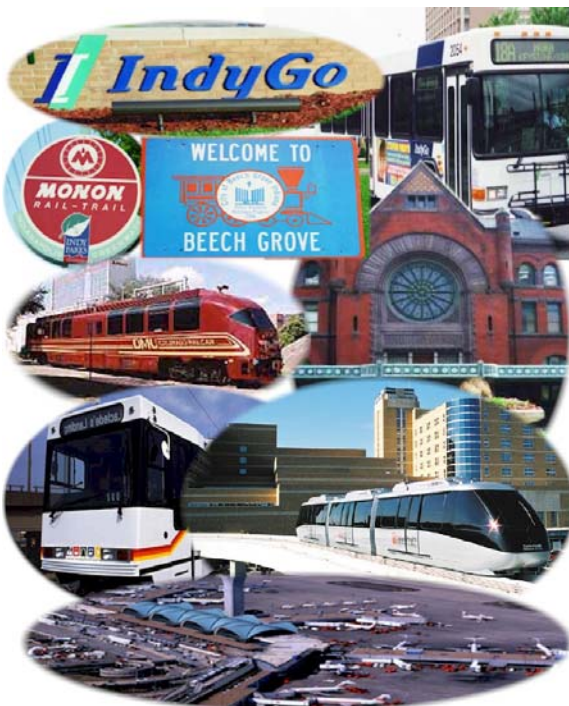




INDIANAPOLIS  
METROPOLITAN PLANNING ORGANIZATION

Tech Memo I-7C  
Regional Systems  
Evaluation Report

Indianapolis Metropolitan Area Rapid  
Transit Study



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### I. ENVIRONMENTAL JUSTICE ISSUES

#### A. Introduction to Environmental Justice

The purpose of this Phase I Tech Memo on *Environmental Justice (EJ)* is to issue general information on the Title VI of the 1964 Civil Rights Act (42 U.S.C. 2000d-1) and related regulations, The President's Executive Order on Environmental Justice, the U.S. DOT Order, and the FHWA Order.

This Tech Memo is to be considered at this preliminary Phase I stage of the overall study as a presentation of general information about the EJ program, as well as an outline of the elements of the EJ planning program to be included in the upcoming phases of work. The EJ program will become especially important in the next phase of work as route alignments and specific technologies are further defined and evaluated for impacts on the community and neighborhoods.

#### B. Title VI Background

Title VI states that "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

The Environmental Justice (EJ) Orders further amplification of Title VI by providing that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations". While Title VI and EJ concerns have most often been raised during project development, it is important to recognize that the law also applies equally to the processes and products of planning.

#### C. Public Involvement

A fundamental principle of environmental justice is to conduct a meaningful and inclusive public involvement effort that seeks to involve minorities and low-income populations in the decision making process at all levels of the project development phases. This is important because of the potential effects of not considering environmental justice issues, such as the following, throughout the project planning phases.

- Disproportionately high and adverse effects on minority and low-income populations due to real estate development changes that may occur due to the implementation of the project.
- Investments that decrease racial and economic segregation, and supports the creation of affordable housing.
- Vast changes to the social structure present in the current neighborhoods.
- Preservation of racially and ethnically mixed neighborhoods.
- Negative impacts on accessibility, i.e. jobs, housing, health care, social activities, shopping, education centers, and recreation.





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### D. Elements of the Environmental Justice Planning Program

The following efforts and information will be undertaken and presented in the next phases of this study to ensure compliance with Title VI requirements.

- Demographic profile information of the metropolitan planning area will be attained that includes the identification of the locations of socio-economic groups, including low-income and minority populations.
- Undertake a planning process that provides an analytical approach for assessing the regional benefits and burdens of the transit system investments for different socio-economic groups.
- Undertake a public involvement process that provides a strategy for engaging minority and low-income populations...reduce participation barriers.
- Engage organizations representing low-income and minority populations, as well as, utilize media targeted to low-income or minority populations.
- Develop mechanisms to ensure that issues and concerns raised by low-income and minority populations are appropriately considered in the planning process.

## II. REGIONAL TRANSIT ACTIVITY/ DEMAND CENTERS

### A. Introduction to Regional Transit Activity / Demand Centers

The Indianapolis region is centered on Marion County with eight counties surrounding it. Even though Marion County's population and employment are projected to decline by 2025 and the surrounding counties' population and employment are expected to continue to grow, Marion County will have over three-quarters as much population and more jobs than all of the other counties combined in 2025. Marion County's 2000 population of 860,500 is projected to decrease to 854,000 by 2025, compared with the eight surrounding counties whose 2000 population of 747,000 is projected to reach 1,104,800 by 2025, for a regional total of roughly two million. Marion County's 2000 employment of 576,300 is projected to decline to 558,500 by 2025, compared with the eight surrounding counties whose 2000 employment of 364,700 is projected to increase to 495,700 in 2025, for a regional total of a little over one million jobs. Of the eight counties, three—Hamilton to the north, Johnson to the south, and Hendricks to the west--account for the bulk of the workers commuting to Marion County for work.

The existing radial roadway and rail networks, which are focused on downtown Indianapolis in Marion County, reflect the region's historic development pattern and reinforce the projected growth pattern. In addition to the numerous activity centers located in downtown Indianapolis and Marion County, numerous attractions and destinations are located in the surrounding counties.

The challenge in defining a regional transit network is to link as many as possible of the key (existing and potential future) attractions and destinations with a cost-effective network of routes. Rapid transit corridors need to use or at least parallel existing highway/rail corridors, where possible, in order to minimize displacements and neighborhood disruption to community cohesion. For the eight county Indianapolis metropolitan planning region, this logically means building on the region's numerous existing corridors that consists of either a major highway right-of-way or an existing railroad right-of-way (active or inactive tracks) or the combination of the two rights-of-way that could feasibly support a fixed guideway or busway transit system. These fixed transit systems would be fed and supported by a





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network of lateral bus feeder routes. (Figure 1—Regional Study Corridors shows conceptually the potential transit corridors considered for the region and Table 1 describes the key routes.) Accordingly, the Indianapolis region was divided into eight conceptual study sectors that: 1) contain candidate highway/rail alignments; 2) that contain multiple activity/high demand centers (shown in Figure 2—Regional Activity Centers); and 3) that correspond to the travel desire lines that graphically show in order of magnitude line widths the trip density patterns between the centroids of the traffic zones for the region (refer to the patronage forecasting model discussion in Tech Memo I - 7B). Figure 3--Regional Study Sectors shows the eight study sectors, which are labeled according to the points of a compass.

### B. Key Variables

Figure 2 shows the Indianapolis regional activity centers; as well as, the region's urbanized areas and mileage rings around the central business district (CBD). Employment concentrations represent one of the most significant markets for a regional rapid transit system. The employment concentrations for the Indianapolis Metropolitan Region include: the Indianapolis central urbanized area/CBD which has and is forecasted to have the highest employment density in the region; regional service centers, such as the airport; regional commercial corridors and centers, including shopping centers; major industrial/manufacturing centers; and large governmental and institutional employers, such as: hospitals and university campuses. Dense residential concentrations will similarly generate riders for transit and represent a market to serve. Trips will also be made for entertainment and student commuters, especially those attending universities and colleges. Transfer facilities for intermodal transit and parking facilities that may be able to be jointly used by transit patrons represent additional interface points for a regional rapid transit system. Vacant Brownfields or underutilized property can offer the opportunity for redevelopment through transit-oriented development programs. Collectively, these land uses represent the kinds of major activity and potential transit demand centers that should influence the designation and selection of regional rapid transit corridors.

### C. Sectors

Figure 3 shows eight conceptual study sectors that were sketched to represent the geographical areas of the metropolitan planning region. These pie-shaped areas were used to put into perspective the concentrations and interrelationships of major activity/high demand centers, as well as the general commuter traffic sheds that consist of similar trips to-and-from the region's highest density and major employment trip generator ... the Indianapolis CBD. These study sectors do not assume or preclude the fact that commutes also occur between the study sectors. These cross-sector commutes will be taken into consideration in the design of the total Regional Transit System plan and in particular, will be represented through a local feeder and/or express bus network.

The following sections highlight the highway/rail routes and transit activity/demand centers in the eight sectors.

**North:** The primary radial highway corridor in the north sector is US 31 (Meridian Street), which parallels the former Monon Railroad, now the Monon Trail. The primary lateral feeders are: I-65/70, 38<sup>th</sup> Street, 86<sup>th</sup> Street, I-465, 116<sup>th</sup> Street, 146<sup>th</sup> Street, and SR 32. The sector includes the Carmel CBD and extensive corridor development along US 31. The smaller urbanized areas include: Westfield, Cicero, Arcadia, and Atlanta CBDs. In addition, the sector includes several high-density centers: the Indiana State Fair Grounds; the office/retail center at I-465 and SR 431, which includes Keystone at the Crossing; the Northwest Business Park; the Meridian Technology Center; major medical





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TABLE 1

Indianapolis Metropolitan Area Rapid Transit Study:  
Regional Study Corridors

<u>SECTOR/ CORRIDOR</u>	<u>ROUGHLY CENTERED ON</u>	<u>CONNECTION</u>	<u>LENGTH (IN MILES)</u>
<b>NORTH</b>			
N-1	116 <sup>th</sup> St.	US 31 to I-69, Fishers	8
N-2	US 31	I-465 to SR 19, Westfield	8
N-3	SR 32	US 31, Westfield to SR 19, Noblesville	6
N-4	SR 19 & Hoosier Heritage Railroad	SR 32, Noblesville to County Line (future connect. to Tipton & Kokomo)	12.5
<b>NORTHEAST</b>			
ConNECTIONS A	Binford Blvd. & Hoosier Heritage Railroad	Indy CBD to I-465, Castleton	10.5
ConNECTIONS B	I-69/SR 37 & Hoosier Heritage Railroad	I-465, Castleton to SR 32, Noblesville	9.5
NE-1	US 36/SR 67 & CSX, Cleveland Line	Indy Belt Railroad to SR 38, Pendleton	26.5
NE-2	SR 67/9 & CSX, Cleveland Line	SR 38, Pendleton to SR 32, Anderson	7.5
NE-3	SR 32 & Central Indiana & Western Railroad (shortline)	Anderson to SR 13, Lapel	9
NE-4	SR 32 & CSX, Cleveland Line	Anderson to County Line (future connect to Muncie)	7.5
NE-5	SR 32 & abandon RR corridor	SR 13, Lapel to SR 19, Noblesville	8





