RETHINK 65 70 REBUILD IT RIGHT.

Total Value Report

May 2021

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1. Introduction

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Introduction

Reconstruction of the I-65/70 Inner Loop is a once in a lifetime opportunity to transform the city's infrastructure in a way that learns lessons from the past, catalyzes inclusive economic development, enhances neighborhood connectivity, and drives job creation and improves the community's quality of life.

Study Background

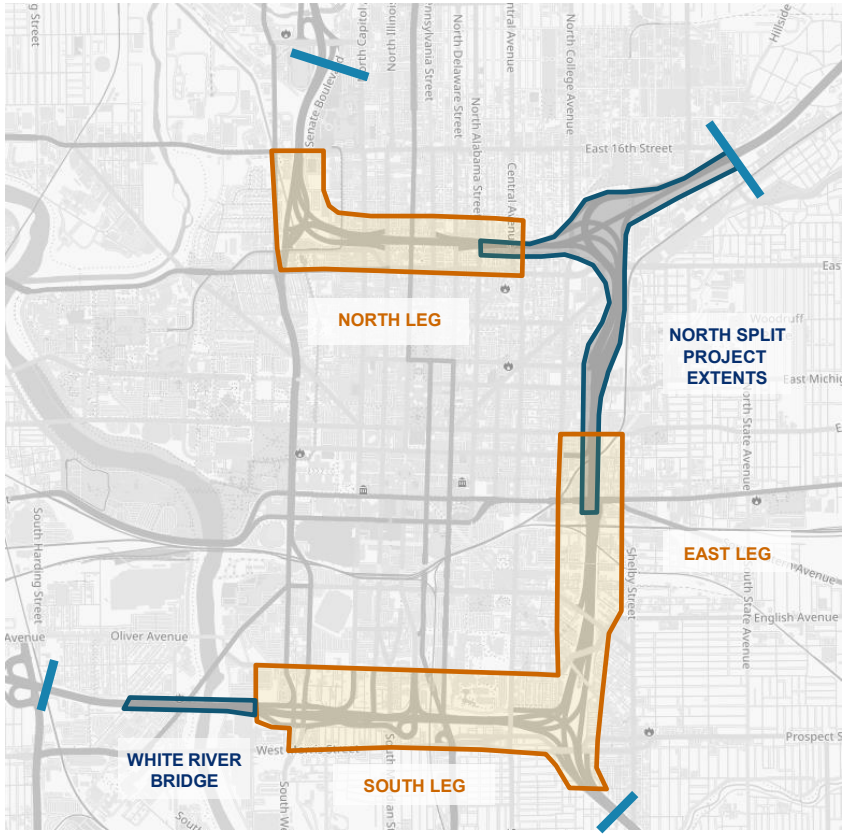
Downtown I-65/I-70 is reaching the end of its useful life and will be rebuilt from the ground up over the next decade. The North Split interchange is the first phase of the reconstruction, currently under a design-build contract.

Since 2018, the Rethink 65/70 Coalition's mission has been to advocate for an Inner Loop vision that aims to achieve greater benefits for City residents, local economic development, quality of life, and that promotes inclusion and equitable development.

The Coalition's initial efforts on the North Split have created leadership momentum - including the Indy Chamber, the Mayor's Office, the City County leadership, and others - to work with INDOT to achieve better design outcomes for Indianapolis.

The Coalition's concept is to reconstruct the Inner Loop, as a Recessed Highway with a parallel boulevard system and new open spaces. This vision has the potential to transform the city's Inner Loop in a way that addresses historic environmental justice challenges, catalyzes inclusive economic development, enhances neighborhood connectivity, and supports job creation and improved quality of life for Indianapolis. It would result in shrinking the interstate footprint, dramatically reconnecting the city's street grid and its neighborhoods. Finally it could create around 80 acres of developable land that would help fund the enhanced vision for the reconstruction of the Interstate.

This report provides a comprehensive analysis of the Recessed Concept Total Value, compared to rebuilding the Interstate as is.



Study Area

Rethink Recessed Concept Study Area
North Split project Extents
INDOT System Level Analysis study extent

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Introduction
Objectives

Total Value Report

The objective of this Total Value report is to provide a comprehensive analysis for a Recessed Concept compared to rebuilding the Interstate largely as is, supported by key evaluation metrics, opportunities or narratives that include:

- Social and environmental justice
- Traffic and connectivity
- Technical engineering and design feasibility
- Cost comparison
- Economic benefits
- Potential fiscal revenue

In addition, the Total Value report presents options and recommendations for the project leadership group to take into consideration for the next stages of vision development, planning and discussions with community groups and other stakeholders:

- Design development and phasing
- Project funding and financing
- Procurement and governance.

