NEXTGEN

IT'S YOUR MOVE

Appendix F: Tier 1 Screening Methodology and Results

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COTA CENTRAL OHIO TRANSIT AUTHORITY
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OVERVIEW

The Central Ohio Transit Authority (COTA) is undertaking a planning effort, COTA Next Generation 2050 ("NextGen"), to explore central Ohio's future public transportation needs. The planning process began in January 2015 and is designed to create a long-term perspective on transit investment opportunities, guiding transit development through 2050.

Community Transit Priorities

Through the outreach process, an initial list of eight values was drafted. In subsequent outreach activities, the team worked with community members and stakeholders to refine and prioritize these values. The process resulted in identification of five values or priorities for how transit investment should be directed and measured.

The following five values create the structure of the evaluation framework.

1. Make Better Connections – Improve existing transit service's reach further into the communities it already serves.
2. Invest in Underserved Communities – Direct transit investment to specific corridors and neighborhoods.
3. Coordinate with Growth – Encourage inward growth and serve existing neighborhoods. Strengthen fast-growing areas.
4. Build on Success – Make existing transit service more compelling.
5. Sustainability – Protect the environment and reduce greenhouse gas emissions.

The NextGen evaluation framework is split into two phases. The Tier 1 evaluation will evaluate a broad list of potential high capacity transit corridors and the Tier 2 evaluation will prioritize specific projects. This memo summarizes the results of the Tier 1 evaluation framework which assessed corridors where high capacity transit service is needed and/or where there are opportunities to investment in high capacity transit to advance the articulated goals and values.

Evaluation Corridors

The corridors considered in the evaluation were identified through the needs assessment and community engagement process. These alignments are intended to be "mode neutral" and could reasonably be served by a number of transit modes, from streetcars to enhanced bus. The study team identified 26 corridors that could potentially meet the objectives of the HCT study for the Central Ohio Transit Authority shown in Figure 1 and further described in Figure 2.

Corridor 26, the Newark Connection, was assessed in the Tier 1 screening analysis, but a separate analysis will be conducted. This corridor differs from the other proposed corridors in that it is regional in scope and intended to address long distance commuter travel by providing an alternative to the freeway.