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<u>SECTOR/ CORRIDOR</u>	<u>ROUGHLY CENTERED ON</u>	<u>CONNECTION</u>	<u>LENGTH (IN MILES)</u>
NE-6	SR 38	SR 32, Noblesville to US 36, Pendleton	13.5
NE-7	SR 238	SR 37, Noblesville to US 36, Fortville	9.5
NE-8	CR 600W/Mount Comfort Rd. (prop. County Hwy. Upgrade)	US 36, McCordsville to 38 <sup>th</sup> St./ CR 300N	4.5
<b>EAST</b>			
E-1	CSX, Hunter Industrial Track	Indy Belt Railroad to Post Rd. (future extend. To Maxwell)	18.5
E-2	US 40 & abandon railroad to Greenfield	I-65/70, Indy CBD to SR 9, Greenfield	12
E-3	US 40	SR 9, Greenfield to County Line (future extend. to Knightstown)	9
E-4	SR 9	SR 9, Greenfield to US 52/ Amtrak CSX Line, Fountaintown	6.5
E-5	SR 9	US 40, Greenfield to Maxwell	5
E-6	SR 9	Maxwell to US 36, Pendleton	8.5
E-7	CR 600W (prop. County Hwy. up-grade)	US 40, Cumberland to US 52, New Palestine	3.5
E-8	CR 600W (prop. County Hwy. up-grade)	I-70 to US 40, Cumberland	3
<b>SOUTHEAST</b>			
SE-1	I-74 & CSX, Indiana and Ohio Railroad	Indy Belt Railroad to SR 44, Shelbyville	25.5
SE-2	I-74 & CSX, Indiana and Ohio Railroad	SR 44, Shelbyville to County Line (future extend. to Greensberg)	10





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<u>SECTOR/ CORRIDOR</u>	<u>ROUGHLY CENTERED ON</u>	<u>CONNECTION</u>	<u>LENGTH (IN MILES)</u>
SE-3	SR 9	CSX, Indiana and Ohio Railroad, Shelbyville to US 52, Fountaintown	10
SE-4	SR 44	SR 9, Shelbyville to US 31, Franklin (connects I-65 & I-74)	16
SE-5	CR700N/Fairland Rd., (prop. County Hwy. up-grade)	I-74, Fairland to US 31, New Whiteland	15
SE-6	CR 600W (prop. County Hwy. up-grade)	US 52 to I-74	5.5
SE-7	Washington St./US 52 & CSX (Amtrak line)	Indy Belt Railroad to New Palestine 10.5	
SE-8	US 52 & CSX (Amtrak line)	New Palestine to SR 9	7.5
SE-9	US 52 & CSX (Amtrak line)	SR 9 to Shelby County line	7.5
<b>SOUTH</b>			
S-1	US 31 & CSX, Louisville & Indiana Railroad	I-70, Indy CBD to SR 135, Greenwood	9.5
S-2	US 31 & CSX, Louisville & Indiana Railroad	SR 135, Greenwood to SR 44, Franklin	9.5
S-3	US 31 & CSX, Louisville & Indiana Railroad	SR 44, Franklin to County Line, Edinburgh	10
S-4	SR 135 & Indiana Railroad	I-70, Indy CBD to SR 144, Bargersville	16
S-5	SR 135 & Indiana Railroad	SR 144, Bargersville to County Line, Morgantown	15.5
S-6	SR 44	SR 144 to SR 135	5





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<u>SECTOR/ CORRIDOR</u>	<u>ROUGHLY CENTERED ON</u>	<u>CONNECTION</u>	<u>LENGTH (IN MILES)</u>
S-7	SR 144	SR 135, Bargersville to US 31, Franklin	6
S-8	(prop. new County Hwy.)	US 31, New Whiteland to SR 135	4.5
S-9	(prop. new County Hwy.)	SR 135 to SR 37	5
S-10	SR 144	(prop. new County Hwy.) to SR 135, Bargersville	4
S-11	SR 44	SR 37, Martinsville to SR 135	11.5
<b>SOUTHWEST</b>			
SW-1	SR 37 & proposed I-69 southern alignment	I-465 to SR 144, Bluffs	9.5
SW-2	SR 37 & proposed I-69 southern alignment	SR 144, Bluffs to Martinsville	14.5
SW-3	SR 67 & Indiana Southern RR	Martinsville to County Line (future extend. to Spencer)	9.5
SW-4	SR 67, Kentucky Ave., I-70, US 40 & CSX/Amtrak	SR 144, Mooresville to Indy Belt RR & Airport MidField Terminal to Indy CBD	12
SW-5	SR 67 & Indiana Southern RR	SR 144, Mooresville to Martinsville	14
SW-6	SR 144	SR 67, Mooresville to SR3 37, Bluffs	7
SW-7	SR 267	I-70 to SR 42, Mooresville	5
SW-8	SR 267	I-70 to US 40, Plainfield	3
SW-9	(proposed new hwy.)	US 40 to Mooresville Rd., Friendswood	5





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<u>SECTOR/ CORRIDOR</u>	<u>ROUGHLY CENTERED ON</u>	<u>CONNECTION</u>	<u>LENGTH (IN MILES)</u>
SW-10	SR 39	I-70 to SR 67	8.5
SW-11	CBD Transit Center, CSX, St. Louis Line to Airport MidField Terminal	Indy CBD to Airport MidField Terminal	12
SW-12	CBD Transit Center, Louis. & Indiana RR, Raymond St., (new) I-70 alignment to Airport MidField Terminal	Indy CBD to Airport MidField Terminal	12
SW-13	CBD Transit Center, CSX, St. Louis Line, US 40 to SR 267	Indy CBD to SR 267, Plainfield	13
<b>WEST</b>			
W-1	SR 267	US 40, Plainfield to US 36, Avon	4
W-2	US 36 & CSX, St. Louis Line	SR 267, Avon to SR 39, Danville	6.5
W-3	SR 267	US 36, Danville to abandon RR corridor	3.5
W-4	SR 39	US 36, Danville to abandon RR corridor	6
W-5	SR 39	I-70 to US 36, Danville	11.5
W-6	Raceway Rd. (prop. hwy. up-grade)	US 36 to abandon RR corridor	2.5
W-7	US 36	SR 267, Avon to Raceway Rd. (proposed hwy. up-grade)	2.5





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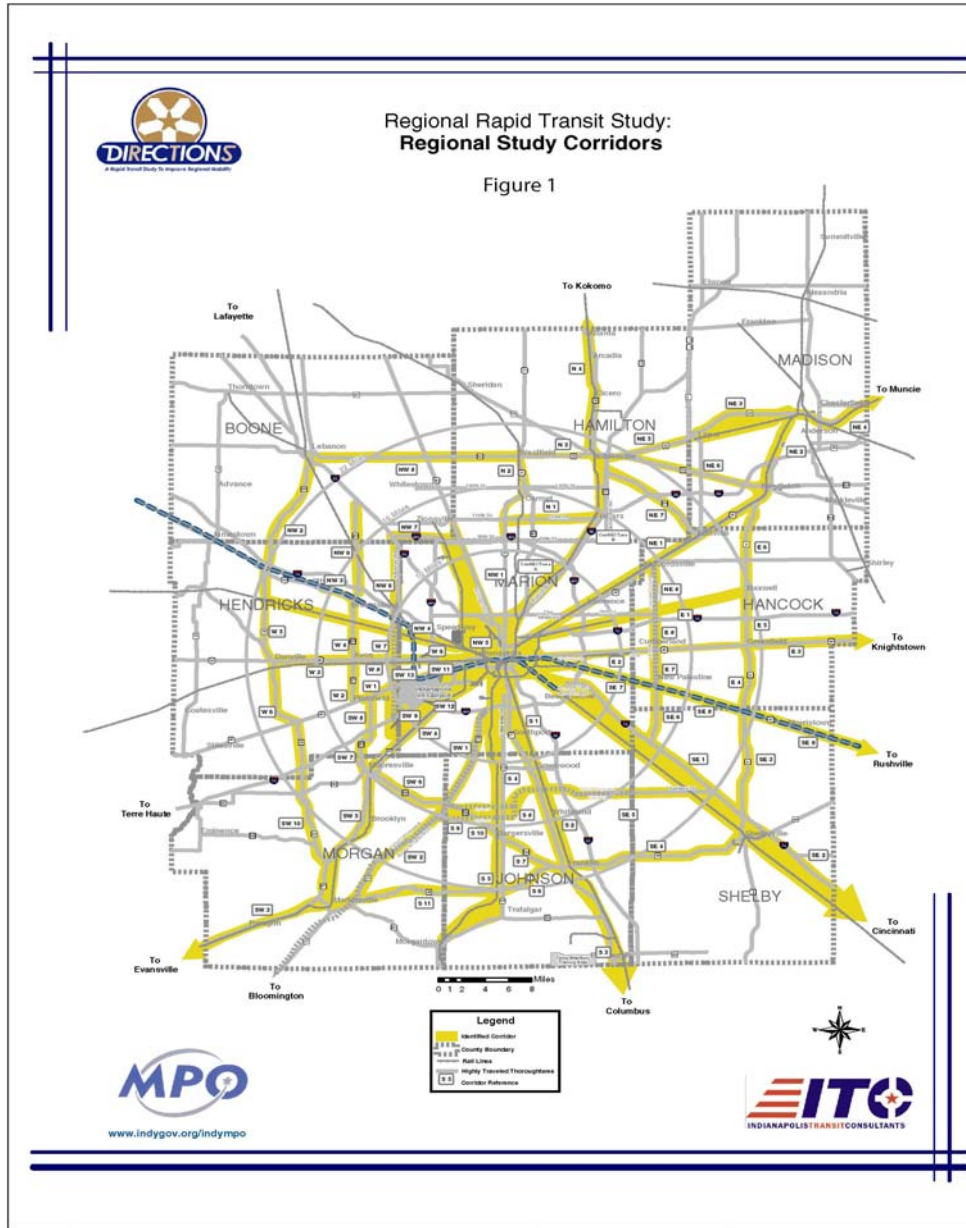
<u>SECTOR/ CORRIDOR</u>	<u>ROUGHLY CENTERED ON</u>	<u>CONNECTION</u>	<u>LENGTH (IN MILES)</u>
W-8	US 36	Raceway Rd. (proposed hwy. up-grade) to I-465	3.5
<b>NORTHWEST</b>			
NW-1	US 421, Michigan Rd. & CSX, Zionsville Ind. track	Speedway/Indy CBD to 96 <sup>th</sup> St., Zionsville	12.5
NW-2	SR 39	SR 32, Lebanon to abandon RR Corridor	15
NW-3	SR 267/SR 136 (Amtrak/CSX, Crawfordsville Branch)	abandon railroad corridor, Brownsburg to Pittsboro	5.5
NW-4	abandoned railroad corridor	SR 39 to Speedway	17.5
NW-5	CSX active line	Speedway to Indy CBD	3
NW-6	Raceway Rd. (prop. hwy. up-grade)	I-65 to abandon railroad corridor	8
NW-7	I-865	I-65 to I-465	4
NW-8	SR 32	SR 39, Lebanon to US 31, Westfield	17.5
NW-9	SR 267	I-65 to CSX, Crawfordsville Branch	9.5