Finally, the study presents recommendations for phasing the mega-project in order to deliver tangible outcomes to local communities within grasp while creating a proof of concept that could increase momentum for later stages of the Recessed Concept delivery.

ReThink 65/70 Recessed Highway Concept with Boulevard and Greenway System (illustrative)

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Introduction

Study review process, collaboration and limitations

Review Panel & Advisory Committee

The study was commissioned to Arup by the Indianapolis Chamber of Commerce (Indy Chamber), and funded by the Lilly Endowment, Inc.

The Arup team included local design firms REA and SKA, part of the ReThink Coalition group, and design champions for the Recessed Concept.

At key stages in the study development, Arup presented interim findings to an Advisory Committee who represent local stakeholder and leadership groups (see list in table opposite) to seek feedback and report on progress.

In addition, Arup held meetings with INDOT to include their feedback on the Recessed Concept direction and Arup's emerging findings. Additional technical reviews were held between Arup, the Indy Chamber and the Metropolitan Planning Organization.

Reference data

The outcomes presented in this report and study are relative to a vision document, based on:

- Pre-feasibility concept design documents by the ReThink Coalition, and
- INDOT System Level Analysis traffic model outputs which use 2016 traffic counts and includes planned network improvements.

Exclusions

- Full network traffic modelling including future projections.
- Engineering calculations (e.g structural, civil) other than review of available documents.

Further planning and design studies will be needed to develop the project further and integrate with various planning documents.

Next steps of engagement will be led by the Indy Chamber to the wider community to seek feedback on the Recessed Concept vision supported by findings of this report.

Advisory Committee members and organizations

- 16Tech - Emily Kreuger
- Bates Hendricks Neighbors - Matt Nunley
- Central Indiana Community Foundation - Brian Payne
- City of Indianapolis - Jeff Bennett
- Develop Indy - Vincent Ash
- Downtown Indy, INC. - Sherry Seiwert
- Eli Lilly & Co. - Mike O'Connor
- Governor's Office - Jane Jankowski
- Historic Urban Neighborhoods of Indianapolis – Gary Chilluffo
- Indiana Landmarks - Marsh Davis
- Indianapolis Capital Improvement Board - Andrew Mallon
- Indianapolis City-County Council - Vop Osili
- Indianapolis Department of Public Works - Dan Parker
- Indianapolis Metropolitan Planning Organization - Anna Gremling
- Indianapolis Motor Speedway - Matt Mindrum
- Indianapolis Public Schools - Paul Riley
- Indianapolis Urban League - Tony Mason
- INDOT - Jay Mitchell
- IU Health - Tory Castor
- IUPUI - Amy Conrad Warner
- Ransom Place Neighborhood - Paula Brooks
- Rundell Ernstberger Associates - Kevin Osburn
- Schmidt Associates - Sarah Hempstead
- South Indy Quality of Life Plan - Michelle Strahl Salinas
- Storrow Kinsella - Meg Storrow
- Taft Law - Russell Menyhart
- University of Indianapolis - Jason Dudich
- Young & Laramore - Paul Knapp

2. Strategic Narrative

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Strategic Narrative

I65/70 construction accelerated a continued decline of black/brown and low income communities in Downtown Indianapolis, contributing to thousands of displaced residents and business, and depleted neighborhoods.

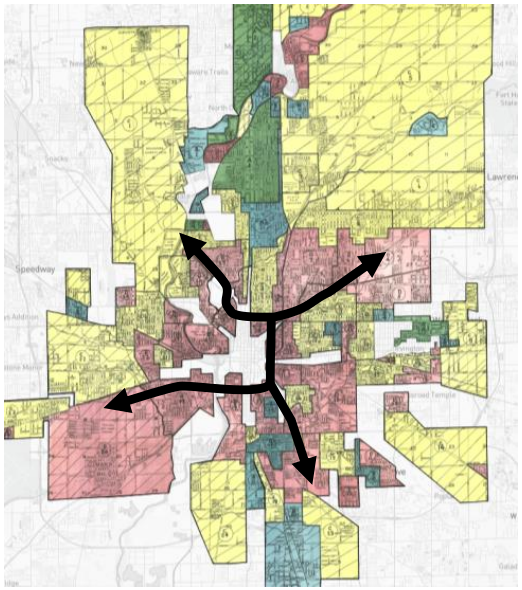
Historic impact on low-income and black / brown communities

The planning, routing, and design decisions pertaining to the construction of the Inner Loop have long been criticized for the detrimental impact these decisions had on minority communities of Indianapolis, and the resulting social injustice stemming from decades of reinforcing racial inequality policies.

