EXEcutivE Summary report

November 18, 2013
CONTENTS

1.0 Introduction ......................................................................................................................... 6

2.0 Red Line Planning Process .................................................................................................. 8
  2.1 Existing and Future Conditions .......................................................................................... 9
  2.2 Purpose and Need and Evaluation Methodology ................................................................. 9
  2.3 Pre-Screening ..................................................................................................................... 10
  2.4 Tier 1 Evaluation ................................................................................................................. 10
  2.5 Tier 2 Evaluation ................................................................................................................. 11
  2.6 Recommended Alternative ................................................................................................. 11

3.0 Red Line Recommended Alternative .................................................................................. 12
  3.1 Recommended Service Plan ............................................................................................... 12
  3.2 Recommended Route ........................................................................................................ 13
  3.3 Program Elements ............................................................................................................. 17
    3.3.1 Unique Branding .......................................................................................................... 17
    3.3.2 Transit Stations .......................................................................................................... 17
    3.3.3 Vehicles ..................................................................................................................... 18
    3.3.4 Running Way Treatments .......................................................................................... 19

4.0 Cost Estimates ...................................................................................................................... 24

5.0 Moving Forward: A Path Towards Implementation of the Red Line ...................................... 25
  5.1 Refinements to the Project Scope ....................................................................................... 25
  5.2 Meeting FTA Requirements ............................................................................................. 25
  5.3 Securing Local Funding .................................................................................................... 27

LIST OF FIGURES

Figure 1-1. Study Area .................................................................................................................. 7
Figure 3-1. North Corridor Recommended Alternative ............................................................... 15
Figure 3-2. South Corridor Recommended Alternative ............................................................. 16
Figure 3-3. North Recommended Alternative: Proposed Transit Priority Features .................... 20
Figure 5-1. Small Starts Process under MAP-21 ..................................................................... 26

LIST OF TABLES

Table 3-1. Draft Preferred Alternative Characteristics ............................................................... 14
Table 4-1. Recommended Alternative Estimated Capital Costs ($Millions) ............................... 24
Table 4-2. Recommended Alternative Estimated Operating and Maintenance Costs ................ 24
1.0 INTRODUCTION

The Alternatives Analysis report summarizes the study process, findings, and recommendations of the analysis of rapid transit alternatives for the Red Line study area (previously the “North-South Corridor”). This analysis of alternatives, hereafter referred to as the Red Line Planning Study, was conducted by Parsons Brinckerhoff for the Indianapolis Metropolitan Planning Organization (MPO), in cooperation with the Indianapolis Public Transportation Corporation (IPTC, or locally recognized as IndyGo) and the Central Indiana Regional Transportation Authority (CIRTA). The three partner agencies formed the Project Management Team (PMT), which was responsible for directing the consultant’s work and implementing the project’s Public Involvement Plan (PIP). The Policy and Technical Committee’s of the Indianapolis Regional Transportation Council (IRTC) are responsible for officially approving the recommendations of this study, thereby signifying that its recommendations support the goals and objectives of the communities which its members represent.

The Red Line study area is centered on the Indianapolis Regional Center (downtown and vicinity) and extends north through Marion County to the City of Carmel in Hamilton County and south through Marion County to the City of Greenwood in Johnson County. The study area was studied as two separate travel corridors: from the Indianapolis Regional Center to the north and from the Indianapolis Regional Center to the south. The overall study area for both corridors is presented in Figure 1-1.

An evaluation framework and associated measures were identified in the initial steps of this study as the preferred method for differentiating among the transit technologies and the available alignments/termini. The framework is consistent with FTA guidance for the evaluation of alternatives provided in FTA’s Procedures and Technical Methods for Transit Project Planning and is described in detail in subsequent chapters. The decision-making process involved three steps, within which the framework and measures were applied:

1. Pre-Screening. Outcome: identification of the range of alternatives to be considered and the preferred mode / technology.
2. Tier 1 Screening. Outcome: narrowing of the alternatives to a smaller set of the most promising modes and routings for both the North and the South Corridors.
3. Tier 2 Screening. Outcome: evaluation of the smaller set of remaining alternatives in the North and South Corridors to support the selection of a single mode and alignment for each corridor.

In each step of the decision-making process, the evaluation methodology was applied to each corridor separately, consistent with FTA policy and guidance elsewhere.

Parallel to the technical process described above, a robust public involvement plan was implemented in order to share information and receive public feedback at critical junctures. Three rounds of public meetings were held within each corridor and in downtown Indianapolis. Additionally, dozens of stakeholder meetings were conducted with individuals, small groups, and neighborhood organizations throughout the study area and throughout the study process. The input that was received through the public involvement process was considered, summarized, and incorporated into the decision-making process. Decisions on which alternatives were advanced, and on which final alternative was selected, reflect a set of considerations that include both the technical evaluation process and considerations emanating from the public process.

The recommendations in this report have been designed to be consistent with the Indy Connect vision, which aspires to create a more livable, accessible, sustainable, and vibrant Central Indiana region. In addition to the preferred transit mode and routing within the identified study area, the Red Line Recommended Alternative provides analysis to support local decisions on:

- Elements of an overall technology concept for the region,
- Optimal operating strategy,
- Pre-Screening Report (Final March 26, 2013)
- Portions of the alignment where transit would operate in exclusive lanes or dedicated right-of-way during all or part of the day,
- Location of transit service and facilities within the street cross section (center of a street or in a curb lane),
- Transit vehicle and stop amenities,
- Traffic signal prioritization, and
- Location of stations.