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Figure 1: Regional Study Corridors

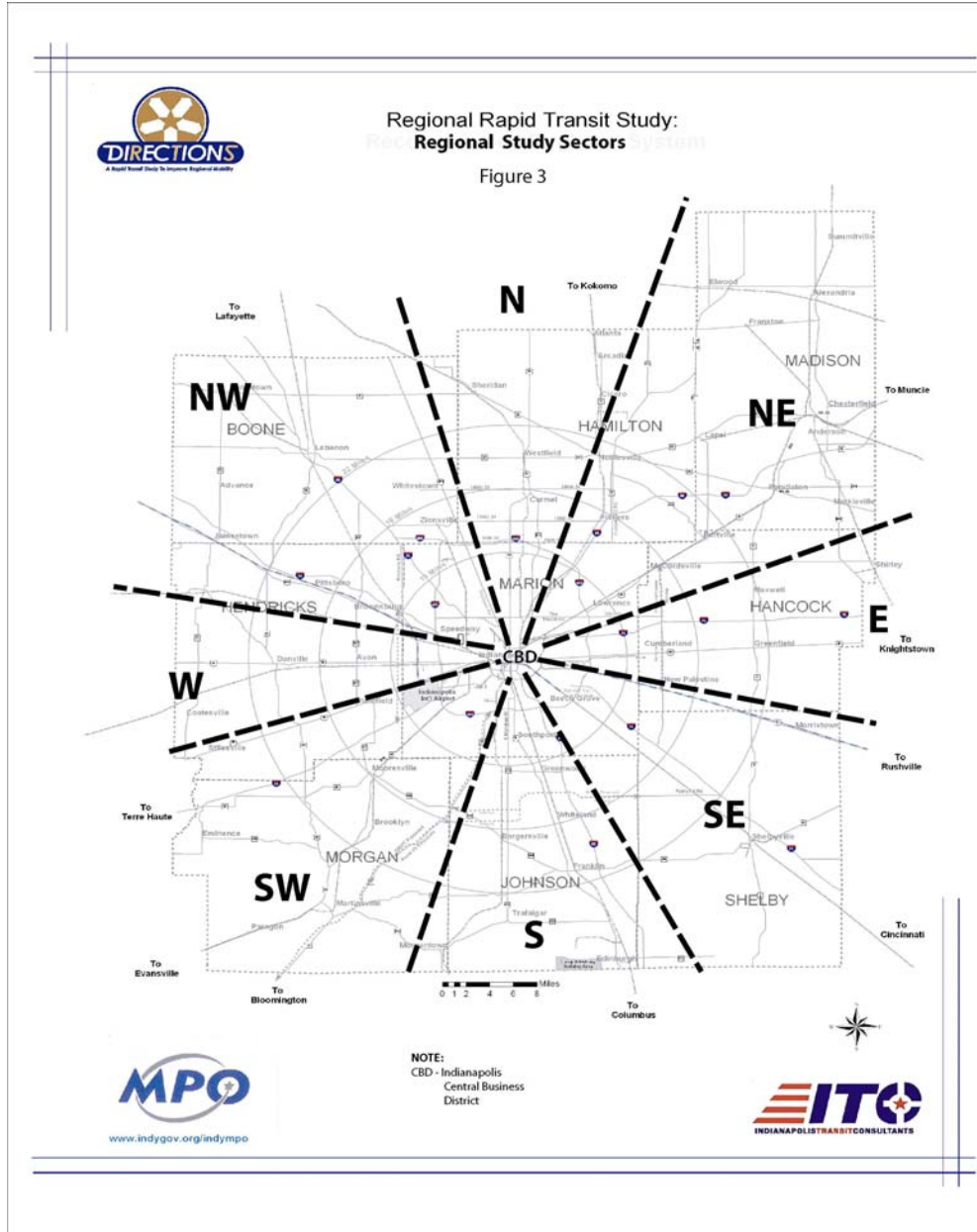






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Figure 3: Regional Study Sectors





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centers in Carmel; and the Village Park Shopping Center. These activity centers reflect the densely developed character of the north sector.

**Northeast:** The northeast study sector was the main area focused on in the ConNECTIONS Study. This sector includes such radial alignments as: Binford Boulevard/I-69, the Hoosier Heritage Railroad and Allisonville Road, as well as the radial alignments of US 36/SR 67 and the CSX-Cleveland Railroad Line that connect Indianapolis downtown with Anderson. Among the key lateral feeder lines are SR 32 and the Central Indiana & Western Railroad (shortline), SR 38, SR 238, and CR 600W/Mount Comfort Road, which is proposed for a County highway upgrade. Key CBD activity centers in the northeast sector are Fishers, Noblesville, Lawrence, and Anderson; with smaller concentrations at McCordsville, Fortville, Pendleton, and Lapel. Major sector employment centers include: Roche Diagnostics Corp., plus the Delco Remy Headquarters, and the Orchard Industrial Park, both southwest of Anderson. Also, included would be the Northeast Center at Lawrence. Several high density centers are located in the northeast sector, including: the Fort Harrison Reuse Authority's redevelopment program and State Park; Castleton Corporate Park; Castleton Square Shopping Mall/Center; Castleton Park; the Castle Industrial Park; the McCordsville Industrial Park; the Verizon Wireless Music Center; and the Hoosier Business Park southeast of Anderson. In addition, the sector includes a concentration of high-density housing north of 96<sup>th</sup> Street and east of the White River. This area includes the Geist Reservoir development area with it's surrounding high-end housing subdivisions, retail and commercial businesses.

**East:** The east sector's key radial lines are the CSX Hunter Industrial Track, as well as the abandoned Pennsylvania Railroad Main Line, and US 40/Washington Street. The former Pennsylvania Railroad right-of-way has had sections sold off, as well as abolished some key grade separations. East of the Marion/Hancock Count Line, US 40 becomes National Road and continues east as a 4-lane highway. Key lateral routes include SR 9 through Greenfield and CR 700W just east of Cumberland, which is proposed by the county to be upgraded. Cumberland and Greenfield are the primary CBD centroids in the east sector. Western Select, Franklin Road Industrial Park, Raytheon, the Ford Plant, Navistar, Jackson Industrial Park, and the Mount Comfort Business Park, as well as the Eli Lilly Greenfield Labs represent the primary employment centers in the east sector. The East Gate Consumer Mall, Washington Square Shopping Center Washington Street Shopping Center, Cherry Tree Shopping Center and the Mount Comfort Airport are the east sector's primary high-density centers.

**Southeast:** The southeast sector includes the US 52/Brookville Road, the CSX Cincinnati Line, the CSX line to Beech Grove shops/Shelbyville and I-74 radial corridors, plus multiple lateral feeders, including: SR 9, SR 44, and CR 700W which is proposed by the county to be upgraded. The southeast sector includes the Beech Grove, New Palestine, Morristown, and Shelbyville CBD concentrations. The sector's key employment centers include Park 52 and Amtrak's Beech Grove yard and storage shops.

**South:** The south sector's radial routes include the Madison Ave./US 31 and CSX/Louisville & Indiana Railroad, as well as Meridian Street/SR 135 and the Indiana Railroad Main Line. The main lateral feeder routes include SR 44, SR 144, and a proposed new INDOT highway corridor connecting Fairland Road/I-74 with the proposed I-69 highway extension project. Its primary CBD concentrations are Greenwood and Franklin with lesser concentrations at Southport, Whiteland, Bargersville, Trafalgar, Morgantown, and Edinburgh. The key employment centers are Eli Lilly Corporate Center, the South Park Business Park, Commerce Park, Greenwood Industrial Park, John Deere Industrial Park, Franklin Industrial Park, Franklin College, University of Indianapolis, and the Camp Atterbury Training Area. The sector's high-density centers include the University of Indiana, St. Francis Health Centers, and Greenwood Park Mall.





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**Southwest:** The southwest sector includes the SR 37/proposed I-69 highway extension project and the Indiana Southern Railroad, SR 67/Kentucky Avenue radial corridors, as well as the US 40/Washington Avenue, I-70, and the CSX/Amtrak radial corridors to the Indianapolis International Airport. The primary lateral routes include SR 39, SR 144, and SR 267. Its primary CBD concentrations are at Plainfield and Martinsville with lesser concentrations at Mooresville and Brooklyn. In addition to the airport as one of the major employers in the region, the southwest sector includes multiple employment centers adjacent to or related to the airport, namely: Federal Express; former United Airlines Maintenance Operations Center; the Airport Business Center; Ameriplex Business Park; and Air Technology Park, Airwest Business Park, Washington Industrial Park. The sector's high-density centers include the Eli Lilly Tech Center, Olin Corp., Rolls Royce, Indiana National Guard Headquarters, Daimler Chrysler, Fletcher Business Park, and the Heartland Crossing PUD.