Figure 1 Map of Potential High Capacity Corridors for Screening

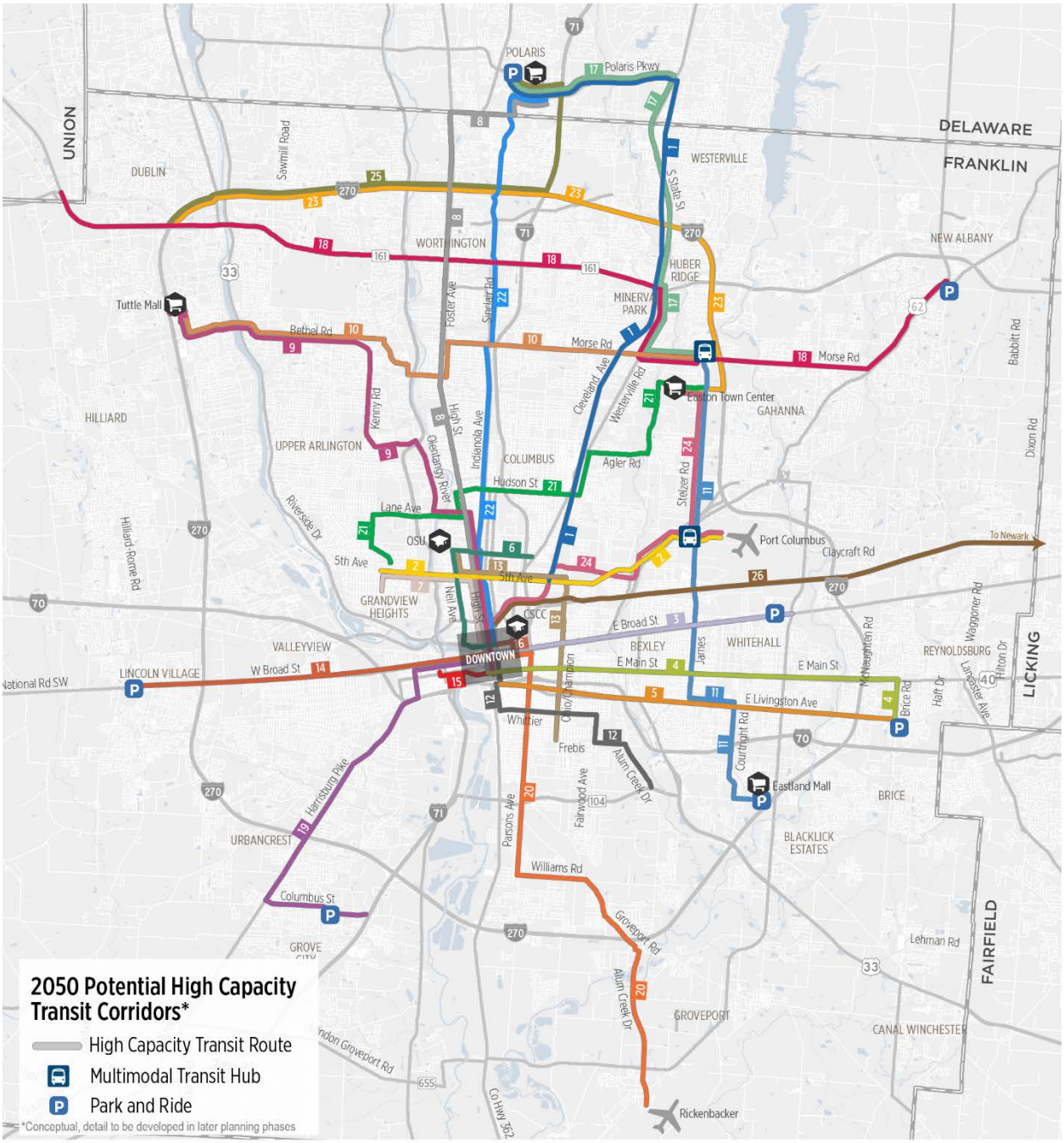

Figure 2 Potential High Capacity Transit Corridor Descriptions

Corridor Description		Analysis	Project Genesis
1	**Former Freight Corridor** Utilize former Mt. Vernon PRR line for HCT between E 17th Ave and Westerville. Extend alignment to Polaris	Forecasts show significant population and employment growth in Westerville and Polaris. Serving these areas with a faster connection to downtown Columbus would facilitate and support that growth.	CMAX on Cleveland Avenue represents a major transit investment in Northeast Columbus. As demand grows, an alternative alignment that supplements CMAX is identified. Using the railroad right-of-way allows for creation of a busway or railway with minimal impacts on existing and proposed roadways.
2	**5th Avenue Grandview-Airport** Connects Grandview, Short North, and the Milo Grogan neighborhood to the Airport using 5th Avenue	Between Grandview Heights and High Street, existing and projected population and employment densities can support higher levels of transit service.	The TSR identified a portion of this corridor as a frequent transit network route. The redevelopment possibilities between High Street and Cleveland Avenue were identified by stakeholders as able to support higher capacity transit as well. An extension to the airport was added onto this segment to provide a destination at the eastern end of the corridor.
3	**East Broad** Connects downtown Columbus, Bexley, and Whitehall via East Broad Street	The existing and projected population and employment densities can support higher levels of transit service.	The TSR identified this corridor as a frequent transit network route. This corridor was one of the most frequently requested from the public outreach process. The Connect Columbus team has also identified this as a potential high capacity transit corridor.
4	**East Main** Connects Reynoldsburg and downtown Columbus via East Main Street	The existing and projected population and employment densities can support higher levels of transit service.	The TSR identified this corridor as a frequent transit network route. Bexley, which is bisected by the East Main corridor, was frequently mentioned as needing enhanced transit service.
5	**East Livingston** Connects Reynoldsburg and downtown Columbus via Livingston Avenue	The existing and projected population and employment densities can support higher levels of transit service.	The TSR identified this corridor as a frequent transit network route. South Columbus, which is partially served by this corridor, was identified by the public as a needing additional transit service.

Corridor Description		Analysis	Project Genesis
6	**Neil Avenue** Connects downtown Columbus, OSU, and 11th Avenue via Neil Avenue	OSU and downtown, which are the anchors of this corridor, were identified as two of the top places for enhanced transit service because of the large concentrations of destinations, residences, and jobs.	The TSR identified this corridor as a frequent transit network route.
7	**5th Ave & High Street** Connects Grandview, Short North, and the Milo Grogan neighborhood to the Airport using 5th Avenue	Between Grandview and downtown Columbus, the existing and projected population and employment densities can support higher levels of transit service.	The TSR identified this corridor as a frequent transit network route. The public process identified High Street as one of the corridors needing transit enhancements.
8	**N High Street** Connects downtown Columbus, OSU, and Polaris via High Street	Between OSU and downtown Columbus, the existing and projected population and employment densities can support higher levels of transit service. North of OSU, there are pockets of density that are supportive of high capacity transit.	The TSR identified this corridor as a frequent transit network route between downtown and Morse Road. The Downtown Columbus Strategic Plan called for high capacity transit linking downtown with OSU. The public process identified High Street as one of the corridors needing transit enhancements. Public input and stakeholder input were among the rationales to extend the alignment to Polaris, a large and growing employment center.
9	**Columbus-Dublin** Connects downtown Columbus to Northwest Columbus and Dublin	Between OSU and downtown Columbus, existing and projected population and employment densities are supportive of high capacity transit. Northwest of OSU there are dense clusters, such as the Tuttle Mall area, that could support high capacity transit.	The TSR identified the segment between downtown and Bethel Road as a potential frequent transit network route. Stakeholder input from Upper Arlington and Dublin indicated that additional growth is planned in this area.

Corridor Description		Analysis	Project Genesis
10	**Dublin-Easton** Connects Dublin, Northwest Columbus, and Easton Town Center via Bethel Road and Morse Road	Along both Bethel Road and Morse Road, existing and projected population and employment densities could support higher levels of transit. Both the Easton and Dublin areas have been identified as future growth nodes that can anchor this corridor.	The TSR identified this corridor between High Street and Easton as a frequent transit network route. The extension to Dublin via Bethel Road was identified by the public as a need and by stakeholders to address east-west connectivity in the Northern Tier suburbs.
11	**Eastland Mall – Easton** Connects Eastland Mall, the Airport and Easton Town Center via Stelzer Road	Existing and projected population and employment densities along this corridor include segments that can support higher levels of transit.	The TSR identified this corridor as a frequent transit network route. It serves an area of high need and connects to major regional employment center.
12	**Alum Creek-Whittier** Connects downtown Columbus to Alum Creek Drive via Whittier and 3rd	Existing and projected population and employment densities along this corridor include segments that can support higher levels of transit.	The TSR identified this corridor as a frequent transit network route. It serves an area of high need, and was identified in the public process as an area needing enhanced service.
13	**Ohio/Champion-OSU** Connects Vassor Village and OSU via Ohio/Champion, 5th Avenue, and Neil Avenue	Existing and projected population and employment densities along most of this corridor can support higher levels of transit.	The TSR identified this corridor as a frequent transit network route. It serves an area of high need.
14	**West Broad** Connects Lincoln Village with downtown Columbus via West Broad Street	Existing and projected population and employment densities along most of this corridor can support high capacity transit.	The TSR identified this corridor as a frequent transit network route. It serves an area of high need, and was identified in the public process as an area needing enhanced service. Additionally, existing COTA service on West Broad performs well, with high ridership and productivity.