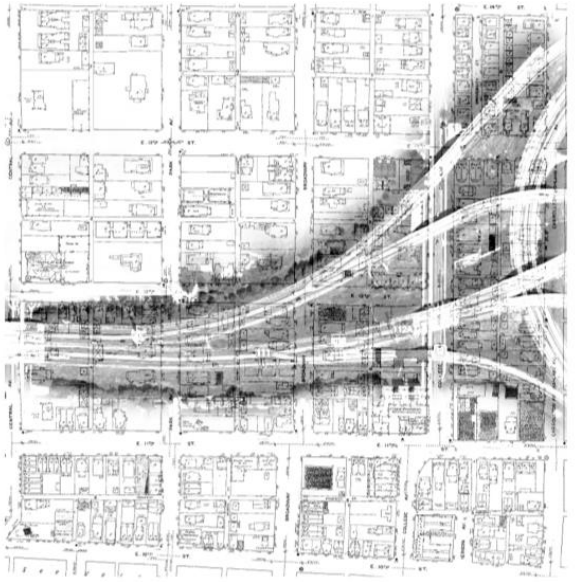
In 1937, only 15% of the Indianapolis population was African American or foreign-born, and they were almost exclusively concentrated where I-65/70 is now built. Redlining and other racial policies contributed to the continued decline and disinvestment in these areas and helped engrain geographic racial inequalities and fostered a generational wealth gap for over a century.

Construction of the Interstate in the 1970s through these neighborhoods disproportionately affected low income and black communities, further accelerating their decline:

- Upwards of 17,000 residents were displaced and thousands of housing stock built in the 1870-1910s were demolished*
- Local business and social services such as schools suffered not only from drastic population loss, but also from loss of local access routes and pedestrian connectivity between the neighborhoods – replaced or interrupted by the interstate barriers
- Negative externalities from traffic (air pollution, noise pollution, pedestrian safety) have had an adverse effect on population health, economic development, and population retention.



Home Owners' Loan Corporation (HOLC) "Residential Security" map, 1937 © *mapping inequality*



North Split overlay on pre-existing urban fabric (Source: Historic Indianapolis)

* Robert K. Nelson, LaDale Winling, Richard Marciano, Nathan Connolly, et al., "Mapping Inequality," American Panorama, ed. Robert K. Nelson and Edward L. Ayers, accessed September 22, 2021, https://dsl.richmond.edu/panorama/redlining/Indianapolis.

* Flats Lost: I-65 Construction, Historic Indianapolis, Jordan Ryan, June 15, 2013, modified.

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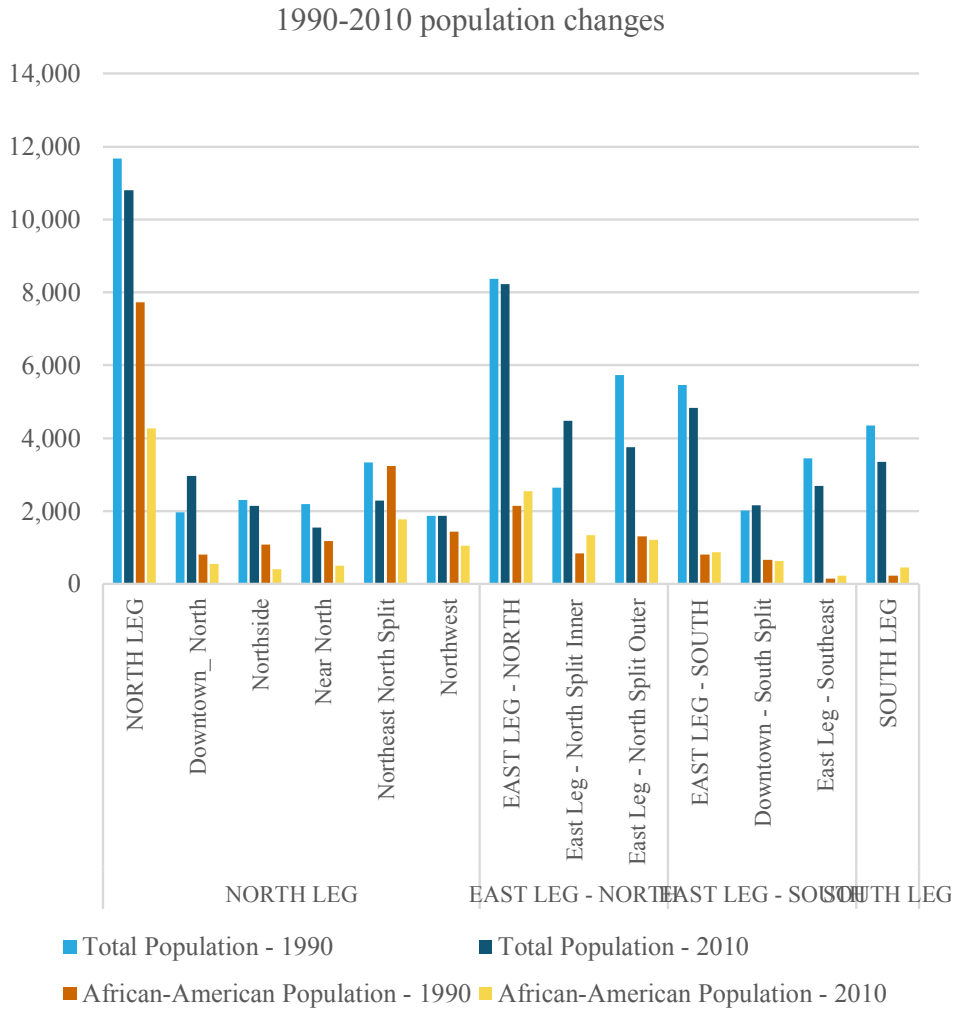
Strategic Narrative

