following:

- *Location of the transit center.* While the existing Mill Race Transit Center is comfortable for passengers and ColumBUS staff, its location is inconvenient, owing to the non-central location of the Downtown, and the center's awkward placement relative to the Downtown. The advantages in covering the existing transit coverage area with a new, centrally-located transit center were explored. No formal site selection study for such a site has been conducted; for the purpose of this analysis, a location proximate to the intersection of Central Avenue and 13<sup>th</sup> Street was designated as the alternate transit center site. It should be noted that the informal hub at the Target location is subject to its ongoing consent, which is not necessarily assured.
- *Number of routes.* An external constraint of the transit system is that funding is relatively fixed, so the capital and operating cost characteristics of alternatives cannot be significantly deviated from those of the existing system. Adding multiple routes is impossible under this constraint; adding a single route (to arrive at a total of five routes) is difficult, but is justified through potential savings from the Call-a-Bus program and the diversion of Surface Transportation Funds and other highway sources for transit vehicle purchases.
- *Routing.* Generally, the alternatives tried to maximize the amount of two-way mileage while still maintaining geographic coverage, a balance that was significantly easier with the five-route alternatives. Extending service along SR 46 was seen as a priority, and could eventually produce savings in the Call-a-Bus program that frequently services this area. SR 46 service would be fixed route like the other routes, but would also allow for limited deviations designated by passengers, since walk connections in the commercial areas here are not well-developed, and uses are set back significantly from the highway. Routing varied in its accessibility to various activity centers; the "performance measures" section below will deal with this issue in more detail.
- *Headways.* All things equal, shorter headways (times between departing vehicles) are advantageous for the system's customers. However, since all vehicles are currently utilized throughout the transit day, and since there is not the budgetary freedom to significantly expand (i.e., double) the number of vehicles and operators, the system headway acts as an upper limit on route travel time. Accordingly, without increasing the number of buses, shrinking the system headway from its current time of 60 minutes to 30 minutes will reduce system coverage (because each of the vehicles will be limited to 30 minutes of route travel time).

#### Existing four-route system (Mill Race Transit Center, 60 minute headways)

The current system configuration, with its 60-minute headways and the hub at Mill Race, serves as the basis for comparison of the other alternatives. Figure 1 (above) shows the existing routes

The five alternatives are listed as follows:

**Alternative #1: Modified four-route system (Mill Race Transit Center, 60 minute headways)**

This alternative was developed to accommodate new geographic markets along SR 46 and to increase two-way routing without budgetary impacts. Deviated fixed-route service is proposed along SR 46; existing routes 1 and 2 have much of their initial mileage combined into a single route. While some loops are still evident, there is a general increase in the amount of the system that is bi-directional. The secondary hub at US 31 is maintained, assuming that this arrangement continues to be acceptable to the Target store.

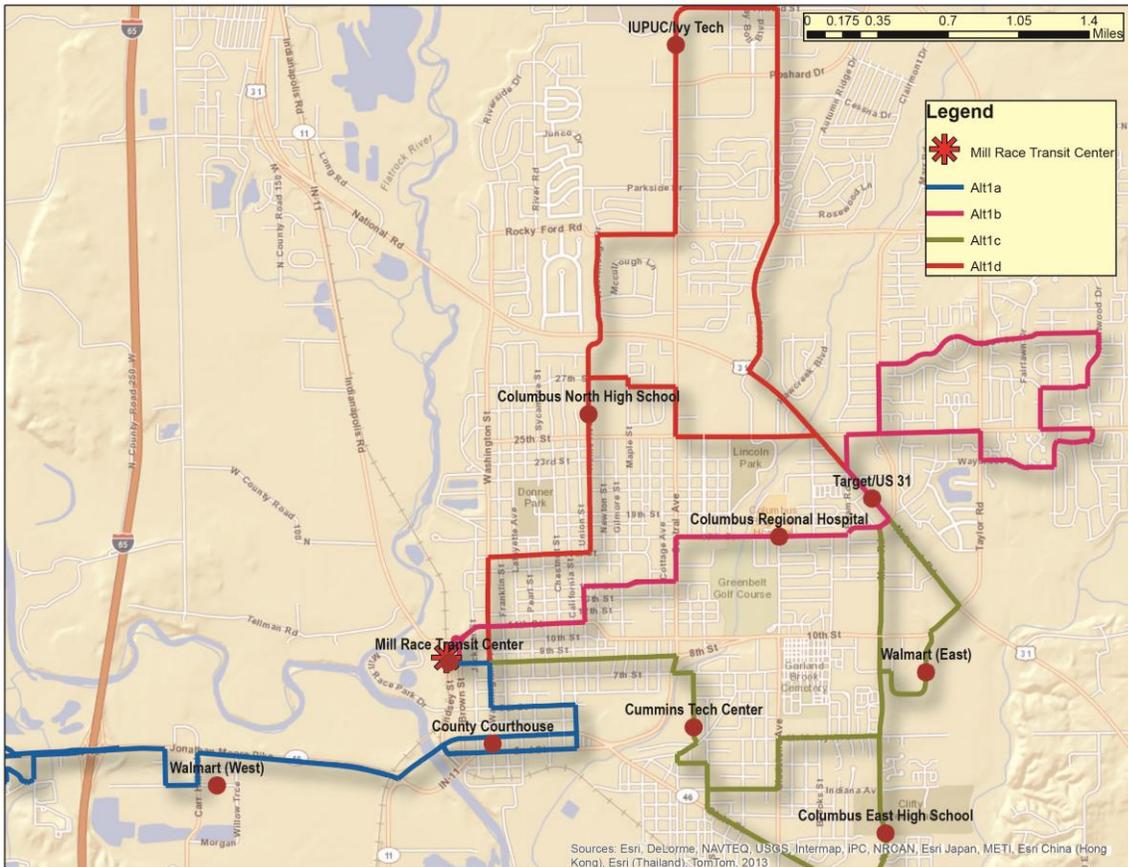


Figure 22: Alternative #1

- It would be good to bullet the whys and wherefores on all of these. To some extent, doing a SLCO on each of the alternatives. Examples:
- Creates the west route without additional buses
- Central city served mostly by 3 routes where north route takes over much of route 1 and 2
- Define Deviated Fixed-route.
- It would be good to have a mileage chart for each alternative so we can compare each to the original. In fact, you might want it to have the original always on the chart.

**Alternative #2: Five-route system (Mill Race Transit Center, 60 minute headways)**

This alternative closely resembles Alternative #1, with the addition of a fifth route that partially compensates for the loss of Route 1 and connects to areas in the northwest of the City. Loops are smaller than in Alternative #1. As before, the secondary hub at US 31 is maintained, assuming that this arrangement continues to be acceptable to the Target store.