Corridor Description		Analysis	Project Genesis
15	**Franklinton-Downtown** Connects Franklinton to downtown Columbus via West Rich Street	Existing and projected population and employment densities along this corridor can support high capacity transit.	The TSR identified this as a frequent transit network route between Mt. Carmel West Hospital and downtown via Rich Street. The Connect ColumbUS effort has identified Franklinton as a high growth area that can support higher levels of service.
16	**East Downtown** Connects East downtown and CSCC with High Street corridor via Spring Street and Long Street	Existing and projected population and employment densities along this corridor can support high capacity transit.	The TSR identified the Spring/Long Street pair as a frequent transit network route in downtown Columbus. Previous work by local streetcar planning advocates also includes connections to East Downtown. Select downtown stakeholders, in particular Columbus State, strongly desire enhanced services linking East Downtown with downtown.
17	**Polaris-Easton** Connects Polaris, Westerville, and Huber Ridge with Easton Town Center	The population and employment forecasts show concentrated growth in both Polaris and Easton.	The travel pattern analysis also shows significant increases in travel flows between the areas surrounding both Polaris and Easton. In order to address these needs, a corridor anchored by Polaris and Easton was created.
18	**Dublin-New Albany** Connects Dublin, Easton Town Center, Gahanna, and New Albany via SR 161, Morse Road, and US 62	The SR 161 corridor is an opportunity to connect these two areas along a corridor that has both existing and projected growth in population and employment densities. In addition, population and employment growth between Easton and New Albany suggest potential for supporting transit.	The population and employment forecasts show concentrated growth in both Dublin and Easton. Stakeholders repeatedly mentioned the difficulty of east/west travel in the northern tier suburbs.

Corridor Description		Analysis	Project Genesis
19	**Grove City** Connects downtown Columbus and Grove City via Harrisburg Pike	Sufficient population and employment growth to support high capacity transit is expected on both the north and south ends of the proposed corridor. Longer segments along the corridor, however, show less of an ability to support higher levels of transit.	Grove City's plans call for a dense core with increased population and employment growth. The goal of this corridor is to connect this growth node to the urban core.
20	**Groveport-Rickenbacker** Connects downtown Columbus, Groveport, and Rickenbacker via Parsons Avenue and Groveport Road	Existing and projected population and employment growth projections indicate that both South Columbus and Groveport/ Rickenbacker have areas that could support higher levels of transit. However this corridor passes through long areas with no transit demand.	The area around Groveport and Rickenbacker is anticipated to add thousands of warehouse/industrial jobs. These types of jobs tend to employ workers of a demographic that are typically attracted to transit. Phase I outreach indicated that linking jobs to economically challenged areas in South Columbus was a priority.
21	**Upper Arlington-Easton** Connects Upper Arlington, OSU, and Easton Town Center via Lane Avenue, Hudson Street, and Agler Road	Between Hudson St. and Upper Arlington, this corridor has the existing and projected population and employment density to support higher levels of transit. Between Hudson St. and Easton, projected densities are much less transit supportive.	This corridor ties together several potential markets. Upper Arlington to OSU will continue to expand with campus growth. OSU and Easton are two of the largest existing and future employment nodes in Columbus, and connecting them with more frequent service was a priority of the TSR.
22	**Downtown-Polaris** Connects downtown Columbus and Polaris via 3rd/4th Avenues, Indianola Avenue, and Sinclair Road	Polaris, parts of Worthington, and all of the alignment south of Hudson St. show the existing and projected population and employment densities to support higher levels of transit. However, between Worthington and Hudson St, only pockets of higher densities exist.	This corridor connects Polaris with downtown in the most direct alignment. Phase I outreach indicated support for facilitating this connection. It does not serve OSU directly.

Corridor Description		Analysis	Project Genesis
23	**Dublin-Easton via I-270** Connects Dublin and Easton Town Center with direct freeway-based connections	Both Dublin and Easton are projected to have the population and employment densities to support higher levels of transit.	This corridor connects Dublin with Easton via I-270. This addresses one of the Phase I outreach unmet needs of better East/West connections along the northern tier of suburbs. Both Dublin and Easton are some of the fastest growing suburban areas in Franklin County.
24	**Downtown-Airport-Easton** Connects downtown Columbus, the Airport, and Easton Town Center with a direct high-speed service	Linking downtown with the Airport was one of the most requested improvements in the outreach process.	The Jobs, Employment, and Transportation (JET) Task Force and the Downtown Columbus Strategic Plan called for high capacity transit linking downtown with the Airport.
25	**Dublin-Polaris via I-270** Connects Dublin and Polaris with direct freeway-based connections	Both Dublin and Polaris are projected to have the population and employment densities to support higher levels of transit.	This corridor connects Dublin with Polaris via I-270. This addresses one of the Phase I outreach unmet needs of better East/West connections along the northern tier of suburbs. Both Dublin and Polaris are some of the fastest growing suburban areas in Franklin County and southern Delaware County.
26	**Newark Connection** Connects Downtown Columbus to Newark with high speed transit	Downtown Columbus has the population and employment density to support peak-commute time regional services. Between Blacklick, Reynoldsburg, and Newark, population and employment densities are limited.	Traffic congestion on I-70 from the east is projected to increase in Franklin, Licking, and Fairfield Counties. In order to provide an alternative to the freeway, a regional connection between Newark is proposed.

SCREENING METHODOLOGY

Analysis of the corridors was conducted by applying fourteen different measures that correspond to the five community value goal statements developed through an extensive public outreach process. The screening criteria and corresponding goal statements are described in Figure 3 Tier 1 Screening Criteriabelow. For each metric, corridors were given relative rankings of “high” “medium” and “low”.

For some of the measures, particularly those using census blocks whose centroids were within 1/4-mile of each corridor, an index was created to normalize the results. The index levels the playing field between longer corridors that have an advantage due to their larger service area and shorter corridors with fewer residents and jobs.

Figure 3 Tier 1 Screening Criteria

Community Value	Screening Criteria	Measure Determines…	Evaluation Measure
Make Better Connections *Improve existing transit service’s reach further into the communities it already serves*	Opportunities to connect with existing transit service	If investment will create and strengthen connections and access to overall network	Number of TSR transit routes intersected
	Quality of potential connections (frequency, span, days of week)	If overall network will be strengthened by connections with higher quality service	Number of TSR frequent routes intersected
	Consistency with local planning efforts	If area will be enhanced/ supported by local efforts	Percentage of total adjacent parcels that are transit supportive
Invest in Underserved Communities *Direct investment to specific corridors and neighborhoods*	Number of low income and/or zero car households along corridor	Extent of need in proposed investment area (as defined by low income residents)	Index of zero-car households by corridor mile
	Jobs – housing balance (ratio of jobs to residents). Fewer jobs per capita results in higher need	Areas with fewer jobs per capita, which means higher demand for travel	Ratio of employment to population for 2015 Ratio of employment to population for 2040
	Designation of corridor or neighborhood as high need area	If area has been identified by other regional effort as overlooked or otherwise disenfranchised	Index of households below the poverty line by corridor mile