**West:** The west sector includes the US 36 and the CSX St. Louis Line radial alignment; SR 39, SR 267, and Raceway Road, a proposed highway upgrade represent the more significant lateral corridors in the west sector. Avon and Danville are two smaller CBD concentrations in the sector. The Airport Tech Park, Quemetco Industrial Park, Speedway Industrial Park, Allison Transmission/GM Plant, is the most noteworthy high-density center in the sector. It should also be noted that the Central State Hospital property is in this sector and could take on a new use at some time that could support transit.

**Northwest:** The northwest sector includes multiple highway/rail corridors: CSX Speedway Line; US 136 and the CSX Crawfordsville Line (Amtrak); and Michigan Road and the CSX/ Zionsville Industrial Track. SR 32, SR 39, SR 267, Raceway Road--a proposed highway upgrade, and I-865 represent the more significant lateral corridors in the northwest sector. Speedway, Brownsburg, Zionsville, and Lebanon are the largest CBD concentrations in the sector; Pittsboro represents a smaller outlying CBD concentration. The Zionsville Industrial Park is the largest employment center in the sector; the Lebanon Industrial Park provides a smaller outlying employment center. The sector contains multiple high-density centers including: Speedway Track, Commerce Center, Indianapolis Raceway Park, Butler University, Lafayette Square Mall, high-density housing in the vicinity of the CSX Zionsville Industrial Track and 62<sup>nd</sup> Street, College Park, and the Village of West Clay.

### III. DESCRIPTION OF REGIONAL RAPID TRANSIT SYSTEMS

In preparation for the initiation of the Public Outreach program, a comprehensive analysis was made of: activity centers within the region; existing and future points of roadway congestion; existing and future concentrations of housing; existing and future concentrations of employment activity; freight rail corridors; divided roadways (offering the opportunity for placement of a rapid transit corridor within the limits of existing rights-of-way); corridors offering the opportunity for "Smart Growth" or "Antiurban Sprawl" type development based on future construction of a regional rapid transit facility. These regional corridors constitute a ubiquitous network of rapid transit facilities for the multi-county study region. Some corridors are focused on the central business district; others connect major activity centers outside of the central business district of Indianapolis; while, still other corridors serve as feeders to possible major radial and circumferential rapid transit corridors.

It is from the development and analysis and of comprehensive planning data described above and from the ubiquitous network of possible regional rapid transit facilities, that a series of discrete regional rapid transit systems were defined for ultimate dialogue with and evaluation by the regional "Public" participating in the Public Outreach program. A number of preliminary regional system alternatives were evaluated by the MPO Staff and the regional rapid transit study management team; the evaluation of these professionals shaped the alternatives, which were





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presented in the Public Outreach process. During the Public Outreach process, the involved public sought yet further refinements to the alternative regional systems. The regional systems (three in number) originally presented in the Public Outreach program were supplemented by a fourth system; a system reflective of the study team's response to public input. The four regional systems evaluated in Phase One Public Outreach are described below.

### **A. Alternative #1: Automated Guideway Transit (AGT), Commuter Rail Transit (CRT), and Express Bus**

Alternative #1, AGT, CRT, and Express Bus is provided in the following corridors: Noblesville to the Indianapolis Central Business District (CBD); Cumberland to the Indianapolis CBD; Greenwood to the Indianapolis CBD; Greater Indianapolis Airport to the CBD; and Avon to the Indianapolis CBD. Additionally, this alternative includes Commuter Rail Transit (CRT) from Zionsville to the Indianapolis CBD. Finally, Alternative #1 includes Express Bus services from Anderson to the Indianapolis CBD as well as feeder systems to the rapid transit corridors previously described.

**Because of a series of important urban centers to the north of the Indianapolis CBD, this corridor will be added to all alternatives to be studied in close concert with the corridors to Fishers and Noblesville.**

Each of the four regional rapid transit systems are presented in the public outreach meeting handout of Appendix A.

### **B. Alternative #2: Bus Rapid Transit (BRT), Light Rail Transit (LRT) and Express Bus**

In Alternative #2, BRT is provided for in the following corridors: Zionsville to the Indianapolis CBD; Cumberland to the CBD; Greenwood to the Indianapolis CBD; and Avon to the Indianapolis CBD. Additionally, LRT is provided in a corridor beginning at Noblesville, extending through the Indianapolis CBD and then to the Greater Indianapolis Airport. Express Bus service is proposed from Anderson to the Indianapolis CBD, and from Martinsville to the Indianapolis CBD. Additionally, Express Bus systems feed the major line haul systems.

### **C. Alternative #3A: LRT, CRT, and Express Bus**

Alternative 3A provides for LRT service in the following corridors: Zionsville to the Indianapolis CBD; Cumberland to the Indianapolis CBD; Greenwood to the Indianapolis CBD; and the Greater Indianapolis Airport to the Indianapolis CBD. This alternative provides for CRT service from Noblesville to the Indianapolis CBD. As with Alternative 2, Express Bus services are provided in the Anderson to Indianapolis CBD corridor; Martinsville to Indianapolis CBD corridor; and Danville to Indianapolis CBD corridor. Express Bus services feed the line haul system throughout the region.

### **D. Alternative #3B: LRT, CRT, and Express Bus**

In Alternative 3B, the alternative developed based on input from the Public Outreach Program, LRT service is provided from Noblesville through the Indianapolis CBD to the Greater Indianapolis Airport, and from Greenwood to the Indianapolis CBD. Commuter Rail Service exists from Anderson to the Indianapolis CBD, from Highway 52 SW to Indianapolis CBD, and Zionsville to the Indianapolis CBD. Express Bus Service exists from Martinsville to the Indianapolis CBD, and from Danville to the Indianapolis CBD. Furthermore, Express Bus service throughout the region will feed the line haul Rapid Transit Systems.





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### IV. COMPARATIVE ANALYSIS AND IDENTIFICATION OF PREFERRED REGIONAL SYSTEM

As part of this Phase I Indianapolis Regional Rapid Transit Study, Technical Memorandum I – 5A, entitled “Performance Measures and Evaluations Process,” defined a methodology where by regional rapid transit system alternatives would be evaluated on the basis of the performance of each these alternative regional systems. The performance measures crossed a range of topics including: transportation gains; socio-economic effects; environmental effects and land use gains.

These performance measures, as they would ultimately be refined, are the basis for the “Generalized Goals and Specific Objectives for Regional Rapid Transit System Planning” eventually considered in a series of Public Outreach meetings which were a part of the Phase I Regional Rapid Transit Study effort. Through an interactive process involving Indianapolis Transit Consultants, the staff of the Metropolitan Planning Organization, the project management team for the Regional Rapid Transit Study, and various “publics” throughout the multi-county Indianapolis Region, the performance measures in Technical Memorandum I – 5A were restated as five generalized goals for community development. These generalized goals, which provide the basis for evaluating alternative regional rapid transit systems, are: maximized land use benefits; maximized environmental benefits; maximized mobility and transportation; maximized socio-economic benefits; and maximized intermodal compatibility and benefits.

Graphic presentations were developed for the purpose of illustrating the generalized community goals for interaction in a series of public outreach meetings in Indianapolis. The generalized community goals were stratified into a series of specific objectives for regional rapid transit system planning. Graphic presentations included: existing and future distribution of regional population and employment; existing and projected congestion on major streets and highways in the Indianapolis region; existing significant activity in the region (including the Indianapolis CBD); characteristics of rapid transit technologies suitable for consideration in the Indianapolis Regional Rapid Transit Study; and other background planning information needed by the public throughout the Indianapolis region to evaluate the performance of alternative regional transit systems.

These performance measures were presented to the involved publics in a package of public outreach meeting materials; the public outreach meeting package also included a map of all potential corridors for rapid transit deployment within the multi-county Indianapolis region – a map developed based on the performance measures and the planning data related to these measures. Additionally, the package included four suggested regional rapid transit systems (each system having equal capital cost so that relevant comparisons and evaluations could be made) as well as an effectiveness scoring matrix with which the public outreach participants would score each of the four alternative regional transportation systems against the performance measures (the generalized community goals and the specific community objectives developed in this consultative process).

Public Outreach participants were asked to rank the Rapid Transit System Measures (i.e., the generalized statements of community goals and the specific statements of community objectives). Prior to asking public participants to rank the performance measures, the public was asked to add to the suggested list of performance measures or delete from the suggested list of performance measures developed by the MPO, its transit consultant, and the Regional Rapid Transit System’s management team. All public participants concurred in the relevance of the performance measures as presented and ranked those measures consistent with each individual’s perception of the importance of each. Finally, the public participants scored each of the four alternative regional rapid transit systems against the performance measures (expressed as five goals for community development and related specific objectives). That package is attached to this document (see Appendix A).





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The Regional Rapid Transit System performance measures subjectively treated cost as well as objectives directly related to patronage or system utilization. A more rigorous presentation of the system performance in Technical Memorandum I – 7B, "Travel Demand Analysis/Ridership Report" and a series of preliminary but comprehensive cash flow models (one for each alternative) was accomplished by the consultant. The content of Technical Memorandum I – 7C and the results observed in reviewing the comprehensive cash flow analysis supported the subjective cost-effectiveness evaluations developed in the Public Outreach Program.

The materials in this Section IV present the comparative, multiple-criteria, cost-effectiveness evaluations of the four regional rapid transit systems considered in the public outreach process followed by an identification of a statistical evaluation of these analyses.