While subsequent phases of project development will offer opportunities to refine some of the project details, the goal of the Red Line Planning Study is to reach decisions that will be sustainable as the project advances through design and implementation.
Base Map and Study Area

Sources:
- U.S. Census Bureau
- Indianapolis Metropolitan Area Geographic Infrastructure Systems (IMAGIS)
- Hamilton County GIS

Figure 1-1. Study Area
2.0 RED LINE PLANNING PROCESS

The Red Line planning process was conducted over approximately a one-year period, from November 2012 to December 2013. Over this period, a defined technical process was implemented in parallel to the Public Involvement program. The technical process involved six major technical steps, as shown in the graphic below:

The following interim reports were produced to document each step of this process:

- Existing and Future Conditions Report (Draft April 5, 2013. Final expected December 2013)
- Purpose and Need and Evaluation Methodology (Final March 4, 2013)
- Pre-Screening Report (Final March 26, 2013)
- Tier 1 Evaluation Report (Final October 3, 2013)
- Recommended Alternative Report (Final October 15, 2013)
The final Alternatives Analysis document is the culmination of the entire Red Line planning process and summarizes the analyses, findings, recommendations, and outcomes of the entire study and all of its component parts.

The public and stakeholders were engaged throughout planning process. This was done in various ways including small group conversations, one-on-one discussions, presentations to large groups, as well as public open houses. Stakeholders that participated ranged from small neighborhood associations, church congregations, and developers and community development corporations to large institutions like universities and hospitals, large regional employers, elected officials, chambers of commerce, and many more. In particular, two stakeholder committees were formed to help guide the direction of the study: the Downtown Advisory Committee which was made up of representatives of Indianapolis businesses, organizations, and individuals with a special interest in the Regional Center, and the Community Leaders Committee, a group of minority business and community leaders from throughout the region.

In addition to the many outreach opportunities and meetings with stakeholders, three rounds of public open houses were held and advertised to the greater public to ensure opportunities for anyone to attend, learn, ask questions, and make suggestions. These open houses were held in February/March (nine meetings), August (nine meetings), and November (one meeting) of 2013. Two live webinars were also provided to supplement the reach of educational opportunities.

2.1 EXISTING AND FUTURE CONDITIONS

During this first task, the project team reviewed past recommendations, within multiple planning efforts, for improving and enhancing regional transit. Review materials included the “Summary Report of Transportation Alternatives” created by the Central Indiana Transportation Task Force (CITTF) in 2010, IndyGo’s most recent “Comprehensive Operational Analysis” (COA) approved in 2010, the “Long Range (2035) Transportation Plan (LRTP): Indy Connect Transit Vision Plan” approved by the Indianapolis Metropolitan Planning Organization (MPO) in 2011, and various targeted area plans and comprehensive plans created by various jurisdictions within the Red Line study area.

It was determined, through analysis of existing conditions, that there is a need within the Red Line study area to not only enhance service for those who currently use the bus system, but also to attract a substantial number of new riders by making transit more competitive with the automobile in terms of travel time, access, and reliability. The findings of the Existing and Future Conditions analysis were used to help identify the purpose and need of the project and to craft the goals and objectives for the Red Line study.

2.2 PURPOSE AND NEED AND EVALUATION METHODOLOGY

The Purpose and Need for enhancing transit within the North-South Corridor was developed through an understanding of existing and future conditions within it. While the North and South Corridors contain some of IndyGo’s highest ridership bus routes, transit service in the corridor is currently limited and carries a small share of travel. Most transit users are those who are transit dependent. Transit improvements in the Red Line study area are intended to not only enhance service for those who currently use the bus system, but also to attract a substantial number of new riders by making transit more competitive with the automobile in terms of travel time, access, and reliability. The Red Line transit service will be part of a comprehensive regional program that provides better and more direct connections between origins and destinations.

As noted in the existing plans, Indy Connect aspires to create a more livable, accessible, sustainable, and vibrant Central Indiana region. In addition to providing transportation choice to Central Indiana residents, transit improvements are intended to create development and growth opportunities. The selected system should encourage more focused development within established activity centers and identified areas with potential for transit-oriented development, thereby further encouraging transit use, improving air quality, and enhancing regional sustainability.

Given the Red Line goals of further encouraging transit use, improving air quality, creating development and growth opportunities, and enhancing regional sustainability, an evaluation framework was developed and organized around five primary perspectives: effectiveness, cost-effectiveness, financial feasibility, impacts, and equity:

- **Effectiveness.** The extent to which the alternatives address the stated needs in the corridor. Evaluation measures were derived from the adopted goals and objectives as well as the Purpose and Need.
• **Impacts.** The extent to which the alternatives support other local policy goals, present potential environmental and traffic issues that could be fatal flaws, or otherwise influence the selection of a preferred alternative.

• **Cost-effectiveness.** The extent to which the costs of the alternatives, both capital and operating, are commensurate with their anticipated benefits.

• **Financial and Technical Feasibility.** The extent to which funding for the construction and operation of each alternative is considered to be readily available and the extent to which potential engineering challenges or restrictions could limit the viability of an alternative.

• **Equity.** The extent to which an alternative’s costs and benefits are distributed fairly across different population groups.

Organizing the evaluation around these different perspectives was intended to highlight the important trade-offs to be made in selection of the recommended alternative and provide guidance to decision-makers in their review.

2.3 **PRE-SCREENING**

The Pre-Screening task was used to narrow a multitude of Red Line route options into a manageable number of alternatives to carry forward for further, more specific evaluation. The purpose of the pre-screening step was to document the alternatives considered, as well as those that were eliminated prior to the formal screening of alternatives. The pre-screening step additionally, allowed for elimination of fatally flawed alternatives from further consideration. Three questions were used to pre-screen the wider universe of alternatives:

- Had the alternative been eliminated in previous studies/discussions for reasons that are still considered valid?
- Was a mode or alignment (including alignment segments) clearly ill-suited to addressing purpose and need in these corridors?
- Did the mode and/or alignment have an obvious fatal flaw considering the market to be served, the environment within which it would operate, or the amount of funding likely to be available?