Community Value	Screening Criteria	Measure Determines…	Evaluation Measure
Build on Success *Make existing transit service more compelling*	Existing ridership in corridor or area	Demand for future investment (high ridership suggests more need)	Total Ridership within ¼ mile of the corridor
	Passenger per hour on existing services	Success of existing service productivity	Average passengers per hour on existing COTA routes by corridor mile
	Potential for travel time savings	Opportunity for improvement in travel time given physical conditions	Corridor traffic volume to lane capacity ratio for 2015
Coordinate with Growth *Encourage inward growth and serve existing neighborhoods. Strengthen fast growing areas.*	Transit supportive development density for corridor or service area	If area is oriented towards transit service	Index of population and employment within ¼ mile per corridor mile in 2015
	Projection of Future Population and Employment	Size of future population/employment markets served	Index of population and employment within ¼ mile per corridor mile in 2040
	Rate of change in population and employment	Areas with increasing population and employment density, which demonstrate transit oriented environment	Index of change in population and employment within ¼ mile per corridor mile (2015-2040)
Sustainability *Protect the environment and reduce greenhouse gas emissions.*	Repurposing space (abandoned corridors, areas)	If investment promotes infill development or redevelopment of brownfield sites	Number of brownfield sites by corridor mile
	Service in congested corridors	If investment reduces congestion as a strategy to reduce tailpipe emission and greenhouse gases	Corridor traffic volume to lane capacity ratio for 2040

SCREENING CRITERIA

Goal: Make Better Connections

Connections with Existing Transit Service

High capacity transit functions best if the investment will create and strengthen connections and access to the regional and local transit networks. High capacity transit systems like light rail transit (LRT) and bus rapid transit (BRT) have a function to arterial streets in the automobile transportation network: they connect at one end to the regional system (commuter rail and HOV lanes on highways) and at the other end to the local system of bus routes, bike lanes and alternative mobility options such as shared cars and bikes. A complete transit network that is integrated seamlessly with maps, ticketing and real time coordinated arrival times make using transit a much more attractive option for all users.

Measure: Number of TSR Routes Intersected

For each proposed corridor it was determined how many of the 2017 Transit System Redesign (TSR) bus routes intersect the corridor. All bus routes which have the same or nearly the same alignment were removed from the number of intersecting routes.

Rating	Description
High Over 35 intersecting routes	Six corridors fall into the “High” category: 1, 6, 7, 8, 9, and 22. These corridors intersect with between 36 and 51 bus routes throughout the region.
Medium 25 – 35 intersecting routes	Ten corridors fell into the “Medium” category intersecting with 25 to 33 bus routes. These corridors include several areas identified as needing additional transit services or fast growing areas that might not yet have services in place as needed.
Low 0 - 24 intersecting routes	Corridors that fall into the “Low” category include: 5, 10, 11, 17, 18, 21, 23, 24, and 25.

Quality of Potential Connections

The frequency of transit service, particularly along high capacity corridors, can significantly impact ridership. Passengers want to know that the service frequency will allow them to easily connect to other regional transit services. This measure evaluates how each corridor’s connectivity to the overall network will be strengthened by connections with higher capacity service.

Measure: Number of TSR High Frequency Routes Intersected

For each proposed corridor it was determined how many of the TSR high frequency bus routes intersect the corridor. A TSR high frequency bus route is defined as a corridor having 15-minute or better service throughout the day. Having good connections to frequent connecting routes increases the capacity of the system to provide timed transfers to large numbers of passengers and increases the overall attractiveness of the transit system. All TSR frequent routes which have the same or nearly the same alignment were removed from the number of intersecting routes.

Rating	Description
High More than 9 routes	Five corridors intersect with a high number TSR high frequency routes. These are 1: Former Freight Corridor; 3: East Broad; 8: North High Street; 9: Columbus-Dublin; and 19: Grove City. These corridors are designed to handle large numbers of timed transfers to other destinations in the network.
Medium 6 - 9 routes	Thirteen corridors fall into the "Medium" category of intersecting TSR high frequency routes. These are: 2, 4, 5, 6, 7, 12, 13,14,15,16, 20, 21, and 22.
Low 0 – 5 routes	Seven corridors fall into the "Low" category and do not have a high number of TSR high frequency intersecting routes. These include (in ascending order) 25, 23, 17, 18, 24, 10, and 11.

Consistency with Local Planning

Investments in high capacity transit corridors function best when accompanied by transit supportive land uses. Transit supportive land uses include the following categories: Community Commercial, Education, Higher Education, Hospitals, Neighborhood Commercial, Neighborhood Mixed Use, Office, Regional Commercial, Residential High Density Suburban and Urban.

Other categories of land uses are less supportive of transit investments because they typically do not generate enough trips. Non-supportive land uses for transit systems include: Agriculture, Correctional Facilities, Government, Industrial and Light Industrial, Open Space, Parks and Protected Land, Public Parking, Quarries, Rail Yards, Low to Medium Residential (Rural, Suburban and Urban), Rights of Way (existing and future roads), Utilities, Vacant Land, Warehouses and Water bodies.

Airports are one of the land use categories around which there is some debate as to the transit supportive nature. Some airport transit connections have very low ridership due to the necessity for most riders to transfer from their home or office to the airport, the inconvenience of carrying luggage to the bus stop and on the bus, and employees that work at airports often have work hours that are difficult to serve with transit, unless the span of service is close to 24 hours a day. However, some airports have high transit ridership, particularly when there is frequent transit service during most of the day, connections between the transit stop and the terminal are convenient, and there are good connections to the rest of the transit network in place. For these reasons, as well as the high level of public support in Columbus for an airport connection, for this analysis, airport land use parcels were considered a transit supportive land use.

Measure: Percentage of total land within ¼ mile of the transit corridor that is transit supportive

For each proposed corridor, the total acreage of transit supportive parcels was calculated as a percentage of total acreage of all parcels located within a ¼ mile of the transit corridor. The source of the land use data is MORPC's Franklin County Land Use shape file.