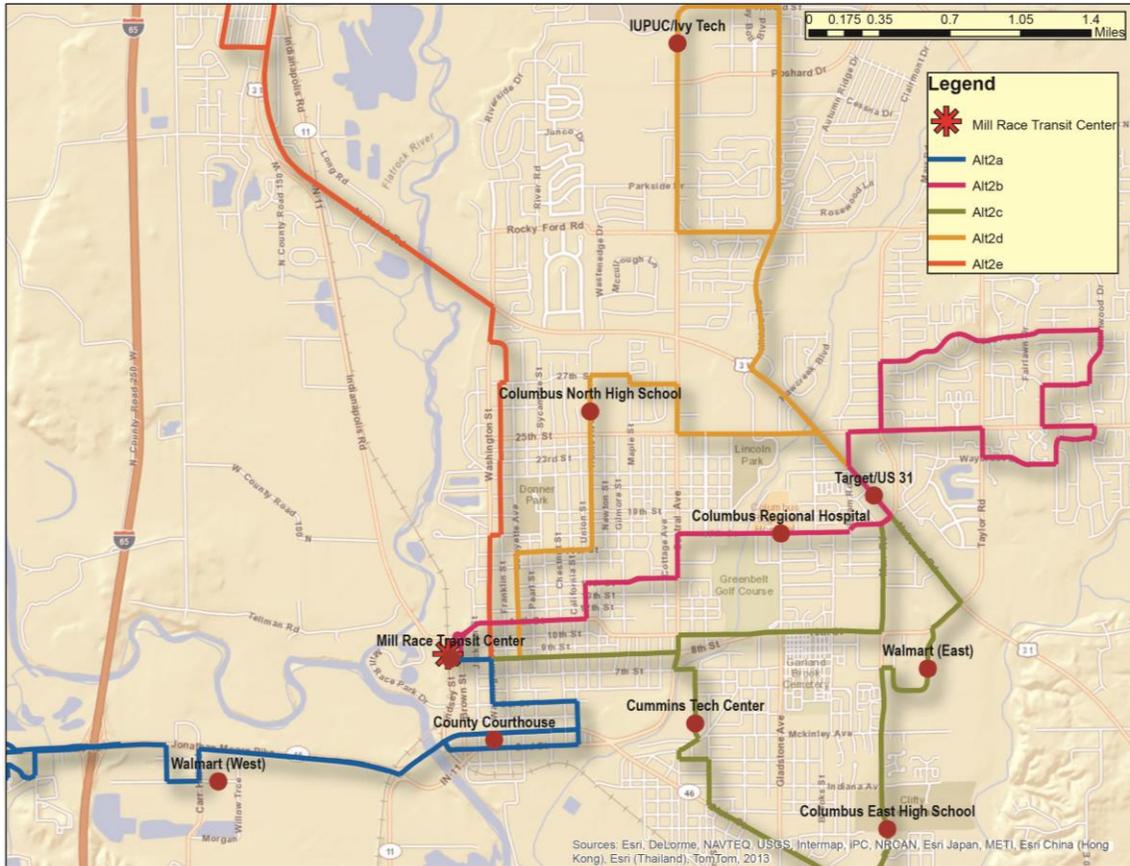


Figure 23: Alternative #2

**Alternative #3: Four-route system (New Central Hub, 60 minute headways)**

This alternative also closely resembles Alternative 1. The development of a centrally-located a more central hub location provides more opportunities for establishing two-way service in the core area, but at the expense of having only one route (the proposed new SR 46 deviated fixed-route service) intersect Downtown Columbus, and less service being provided to the neighborhoods north of Downtown to Columbus North High School. As noted, the Target hub is more central to the core of the City, although it is privately owned, however. A location under public ownership that is publicly owned would provide more stability. Locations along 17<sup>th</sup> Street (east of Central to Target), or along Central (between 13<sup>th</sup> and 25<sup>th</sup>) were considered viable options but thought to be the best options for this more-central hub. For illustrative purposes, this map shows the hub purposes, these are shown on 13<sup>th</sup> Street, just off Central.

Loops are even smaller than in the prior two alternatives. The US 31 Target store is maintained as a potential transfer point for two of the routes, but its importance is diminished with the relocation of the transit center to a central location.

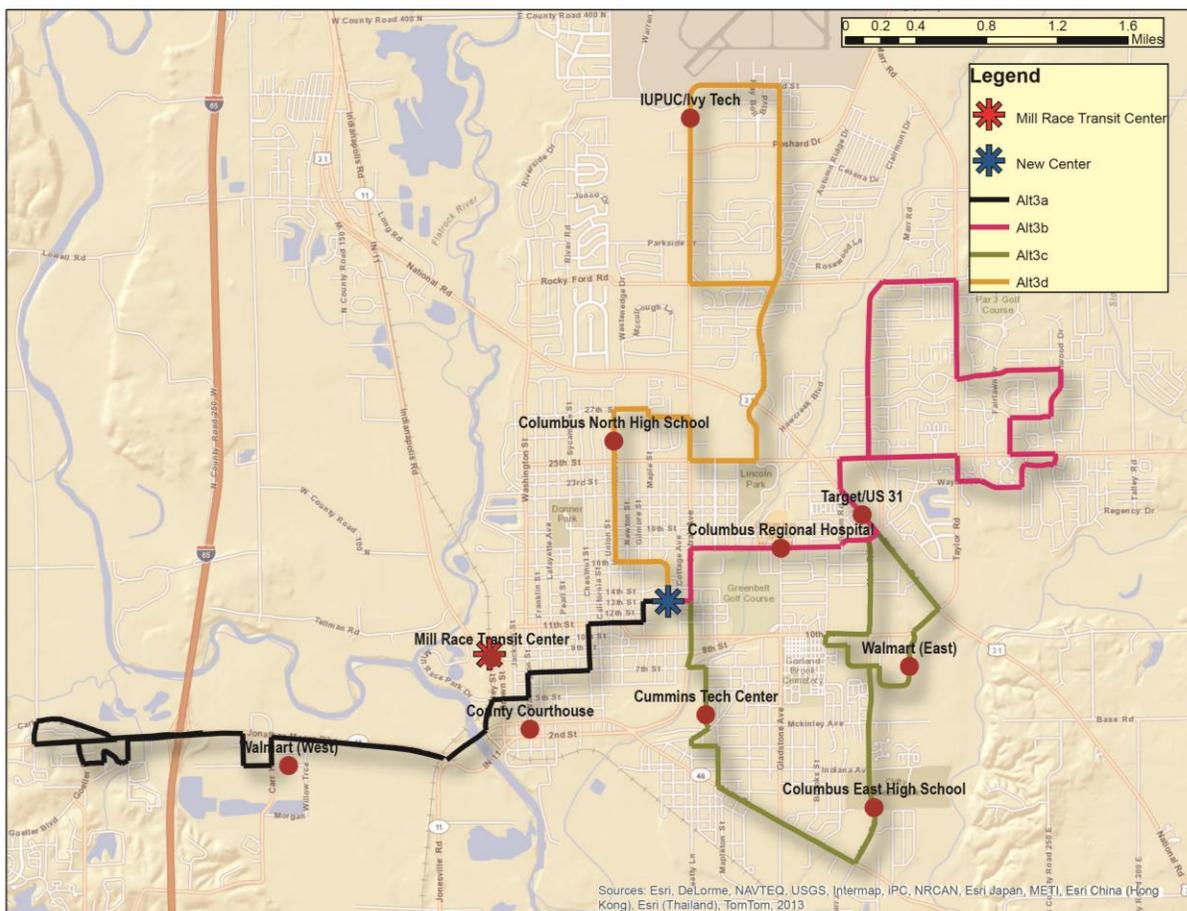


Figure 24: Alternative #3

**Alternative #4: Five-route system (New Central Hub, 60 minute headways)**

Alternative 4 includes the network shown in Alternative 3 but adds a fifth route, designed to retain coverage in the northwestern area of Columbus and add new coverage along the US32/National Road corridor to serve employment sites and newer residential subdivisions and apartment complexes. The US 31 Target store is maintained as a potential transfer point for two of the routes, but its importance is diminished with the relocation of the transit center to a central location.