Depending on the answers, certain alternatives were recommended to be eliminated from further consideration prior to the Tier 1 Screening evaluation. Along with a selection of roadway segments to be analyzed, this step identified Bus Rapid Transit (BRT) as the preferred mode to be used in the analysis of build alternatives.

2.4 **TIER 1 EVALUATION**

The purpose of the Tier 1 Screening was to identify the suitability of each alignment, in each segment, for each technology and to develop a small set of the most promising transit alternatives for the North and South segments of the corridor for further refinement and evaluation. Within the Tier 1 screening step, each alignment was evaluated against the technology that had been advanced from the Pre-Screening phase.

The Tier 1 Screening used both qualitative and quantitative evaluation measures. Data for the screening stemmed largely from available demographic data, GIS data, local planning studies and documents, field reconnaissance, and stakeholder and public feedback. Evaluation measures included criteria such as density of residents and jobs served by the potential route; transit dependent populations served; connections to other transit corridors or bike routes; operational efficiencies associated with each alternative; convenience and accessibility of service to regional activity centers (health, employment, education, and recreation); opportunity for economic development; opportunity to reduce congestion and air pollution and enhance the environment; and technical and financial feasibility. For each evaluation measure, the alignment and technology alternatives were rated and presented within a summary matrix of the data and ratings by corridor. The poorest performers were eliminated from further consideration.

The Tier 1 evaluation resulted in the selection of six North Corridor build alternatives and four South Corridor build alternatives for advancement into the next stage of study.
2.5 TIER 2 EVALUATION

The Tier 2 Screening evaluation was performed to evaluate the short list of full corridor alternatives, using the travel demand forecasting model, at a level of detail sufficient for local decision-makers to select a recommended alternative. The alternatives were refined, conceptual station locations were identified, and a limited level of conceptual engineering was performed to provide a basis for capital cost estimating, operations and maintenance costs estimating, and financial analyses. The Tier 2 Screening also included a more detailed environmental screening and impact study.

The Tier 2 evaluation resulted in the selection of two North Corridor build alternatives and two South Corridor build alternatives for advancement into the final of study.

2.6 RECOMMENDED ALTERNATIVE

The remaining sections of this report describe the route that is being recommended for advancement within North-South Corridor. Along the majority of the alignment, a single route has been identified. There are, however, two issue areas identified within the corridor where further study is recommended before final selection of the preferred route. Within each of these issue areas, the alternatives have been narrowed down to no more than two route choices. Mode, vehicle type, and other features of the service have been identified and are also described in the following sections. The recommended alternative in the North-South Corridor has been named the Red Line to facilitate communication to the public.

The selection of the final Locally Preferred Alternative (LPA) will occur in the next phase of study, as part of Project Development and National Environmental Policy Act (NEPA) environmental documentation of the Build and No-Build alternatives.
3.0 RED LINE RECOMMENDED ALTERNATIVE

This chapter describes the Recommended Alternative for the Red Line, including route, stations, vehicles and operating elements. The development of the recommended alternative (Red Line) for the North-South Corridor of Indy Connect was described in detail in the Tier 2 Refined Alternatives Evaluation Report: Red Line. Bus Rapid Transit (BRT) is the recommended mode, with limited stops overlaid on background local bus. The proposed service plan and unique elements of the Red Line BRT are described in the following sections of this report.

3.1 RECOMMENDED SERVICE PLAN

The service plan for the recommended alternative provides the following BRT service characteristics, which are determined based upon the recommendations of the 2010 Comprehensive Operational Analysis for the Indianapolis region:

SERVICE SPAN

- Weekdays: 4:30 AM - 12:30 AM (20 hours per day)
- Saturdays: 6:00 AM - 12:30 AM (18.5 hours per day)
- Sundays: 6:30 AM - 9:00 PM (14.5 hours)
- Peak hour service span is six hours during weekdays, with three hours during the AM peak and three hours during the PM peak.
- 254 weekdays per year and 53 Saturdays and 58 Sundays/Holidays per year.

HEADWAYS

- Weekdays: 10 minutes during the peak period, 15 minutes during the off-peak period
- Weekends: 20 minutes daytime, 30 minutes night (COA recommended 30 minute weekend headways)

LAYOVER TIME: 10%

STOP PATTERN: Buses would stop at all station locations on all trips.

It is recommended that local bus stops be co-located with or situated adjacent to the proposed BRT stations where the exiting local stop is in close proximity to the BRT station. This recommendation applies to routes that parallel the BRT as well as routes that intersect the BRT as a way to encourage greater connectedness through convenient transfer opportunities and enhanced transit service levels. The potential for coordinating schedules, and thus create timed transfers, between the Red Line and IndyGo exists at many of the following locations within the North Corridor:

- Route 4 at multiple locations along Capitol Avenue and Illinois Street south of 38th Street
- Route 17 at multiple locations along College Avenue between 38th and 62nd Streets
- Route 18 at multiple locations along College Avenue between 62nd and 86th Streets
- Route 19 at College Avenue and 52nd Street
- Route 28 at multiple locations along Capitol Avenue and Illinois Street south of 38th Street
- Route 38 at 38th Street and either Capitol Avenue or Illinois Street
- Route 39 at College Avenue and 38th Street

Similarly, within the South Corridor, the following IndyGo routes connect to the Red Line and provide the opportunity to create timed transfers:

- Route 12 at multiple locations along Virginia Avenue and Shelby Street north of Minnesota Street
• Route 13 at South and East Streets
• Route 14 at South and East streets and at Prospect and Shelby streets
• Route 16 at multiple locations along Emerson Avenue south of Stop 11 Road
• Route 22 at multiple locations along Virginia Avenue and Shelby Street
• Route 31 at multiple locations along Madison Avenue between I-465 and Stop 11 Road

3.2 RECOMMENDED ROUTE

The route described below is recommended for further analysis as the preferred route. There are two issue areas within the recommended route that will require additional analyses in future phases of study. It is recommended that, to the extent possible, these issue areas be resolved before entering NEPA documentation.