Rating	Description
High Over 50% transit supportive land uses	The five transit corridors with the highest percentages of transit supportive land uses include 9: Columbus-Dublin (51% transit supportive), 8: N High Street (52% transit supportive), 14: West Broad (54% transit supportive), 21: U. Arlington-Easton (55% transit supportive), and 16: East Downtown (with 63% transit supportive land use).
Medium 41 to 50% transit supportive land uses	Six corridors fall within the "Medium" transit supportive land use category. These include 6, 17, 5, 4, 10, and 7 with transit supportive land uses representing from 42% to 48% of total land within a quarter mile of the corridor.
Low 0 to 40% transit supportive land uses	The remaining fifteen corridors are in the "Low" category of transit supportive land use. These include 20, 2, 24, 11, 12, 1, 25, 3, 19, 13, 15, 23, 18, and 22.

Goal: Invest in Underserved Communities

Transit Dependent Households

High capacity transit corridors can particularly benefit households that are lower income and those that do not have reliable or regular access to a vehicle. This section looks at the number of zero vehicle households relative to income to determine poverty ranking. There is not always a direct correlation between income and car ownership. An increasing trend with the millennial generation (people born between 1977 and 1992) is to delay or avoid car ownership in favor of taking transit, cycling, walking, or using car sharing services. However, some households remain carless because they cannot afford to own and operate a car and rely on transit for many or most of their daily travel needs. The difference between household income levels and car ownership indicates whether not owning a car was by choice or by necessity.

Measure: Index of zero vehicle households within ¼ mile per corridor mile

Data on individuals without access to a vehicle was obtained from the American Community Survey (2012) at the Block Group level. The total number of these individuals that would be served by each corridor formed the basis for the ratings.

To determine the number of zero vehicle households that would be served by each corridor, the study team summed all the households in Block Groups whose centroids were within 1/4-mile of each corridor, but this figure gave longer corridors an advantage due to their larger service area. Therefore, a zero vehicle household figure normalized by the length of the corridor was developed. The normalized score for each corridor was then divided by the average score across all corridors to produce an index value. Therefore, an index of 1 is average; a score below 1 indicates a corridor that would indicate below average, while a score above 1 indicates a corridor that would be above average.

Rating	Description
High Index above 2.0	The highest numbers of zero vehicle households are found along corridors 16: East Downtown and 15: Franklin-Downtown. Corridor 15 also ranked as the highest poverty block group indicating a large number of captive riders and a transit dependent community. This contrast with corridor 16 which ranks low in poverty per corridor mile, indicating a large number of zero vehicle households are transit riders by choice who could afford to own and drive a car if they wanted to, but have chosen not to.
Medium Index 0.9 to 2.0	Ten corridors fall into the “Medium” category of vehicle ownership: 2, 3, 4, 5, 6, 7, 8, 12, 13, and 14. Some of these corridors fall into the “Medium” or “High” category for Poverty per Corridor Mile as well, indicating a corridor has more riders by choice and households that choose to live without a car even though they could likely afford one.
Low Index below 0.9	Thirteen corridors ranked “Low” in the number of zero vehicles per corridor mile, including: 1, 9, 10, 11, 17, 18, 19, 20, 21, 22, 23, 24, and 25.

Jobs/Housing Balance

This measures the ratio of jobs to residents along the corridor. Fewer jobs per capita may result in higher transit ridership as residents must seek employment elsewhere in the region and commute outside their neighborhood to get to work. Fewer jobs per capita and high transit ridership is also an indication of the lack of affordable housing in city centers or high employment areas that force middle to lower income families to commute long distances to reach their jobs. A ratio of 1:1 means population and jobs are evenly balanced along a transit corridor, an ideal situation for people who live and work along the line. A ratio below 1 indicates an area with few jobs and numbers above 1 to 4 indicate increasing employment density and a lack of housing in the area to match the number of jobs there, forcing longer commutes.

Measure: 2015 ratio of jobs to population

The analysis used regional population and employment data from MORPC for 2015. The number of residents and jobs within a 1/4-mile buffer of each corridor were used to create a ratio of jobs to population for 2015.

Rating	Description
High Below 1 jobs to population ratio	The "High" jobs to population ratio corridors are more predominantly residential areas that serve local trips and have few local jobs. These four corridors include 10, 11, 21, and 13 with a jobs housing balance between 0.81 and 0.86.
Medium 1 to 2 jobs to population ratio	Seven corridors fall in the "Medium" range with a population to jobs ratio of one person for every four jobs. In ascending order (becoming more employment focused), these corridors are 5, 18, 4, 2, 8, 9, and 22.
Low Above 2 jobs to population ratio	The remaining corridors had "Low" (above 4 jobs per resident) ratios of current jobs/housing balance. One corridor –16: East Downtown – has the highest Jobs to Housing ratio of 13.28 jobs per dwelling unit along this corridor, far higher than the other corridors.

High Need Areas

The Columbus region is committed to investing in underserved neighborhoods to ensure regional equity and access. If an area or corridor has been identified by regional planning efforts as overlooked or otherwise disenfranchised, investments in high capacity transit can help residents connect with jobs, educational opportunities, and social services throughout the region.

Further, income status is one of the strongest indicators of a higher-than-average reliance on public transportation; people with lower incomes are less likely to have reliable access to a private vehicle and thus are more likely to use transit. The study team gathered demographic data to estimate the number of individuals living below the poverty level that would be served by each corridor. The total number of these individuals that would be served by each corridor formed the basis for the ratings.

Measure: Index of households below the poverty line within ¼ mile per corridor mile

The number of individuals in poverty was obtained from the 2008-2012 American Community Survey (ACS), which gives data at the Block Group level (generally a cluster of city blocks). ACS gives data on the number of people below the poverty threshold only for people ages 18 and over. The ACS' poverty thresholds are dependent on household size. In 2012, the threshold was an annual income of $11,945 for a single person household, $15,450 for a household of two and higher for additional people.

To determine the number of households living below the poverty level that would be served by each corridor, the study team summed all the households in Block Groups whose centroids were within 1/4-mile of each corridor, but this figure gave longer corridors an advantage due to

their larger service area. Therefore, a low-income population figure normalized by the length of the corridor was developed. The normalized score for each corridor was then divided by the average score across all corridors to produce an index value. Therefore, an index of 1 is average; a score below 1 indicates a corridor that would improve transit service for a below average number of low-income households, while a score above 1 indicates a corridor that would improve transit for an above average number of low-income households.