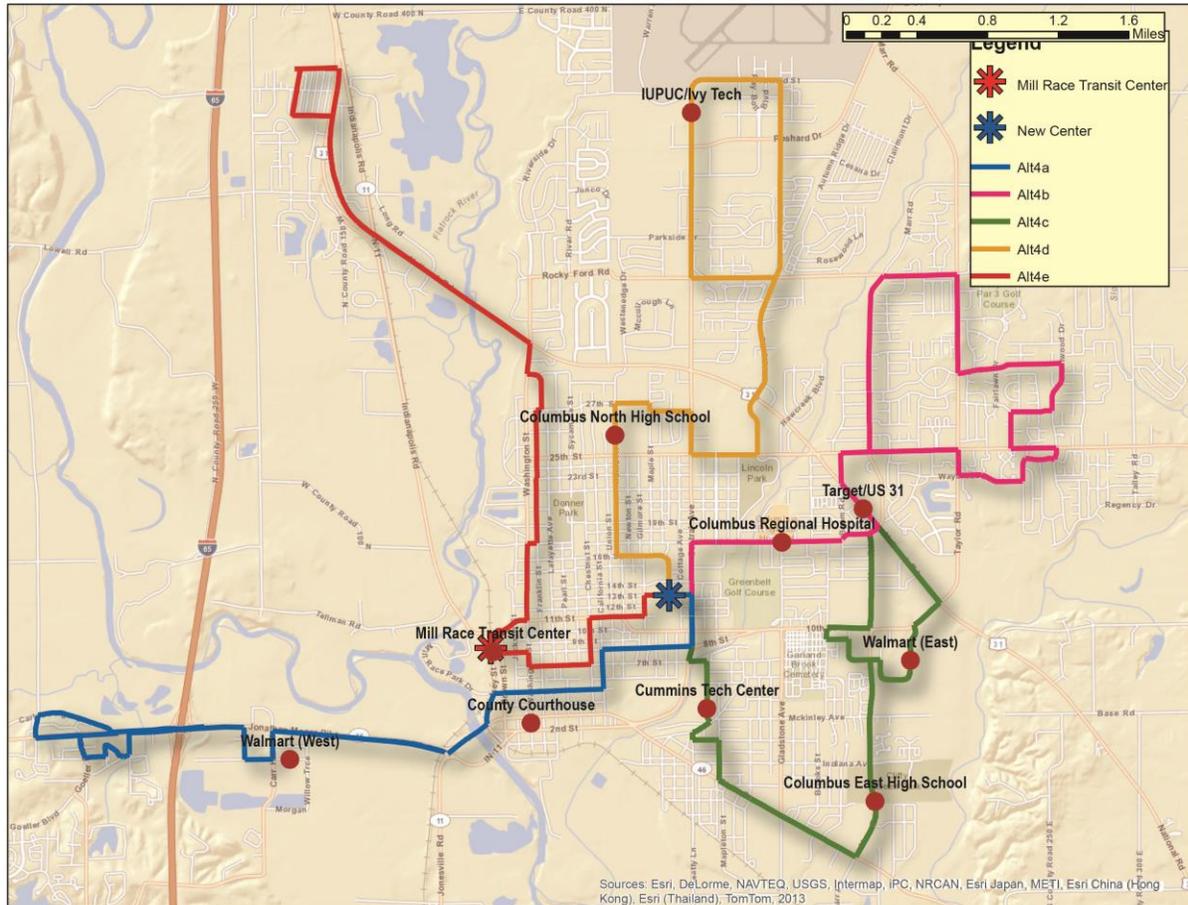


Figure 25: Alternative #4

**Alternative #5: Four-route system (New Central Hub, 30 minute headways)**

In order to identify tradeoffs involved in shortening the headway, a 30-minute alternative was developed, based upon Alternative #3. (A similar option based on Alternative #1 was also developed, and rejected; see below). In order to maximize geographic coverage with the shorter travel times, routes primarily consist of one-way loops. Accommodating service to US 46 is not possible within the constraints of this system.

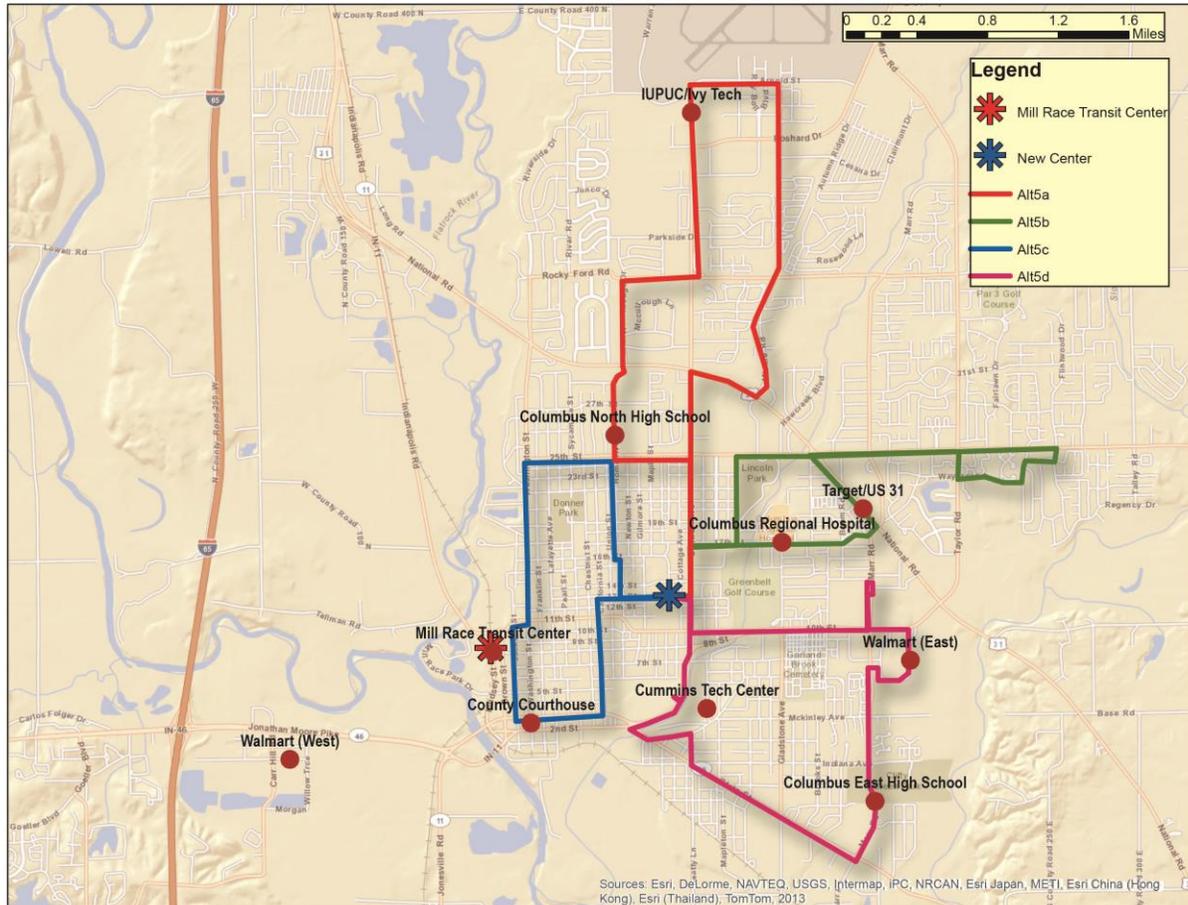


Figure 26: Alternative #5

**Other options considered**

The alternatives listed above represent the final candidates emerging from a larger set of options that were generated, but not shown here. For the most part, these options can be seen as approximations leading to the refined alternatives above; however, there are two notable exceptions where major reconfigurations of the system were deemed infeasible, as follows:

- *Modified four-route system (Mill Race Transit Center, 30 minute headways).* At the existing transit hub, applying 30-minute service effectively eliminates coverage of areas on the north and east of US 31, including Ivy Tech and IUPUC.
- *Exit 64 Limited Stop service.* Some interest had been expressed in stakeholder meetings about extending limited-stop or express service from Mill Race to the industrial parks clustering Exit 64 along I-65. Several options were explored, but no feasible options resulted, for the following reasons:
  - Round-trip travel times (even without stops) would take 40-45 minutes in peak hour, calling into question the potential reliability of the service.

- Walking facilities are non-existent; the service would therefore have to circulate within the industrial parks in order to maintain customer safety. This would further increase the travel time on the route, making it infeasible to operate the route within a 60 minute service frequency with a single bus.

## Performance Measures

Evaluation and comparison of the alternatives was accomplished through the application of a small set of metrics. This evaluation used geographic information systems and data sets developed as part of this project or that were independently available. Following is the list of data sets used and their rationale for inclusion:

- Section 8 and Public Housing. Many riders of the ColumBUS system use it because they lack feasible alternatives, and in particular cannot afford to own and operate a motor vehicle. While we cannot know with certainty the residential location for each and every transit-dependent household, it seems reasonable that neighborhoods containing publicly-assisted housing would have a higher proportion of transit-dependent persons.
- Coverage. The actual square mileage of the service area, measured by the total area within ¼-mile of a transit route, gives a sense of the efficiency of the system to work with its resources. Coverage is usually maximized by utilizing one-way “loops”, however, which reduces the number of choices available to the customer; therefore, bidirectional route mileage is also preferred.
- Existing boardings. Existing system activity is the best indication of travel desires of transit customers. Existing areas with higher intensity of activity should continue to be served by any system reconfiguration. The proportion of existing boardings within one-eighth of a mile of the alternate route systems is thus an important measure of the potential effectiveness of an alternative.
- Population and employment density show us areas with high land use activities, and accordingly higher potential for transit trips.
- Frequency?
- Travel times between activity centers identified in Figure 18 (below) were calculated, based upon distance, a 13 mph operating speed (including stops), 10-minute layovers at transit centers, and a 5-minute layover at the Target on US 31 (for the existing system). Travel times for the existing system are shown in Table 1:

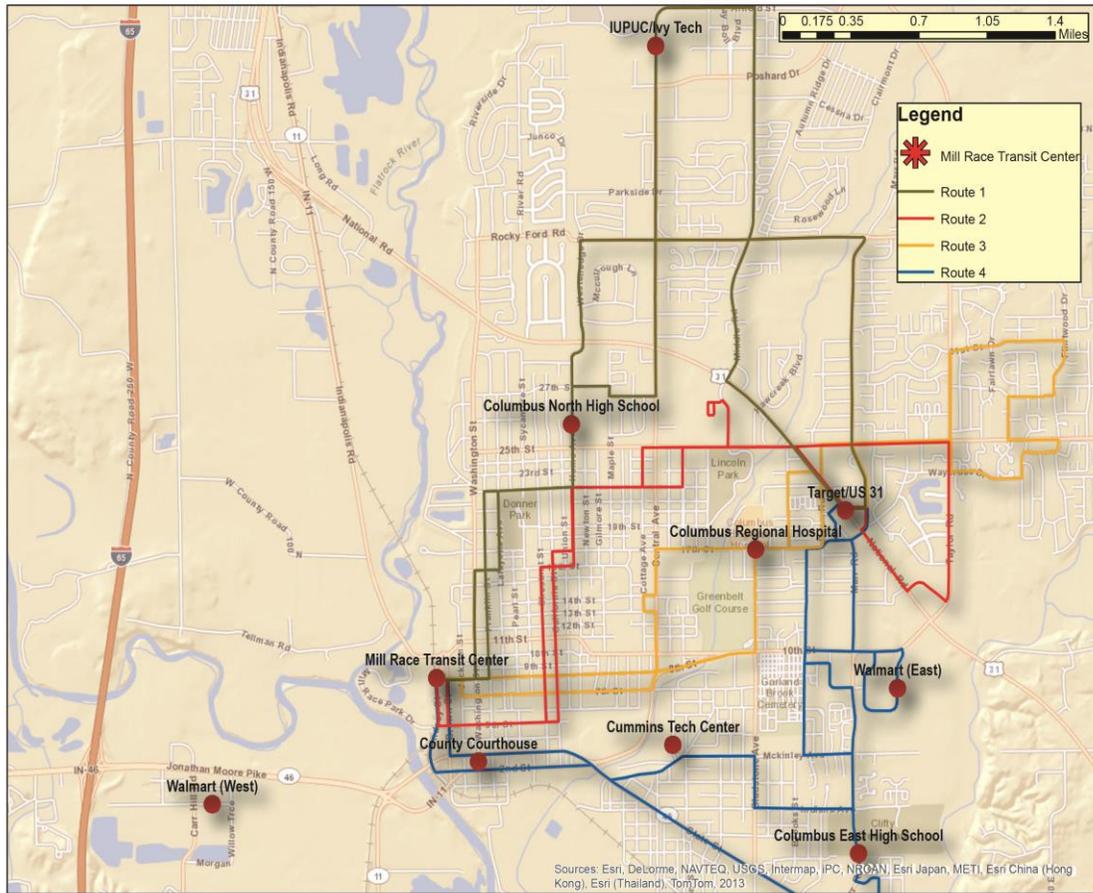


Figure 27: Representative community activity centers (not intended to be exhaustive)

Table 1: Existing System Travel Times (Estimated)

Existing System		To									
		City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
<b>From</b>	Time Matrix(Minutes)										
	City Courthouse		13.3	17.6	39.9	51.0	28.5	28.5	11.7	12.9	2.7
	Hospital	13.7		4.3	24.8	58.8	36.3	34.2	19.5	26.6	10.5
	US31/Target	18.0	4.3		15.5	13.8	40.6	87.4	23.8	30.9	14.8
	IUPUC/Ivy Tech	23.1	30.5	34.8		68.2	45.7	113.1	10.9	36.0	19.9
	Cummins East	5.5	18.8	30.4	45.4		44.0	49.4	17.2	34.3	8.2
	Walmart East	26.7	34.1	3.7	24.2	22.5		57.4	32.5	39.6	23.5
	Walmart West	28.5	34.2	87.4	113.1	49.4	57.4		72.2	70.3	34.2
	Columbus North	12.2	19.6	16.7	37.2	57.3	34.8	72.2		25.1	9.0
	Columbus East	36.4	43.8	13.4	33.9	32.2	9.7	70.3	42.2		33.2
Mill Race Center	3.2	10.6	14.9	37.2	48.3	25.8	34.2	9.0	16.1		

(Note: US 46 is not served by fixed-route transit under the Existing System [the red cells], so walking times are given instead).