### A. Comparative Cost-Effectiveness Analysis

#### 1. Multiple Criteria Evaluation of Alternative Regional Rapid Transit Systems

Subsections (a) and (b) present the public involvement based prioritization of measures and public involvement based effectiveness evaluations of alternative plans. Section (c) presents an overview of the statistical testing done on both the criteria weighting and plan evaluation scaling exercises.

**(a) Ranking and Weighting of Performance Measures** - The materials presented hereunder summarize the public's priority ranking of the Regional Rapid Transit study's measures (i.e., comprehensive community development goals). Rankings of each citizen who participated in the criteria evaluation effort are tabulated based on the public outreach meeting in which that citizen participated. Utilizing a straightforward method from Utility Theory, the raw ranks are inverted and the total scoring for each performance measure (comprehensive statement of community goal) is calculated. These total scores are normalized so that when taken together the scores equal 100% (or 1.00). At the bottom of the second page of Appendix B, the scoring of participating citizens is summarized, followed by a summary of scores from the Regional Rapid Transit Study management team and staff professionals. Finally, on the second page of Appendix B, the combined scoring of involved citizens and professionals is presented. Appendix B is entitled "Regional Rapid Transit Study, Goals/Objectives Ranking Matrix and Average Utility Values for Each Criterion." It is interesting to know that the important performance evaluation criteria for both the involved citizens and the involved professionals relates to the maximization of mobility. The second most important criteria for both groups is performance related to the maximization of socio-economic benefits throughout the region. The least important performance measure for both groups is related to maximization of intermodal compatibility.

The data presented in Appendix B, "Regional Rapid Transit Study Goals/Objectives Ranking Matrix and Average Utility Value for Each Criterion," was subjected to a range of statistical tests as suggested in the text Nonparametric Statistics for the Behavioral Sciences by Sydney Siegel and John Castellan, and published by McGraw-Hill, in 1988. As is presented in the text at the end of Appendix C "Nonparametric Statistical Analysis of Comprehensive Community Development Goals (Performance Measures)," it is concluded that for a criteria weighting exercise involving seventy public outreach participants, the results obtained are highly significant and it may be stated that the level of agreement among these seventy individuals constitutes a good consensus. The Kendall coefficient of concordance used in these statistical analyses suggest that the average values shown constitute the best estimate of the true relative values of the evaluation criteria (or performance measures) used.





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**(b) Cost-Effectiveness Evaluation of Alternative Plans** - The scoring of each of the alternative regional rapid transit systems, relative to each of the five goals (or performance measures), has been tabulated. This tabulation is presented in Appendix D and is entitled "Alternative Rapid Transit Systems Scoring Against Each Evaluation Criterion and Plan Effectiveness for Each Regional Rapid Transit System Alternative." Particular note must be taken to the fact that based on input from early community outreach meetings, the initial set of three alternatives was expanded to include a public involvement based alternative 3B. Average effectiveness scoring data is presented for those meetings wherein only alternatives one, two, and three were evaluated. In a separate summary, plan evaluation data is presented for the exercise which incorporates the public involvement based Alternative 3B.

As was done in establishing the relative weights of each of the evaluation criteria (performance measures), professionals associated with the Regional Rapid Transit Study also scored all four alternatives (including that alternative feed back from the community outreach process). The citizens as well as the professionals scored Alternative 1 and Alternative 3 (this scoring included the alternative which resulted from the public involvement based alternative) the highest of all alternatives considered. These alternatives incorporate Automated Guideway Transit (AGT), Commuter Rail Transit (CRT), and Express Bus services. The lowest were given to Alternative 2 (the system involving Bus Rapid Transit (BRT), LRT, and Express Bus) and to Alternative 3B (the second of two systems involving LRT, CRT, and Express Bus).

With respect to all four systems, the scoring was very close, suggesting the need to further consider all technologies including LRT and BRT, as the overall Regional Rapid Transit Study moves forward. Using methods from nonparametric statistics, the cost-effectiveness evaluation of the four alternative regional rapid transit systems plans was subjected to a careful analysis. That statistical evaluation is presented as Appendix E entitled "Nonparametric Statistical Analysis of the Evaluation of Alternative Regional Rapid Transit System Plans." These tests suggest that each of the first four performance measures constitute a valid basis for discriminating among the four alternative plans under study. The fifth performance measure (maximize intermodal compatibility benefits) did not provide a valid basis for discriminating among the four regional rapid transit systems studied. However, the variations of the effectiveness values for the scoring of each of the four Alternative Regional Rapid Transit Systems plans, relative to each of the five performance measures, are acceptably equal.

**(c) Statistical Analysis: Performance Measure Ranking; Evaluation of Alternative Plans** - The task was to evaluate the effectiveness of a number of rapid transit alternatives; five criteria (i.e., performance measures) were developed upon which an evaluation of alternative regional rapid transit plans could be based. The involved publics received a number of graphics and documents, heard presentations by staff and consultants, and engaged in open discussion. They then ranked these five criteria in order of importance as related to a decision making process. The purpose of the rankings was to establish a set of weights – a criteria utility vector – for use in the evaluation process. The more important criteria (performance measures) would receive higher weights while the least important would receive lower weights.

The alternative rapid transit plans were then studied. The process required those participating in the Public Outreach Program to look at the alternatives, one criterion at a time. The participants were requested to objectively evaluate how well a particular alternative could achieve the performance under discussion. Normally, one would assign a value of 3 if the plan was indifferent in meeting the various objectives of each performance measure (goal). If the quality of a particular alternative were such that achieving the objectives of the goal were enhanced or strengthened, an evaluation of 4 or 5 would be assigned. If the alternative weakened the chances of achieving the objectives, an evaluation of 1 or 2 would be assigned.





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Average effectiveness values for each alternative performance measure combination were calculated and stored in an effectiveness matrix. Multiplication of the effectiveness matrix by the criteria utility vector resulted in an overall effectiveness value for each alternative in achieving the five goals.

**(i) Criteria Utility Vector** - The situation is this: a set of n items (criteria or goals) are ranked in order from 1 to n according to some characteristic (importance to rapid transit planning) by m participants (the "publics" involved in the regional rapid transit study.) The question is: are these m rankings in substantial agreement or merely randomly generated numbers?

Statistical analyses of ranking data are performed using nonparametric techniques. The ranking data collected in this study is called "distribution free" data. The goals were ranked in order of importance with no indication of how much more important one goal might be than another. When there are only two participants, Spearman's Rank Correlation Coefficient is calculated. When m is equal to three or more, Kendall's Coefficient of Concordance must be calculated. In this study, 70 participants are involved. One way to measure concordance between m sets of rankings would be to take the average value of Spearman's coefficient for all possible sets of two rankings. In this case, the number of possible rankings is the combination of 70 participants taken two at a time or 2,415 sets.

Kendall's much simpler approach is to look at a data set with perfect agreement of ranks by all public outreach participants and compare this to a hypothetical set with virtually no agreement among participants. For both data sets, one could calculate the average rank for each criterion by summing over all participants and dividing by the number of participants. In the case of little or no agreement, the average ranks would be almost identical. In the case of perfect agreement, the average ranks would be 1r, 2r, 3r, 4r,.....nr for the n respective criteria. The sum of squares for the perfect agreement case would be the maximum sum of squares for any possible ranking of n criteria by k participants. The set with no agreement would have the smallest sum of squares of all possible rankings. The coefficient of concordance (W) is an index of the divergence of the agreement shown in the actual data set from the perfect agreement case.

The calculation of W is performed as follows:

- Step 1. For the actual data set, calculate the means of ranks given by all participants for each criterion. With 5 criteria, there will be five averages.
- Step 2. Calculate the sum of squares of these means – call this DSS.
- Step 3. Calculate the maximum sum of squares – call this MSS.

$$MSS = n(n^2-1)/12 \quad (\text{Where } n = \text{number of criteria.})$$

- Step 4. Calculate W:

$$W = DSS/MSS \quad (\text{Note that } W \text{ must lie between } 0 \text{ and } 1.)$$

The method of testing for significance for most nonparametric techniques depends on the sample size. A small sample consists of from 3 to 7 criteria. We consider 5 criteria in this study. The Null hypothesis assumes the rankings are independent and have no agreement. Table T of Siegel's text lists Critical values of W for 0.5 and 0.01 significance levels. These critical values are 0.117 and 0.160 respectively for the case of five criteria and 20 participants. The critical values continue a gradual decline as the number of participants increases. There were 70 participants involved in this study.





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The observed value of  $W$  in this study was 0.1801. This represents a highly significant result and we can reject the Null hypothesis. We conclude there is a good consensus among the participants concerning how these 5 criteria affect or impact rapid transit planning. They appear to be employing the same standards in ranking the criteria. However, we cannot conclude with absolute certainty that these rankings are necessarily correct; only time will tell. However, Kendall states that the best estimate of the "true ranking" of  $n$  objects is provided, when  $W$  is significant, by the order of the several average rankings; these public outreach results are "highly significant."

**(ii) Effectiveness Matrix** - The second step of the public outreach in this study concerned their individual evaluation of how well each of the several alternatives being considered contributed to the realization of the performance associated with an individual goal. In general, an evaluation of 3 (on a 1 to 5 scale) would indicate the alternative in question made little difference in the realization of the criterion under study. If the alternative appeared to enhance or improve the realization of objectives, an evaluation of 4 or 5 would be given as appropriate. On the other hand, an evaluation of 1 or 2 would be given if the alternative appeared to be detrimental to achieving the objectives.

There were 36 useable evaluations prepared by the participants. The participants considered one criterion at a time and evaluated the effectiveness of each of the 4 alternatives in achieving the objectives. Thus there were 36 effectiveness numbers submitted for each Criterion-Alternative pairs – a total of 20 pairs. The totals were calculated for every pair and divided by 36 to obtain average effectiveness values which were stored in an effectiveness matrix. Multiplication of the average effectiveness matrix by the criteria utility vector produces a number called the overall average effectiveness of each alternative regional rapid transit plan in realizing the objectives characterized by the goals.