In the North corridor, the recommended route starts in Carmel (Hamilton County) in the vicinity of the Palladium (Range Line Road and 126th Street / City Center Drive). Within Carmel, the route would proceed west and southwest on City Center Drive, and then turn south on Pennsylvania Street, continuing onto Pennsylvania Parkway to its intersection with College Ave. At College Avenue, the line would turn south.

From the intersection of Pennsylvania Parkway and College Avenue, the Red Line would use College Avenue south to 38th Street. Between 38th Street and 16th Street, two route options are still being considered and evaluated as Issue Area #2: Meridian Street or the one-way pair of Capitol Avenue and Illinois Street.

Issue Area #1: North Corridor: Illinois / Capitol vs. Meridian Street in Indianapolis from 16th Street to 38th Street. Based on public and stakeholder input, the Meridian Street corridor is now being considered as a location for a potential transit-way with the envisioned investment facilitating connections among multiple lines. Various options are under consideration for how a route along Meridian Street between 16th and 38th Streets could be implemented to bring about the greatest regional benefit. The choice between these two route options (Capitol/Illinois vs. Meridian) will need to consider right-of-way impacts, traffic and parking impacts, and operational constraints to a high level of detail and choices will need to be made on a regional level in order to support such analysis. Potential operating characteristics of the Purple Line, policy decisions about operating characteristics of local bus in the corridor, and other issues will be considered as inputs to this analysis.

From 16th Street the line would continue along the one-way pair of Capitol / Illinois either from Meridian Street or from Capitol / Illinois. The one-way pair of Capitol and Illinois would be utilized from 16th Street south into the Regional Center. The recommended route would use Maryland Street eastbound from Capitol Avenue and terminate at the Downtown Transit Center (DTC). Northbound, the line would exit the DTC via Washington Street westbound, then turn north on Illinois Street.

In the south corridor, the recommended route would start in Greenwood (Johnson County) at the junction of U.S. 31, Madison Avenue, and Smith Valley Road. From this southern terminus, the line would proceed north on Madison Avenue through Greenwood and into Marion County and the City of Indianapolis.

North of I-465, the recommended route would turn off Madison Avenue and proceed north on Shelby Street, connecting to Virginia Avenue in the Fountain Square neighborhood. The line would continue northwest on Virginia Avenue where Issue Area #3 is encountered; the route would either take a small deviation at McCarty Street (westbound) and East Street (northbound) to better access the high employment of Eli Lilly’s corporate campus or continue along Virginia Avenue from this location.

Issue Area #2: South Corridor: Virginia Avenue vs. East Street / McCarty Street in Indianapolis at Eli Lilly & Company Corporate Center. In the South Corridor, the corporate headquarters of Eli Lilly & Company is one of the largest employment sites in the region, with 111-acres and thousands of employees. From the Red Line preferred route, the closest that the service could get to the campus would be by diverting west from Virginia Avenue on McCarty Street to East Street, stopping in the vicinity of East Street and E. Merrill Street, and then turning northwest onto Virginia Avenue. The benefit, however, of stopping immediately adjacent to the Lilly Corporate Center would be offset to some extent by the indirectness of the suggested route diversion. Additionally, recently constructed mixed use development on Virginia Avenue between McCarty Street and East Street would not be served with front-door access in this scenario, although it would remain within walking distance of the proposed station. An alternative to the McCarty/ East
route diversion which could accomplish the same objective is to divert west from Shelby Street at Fountain Square, using the one-way pair of Morris St. (eastbound) and Prospect St. (westbound) to travel between East Street and Virginia Avenue. This option, too, would connect back in with the previously described preferred route at the Virginia Ave. / East St. intersection. This last option is being considered as a result of public input received in the final stages of the planning process and has not yet been evaluated against the goals and objectives of the project. The project team, however, believes that it merits review. Additional study will be required before selection is made of the best routing alternative.

From the intersection of East Street and Virginia Avenue, the line would continue northwest on Virginia Avenue and terminate at the DTC in the vicinity of Maryland and Delaware streets.

Figures 3-1 and 3-2 illustrate the draft recommended route and stations in each corridor. Table 3-1 summarizes other key characteristics of the preferred alternative as presented in the Tier 2 Report.

### Table 3-1. Draft Preferred Alternative Characteristics

<table>
<thead>
<tr>
<th>Project Characteristic</th>
<th>North Corridor – Carmel to DTC</th>
<th>South Corridor – Greenwood to DTC</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Mode</td>
<td>Bus Rapid Transit (BRT)</td>
<td>BRT</td>
<td></td>
</tr>
<tr>
<td>Service Length</td>
<td>34.3 miles</td>
<td>24.2 miles</td>
<td></td>
</tr>
<tr>
<td>Number of BRT Stations</td>
<td>24 or 27*</td>
<td>14</td>
<td>* Depending on which route alternative is selected between 16th and 38th Streets</td>
</tr>
<tr>
<td>Headway</td>
<td>10 min peak / 15 min off-peak</td>
<td>10 min peak / 15 min off-peak</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 min day / 30 min night</td>
<td>20 min day / 30 min night</td>
<td></td>
</tr>
<tr>
<td>Service Span</td>
<td>20 hours</td>
<td>20 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.5 hours</td>
<td>18.5 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.5</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td>New BRT Vehicles Required for Peak Services</td>
<td>11</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

It has been assumed that local IndyGo service would continue to operate within the corridor along existing routes and at existing service frequencies.
Figure 3-1. North Corridor Recommended Alternative

Sources:
U.S. Census Bureau
Indianapolis Metropolitan Area
Geographic Infrastructure Systems (IMAGIS)
Hamilton County GIS
Figure 3-2. South Corridor Recommended Alternative
3.3  RECOMMENDED PROGRAM ELEMENTS

The Recommended Alternative includes program elements that will make it distinctive from the region’s other local and express bus services. Elements discussed in this section include:

- **Unique Branding**: Provides an identifiable, marketable, and common theme that generates a clear and positive recognition of the service.