Rating	Description
High Index above 1.4	Six corridors rate as high: 5, 6, 13, 14, 15, and 21. The highest concentration of households in poverty per route mile is found along corridor 15: Franklinton-Downtown with an index of 1.82.
Medium Index 0.9 to 1.4	Nine corridors fall into the "Medium" category. In the order of ascending poverty levels per route mile we have corridors 4, 2, 22, 19, 11, 12, 8, 7, and 9.
Low Index below 0.9	The corridors ranked "Low" for poverty per corridor mile (in ascending order) include corridors 25, 23, 26, 17, 18, 24, 10, 3, 20, 1, and 16. These corridors are surrounded by more affluent neighborhoods where transit would need to compete better with automobile travel in order to capture more "riders by choice". It is interesting to note that Corridor 16: East Downtown has the second highest number of zero vehicle households (2.62) but a low (0.89) poverty rate, indicating these are more affluent urban dwellers who choose to live without a car and use transit and other modes for a greater share of total trips.

Goal: Build on Success

Existing Ridership in Corridor or Area

An analysis of existing ridership determines the potential demand for future transit investment (high ridership suggests more need) based on current ridership levels by corridor length. This metric reflects boardings and alightings for all transit stops within ¼ mile of the corridor length.

Measure: Total Ridership within ¼ mile of the Corridor

The ratings in this Tier 1 criterion were based on the amount of COTA ridership in the vicinity of each corridor, assuming that more activity in an area would be a likely indication of more ridership activity that may benefit from premium transit service. The study team used 4 months of ridership data from automated passenger counters onboard COTA buses from September 2014 to December 2014 to determine average weekday boardings and alightings by stop for all of COTA's fixed-route stops. The team then mapped the location of each transit stop. Boardings and alightings were then summed to determine overall stop activity within a 1/4-mile service area buffer of the corridor.

Rating	Description
High Ridership above 18,000	Eight corridors ranked “high” in total existing ridership, including in ascending order: 14, 3, 1, 7, 22, 9, 8, and 10. One corridor – 10: Dublin – Easton – stands out as having an existing ridership of 76,895 people.
Medium Ridership between 9,000 and 18,000	Seven corridors had ‘Medium’ ridership levels, ranging from 10,106 riders to 17,038 riders. These corridors were: 5, 16, 4, 6, 12, 19, and 20.
Low Ridership below 9,000	The remaining ten corridors had “Low” ridership levels between 81 people and 8,034 people. These corridors were: 25, 23, 17, 18, 24, 2, 11, 15, 21, and 13.

Passengers per Hour on Existing Services

The number of “passengers per hour” is a basic measure of productivity, i.e. how many riders per unit of service are obtained. Existing high productivity routes are also an indication that these routes will continue to be productive and successful into the future.

Measure: Average passengers per hour on existing COTA routes by corridor mile

Along each corridor, COTA routes that have the same alignment as the proposed corridor were selected if they share the alignment of the proposed corridor for over one mile. If multiple existing COTA routes overlap with the proposed corridor, the highest performing of these routes was used for this analysis. For each route overlapping with a corridor, the percent of the corridor overlapped by the route and the productivity of the overlapping route were determined. An average productivity measure was calculated by summing the product of the percent of the corridor overlapped by each route and the productivity of each route. Note that this measure uses productivity (passengers per hour) for entire routes, as productivity data was not available by stop.

Rating	Description
High Over 25 passengers/hour by corridor mile	Six corridors fall into the "highly productive" category, averaging from 27 to nearly 32 passengers per corridor mile. These are Corridor 5: East Livingston, Corridor 1: Former Freight Corridor; Corridor 4: East Main, Corridor 8: N High Street, Corridor 3: East Broad, and Corridor 14: West Broad.
Medium Between 18 and 25 passengers/hour by corridor mile	Twelve corridors fall into the "medium productivity" category, with 18 to 23 average passengers per corridor mile. These are (in ascending order) corridors 20, 18, 10, 24, 11, 12, 6, 7, 19, 9, 15 and 16.
Low Below 18 passengers/hour by corridor mile	There are seven corridors in the "lower productivity" category, with 13 to 16 passengers per corridor mile on average. These include Corridor 22: Downtown-Polaris with the lowest productivity in the system, and corridors 25, 17, 13, 2, 23, and 21. Many of these corridors do not have robust service on them now.

Potential for Travel Time Savings

Traditionally, traffic engineers have sought to alleviate traffic congestion by adding more roadway capacity. However, as urban areas have grown more congested and the availability of land to expand traffic lanes has disappeared over time or became too expensive to acquire, more creative ways to add capacity and improve travel times for buses in high traffic volume conditions have had to be employed.

National market research has shown that potential patrons are more likely to consider transit if congestion levels increase, if transit service has a meaningful way to travel through the congestion in an expedited manner. This analysis of congested corridors analyzes the top transit corridors for potential travel time enhancement investments.

Measure: Volume to Capacity Ratio on the corridor

For each corridor, each street section along the corridor was identified. In order to determine the total volume of the corridor, the sum of the volumes of each street section along the corridor was determined. Similarly, in order to determine the total capacity of the corridor, the sum of the capacities of each street section was determined. The volume to capacity ratio (V/C) for each corridor was determined by dividing the summed corridor volume by the summed corridor capacity. The volume of capacity measure should be seen as a relative measure of congestion along any particular corridor. Traffic volume and street capacity data were provided by MORPC.

Rating	Description
High Over 0.65 V/C ratio	Eight corridors fall within the “High” congestion category with V/C ratios between 0.65 and 0.71. These are corridors 25, 17, 8, 18, 10, 12, 23, and 1. These corridors are very congested and without dedicated facilities, transit service would have trouble keeping on schedule.
Medium 0.5 to 0.65 V/C ratio	Thirteen corridors fall within the “Medium” category. These corridors will experience delays during peak hour congestion but not have as variable travel times during off-peak hours. These are corridors 7, 20, 9, 22, 21, 4, 13, 5, 6, 3, 24, 11, and 16. These corridors have V/C ratios from 0.51 to 0.65.
Low Below 0.5 V/C ratio	Just four corridors are in the “Low” congestion category: 2, 19, 15, and 14.