The statistical analysis consisted of Bartlett's test for homogeneity of variances of several normal populations and the F-test for the equality of means. Ostle's book provides a methodology for performing these tests. The Null hypothesis for Bartlett's test is that the variances are equal. We prefer to accept this hypothesis in concluding that equal variance provide evidence of consistency in the evaluations performed by the participants.

The F-test for the equality of means corresponds to the mechanics of a one-way analysis of variance for a completely randomized design - - although all requirements of a completely randomized design are not satisfied. The use of individual participants for providing single effectiveness numbers for each criterion-effectiveness pair would satisfy the requirements. Thus, we would need 720 different participants to come up with 36 useable evaluations. Also the interpretation of this test is different. We are not interested in any linear model associated with the alternatives but only in testing the equality of means of several normal populations.

For every criterion, the mean effectiveness values associated with each alternative were calculated and tested for equality. The Null hypothesis is that means are equal. We prefer to reject this hypothesis in concluding that the participants were able to discriminate among sites in their assignment of effectiveness values.

The results of Bartlett's test demonstrated that the Null hypothesis of equal variances could not be rejected and we conclude that the variances are equal. The results of the F-test for equality of means demonstrated that the Null hypothesis of equal means was rejected for four of the criteria. The Null hypothesis was accepted for the fifth Criterion – Maximize Intermodal Compatibility Benefits.





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### 2. Travel Demand Analysis/Ridership Report

This material is the subject of a previous technical memorandum. That tech memo is Technical Memorandum I-7B: "Travel Demand Analysis Ridership Report" dated October 14, 2003. The reader is asked at this point in the review of this "Regional Systems Evaluation Report, to refer to Tech Memo I-7B."

### 3. Financial Feasibility Analysis of Alternative Regional Rapid Transit Systems

The subsections describe the comprehensive financial feasibility study undertaken in Phase I as well as a discussion of important local fund sources (TIF and public/private partners).

**(a) Comprehensive Cash Flow Model Results** - As a part of the Phase I Regional Rapid Transit Study, a preliminary, comprehensive, cash flow analysis was developed for each of the four regional rail systems under consideration (and defined earlier in this document). So as to provide an "Apples and Apples" comparison among the four Regional Rapid Transit Systems, the capital cost are equal; the four systems were designed so as to demonstrate parity in capital cost. Therefore, a quick evaluation of the financial performance of each of the alternatives may be made by viewing the balance of cash on hand at the end of the overall 25-year development period for all construction phases of each of the four Regional Rapid Transit systems. As we review the cash flow analysis data presented in Appendix F "Preliminary Cash Flow Analysis of Rapid Transit Alternatives," we note that Alternative 1 possesses the highest ending balance of all four alternatives. Alternatives 3A and 3B, the LRT dominated alternatives, perform at a level slightly lower than the AGT dominated alternative. Alternative 2, BRT based alternative, is the lowest financial performer of all four alternatives studied.

The cash analysis introduced in this subsection (a) considers a range of local, state, and federal funding sources. These funding sources have been proven to be effective in the development of the required financial consensus underpinning the implementation of contemporary rapid transit systems. Among the local funding sources are Tax Increment Financing (TIF), described below, benefit assessment districts, revenues from joint-development/value capture, and right-of-way. In Indiana, there are two state-level Public Mass Transit accounts (Public Mass Transportation Fund and Commuter Rail Service Fund). Of these two, the State Public Mass Transportation Fund is the only one considered in these early cash flow models. Numerous federal funds are potentially for the funding of a regional rail system in the Indianapolis Region. Most important among the federal funds are the Section 5309 New Start Rail Discretionary Funds administered by the Federal Transit Administration (FTA). Other federally based revenue sources, such as Congestion Management and Air Quality (CMAQ) funding are considered in the model.

**(b) Tax Increment Financing and Other Fund Sources** - Tax Increment Financing (TIF) provides for the temporary allocation to economic development districts of increased tax proceeds in an allocation area generated by increases in assessed value due to the improvement being funded by the TIF District. Such tax proceeds are used to fund capital improvements, such as rapid transit developments. Property tax assessments are frozen at predevelopment levels in designated allocation areas, municipal bonds are issued to finance the capital (rapid transit) improvements, and the added incremental tax revenues over the frozen levels are used to meet debt service requirements. After the bonds are paid off, the tax increment reverts to the original agency(ies), producing a higher tax base than would have occurred had the rapid transit capital improvement not been built.

In this instance, the areas demonstrably impacted by the development of the Indianapolis Regional Rapid Transit System are at an observed radius from station locations. A recent study of transit-related impact on property values in the Dallas area shows that increases of 25 percent occur in the immediate station vicinity. The 25 percent





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increase remains constant for 1/4 mile and then diminishes linearly to 0% for property 1.5 miles out from the station. Data developed earlier in Los Angeles confirm the Dallas results that property value increases for land under the economic influence of rapid transit occur for a distance of 1.5 miles from the transit station.

The area of a 1.5 miles circular area is about 4,524 acres. There are about 55 stations in the rail transit plan, so we will assume the following:

- i) A 12.5 percent average increase in property value;
- ii) The tax rate is 0.01;
- iii) Property values average \$550,000 per acre, assume 5 du's per acre in residential areas.

With these assumptions, the incremental taxes collected will rise to \$171,000,000 in 2025 from \$0 in 2005. The revenues are projected to increase by 1/20th or 5% each year. The increments amount to \$687 of additional taxes per acre at 5 du/AC. The rapid transit economic enhancement tax for any single property is 139/household by 2025. Land economics metrics positively influenced by the introduction of rapid transit include (in addition to land values): rental prices, rental absorption rates, and real estate sales.

**(c) Private Sector Joint Development/Value Capture Financing** - The basis for joint development financing assumes the construction (within 20 years) of the equivalent of a 100,000 square feet office building at each of the 55 stations. If this space is considered as Class B office space, the annual rental fee will be about \$12.50 per square foot. At buildout, this amounts to an annual income in 2025 of about \$68,750,000. If this income were capitalized at 8% per annum, the total investment would be valued at \$859,375,000.

If we assume the land can be sold (or leased) at 20% of the values, a total of \$171,875,000 of land sales over the 20-year period would occur. This amounts to an annual land sale income of about \$8,590,000 per year from 2006 through 2025.

### **B. Identification of Preferred Regional System**

The public involvement based multiple criteria performance measures cost-effectiveness process resulted in the identification of the AGT-based alternative (Alternative #1) as the preferred regional rapid transit system. The result of this citizen-based public outreach effort was supported by the transportation professionals scoring of alternatives, the preliminary analysis of patronage results, and the comprehensive financial feasibility analysis of the four alternates under study. Section III, above, presents an illustration of the preferred regional system. This preferred system will be taken into Phase II, where feasibility analysis of each corridor in the preferred system will be undertaken.

The Phase II effort will again be based on public outreach. The Phase II effort will be intensified relative to the involvement of top governmental and business leaders throughout the region.





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### Bibliography

1. Siegel, Sidney and N. John Castellan, Nonparametric Statistics for the Behavioral Sciences, (McGraw – Hill Book Co., 1988 Edition).
2. Kendall, Maurice and Jean D. Gibbons, Rank Correlation Methods, (Edward Arnold – Holder and Stoughton, Fifth Edition, 1990).
3. Ostle, Bernard, Statistics in Research, (The Iowa State University Press, Second Edition, 1963).





# Regional Rapid Transit Study

# PUBLIC OUTREACH MEETING

Management Team Meeting; Thursday May 22, 2003; 11:00Am to 2:00PM

## PURPOSE:

It is the purpose of this initial round of Public Involvement Outreach to accomplish two things:

**Ranking of Community Development Criteria.** The MPO seeks citizen input relative to the Rapid Transit System planning process in which the MPO is engaged. Specifically, the MPO seeks public input on the process by which rapid transit corridors are chosen for inclusion in one of several potential Regional Rapid Transit System Alternatives. This first step involves identifying and ranking the community goals & objectives (i.e. Community Development Criteria), which a future Rapid Transit System will support.

**Scoring Alternative Rapid Transit System Plans.** The second step involves scoring of Alternative Rapid Transit System Plans relative to the extent to which a specific plan supports the achievement of the Community Development Criteria against which that plan is being evaluated.

**Mail to:** Philip D. Roth, AICP - Indianapolis MPO  
200 E. Washington St., Room 1841  
Indianapolis, IN 46204

## Generalized Goals and Specific Objectives for Regional Rapid Transit System Planning

Community Development Criteria		Rank	Comments on Criteria
General Goals	Specific Objectives		
Maximize Land Use Benefits	<ul style="list-style-type: none"> <li>• Land Use Enhancements</li> <li>• Smart Growth Initiatives</li> <li>• Transit Compatibility</li> <li>• Regional Attractiveness &amp; Destinations</li> </ul>		
Maximize Environmental Benefits	<ul style="list-style-type: none"> <li>• Air Quality</li> <li>• Historic</li> <li>• Threatened &amp; Endangered Species</li> <li>• Noise</li> </ul>		
Maximize Mobility & Transportation Benefits	<ul style="list-style-type: none"> <li>• Congestion Relief</li> <li>• Minimal Right of Way Needs</li> <li>• Speed/Comfort/Safety of Commute</li> <li>• Connectivity of Demand/Activity Centers</li> <li>• Cost Effectiveness</li> <li>• Stimulus for Improved Local Bus System</li> <li>• Appropriateness of Technology for Region</li> </ul>		
Maximize Social & Economic Benefits	<ul style="list-style-type: none"> <li>• Mobile Workforce</li> <li>• Reduced Traffic Distributions to Communities</li> <li>• Stimulate Economic Development</li> <li>• Environmental Justice</li> <li>• Visual/Aesthetic Intrusions</li> <li>• Connectivity of Neighborhoods to Jobs</li> <li>• Job Creation</li> </ul>		
Maximize Intermodal Compatibility & Benefits	<ul style="list-style-type: none"> <li>• Conflicts with Existing Freight Rail Lines</li> <li>• Supports New Midfield Terminal at Airport</li> <li>• Supports New Downtown Indianapolis Transit Center</li> <li>• Support/Connect with Other Transit/Transportation Systems</li> </ul>		