Application of Performance Measures to Alternatives

Application of the performance measures to the alternatives (with the exception of travel times, which are addressed separately following this section), including the existing system, yields the following statistics:

Table 2: Performance measures application

Description					Performance Measures					
Alternative Name	Transit Center	Number of Routes	Route Mileage	Headway (# of mins)	Frequency (Buses/hr)	Bidirectional mileage	Coverage (mi <sup>2</sup> )		Population	
							1/4-mile	1/2-mile	1/4-mile	1/2-mile
Existing	Mill Race	4	44.7	60	1.00	15.69	10.45	14.54	24,966	30,164
1	Mill Race	4	45.2	60	1.00	25.28	10.83	16.72	23,072	30,546
2	Mill Race	5	55.3	60	1.00	36.83	12.31	19.55	23,905	31,740
3	Central	4	43.4	60	1.00	30.33	10.35	16.45	22,041	30,023
4	Central	5	54.8	60	1.00	39.61	12.17	19.22	24,612	32,118
5	Central	4	27.6	30	2.00	3.26	8.65	13.00	20,044	27,300

Table 3: Performance measures application (continued)

Performance Measures for Columbus Plan													
Description	Performance Measures												
Alternative Name	Employment		Existing Boardings		Section 8 housing		Public housing		# of routes accessing				
	1/4-mile	1/2-mile	1/4-mile	1/2-mile	1/4-mile	1/2-mile	1/4-mile	1/2-mile	Downtown	Hospital	Target	Mill Race	
Existing	19,645	21,037	1,063	1,063	521	541	166	168	2	1	4	4	
1	20,687	22,492	1,040	1,063	485	522	165	168	1	1	3	4	
2	22,175	23,911	1,048	1,063	539	570	169	173	1	1	3	5	
3	19,636	22,333	827	1,063	474	539	134	167	1	1	2	-	
4	21,773	23,894	1,043	1,063	553	587	164	170	2	1	2	1	
5	19,134	20,790	1,038	1,060	480	522	165	168	1	1	1	1	

(Note: Green indicates positive measure relative to other alternatives; yellow indicates average performance; orange indicates poor performance. .)

Alternative 3 captures less of the existing boarding activity and public housing units than the other alternatives, due to the relocation of the transit center; it is not until the addition of a fifth route in Alternative 4 that this deficit is mitigated. Because of its smaller coverage area, Alternative 5 serves fewer people and has the lowest amount of bi-directional mileage, although it captures nearly all of the existing boarding activity.

Travel times for the alternatives, and their changes relative to the Existing System, are shown below:

Table 4: Alternative 1 travel times

Alternative 1		To									
	Time Matrix(Minutes)	City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		27.0	31.6	44.7	24.1	27.9	7.8	25.3	32.5	6.9
	Hospital	27.0		4.6	20.3	27.0	40.8	34.8	28.2	35.4	9.8
	US31/Target	31.6	4.6		15.7	31.6	45.4	39.1	32.8	40.0	14.4
	IUPUC/Ivy Tech	35.6	38.5	43.1		35.9	49.7	43.4	10.3	44.3	18.7
	Cummins East	48.0	28.5	18.9	68.9		13.8	55.8	49.5	8.4	31.1
	Walmart East	34.2	14.7	5.1	25.8	34.9		42.0	35.7	43.3	17.3
	Walmart West	7.8	34.8	39.1	52.5	31.9	45.7		33.1	40.3	14.7
	Columbus North	25.3	28.2	32.8	19.4	25.6	39.4	33.1		34.0	8.4
	Columbus East	39.6	20.1	10.5	31.2	39.9	5.4	47.4	41.1		22.7
	Mill Race Center	6.9	9.8	14.4	27.8	7.2	21.0	14.7	8.4	15.6	

Table 5: Alternative 1 travel time change (from Existing System)

Alternative 1 (Change)		To									
	Time Matrix(Minutes)	City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		13.7	14.1	4.8	(26.9)	(0.6)	(20.7)	13.6	19.6	4.2
	Hospital	13.3		0.4	(4.5)	(31.8)	4.5	0.6	8.7	8.8	(0.7)
	US31/Target	13.7	0.4		0.2	17.8	4.9	(9.9)	9.1	9.2	(0.4)
	IUPUC/Ivy Tech	12.5	8.0	8.4		(32.3)	4.0	(10.7)	(0.6)	8.3	(1.2)
	Cummins East	42.5	9.7	(11.5)	23.5		(30.2)	-	32.3	(25.9)	22.9
	Walmart East	7.6	(19.4)	1.4	1.6	12.4		(25.7)	3.3	3.8	(6.2)
	Walmart West	(20.7)	0.6	(48.3)	(60.6)	(17.5)	(11.7)		(39.1)	(30.0)	(19.5)
	Columbus North	13.1	8.6	16.1	(17.8)	(31.7)	4.6	(39.1)		8.9	(0.6)
	Columbus East	3.3	(23.7)	(2.9)	(2.7)	7.7	(4.3)	(22.9)	(1.1)		(10.5)
	Mill Race Center	3.7	(0.8)	(0.4)	(9.4)	(41.1)	(4.8)	(19.5)	(0.6)	(0.5)	

Table 6: Alternative 2 travel times

Alternative 2		To									
	Time Matrix(Minutes)	City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		27.0	31.6	44.7	24.1	27.9	7.8	25.3	32.5	6.9
	Hospital	27.0		4.6	20.3	27.0	40.8	34.8	28.2	35.4	9.8
	US31/Target	31.6	4.6		15.7	31.6	45.4	39.1	32.8	40.0	14.4
	IUPUC/Ivy Tech	44.7	47.6	52.2		45.0	58.8	52.5	19.4	53.4	27.8
	Cummins East	48.0	28.5	18.9	68.9		13.8	55.8	49.5	8.4	31.1
	Walmart East	34.2	14.7	5.1	25.8	34.9		42.0	35.7	43.3	17.3
	Walmart West	7.8	34.8	39.1	52.5	31.9	45.7		33.1	40.3	14.7
	Columbus North	25.3	28.2	32.8	19.4	25.6	39.4	33.1		34.0	8.4
	Columbus East	39.6	20.1	10.5	31.2	39.9	5.4	47.4	41.1		22.7
	Mill Race Center	6.9	9.8	14.4	27.8	7.2	21.0	14.7	8.4	15.6	

Table 7: Alternative 2 travel time change (from Existing System)