- **Transit Stations**: Provides real-time information, off-board fare collection, level boarding, improved pedestrian access, and security features, creating a waiting environment similar to that found at a rail transit station.

- **Transit Priority Treatments**: Provides the ability for the BRT to receive priority treatment through signal priority, queue jumps, or dedicated transit lanes.

- **Vehicles**: Specially designed door and interior configuration elements that allow for higher capacities and faster boarding.

3.3.1  UNIQUE BRANDING

The FTA has recognized the significant impacts on ridership and public perception associated with branding of BRT services. General elements of branding proposed for the Red Line Recommended Alternative include:

- A logo and color scheme to distinguish it from Indianapolis’ local and express services. This logo and color scheme will be utilized on the buses used for the service, on stations and stop markers, and on schedules and other public information used to promote the service.

- A comprehensive marketing and branding strategy to provide customer information through various media outlets to educate and inform the public of the benefits of the service. As typical with marketing efforts, follow up research on the effectiveness of the message is recommended.

- Physical infrastructure featuring a unified branding for the Red Line service. Shelters and other infrastructure used for the service will include the color scheme and logos, as well as distinct architectural elements to further underscore to the public that the BRT service is a distinct service. These architectural details will become part of branding.

3.3.2  TRANSIT STATIONS

BRT stations are integral to establishing the service as a permanent high-frequency amenity for the corridor. In the preferred alternative, there are up to 41 station sites proposed, with 27 in the North corridor and 14 in the South corridor. Among the 41 station sites, nine are proposed in the mile-square of downtown Indianapolis; seven of them north of the DTC and two of the south of the DTC.

On two-way streets, a station most often constitutes two platforms, one in each direction of travel. On one-way streets, a station will have a single platform area. Fewer total stations would be provided if a Meridian Street median transitway option is selected between 16th and 38th Street because of the possibility to use one center station for both north- and south-bound travel.

Four station typologies—Minimal (Stand Alone), Basic, Storefront, and Major—were identified for implementation along the Red Line along with subsets within each typology to allow for variations within certain contexts. Each typology includes common components at each station. There is an area where the anticipated 60’ long BRT vehicle will engage the station – the BRT landing area. The overall station area will match the length of the landing area and will be a platform raised to closely match the floor height of the BRT vehicle, allowing level boarding. The ground plane will be marked with loading area indicators that align with the BRT doors. Each station will include a ticketing kiosk, real time information, a system map and transit line identification. For added safety, tactile warning strips and railings are included on the station curbside edge. Station amenities will include, at a minimum, a covered shelter, seating, waste and recycling receptacles and bike parking. A basic station is graphically illustrated and labeled below to provide an overview of the components found within each station. The distinctions between each station typology are detailed in the Tier 2 Refined Alternatives Evaluation Report: Red Line.
Park-and-ride facilities have been identified for seven of the station locations: three in the North corridor and four in the South corridor. All park-and-ride facilities have been assumed to be surface parking lots in the near term, except where structured parking already exists. Where possible, an existing parking facility would be utilized through a shared use parking arrangement with adjacent development.

**North Corridor Park-and-Ride locations:**
1. Pennsylvania Street / Congressional Boulevard
2. College Avenue / 96th Street
3. College Avenue / 62nd Street (existing parking structure)

**South Corridor Park-and-Ride locations:**
1. Shelby Street / Hanna Avenue (University of Indianapolis)
2. Madison Avenue / County Line Road (Greenwood Park Mall)
3. Madison Avenue / Main Street
4. Madison Avenue / U.S. 31

### 3.3.3 VEHICLES

A fleet of up to 19 low-floor articulated BRT vehicles is proposed for the Red Line service: eleven to operate in the North Corridor during weekday peak periods and eight in the South Corridor during weekday peak periods. Although the initial demand forecast for 2015 ridership does not indicate a need for the capacity of articulated vehicles, the concept at this stage of the process is that the larger vehicles will be a component of the overall system branding. Future phases of the study, which will include future year ridership forecasts, will refine this assumption. This number of buses assumes separate North and South Corridor operation. If there is a shorter interlined route spanning both corridors, fewer vehicles will be needed. Additional identical vehicles should be procured to serve as spares. The vehicles would be stored and maintained at the existing IndyGo operating and maintenance facility on West Washington Street in Indianapolis. At the time of the writing of this document, a preferred fuel for the vehicles has not been identified. IndyGo currently operates diesel, hybrid, and electric vehicles in its fleet. It is exploring the use of compressed natural gas (CNG) but does not now have the infrastructure to support CNG buses. Red Line vehicles will be branded with a unique branding identity as described earlier in this section.
3.3.4 RUNNING WAY TREATMENTS

SIGNAL PRIORITIZATION AND QUEUE JUMPS

The Red Line will have faster travel time and increased reliability through implementation of a Transit Signal Priority (TSP) system. The TSP system will achieve this reliability by extending the green or shortening the red signal indication when the bus is behind schedule (beyond a pre-defined threshold amount). Infrastructure for the TSP will include improvements to all traffic signals within the route, equipment on buses, and software upgrades. The City of Indianapolis is currently utilizing signal prioritization for emergency vehicles.