Goal: Coordinate with Growth

Transit Supportive Development Density

By developing land at higher residential densities and a higher percentage of mix of uses, more origins and destinations become located within walking, bicycle and transit proximity. Zoning and planning for transit supportive densities are tools local governments can use to ensure future livable communities, reduced vehicle miles travelled (VMT) and high productivity transit corridors.

Measure: Index of population and employment within ¼ mile per corridor mile (2015)

This analysis looks at existing 2015 population and employment density from the MORPC located within ¼ mile of the transit corridors that could support high, medium and lower transit service. The analysis summed the total population and jobs located within ¼ mile buffer of each corridor. The total population and jobs for each corridor was normalized by the length of the proposed corridor to generate an index based on the average across all 26 corridors.

Rating	Description
High Index Over 2.0	Four corridors have high population and employment densities. These are Corridor 6: Neil Avenue, Corridor 7: 5th Avenue and High Street, Corridor 15: Franklinton-Downtown and Corridor 16: East Downtown. Combined population and employment per route mile in these corridors range from 15,794 to 23,745, with the highest density found in the East Downtown area.
Medium Index 0.7 to 2.0	Mid-range population and employment per route mile are found along eleven corridors, including corridor 5, 4, 20, 1, 19, 22, 3, 14, 12, 9, and 8. These corridors show combined population and employment densities per route mile in the range from 5,350 to 10,392.
Low Index Below 0.7	Ten corridors are in the “Low” category with 2,912 to 4,822 population and employment per route mile.

Projected Future Population and Employment Density

The size of the projected 2040 population and number of jobs within a quarter mile of transit in the employment market served is another way to measure density and helps determine the economic sustainability of current bus routes in the future. The analysis helps to determine if current routes will still be viable in the future, or if route restructuring will be needed to serve new centers of population and employment, capturing changes over time.

Measure: Index of 2040 population and employment within ¼ mile per corridor mile

This analysis uses 2040 population and employment projections from MORPC located within ¼ mile of each proposed transit corridor. The total population and jobs projected for 2040 for each corridor was normalized by the length of the proposed corridor to generate an index based on the average across all 26 corridors.

Rating	Description
High Index Over 2.0	The corridors that serve areas with the most population and jobs include Corridor 6: Neil Avenue; Corridor 7: 5th Avenue and High Street; Corridor 15 Franklinton-Downtown and Corridor 16: East Downtown with an index of 3.22.
Medium Index 0.7 to 2.0	Corridors that fall into the "Medium" combined category of population and employment density include (in ascending order) Corridors 13, 5, 4, 20, 1, 19, 22, 3, 14, 9, 12, and 8 with combined population and employment ranging from 6,258 to 12,053 per corridor mile in the ¼ mile buffer area in 2040. However, looking at population and employment alone (not factoring in corridor length), Corridor 8: N. High Street had the highest forecast population within a quarter mile (66,314) and the highest forecast employment (112,535 jobs).
Low Index Below 0.7	Low density population and employment corridors include (in descending order) corridors 11, 24, 18, 23, 10, 17, 25, 2, and 21. The combined population and employment in the quarter mile buffer of these corridors range from 34,907 to 65,315 in 2040.

Rate of Change in Population and Employment

The rate of positive change (or growth) in population and employment within ¼ mile of each transit corridor looks at areas with increasing population and employment density, which demonstrate an improving environment for transit oriented development.

Measure: Index of change in population and employment within ¼ mile per corridor mile (2015-2040)

This analysis uses 2040 population and employment projections along with 2015 data from MORPC located within ¼ mile of each proposed transit corridor. The difference between the total population and jobs projected for 2015 and 2040 for each corridor was normalized by the length of the proposed corridor to generate an index based on the average across all 26 corridors.

Rating	Description
High Index over 2.0	The projected high growth areas for population and employment in 2040 show a continued growth in already highly developed downtown areas served by Corridor 7: 5th Avenue and High Street, Corridor 16: East Downtown, and Corridor 15: Franklinton-Downtown.
Medium Index from 0.7 to 2.0	There are thirteen corridors in the "Medium" category of projected growth, including (in increasing density order) Corridors 4, 1, 20, 2, 22, 19, 9, 3, 13, 8, 14, 12, and 6. These are areas characterized by continuing infill development along the transit corridors to support their growth as population increases.
Low Index below 0.7	Projected "Low Growth" corridors include the areas around corridors 11, 24, 10, 23, 18, 25, 21, 17, and 5. These corridors are not projected to have significant population and employment growth in relation to the other corridors.

Goal: Sustainability

Repurposing Space

A look at abandoned corridors, vacant lots, toxic waste sites, other areas is one way to assess the environmental sustainability of transit corridors. High capacity transit can be a powerful catalyst for new investment and redevelopment of projects. Once a transit project or corridor is selected for transit system upgrades, more studies are conducted under NEPA regulations to identify environmental impacts, station locations and potential redevelopment sites.

For the purpose of this study, "Brownfield sites" are defined as "abandoned, idled, or under-used industrial, commercial, or institutional property where expansion or redevelopment is complicated by known or potential releases of hazardous substances or petroleum."[1] Special funding is available from the Federal government to cap and re-use known or suspected former toxic waste sites as a less expensive alternative to digging up the tainted soil and disposing of it elsewhere. Transportation projects are listed as one of the redevelopment end uses, since transportation related projects typically cap or pave over many acres of land (such as for parking lots, access roads, maintenance and storage yards, etc.)

Measure: Number of Brownfield sites per corridor mile

Brownfield sites that intersect a ¼ mile buffer around each corridor were selected. The number of selected brownfield sites were summed, and then normalized by the length of the corridor. An index of the average number of accessible brownfield sites for all 26 corridors was used to rank the alternatives.

[1] Ohio Environmental Protection Agency. http://epa.ohio.gov/derr/SABR/brown_dtb/browndtb.aspx

Rating	Description
High Index of more than 1	The two corridors in the "High" category include Corridor 16: East Downtown with two redevelopment sites along its 1.95 mile corridor and Corridor 15: Franklin-Downtown ranked the highest in terms of potential redevelopment sites with three identified along its 1.82 mile long corridor.
Medium Index of 0.5 to 1.0	Four corridors fall into the "Medium" category of redevelopment sites including Corridor 13 (with 5 sites along 9.4 miles), Corridor 6 (with 4 sites along 5.62 miles), Corridor 7 (with 3 sites along 4.77 miles) and Corridor 2 (with 6 sites along 7.9 miles).
Low Index below 0.5	The remaining nineteen transit corridors in the "Low" category have between 1 and 4 potential redevelopment sites spotted along their length.