Alternative 2 (Change)		To									
Time Matrix(Minutes)		City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		13.7	14.1	4.8	(26.9)	(0.6)	(20.7)	13.6	19.6	4.2
	Hospital	13.3		0.4	(4.5)	(31.8)	4.5	0.6	8.7	8.8	(0.7)
	US31/Target	13.7	0.4		0.2	17.8	4.9	(48.3)	9.1	9.2	(0.4)
	IUPUC/Ivy Tech	21.6	17.1	17.5		(23.2)	13.1	(60.6)	8.5	17.4	7.9
	Cummins East	42.5	9.7	(11.5)	23.5		(30.2)	6.4	32.3	(25.9)	22.9
	Walmart East	7.6	(19.4)	1.4	1.6	12.4		(15.4)	3.3	3.8	(6.2)
	Walmart West	(20.7)	0.6	(48.3)	(60.6)	(17.5)	(11.7)		(39.1)	(30.0)	(19.5)
	Columbus North	13.1	8.6	16.1	(17.8)	(31.7)	4.6	(39.1)		8.9	(0.6)
	Columbus East	3.3	(23.7)	(2.9)	(2.7)	7.7	(4.3)	(22.9)	(1.1)		(10.5)
	Mill Race Center	3.7	(0.8)	(0.4)	(9.4)	(41.1)	(4.8)	(19.5)	(0.6)	(0.5)	

Table 8: Alternative 3 travel times

Alternative 3		To									
Time Matrix(Minutes)		City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		28.0	32.6	58.1	27.6	45.1	12.2	29.0	38.5	12.7
	Hospital	28.0		4.6	39.1	18.2	40.7	28.3	19.7	26.6	28.2
	US31/Target	32.6	4.6		43.7	19.2	5.4	32.9	24.3	10.8	32.8
	IUPUC/Ivy Tech	48.4	39.1	43.7		35.4	57.9	48.8	19.4	43.8	48.7
	Cummins East	23.2	28.5	18.9	35.4		22.5	28.0	16.0	8.4	27.9
	Walmart East	45.4	14.7	5.1	57.6	22.2		50.8	38.8	13.8	50.1
	Walmart West	12.2	28.3	32.9	48.8	28.0	50.5		29.4	36.4	13.8
	Columbus North	29.0	19.7	24.3	19.4	16.0	38.5	29.4		24.4	29.3
	Columbus East	38.5	10.5	10.5	43.8	8.4	5.4	36.4	24.4		36.3
	Mill Race Center	12.7	28.2	32.8	48.7	27.9	50.4	13.8	29.3	36.3	

(Note: Mill Race Center and the County Courthouse are not connected by transit; they are also not adjacent to a transit route, although they are within ¼-mile of one (walking distance)).

Table 9: Alternative 3 travel time change (from Existing System)

Alternative 3 (Change)		To									
	Time Matrix(Minutes)	City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		14.7	15.0	18.2	(23.4)	16.6	(16.3)	17.3	25.6	10.0
	Hospital	14.3		0.4	14.4	(40.6)	4.4	(5.9)	0.2	-	17.7
	US31/Target	14.6	0.4		28.2	5.4	(35.2)	(54.5)	0.5	(20.1)	18.1
	IUPUC/Ivy Tech	25.3	8.6	9.0		(32.8)	12.2	(64.3)	8.5	7.8	28.8
	Cummins East	17.7	9.7	(11.5)	(10.0)		(21.5)	(21.4)	(1.2)	(25.9)	19.7
	Walmart East	18.8	(19.4)	1.4	33.4	(0.3)		(6.6)	6.3	(25.8)	26.7
	Walmart West	(16.3)	(5.9)	(54.5)	(64.3)	(21.4)	(6.9)		(42.8)	(33.9)	(20.4)
	Columbus North	16.8	0.1	7.6	(17.8)	(41.3)	3.7	(42.8)		(0.7)	20.3
	Columbus East	2.1	(33.3)	(2.9)	9.9	(23.8)	(4.3)	(33.9)	(17.8)		3.2
	Mill Race Center	9.5	17.6	18.0	11.5	(20.4)	24.6	(20.4)	20.3	20.2	

(Note: Mill Race Center and the County Courthouse are not connected by transit; they are also not adjacent to a transit route, although they are within ¼-mile of one (walking distance)).

Table 10: Alternative 4 travel times

Alternative 4		To									
	Time Matrix(Minutes)	City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		28.0	32.6	58.1	27.6	45.1	12.2	29.0	38.5	12.7
	Hospital	28.0		4.6	39.1	18.2	40.7	28.3	19.7	26.6	27.7
	US31/Target	32.6	4.6		43.7	19.2	5.4	32.9	24.3	10.8	32.3
	IUPUC/Ivy Tech	48.4	39.1	43.7		35.4	57.9	48.8	19.4	43.8	48.2
	Cummins East	23.2	28.5	18.9	35.4		22.5	28.0	16.0	8.4	27.4
	Walmart East	45.4	14.7	5.1	57.6	22.2		50.8	38.8	13.8	49.6
	Walmart West	12.2	28.3	32.9	48.8	28.0	50.5		29.4	36.4	13.8
	Columbus North	29.0	19.7	24.3	19.4	16.0	38.5	29.4		24.4	28.8
	Columbus East	38.5	10.5	10.5	43.8	8.4	5.4	36.4	24.4		35.8
	Mill Race Center	12.7	27.7	32.3	48.2	27.4	49.9	13.8	28.8	35.8	

(Note: Mill Race Center and the County Courthouse are not connected by transit; they are also not adjacent to a transit route, although they are within ¼-mile of one (walking distance)).

Table 11: Alternative 4 travel time change (from Existing System)

Alternative 4 (Change)		To									
	Time Matrix(Minutes)	City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		14.7	15.0	18.2	(23.4)	16.6	(16.3)	17.3	25.6	10.0
	Hospital	14.3		0.4	14.4	(40.6)	4.4	(5.9)	0.2	-	17.2
	US31/Target	14.6	0.4		28.2	5.4	(35.2)	(54.5)	0.5	(20.1)	17.6
	IUPUC/Ivy Tech	25.3	8.6	9.0		(32.8)	12.2	(64.3)	8.5	7.8	28.3
	Cummins East	17.7	9.7	(11.5)	(10.0)		(21.5)	(21.4)	(1.2)	(25.9)	19.2
	Walmart East	18.8	(19.4)	1.4	33.4	(0.3)		(6.6)	6.3	(25.8)	26.2
	Walmart West	(16.3)	(5.9)	(54.5)	(64.3)	(21.4)	(6.9)		(42.8)	(33.9)	(20.4)
	Columbus North	16.8	0.1	7.6	(17.8)	(41.3)	3.7	(42.8)		(0.7)	19.8
	Columbus East	2.1	(33.3)	(2.9)	9.9	(23.8)	(4.3)	(33.9)	(17.8)		2.7
	Mill Race Center	9.5	17.1	17.5	11.0	(20.9)	24.1	(20.4)	19.8	19.7	

(Note: Mill Race Center and the County Courthouse are not connected by transit; they are also not adjacent to a transit route, although they are within ¼-mile of one (walking distance)).