Queue jumps are an alternative to TSP and are preferable when there is a need for a near side bus stop or where TSP is not possible due to level of service (LOS) constraints. Queue jump treatments reduce delay at signalized intersections for bus transit by using a right-turn lane or a separate lane for buses only. This allows transit vehicles to avoid the queue in the adjoining through lanes. Buses are exempted from any right-turn requirements at the intersection. Queue jumps are currently used by only IndyGo at a limited number of downtown intersections.

In the North corridor of the Red Line, nine signalized intersection locations were identified where transit signal priority and queue jumps were both applicable based on LOS and the existence of an exclusive right turn lanes for existing traffic volumes. Seven signalized intersections were identified where both strategies were applicable under future traffic volumes. In the South corridor of the route, nine signalized intersection locations were identified where transit signal priority and queue jumps were both applicable. Seven signalized intersections were identified where both strategies were applicable under future traffic volumes. Specific locations for recommended treatments are described in the following sections of this report.

DEDICATED LANES

Dedicated bus lanes provide the highest type of BRT service by offering better travel speeds, service reliability, and passenger attraction. The basic goal of implementing bus lanes is to give BRT vehicles an operating environment free from the delays caused by general traffic. Improved travel time provides consistency to regular transit users and reduces the amount of recovery time that needs to be built into schedules for transit operators, resulting in savings to Operating and Maintenance (O&M) costs.

Semi-exclusive bus lanes (also known as Business Access and Transit, or BAT lanes) were considered for segments where the existing lane configuration would allow bus operations in an exclusive lane without significant impact to general vehicular operations. The analysis conducted to determine this was performed for segments of the corridor with existing low occupancy parking lanes and/or available right of way. In cases where local bus routes operated along the same route as the Red Line, it was assumed that the IndyGo service could also use the dedicated lanes along with the BRT vehicles, although the BRT vehicles would need the ability to safely and efficiently pass local bus service, especially where they are stopped at local bus stops.

Dedicated lane segments have been identified in the North corridor for portions of Capitol and Illinois Streets, College Avenue, and City Center Drive. There were no opportunities identified for dedicated lanes in the South corridor.
North Recommended Alternative: Proposed Transit Priority Features

- Downtown Transit Center
- Park and Ride Locations
- Transit Stops
- Queue Jump
- Routes
- Alternate Routes
- Bus Lanes

Sources:
- U.S. Census Bureau
- Indianapolis Metropolitan Area Geographic Infrastructure Systems (IMAGIS)
- Hamilton County GIS

Figure 3-3. North Recommended Alternative: Proposed Transit Priority Features
Specific running-way treatments are proposed along the Red Line as described below. Traveling north from the DTC, the following are elements of the preferred alternative in the North Corridor:

**Capitol Avenue / Illinois Streets**

From Washington Street in downtown Indianapolis and north to Fall Creek Parkway, the BRT is proposed to operate in the existing right side parking lane area on both Capitol and Illinois Streets, shared with right turns (the BAT lane concept). North of 23rd Street to 38th Street, the BRT would have to operate in mixed traffic in the right traffic lane. The existing bike lanes on both streets would remain but could shift to the left side curb lane for improved cyclist safety. Given the interconnection of traffic signals in the central area, transit priority treatments along these two streets would focus primarily on queue jump treatments, including at the following locations:

- Existing southbound bus-only signal on Capitol Avenue at the State Capitol stop
- Added southbound queue jump on Capitol Avenue at 16th Street
- Northbound queue jump on Illinois Street at 10th Street and 38th Street
- Northbound Right Turn Except Buses treatment on Illinois Street at 16th Street and at 29th Street

**Meridian Street**

The running way options along the Meridian Street route alternative could use either curb-side or center running dedicated lanes, but would likely have impacts to on-street parking and vehicular capacity. Because the impacts to traffic capacity and transit operations could be significant and extend beyond the boundaries of the study area, a detailed analysis and micro-simulation will be required. Alternative treatments will need to be considered in future phases of study.

**38th Street**

At 38th Street, in conjunction with the Capitol Avenue / Illinois Street route option, a potential off-street transit center has been identified on the northeast corner of 38th and Illinois Street, associated with potential redevelopment of some of the parcels on that corner. Such a transit center would provide transfer opportunities for the Red Line BRT, the Purple Line (38th Street) BRT, and local bus routes. Access to the site could be provided off 39th Street to the north, with a potential connection west to Capitol Avenue to avoid a weaving maneuver for buses on westbound 38th Street. East along 38th Street to College Avenue, the BRT route would operate in mixed traffic.

**College Avenue**

Three general operating configurations for BRT along College Avenue between 38th Street and 62nd Street have been identified. Unless otherwise indicated, reference to elimination of on-street parking refers only to peak-hour restrictions within the lane that the BRT vehicle is operating. During the off-peak hours, when parking would be permitted, the BRT vehicle would operate in mixed traffic adjacent to the parking lane. The three primary configurations (with variations noted) are:

1. Existing parking lanes would be preserved at all times and BRT would operate in mixed traffic in both directions, peak and off-peak. Two northbound through travel lanes would be preserved along the corridor.
2. Existing parking lanes northbound and southbound would be converted to transit-only lanes in the peak hour of each direction (southbound in the AM peak and northbound in the PM peak). In the off-peak hours in each direction, parking would be permitted in these lanes and the BRT vehicle would operate in mixed traffic adjacent to parking.

3. Existing parking lanes northbound and southbound would be converted to transit-only lanes in the peak hour of each direction (southbound in the AM peak and northbound in the PM peak). In the off-peak hours in each direction, parking would be permitted in these lanes and the BRT vehicle would operate in mixed traffic adjacent to parking. One lane of northbound traffic would be removed in this scenario in order to accommodate raised medians and/or center left-turn lanes.