**Instructions:** Please rank the most important Community Development Criteria with a one (1), the second most important with a two (2), etc. Place the rank you assign in the box at the right of each Community Development Criteria. In addition, please place any comments which you may have on any specific criteria in the space provided



For more information, visit [www.indygov.org/indympo](http://www.indygov.org/indympo) or contact: Mike Dearing, MPO Manager/Master Planner at (317) 327-5139





# Regional Rapid Transit Study

## Scoring Matrix for Potentially Viable Regional Rapid Transit Systems

Community Development Criteria		Alternative No. 1 AGT/CRT/EXB	Alternative No. 2 BRT/LRT/EXB	Alternative No. 3-A LRT/CRT/EXB	Alternative No. 3-B LRT/CRT/EXB
General Goals	Specific Objectives				
<b>Maximize Land Use Benefits</b>	<ul style="list-style-type: none"> <li>• Land Use Enhancements</li> <li>• Smart Growth Initiatives</li> <li>• Transit Compatibility</li> <li>• Regional Attractiveness &amp; Destinations</li> </ul>				
<b>Maximize Environmental Benefits</b>	<ul style="list-style-type: none"> <li>• Air Quality</li> <li>• Historic</li> <li>• Threatened &amp; Endangered Species</li> <li>• Noise</li> </ul>				
<b>Maximize Mobility &amp; Transportation Benefits</b>	<ul style="list-style-type: none"> <li>• Congestion Relief</li> <li>• Minimal Right of Way Needs</li> <li>• Speed/Comfort/Safety of Commute</li> <li>• Connectivity of Demand/Activity Centers</li> <li>• Cost Effectiveness</li> <li>• Stimulus for Improved Local Bus System</li> <li>• Appropriateness of Technology for Region</li> </ul>				
<b>Maximize Social &amp; Economic Benefits</b>	<ul style="list-style-type: none"> <li>• Mobile Workforce</li> <li>• Reduced Traffic Distributions to Communities</li> <li>• Stimulate Economic Development</li> <li>• Environmental Justice</li> <li>• Visual/Aesthetic Intrusions</li> <li>• Connectivity of Neighborhoods to Jobs</li> <li>• Job Creation</li> </ul>				
<b>Maximize Intermodal Compatibility &amp; Benefits</b>	<ul style="list-style-type: none"> <li>• Conflicts with Existing Freight Rail Lines</li> <li>• Supports New Midfield Terminal at Airport</li> <li>• Supports New Downtown Indianapolis Transit Center</li> <li>• Support/Connect with Other Transit/Transportation Systems</li> </ul>				

**Instructions:** On a scale of 1 to 10, please score the effectiveness of each Alternate relative to accomplishing each of the five (5) Community Development Criteria. A score of ten (10) is your indication that the Alternate totally accomplishes the Community Development Criteria. A score of zero (0) is your indication that the Alternate does not accomplish the Community Development Criteria. Please score each of the three Alternate separately.



Regional Rapid Transit Study  
Goals/Objectives Ranking Matrix  
And Average Utility Values for Each Criterion

Goal No. 1: Maximize Land Use Benefits.  
Goal No. 2: Maximize Environmental Benefits.  
Goal No. 3: Maximize Mobility & Transportation Benefits.  
Goal No. 4: Maximize Social & Economic Benefits.  
Goal No. 5: Maximize Intermodal Compatibility Benefits.

	Goal No. 1		Goal No. 2		Goal No. 3		Goal No. 4		Goal No. 5	
	Act.	Inv.	Act.	Inv.	Act.	Inv.	Act.	Inv.	Act.	Inv.
<b>Greenwood Public Mtg.</b>										
G-1	3	3	4	2	1	5	5	1	2	4
G-2	5	1	1	5	3	3	4	2	2	4
<b>Cumberland Public Mtg.</b>										
C-1	1	5	1	5	3	3	4	2	5	1
C-2	2	4	4	2	3	3	5	1	1	5
C-3	3	3	5	1	2	4	1	5	4	2
C-4	3	3	4	2	1	5	2	4	5	1
C-5	4	2	5	1	1	5	2	4	3	3
C-6	1	5	2	4	4	2	3	3	5	1
C-7	1	5	2	4	5	1	3	3	4	2
C-8	1	5	4	2	2	4	3	3	5	1
C-9	1	5	2	4	4	2	3	3	5	1
C-10	1	5	2	4	3	3	4	2	5	1
C-11	2	4	3	3	4	2	1	5	5	1
C-12	3	3	2	4	1	5	4	2	5	1
C-13	1	5	4	2	5	1	3	3	2	4
C-14	5	1	3	3	1	5	2	4	4	2
C-15	5	1	3	3	2	4	1	5	4	2
C-16	4	2	2	4	1	5	3	3	5	1
C-17	1	5	4	2	3	3	2	4	5	1
C-18	3	3	2	4	1	5	3	3	5	1
<b>Plainfield Public Mtg.</b>										
P-1	1	5	5	1	2	4	4	2	3	3
P-2	3	3	5	1	2	4	1	5	4	2
P-3	4	2	5	1	3	3	1	5	2	4
P-4	3	3	4	2	1	5	2	4	5	1
P-5	4	2	3	3	2	4	1	5	5	1
P-6	4	2	3	3	1	5	5	1	2	4
P-7	4	2	3	3	1	5	5	1	2	4
P-8	4	2	3	3	1	5	5	1	2	4
<b>Fishers Public Mtg.</b>										
F-1	2	4	4	2	1	5	3	3	5	1
F-2	3	3	4	2	1	5	2	4	5	1
F-3	4	2	3	3	1	5	2	4	5	1
F-4	5	1	4	2	1	5	3	3	2	4
F-5	5	1	2	4	1	5	3	3	4	2
F-6	3	3	1	5	2	4	4	2	5	1
F-7	5	1	4	2	3	3	2	4	1	5
F-8	2	4	4	2	1	5	3	3	5	1
F-9	2	4	5	1	4	2	1	5	3	3
<b>City/County Public Mtg.</b>										
D-1	4	2	1	5	2	4	3	3	5	1
D-2	4	2	5	1	3	3	1	5	2	4
D-3	3	3	5	1	4	2	2	4	1	5

	Goal No. 1		Goal No. 2		Goal No. 3		Goal No. 4		Goal No. 5	
	Act.	Inv.	Act.	Inv.	Act.	Inv.	Act.	Inv.	Act.	Inv.
D-4	4	2	5	1	1	5	2	4	3	3
D-5	4	2	2	4	5	1	1	5	3	3
D-6	2	4	1	5	3	3	5	1	4	2
D-7	2	4	5	1	1	5	3	3	4	2
D-8	3	3	5	1	2	4	1	5	4	2
D-9	3	3	1	5	2	4	4	2	5	1
<b>Management Team Mtg.</b>										
M-1	1	5	4	2	3	3	2	4	5	1
M-2	5	1	1	5	2	4	3	3	4	2
M-3	4	2	2	4	1	5	3	3	5	1
M-4	1	5	2	4	3	3	4	2	5	1
M-5	5	1	3	3	1	5	4	2	2	4
M-6	2	4	5	1	1	5	4	2	3	3
M-7	3	3	5	1	2	4	1	5	4	2
M-8	3	3	5	1	1	5	2	4	4	2
M-9	2	4	1	5	4	2	3	3	5	1
M-10	5	1	4	2	1	5	2	4	3	3
M-11	3	3	5	1	1	5	2	4	4	2
M-12	1	5	2	4	4	2	3	3	5	1
M-13	3	3	4	2	2	4	1	5	5	1
M-14	2	4	4	2	1	5	3	3	5	1
<b>RTS Staff &amp; Consultants</b>										
I-1	3	3	2	4	4	2	1	5	5	1
I-2	3	3	4	2	1	5	2	4	5	1
I-3	3	3	4	2	1	5	2	4	5	1
I-4	2	4	3	3	1	5	4	2	5	1
I-5	5	1	4	2	1	5	3	3	2	4
I-6	4	2	5	1	1	5	3	3	2	4
I-7	2	4	5	1	1	5	4	2	3	3
I-8	4	2	2	4	1	5	3	3	5	1
I-9	3	3	4	2	2	4	1	5	5	1
I-10	2	4	4	2	3	3	1	5	5	1

<b>PUBLIC OUTREACH SCORING</b>						
<b>Total Goal Scoring</b>	139	125	175	149	104	692
<b>Normalized Utilitiy Values</b>	0.20	0.18	0.25	0.22	0.15	1.00

<b>MANAGEMENT TEAM, RTS STAFF &amp; CONSULTANTS SCORING</b>						
<b>Total Goal Scoring</b>	73	60	101	83	43	360
<b>Normalized Utilitiy Values</b>	0.20	0.17	0.28	0.23	0.12	1.00

<b>OVERALL SCORING</b>						
<b>Total Goal Scoring</b>	212	185	276	232	147	1052
<b>Normalized Utilitiy Values</b>	0.20	0.18	0.26	0.22	0.14	1.00

**Regional Rapid Transit Study  
Alternative Rapid Transit Systems Scoring Against Each Evaluation Criterion  
And Plan Effectiveness for Each Regional Rapid Transit System Alternative**

Alternative No. 1: Automated Guideway Transit (AGT), Commuter Rail Transit (CRT) & Express Bus (EXB).  
Alternative No. 2: Bus Rapid Transit (BRT), Light Rail Transit (LRT) & Express Bus (EXB).  
Alternative No. 3: Light Rail Transit (LRT), Commuter Rail Transit (CRT) & Express Bus (EXB).