Table 12: Alternative 5 travel times

Alternative 5		To									
	Time Matrix(Minutes)	City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
From	City Courthouse		16.1	20.7	31.6	20.4	26.4	28.5	40.1	26.0	26.5
	Hospital	46.1		4.6	49.1	39.9	45.9	34.2	57.6	45.5	45.9
	US31/Target	41.5	32.6		44.5	35.3	41.3	87.4	53.0	40.9	41.3
	IUPUC/Ivy Tech	34.8	23.5	28.1		28.6	34.6	113.1	8.5	34.2	34.6
	Cummins East	48.0	36.7	41.3	51.0		17.7	49.4	59.5	11.4	47.8
	Walmart East	30.3	19.0	23.6	33.3	24.1		57.4	41.8	29.7	30.1
	Walmart West	28.5	34.2	87.4	113.1	49.4	57.4		72.2	70.3	34.2
	Columbus North	26.8	15.0	19.6	31.5	20.1	26.1	72.2		25.7	26.6
	Columbus East	35.6	24.3	28.9	38.6	29.4	5.3	70.3	47.1		35.4
	Mill Race Center	4.2	19.5	24.1	33.8	24.6	30.6	34.2	42.3	30.2	

(Note: US 46 is not reachable by transit, and Mill Race Center is not adjacent to a transit route, although it is within ¼-mile of one (walking distance)).

Table 13: Alternative 5 travel time change (from Existing System)

Alternative 5 (Change)		To									
Time Matrix(Minutes)		City Courthouse	Hospital	US31/Target	IUPUC/Ivy Tech	Cummins East	Walmart East	Walmart West	Columbus North	Columbus East	Mill Race Center
<b>From</b>	City Courthouse	-	2.8	3.2	(8.3)	(30.6)	(2.1)	-	28.4	13.1	23.8
	Hospital	32.4	-	0.4	24.4	(18.9)	9.6	-	38.1	18.9	35.4
	US31/Target	23.6	28.4	-	29.0	21.5	0.8	-	29.3	10.1	26.6
	IUPUC/Ivy Tech	11.7	(7.0)	(6.7)	-	(39.6)	(11.1)	-	(2.4)	(1.8)	14.7
	Cummins East	42.5	17.9	11.0	5.6	-	(26.3)	-	42.3	(22.9)	39.6
	Walmart East	3.7	(15.1)	19.9	9.1	1.6	-	-	9.3	(9.9)	6.7
	Walmart West	-	-	-	-	-	-	-	-	-	-
	Columbus North	14.6	(4.6)	2.9	(5.7)	(37.2)	(8.7)	-	-	0.6	17.6
	Columbus East	(0.8)	(19.5)	15.5	4.7	(2.8)	(4.4)	-	5.0	-	2.3
	Mill Race Center	1.0	8.9	9.3	(3.4)	(23.7)	4.8	-	33.3	14.1	-

(Note: US 46 is not reachable by transit, and Mill Race Center is not adjacent to a transit route, although it is within ¼-mile of one (walking distance)).

In terms of overall performance, Alternatives 2 and 4 (both of which add a fifth route) rank the best, owing to the increased service area. Alternative 1 is roughly comparable to the Existing System, with improved access to SR 46 and points west. Alternative 3 also provides comparable service to the Existing System, but it has reduced access to transit-dependent populations and cannot service the existing transit hub at Mill Race. Alternative 5 (30 minute alternative) greatly rations the service area to accommodate the more frequent bus service, and has the lowest performance of all the options studies.

## 4. Recommendations

### Preferred alternative

From a service standpoint, Alternative 4 (new central transit hub, five routes) clearly offers a number of advantages relative to the other options. The option serves two new geographic markets (SR 46 and US 31 to the northwest), offers travel time advantages relative to the existing system (by not requiring travel to the west side of town for transfers), and maintains existing access to transit dependent populations.

Implementation of Alternative 4 involves several discrete components – namely, the restructuring of routes to service SR 46, the additional of a fifth route, and the locating a hub that is more central to the transit system, and controlled by the transit system, rather than on private land. Since these components have different financial and regulatory requirements, with varying implementation schedules, a phasing approach is recommended. That is, the existing system should evolve towards the Preferred Alternative in three stages.

In Stage 1, the existing route system can be restructured to serve SR 46. Since this recommendation can be cost-neutral, it should be the easiest one to implement in the short-term, and allows time to secure resources for a later fifth-route addition. This system could be configured according to the routes shown in Alternative 1.

In Stage 2, the fifth route could be added, and the system would look like Alternative 2. There are several justifications for adding the route prior to improving the Target hub location:

- The performance of a four-route, central-hub system (i.e., Alternative 3) is lower relative to Alternative 1.
- Siting a new transit hub is a project likely to span years, with component tasks of a site selection study, funding applications, engineering and environmental review, and construction. The requirements for adding a fifth route (i.e., additional staff, additional vehicle) are less severe, and would likely be implemented in a shorter timeframe.

In Stage 3, the system would be reoriented to this more central hub, thereby completing the transition to Alternative 4. Figure 20 shows these steps and the final outcome.

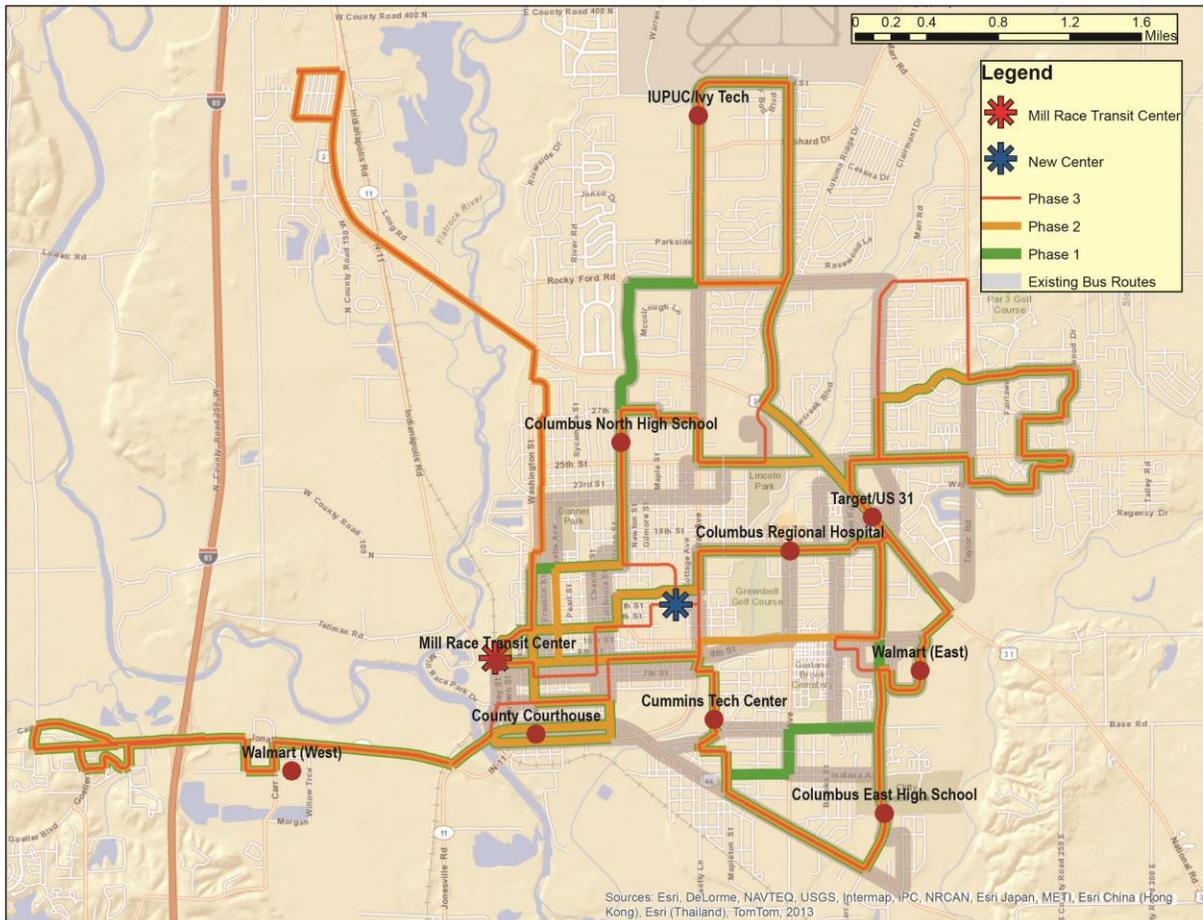


Figure 28: Final Transit Plan

### Action Items and Other Recommendations

It is understood that the implementation of these routing recommendations may result in deviations from the original proposal, particularly as travel time estimates for the routes become more refined.