*As shown in the graphic one lane of northbound traffic would be removed in this scenario in order to accommodate raised medians and/or center left-turn lanes.*
The preferred configuration would be Alternative 1, given its limited impact to on-street parking. At the signalized intersections along the corridor, TSP would be provided.

North of 62nd Street, BRT would operate in mixed traffic along the existing two-lane roadway to Pennsylvania Parkway. TSP capability would be provided at all signalized intersections.

**Through Office Park Area North of I-465**

The BRT routing north of I-465 would extend west along Pennsylvania Parkway to Pennsylvania Street, then north to City Center Drive. The BRT would operate in mixed traffic in this area, and would have to negotiate through the existing roundabout on Pennsylvania at 106th Street and the future roundabout planned at 116th Street. TSP capability would be provided at remaining signalized intersections.

**Access to Carmel Town Center**

The identified BRT routing from the 116th Street and Pennsylvania Street intersection to Carmel Town Center would be northbound on Pennsylvania and then east / northeast via City Center Drive. Along City Center Drive, BRT could operate in the outside travel lanes in exclusive lanes. The route would terminate at Range Line Road, with the turnaround to be provided by a u-turn around the planned roundabout at the intersection of City Center Drive and Range Line Road.

**Traveling north from Greenwood towards the DTC, the following are elements of the preferred alternative in the South Corridor:**

**Madison Avenue**

From the south termini, the recommended alternative would extend north on Madison Avenue, operating in mixed traffic on the two-lane roadway to Noble Avenue, then north through downtown Greenwood in mixed traffic in the outside lanes of the existing four-lane roadway.

North of Greenwood, the BRT route would continue to operate on Madison Avenue past the Greenwood Mall, where a park-and-ride could potentially be incorporated into the outer portion of the existing mall parking lot east of the Auto Service Center or in an adjacent parking lot along Madison Avenue. Queue jumps could be developed southbound at Fry Road and the Mall access road. BRT vehicles could either stay on street at the park-and-ride or divert into the parking lot and turn around. The BRT route would continue in mixed traffic north across the County Line Road, Stop 11 Road, Southport Road, Banta Road, Edgewood Avenue, and Thompson Road intersections then across I-465 to Shelby Street. TSP would be provided when possible.

**Shelby Street**

In the recommended alternative, BRT would operate on Shelby Street from its intersection with Madison Avenue, north to Fountain Square and the intersection of Shelby Street / Virginia Avenue. BRT would operate in mixed traffic on this existing two-lane roadway, with the cycle track maintained on the west side of the street. TSP would be provided when possible.

**Virginia Avenue**

North of Fountain Square, the route would operate on Virginia Avenue north into downtown to access the DTC. BRT would operate in mixed traffic in the existing two-lane roadway along Virginia to East Street, then in the four-lane roadway north of East Street, including under the railroad viaduct. A pedestrian signal would be provided at Louisiana Avenue to serve the BRT station at that location, tied into the pedestrian pathway, connecting the City Way development to the west and the Anthem and Farm Bureau buildings to the east.
4.0 COST ESTIMATES

Capital and operating costs were estimated for each portion of the Red Line corridor separately, north and south, using information and analysis completed and summarized in the Tier 2 Refined Alternatives Evaluation Report: Red Line. Capital costs were estimated using the FTA Standard Cost Categories (SCC) worksheets for each of the different BRT system elements including running-way, transit priority treatments, vehicles, stations, and system elements. Operating cost estimates were derived based on the assumed operating plan for each Build alternative and a derived Operations & Maintenance Cost Model. It was assumed that local bus would continue to operate within the North-South Corridor as it exists today, with minor route modifications to facilitate transfers. The details of specific changes to the local bus routing are described in detail in the Tier 2 Refined Alternatives Evaluation Report: Red Line.

The total estimated capital cost for the recommended base Red Line north segment is $68.6 Million in FY 2012 dollars. This cost assumes operation along the one-way pair of Capitol Avenue and Illinois Street between 16th and 38th Street and along Pennsylvania Street in Carmel. Estimated capital costs have not been developed for the option presented as dashed lines in Figure 3-1 (Meridian Street and Illinois Street) because of the number of outstanding issues to be resolved in their definition and refinement.

The total estimated capital cost for the Red Line south segment is $54.6 Million in FY 2012 dollars. This cost assumes the diversion off Virginia Avenue along McCarty and East Streets in order to provide better access to Eli Lilly & Company.

The capital cost elements for both corridors and their projected costs for the recommended alternative are summarized in Table 4-1.

Table 4-1. Recommended Alternative Estimated Capital Costs ($Millions)

<table>
<thead>
<tr>
<th>Category</th>
<th>NORTH</th>
<th>SOUTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Guideway &amp; Track Elements</td>
<td>$ 8.889</td>
<td>$ 6.366</td>
</tr>
<tr>
<td>20 Stations, Stops, Terminals, Intermodal</td>
<td>$ 8.679</td>
<td>$ 5.340</td>
</tr>
<tr>
<td>40 Site work &amp; Special Conditions</td>
<td>$13.109</td>
<td>$15.203</td>
</tr>
<tr>
<td>50 Systems</td>
<td>$ 2.025</td>
<td>$ 1.065</td>
</tr>
<tr>
<td>60 ROW, Land, Existing Improvements</td>
<td>$13.375</td>
<td>$ 9.610</td>
</tr>
<tr>
<td>70 Vehicles</td>
<td>$13.671</td>
<td>$ 9.765</td>
</tr>
<tr>
<td>80 Professional Services</td>
<td>$ 2.622</td>
<td>$ 2.243</td>
</tr>
<tr>
<td>Unallocated Contingency</td>
<td>$ 6.237</td>
<td>$ 4.959</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$68.607</td>
<td>$54.550</td>
</tr>
</tbody>
</table>