Service in Congested Corridors

Providing high quality transit service in congested corridors is one of the biggest challenges transit agencies face in delivering service that is fast enough to attract drivers out of their cars. These high density corridors are often so congested the bus gets stuck in local traffic. Where providing dedicated rights of way for transit to move faster than local traffic is ideal, it is often not possible due to the amount of local traffic, restricted rights of way, and competition for this space by multiple users: bicyclists, pedestrians, and parked cars. Congested corridors are seen as an opportunity by transit planners to identify ways to improve bus travel times as a way to attract drivers out of their cars (seeing the bus go by while they are stuck in traffic).

Measure: Volume to Capacity Ratio on the corridor (2040)

For each corridor, each street section along the corridor was identified. In order to determine the total volume of the corridor, the sum of the 2040 volumes of each street section along the corridor was determined. Similarly, in order to determine the total capacity of the corridor, the sum of the capacities of each street section was determined. The volume over capacity for each corridor was determined by dividing the summed corridor volume by the summed corridor capacity. The volume of capacity measure should be seen as a relative measure of congestion along any particular corridor.

Rating	Description
High V/C ratio over 0.7	Eight corridors fall within the “High” congestion category with V/C ratios over 0.7. These are corridors 23, 17, 18, 25, 22, 8, 10, and 1.
Medium V/C ratio of 0.6 to 0.7	The majority of corridors fall within the “Medium” category. These corridors will experience delays during peak hour congestion but may operate well during other times.
Low V/C ratio below 0.6	Five corridors are in the “Low” congestion category. These are corridors 15, 7, 19, 14, and 20.

CORRIDOR COMPOSITE ANALYSIS

Figure 4 presents a composite analysis of the Tier 1 Screening across the five community priority areas. Within each community priority area, corridors were rated as follows:

Low	Any corridor with two or three “low” measures
Medium	Corridors with at least two “medium” measures or a mix of “low” and “high”.
High	Any corridor with at least two “high” measures

It is important to note that this analysis did not result in a ranking of the corridors. Rather, corridors are organized into groupings indicating whether further analysis is required. In general, corridors with four or more medium or high ratings are recommended to proceed with Tier 2 screening analysis. Some corridors on the margin were recommended for additional Tier 2 analysis based on public interest in these services as indicated by the online survey conducted as part of Phase 2 outreach. Transit services to the airport had strong public support. Fully 32% supported Corridor 2 and 40% supported Corridor 24. Both corridors were moved into Tier 2 Screening. In addition, Corridor 11 was selected for additional analysis as a result of coordination discussions with MORPC and City of Columbus.

Corridor 26, connection to Newark, is envisioned as a commuter service and is intrinsically different than each of the other corridors due to its length, regional nature, and peak service span. This concept will be evaluated further as part of developing a regional long-range transit plan; however it will not be fully evaluated in Tier 2 as the evaluation process is not suited for this type of service. Market potential and ridership modeling will be conducted.

Overall, eight corridors did not show sufficient warrants to support high capacity transit. The NextGen process will consider service enhancements in all eight corridors, including new service, additional frequency, better weekend service, and express bus connections.

The Tier 2 evaluation process will allow potential high capacity transit corridors to be compared to one another. Some, though not all, of the criteria are related or identical to measures used by the Federal Transit Administration to evaluate projects for federal funding. This ensures that projects that are prioritized as part of the NextGen process have characteristics that are desirable for future funding. However, in keeping with the values of the community which drove the development of the evaluation framework, not all measures that will be used in the Tier 2 process are a part of the FTA funding process. The goal of this process is to prioritize projects that address the community’s goals and desires, and are also well positioned to be realized through the FTA funding process.

Figure 4 Tier 1 Screening Analysis Results

Not Recommended for Further Analysis

Map ID	Corridor Name	Make Better Connections	Invest in Underserved Communities	Build on Success	Coordinate with Growth	Sustainability
10	Dublin-Easton	Low	Medium	Medium	Low	Medium
17	Polaris-Easton	Low	Low	Low	Low	Medium
18	Dublin-New Albany	Low	Low	Medium	Low	Medium
19	Grove City	Medium	Low	Medium	Medium	Low
20	Groveport-Rickenbacker	Medium	Low	Medium	Medium	Low
21	U. Arlington-Easton	Medium	High	Low	Low	Medium
23	Dublin-Easton via I-270	Low	Low	Low	Low	Medium
25	Dublin-Polaris via I-270	Low	Low	Low	Low	Medium

Recommended for Tier 2 Analysis

Map ID	Corridor Name	Make Better Connections	Invest in Underserved Communities	Build on Success	Coordinate with Growth	Sustainability
1	Former Freight Corridor	High	Low	High	Medium	Medium
2	5th Ave Grandview-Airport	Medium	Medium	Low	Low	Medium
3	East Broad	Medium	Low	High	Medium	Medium
4	East Main	Medium	Medium	Medium	Medium	Medium
5	East Livingston	Medium	Medium	Medium	Medium	Medium
6	Neil Avenue	Medium	Medium	Medium	High	Medium
7	5th Ave & High Street	Medium	Medium	Medium	High	Medium
8	N High Street	High	Medium	High	Medium	Medium
9	Columbus-Dublin	High	Medium	Medium	Medium	Medium
11	Eastland Mall-Easton	Low	Medium	Medium	Low	Medium
12	Alum Creek-Whittier	Medium	Medium	Medium	Medium	Medium
13	Ohio/Champion-OSU	Medium	High	Low	Medium	Medium
14	West Broad	Medium	Medium	High	Medium	Low
15	Franklinton-Downtown	Medium	High	Low	High	Medium
16	East Downtown	Medium	Low	Medium	High	Medium
22	Downtown-Polaris	Medium	Medium	Medium	Medium	Medium
24	Downtown-Airport-Easton	Low	Low	Medium	Low	Medium