Moving the implementation of the new central transit hub to Phase 3 should not be construed as a delay of progress; on the contrary, the length of the necessary siting and subsequent engineering and environmental studies suggest that discussions on the new location should start immediately. It is strongly suggested that the City implement a siting study to identify the new location, and look into alternate sources of funds for eventual development of the new hub.

While Phase 1 (four-route service that includes SR 46) is cost-neutral, Phases 2 and 3 are not. In order to effectively argue for implementation of these later phases, ColumBUS should develop an enhanced data collection program so that benefits and costs can be more effectively presented. Since the extension of fixed-route service to SR 46 is being justified, at least in part, on the potentially reduced costs of on-demand service provision to this location, documenting the costs from implementation of Phase 1 will be essential to maintain momentum.



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## Appendix A: General Public Web Survey

1. How often do you ride the bus?
  - 4-5 days per week
  - 1-3 days per week
  - 1-3 days per month
  - Never
  
2. What route do you usually ride? (check all that apply)
  - Route 1 (Blue)
  - Route 2 (Red)
  - Route 3 (Green)
  - Route 4 (Orange)
  
3. About how far do you live from a bus stop?
  - 1-2 minutes
  - 2-5 minutes
  - 5 or more minutes
  - Don't know
  
4. Do you usually have to transfer from one bus to another to complete your trip?
  - Yes, at the Downtown Transit Station
  - Yes, at Target
  - Yes, at another location
  - No
  
5. When you get off the bus at the end of your trip, how far do you have to walk to reach your destination?
  - 1-2 minutes
  - 2-5 minutes
  - 5 minutes or more
  
6. Do you use a wheelchair?
  - Yes
  - No
  
7. Do you take a bicycle onto the bus (using the bike rack on the front of the bus)?
  - Yes
  - No
  
8. For what purposes do you ride the bus? (check all that apply)
  - Work
  - School
  - Regular errands or shopping
  - Visiting neighbors, friends, or family
  - Parks
  - Other
  - None

9. Do you ever take the bus to these locations? (check all that apply)

- Downtown Columbus
- Ivy Tech
- IUPUC
- Columbus East High School
- Columbus North High School
- Social Security Office
- Fair Oaks Mall shopping center
- Columbus Center shopping center (Target)
- Clover Center shopping center (Marsh)
- Northern Village Shopping Center
- Brentwood shopping center
- Holiday Village shopping center
- Pic Way Plaza shopping center
- Clifty Crossing shopping center
- Creekview shopping center (Walmart & Kohls)
- Cummins headquarters office
- Cummins plant
- Airport Industrial Park
- Info Tech Park
- Bartholomew Industrial Park
- South Mapleton Industrial Park
- Donner Center and Park
- Hamilton Center Arena

10. How do you feel about the ColumBUS public transit system?

(Strongly Agree, Agree, No Opinion, Disagree, Strongly Disagree)

- The ColumBUS system is important to Columbus, the economy and creating a more livable city.
- I would like to see ColumBUS as a more prominent part of the transportation system.
- I would like to live in a community where I could ride the bus to meet the needs of my lifestyle.
- Driving is more stressful than riding the bus.
- ColumBUS should provide all citizens, with and without cars, with a high-quality mass transit option.
- ColumBUS fares should be as low as possible to provide mobility to all residents.
- If ColumBUS Transit were convenient enough, I would use it.
- Overall, ColumBUS is doing an effective job serving the city.

11. How would you rate the following about riding the bus in Columbus?

(Adequate, Inadequate, No Opinion)

- Existing bus routes
- System efficiency
- Timeliness
- Bus stop facilities
- Bus stop locations
- Crosswalks near bus stops
- Ramps and accessibility

- Connectivity between bus stops and sidewalks, trails, etc.
- ColumBUS route map

12. If you don't ride the bus, what are the reasons? (please select 3)

- I own a car
- Flexibility
- I need a car for work
- The bus stop is too far from where I live
- Does not go where I want to go
- Does not start early enough
- Does not run late enough
- Takes too long
- No direct route
- Transferring is difficult
- Buses are not reliable
- Does not come often enough
- Poor weekend service
- Safety concerns at the bus stop or on the bus
- Other (please specify)

13. What types of improvements to ColumBUS Transit would you like to see (please select 3)

- Faster and more direct service to and from downtown
- Faster and more direct service everywhere
- More service earlier and later in the day or later in the evening
- More service on weekends
- Service to Westside locations (Tipton Lakes, Walmart, Merchants Mile)
- Service to Indianapolis Road ( industrial and residential areas)
- Service to Edinburgh (outlet mall area, residential areas)
- Bus stops closer to home or where you need to go
- More frequent service during A.M. and P.M. peak hours
- More frequent service all periods of the day
- Availability of rapid transit, or limited stop service
- Provide a downtown shuttle or trolley bus service
- Improve pedestrian and bike access to bus stops (sidewalk, sidepath, multi-use trail and bike lane)
- Provide more park & ride and carpool opportunities
- Improved shelters and other amenities (benches and route information)
- Bus stop signs at all bus stops
- Safe and secure buses and bus stops
- Provide more bike racks on buses and bus lockers at bus stops

14. Does anyone else in your family ride the bus?

- Parent
- Child
- Brother or sister
- Grandparent
- Other

- No one

15. How often do you use Call-a-BUS?

- 4-5 days per week
- 1-3 days per week
- 1-3 times per month
- Never
- I don't know what Call-a-BUS is

16. Does anyone else in your family use Call-a-BUS

- Parent
- Child
- Brother or sister
- Grandparent
- Other
- No one

17. What part of Columbus do you live in?

- Central Columbus (Downtown area, south of 25<sup>th</sup> Street)
- Northside (Rocky Ford area, north of 25<sup>th</sup> Street)
- Northeast Columbus (east of Marr Road)
- East Columbus
- Southside (Shadow Creek Farms, Garden City area)
- Westside (Tipton Lakes, Terrace Lake Road)
- Outside Columbus in Bartholomew County
- Outside Bartholomew County

18. What is your age?

- Under 18 years old
- 19-30 years old
- 31-45 years old
- 46-64 years olds
- 65 years or older

19. What is your annual household income?

- \$25,000 or less
- \$25,000 - \$49,999
- \$50,000 - \$74,999
- \$75,000 - \$99,999
- \$100,000 - \$199,999
- \$200,000 or more

20. How many vehicles are used by your household?

- 0
- 1
- 2
- 3

- 4 or more