Table 4-2. Recommended Alternative Estimated Operating and Maintenance Costs

<table>
<thead>
<tr>
<th></th>
<th>North</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual O&amp;M Cost (2012$)</td>
<td>$7.74 Million</td>
<td>$5.63 Million</td>
</tr>
<tr>
<td>Annual Revenue hours of service</td>
<td>53,965</td>
<td>36,904</td>
</tr>
<tr>
<td>Alternative cost per revenue hour (2012$)</td>
<td>$143.48</td>
<td>$152.49</td>
</tr>
</tbody>
</table>
5.0 MOVING FORWARD: A PATH TOWARDS IMPLEMENTATION OF THE RED LINE

The Red Line Alternatives Analysis has provided a basis for reaching conclusions on the basic scope of the project, as described in the previous chapters. Looking ahead, there are several steps along the path to project implementation. These include refinements to the project scope, meeting FTA requirements, and securing local funding for the project’s capital and O&M costs. This chapter offers a guide to these next steps.

5.1 REFINEMENTS TO THE PROJECT SCOPE

Within the project scope emerging from the Alternatives Analysis, there are a number of project refinements that could be considered going forward. Some of these refinements could make the project more effective in meeting the corridor’s needs, while others could make it more competitive for Federal funding.

Most significant, perhaps, is further consideration of the two remaining route options in the North Corridor south of 38th Street, the Meridian route option and the Capitol/Illinois route option. Meridian offers the advantage of density and good existing ridership, but given the street’s width, introducing a dedicated bus rapid transit facility would be more impactful to traffic flow and parking. Right-of-way acquisition may be required as well. The Capitol/Illinois route option has the advantage of a greater street width, and fewer traffic and parking impacts. Existing development alongside is less dense, but the lower density affords opportunities for future development.

Other refinements to consider are:

- The final route in other “issue areas”
- Park and ride lot size and location
- Interlining the North and South portions of the Red Line operationally, which would reduce the number of transfers, leading to higher ridership
- Operating all or part of the #38 and #39 bus routes on the dedicated Red Line lanes south of 38th
- How limited stop BRT buses and local buses with more frequent stops operate on the same street (or whether they ought to operate on parallel streets)
- Decisions on where to provide dedicated lanes and where to remove parking
- Vehicle type and size

Some of these refinement decisions may have implications for meeting FTA requirements under the National Environmental Policy Act (NEPA), as discussed in the next section of this chapter. It is possible that NEPA requirements could be satisfied with a categorical exclusion (CE) under rules established by FTA in February 2013. Decisions on the final project scope will determine whether a CE applies, or whether an Environmental Assessment or an Environmental Impact Statement would need to be prepared.

5.2 MEETING FTA REQUIREMENTS

As noted above, the Red Line project will need to comply with NEPA to be eligible for Federal funding. While the NEPA process could be undertaken at any time, it may make sense to further refine the project scope first as that could affect the type of NEPA document required, as well as the length and cost of the NEPA process.

Other Federal requirements are a function of the type of Federal funding support to be sought. BRT projects like the Red Line are often eligible for discretionary funding under the FTA’s Fixed Guideway Capital Investment Grants Program established in 49 US Code Section 5309 (often referred to as New Starts and Small Starts). Guidance on certain BRT eligibility changes under the Moving Ahead for Progress in the 21st Century Act (MAP-21) has not yet been released. Nevertheless, it is expected that the Red Line project would meet the basic eligibility requirements for funding as a Small Start project.
Figure 5-1 illustrates the process to be followed to secure funding as a Small Start project.

**Figure 5-1: Small Starts Process under MAP-21**

The Red Line BRT project is currently considered to be in the Planning phase of this process. Advancing the project to the next phase, Project Development, involves submitting a request to FTA describing the project and offering further background information as detailed in the text box on the next page. While FTA acceptance of the project into Project Development does not guarantee funding, it does give the project visibility at the national level as a “pipeline project”. Moreover, acceptance into Project Development means that costs incurred to refine the project and to meet NEPA requirements can be credited toward the local match requirement associated with a future Federal grant.

Before a Small Starts grant is made, the Red Line project will not only have to meet NEPA and basic eligibility requirements but also meet other Small Starts requirements. These include FTA’s Small Starts rating criteria for project justification and local financial commitment. A preliminary analysis in the Alternatives Analysis Final Report shows that the Red Line is likely to receive at least a Medium rating for project justification. To the extent that the refinements listed in the previous section are adopted, and increase ridership, the project will be more competitive. Local land use actions to promote denser, mixed use transit-oriented development around stations, including affordable housing, will also make the project more competitive for a Small Starts grant.

Other Federal funding programs might also be tapped for capital funding, either as a complement to or a substitute for Small Starts. Another Federal source of discretionary funds would be the TIGER Program administered by the U.S. Department of Transportation. TIGER grants are generally in the $10 to $20 million range, and are highly competitive. Flexible funds from the Surface Transportation Program (STP) and/or the Congestion Mitigation and Air Quality Improvement Program (CMAQ) could be used. Since STP and CMAQ funds are distributed to the Indianapolis region by formula, Indianapolis would not need to compete for funding at the national level.

Regardless of the source of Federal funding used, FTA will require that the project be owned, implemented and operated by a local entity with the technical and financial capacity to do so. A decision on whom that entity will be has not yet been made, and is one of the steps along the path forward toward implementing the Red Line.
5.3 SECURING LOCAL FUNDING

Local funding needed to build and operate the Red Line is not currently available. A study committee of the Indiana legislature has been considering transit funding needs and options, and a bill to authorize a referendum on a dedicated funding source could be taken up in the next session. Without an increased, dedicated source of funding, implementation of the Red Line as envisioned in this report will not be possible.