	Alternative No. 1					Alternative No. 2					Alternative No. 3-A					Alternative No. 3-B				
	Goal No. 1	Goal No. 2	Goal No. 3	Goal No. 4	Goal No. 5	Goal No. 1	Goal No. 2	Goal No. 3	Goal No. 4	Goal No. 5	Goal No. 1	Goal No. 2	Goal No. 3	Goal No. 4	Goal No. 5	Goal No. 1	Goal No. 2	Goal No. 3	Goal No. 4	Goal No. 5
<b>Greenwood Public Mtg.</b>																				
G-1	7	7	5	6	5	3	3	1	2	3	5	3	5	3	3					
G-2	4	2	5	6	5	6	5	7	7	7	8	10	9	8	10					
<b>Cumberland Public Mtg.</b>																				
C-1	0	0	5	5	0	5	5	3	5	5	10	10	10	10	10					
C-2	10	8	6	2	2	10	8	6	6	2	10	8	6	10	10					
C-3	3	3	3	3	3	5	5	5	5	5	10	10	10	10	10					
C-4																				
C-5	8	7	7	6	7	6	7	7	6	7	10	10	10	10	10					
C-6	5	4	4	5	3	7	6	6	6	5	9	10	9	9	10					
C-7																				
C-8	4	3	4	2	3	10	9	10	8	9	7	6	7	5	6					
C-9	8	6	7	5	3	9	7	8	5	2	10	10	10	10	7					
C-10	7	5	7	5	5	7	7	9	9	6	9	10	10	10	8					
C-11	9	9	9	9	9															
C-12	4	5	6	6			7	6	8			9	8	10						
C-13																				
C-14																				
C-15	8	9	8	10	8	7	7	6	8	6	6	5	5	7	5					
C-16	2	8	9	7	5	5	4	3	6	8	8	9	10	8	2					
C-17																				
C-18	7	7	7	6	8	3	3	3	5		6	5	5	7	5					
<b>Plainfield Public Mtg.</b>																				
P-1	2	3	4	5	3	8	6	6	7	6	8	8	8	7	8					
P-2	7	5	6	5	6	6	6	6	6	6	7	7	6	6	6					
P-3																				
P-4	6	6	4	2	4	4	4	2	2	4	5	5	3	2	4					
P-5																				
P-6	9	10	8	9	10	6	1	5	8	7	8	1	6	9	10					
P-7	8	0	6	7	7	8	0	7	9	9	8	0	9	9	8					
P-8	6	4	9	7	8	6	4	9	7	8	6	4	9	7	8					
<b>Fishers Public Mtg.</b>																				
F-1																				
F-2																				
F-3	8	9	8	7	7	5	5	6	6	7	6	6	7	6	7	7	7	7	7	7
F-4	10	10	10	10	10	7	7	7	8	8	2	5	1	1	6	8	8	8	8	7
F-5	10	10	10	10	10	9	9	9	9	9	1	1	1	1	1	0	0	0	0	0
F-6																				
F-7	8	8	8	8	8	5	8	7	7	8	2	3	4	5	5	2	3	3	5	3
F-8																				
F-9	5	7	8	8	6	5	8	8	8	5	5	6	7	7	4	7	7	8	9	5
<b>City/County Public Mtg.</b>																				
D-1	7	8	10	8	7	7	5	8	9	7	7	5	8	9	7	6	5	4	4	7
D-2	7	7	7	7	7	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8
D-3	2	4	8	6	2	0	3	5	3	0	9	9	9	9	9	10	10	10	10	10
D-4	7		7	8	6	7		7	6	7	7		8	8	6	7		9	9	7
D-5																				
D-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10
D-7	5	5	5	5	5	0	0	0	0	0	5	5	5	5	5	10	10	10	10	10
D-8	10	10	10	10	10	5	5	5	8	7	7	7	7	7	7	10	10	10	10	10
D-9		10														10	10	10	10	10
<b>Management Team Mtg.</b>																				
M-1	6	5	7	8	8	4	7	6	7	8	3	5	6	8	3	2	5	6	6	2
M-2	10	10	10	10	10	9	9	9	9	9	10	10	10	8	8	10	9	8	8	8
M-3	3	5	6	6	8	4	4	5	4	4	4	6	5	4	4	6	7	8	6	5

**Regional Rapid Transit Study  
Alternative Rapid Transit Systems Scoring Against Each Evaluation Criterion  
And Plan Effectiveness for Each Regional Rapid Transit System Alternative**

M-4	10	10	8	9	5	5	7	8	10	7	8	8	7	7	7	8	8	10	10	9
M-5	6	5	6	7	6	9	9	10	9	9	7	5	5	6	5	7	9	10	9	9
M-6	5	10	3	8	5	4	2	3	4	6	7	5	3	4	5	7	7	8	7	5
M-7	10	8	6	4	5	9	6	8	6	7	6	0	7	3	8	8	2	5	8	2
M-8	4	3	5	6	6	5	2	5	6	6	6	3	7	5	6	7	4	6	5	6
M-9	8	8	7	7	10	5	5	5	7	5	5	4	4	6	4	4	3	3	5	4
M-10	8	9	8	8	9	4	5	4	3	7	4	5	5	3	7	7	7	6	7	7
M-11	8	5	9	8	9	6	5	7	7	7	6	5	7	7	6	5	5	4	5	5
M-12	10	10	10	10	10	7	10	10	7	10	7	3	5	7	5	5	3	5	5	0
M-13	9	9	9	9	9	7	7	6	7	5	5	6	5	5	5	5	6	5	5	5
M-14	8	6	7	7	6	7	6	7	7	6	7	5	7	6	6	7	5	7	6	5
I-1	8	8	7	8	5	6	4	6	5	8	7	8	7	8	8	9	7	10	8	9
I-2	8	7	8	7	7	6	7	8	5	6	7	8	8	6	7	7	8	8	5	7
I-3	3	8	6	7	8	6	6	7	2	6	5	8	5	7	6	6	7	7	8	9
I-4	8	7	9	7	6	6	6	6	6	5	7	7	8	7	6	5	5	2	5	7
I-5	8	7	7	5	7	7	6	7	5	7	7	6	6	5	6	8	7	8	5	7
I-6	6	6	6	7	8	6	6	6	7	8	8	7	6	8	9	8	8	6	8	8
I-7	8	8	10	7	10	2	3	7	4	10	10	9	9	9	10	10	9	9	10	10
I-8	9	8	9	8	9	10	8	8	8	8	9	10	10	10	10	10	10	10	10	10
I-9	10	8	10	9	10	1	2	4	3	4	3	3	4	3	2	2	3	2	2	2
I-10	10	10	10	10	8	5	0	7	7	4	8	7	8	8	8	7	9	9	9	8

<b>PUBLIC OUTREACH SCORING PRIOR TO THE ADDITION OF ALTERNATIVE 3-B</b>																				
<b>Total Goal Score</b>	124	111	129	118	104	121	104	115	125	105	150	140	155	157	140					
<b>Goal Utility Values</b>	0.20	0.18	0.25	0.22	0.15	0.20	0.18	0.25	0.22	0.15	0.20	0.18	0.25	0.22	0.15					
<b>Raw Alternative Effectiveness</b>			<b>118.62</b>					<b>114.87</b>					<b>149.46</b>							
<b>Normalized Effectiveness</b>			<b>0.31</b>					<b>0.30</b>					<b>0.39</b>							
			<b>Alternative No. 1</b>					<b>Alternative No. 2</b>					<b>Alternative No. 3-A</b>							

<b>PUBLIC OUTREACH SCORING AFTER THE ADDITION OF ALTERNATIVE 3-B</b>																				
<b>Total Goal Score</b>	79	88	91	87	78	59	59	71	73	67	59	55	65	66	65	95	88	97	100	94
<b>Goal Utility Values</b>	0.20	0.18	0.25	0.22	0.15	0.20	0.18	0.25	0.22	0.15	0.20	0.18	0.25	0.22	0.15	0.20	0.18	0.25	0.22	0.15
<b>Raw Alternative Effectiveness</b>			<b>85.23</b>					<b>66.25</b>					<b>62.20</b>					<b>95.17</b>		
<b>Normalized Effectiveness</b>			<b>0.28</b>					<b>0.21</b>					<b>0.20</b>					<b>0.31</b>		
			<b>Alternative No. 1</b>					<b>Alternative No. 2</b>					<b>Alternative No. 3-A</b>					<b>Alternative No. 3-B</b>		

<b>MANAGEMENT TEAM, RTS STAFF &amp; CONSULTANTS SCORING OF ALTERNATIVES 1 THRU 3-B</b>																				
<b>Total Goal Score</b>	183	180	183	182	184	140	132	159	145	162	156	143	153	151	152	154	150	163	162	149
<b>Goal Utility Values</b>	0.20	0.17	0.28	0.23	0.12	0.20	0.17	0.28	0.23	0.12	0.20	0.17	0.28	0.23	0.12	0.20	0.17	0.28	0.23	0.12
<b>Raw Alternative Effectiveness</b>			<b>182.39</b>					<b>147.78</b>					<b>151.36</b>					<b>157.11</b>		
<b>Normalized Effectiveness</b>			<b>0.29</b>					<b>0.23</b>					<b>0.24</b>					<b>0.25</b>		
			<b>Alternative No. 1</b>					<b>Alternative No. 2</b>					<b>Alternative No. 3-A</b>					<b>Alternative No. 3-B</b>		

<b>PUBLIC OUTREACH, MANAGEMENT TEAM, RTS STAFF &amp; CONSULTANTS SCORING OF ALTERNATIVES 1 THRU 3-B</b>																				
<b>Total Goal Score</b>	262	268	274	269	262	199	191	230	218	229	215	198	218	217	217	249	238	260	262	243
<b>Goal Utility Values</b>	0.20	0.18	0.26	0.22	0.14	0.20	0.18	0.26	0.22	0.14	0.20	0.18	0.26	0.22	0.14	0.20	0.18	0.26	0.22	0.14
<b>Raw Alternative Effectiveness</b>			<b>267.75</b>					<b>214.11</b>					<b>213.52</b>					<b>251.98</b>		
<b>Normalized Effectiveness</b>			<b>0.28</b>					<b>0.23</b>					<b>0.23</b>					<b>0.27</b>		
			<b>Alternative No. 1</b>					<b>Alternative No. 2</b>					<b>Alternative No. 3-A</b>					<b>Alternative No. 3-B</b>		