Market-led urban resurgence in the last decade contributed to renewed development-related affordability pressures in or near vulnerable, low-income and black-brown communities around the Inner Loop – in particular on the north leg – while south and southeast lagged behind.

Equity challenges in unbalanced urban resurgence trends

- Unbalanced population growth & decline
- Ethnic de-concentration
- Growing wealth gap
- Socio-economic displacement & gentrification effects

The north leg has seen significant demographic changes since 1990 with loss of 3,500 African-American residents, and ethnic diversification with a change from 66% African-American residents on average to 40% in 2010.



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Strategic Narrative

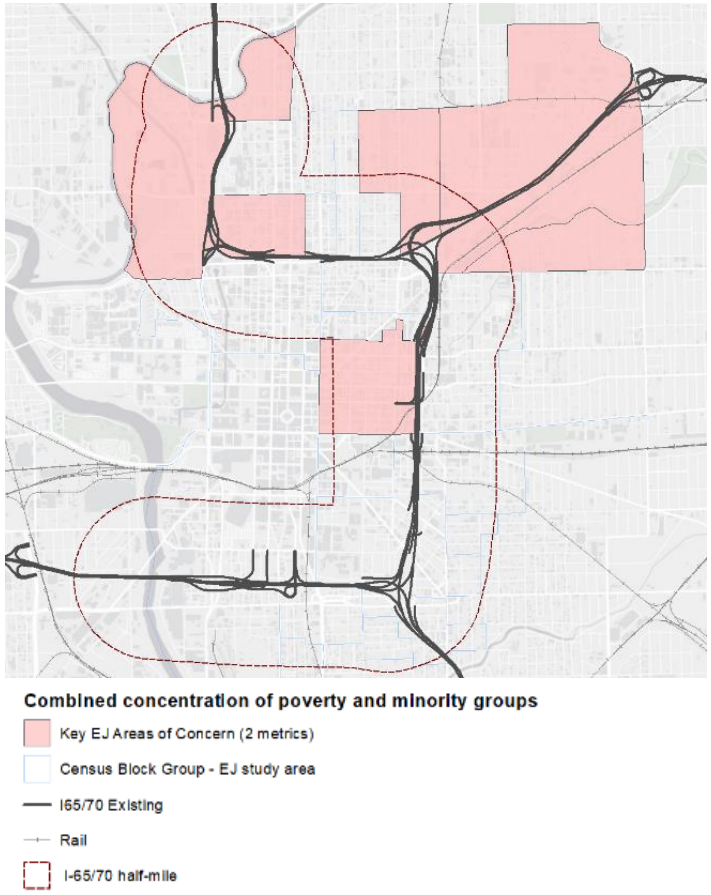
Areas of Environmental Justice concern today

Key areas of concern for Environmental Justice are those that have more than 34% minority population and more than 20% living below poverty threshold.

Today these are mainly located along the north leg and north split and include neighborhoods such as Ransom Place and Martindale-Brightwood.

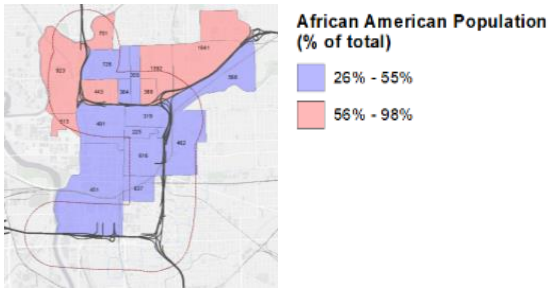
They account for around 11,700 residents in total, half of which are African-American (5,500) of which 1,600 households or 3,300 residents live below poverty level.

Areas of Environmental Justice concern – higher minority and poverty concentration, with demographic characteristics (Source: Arup, 1990-2010 Census, ACS 5-year average 2018)



Total Population (1990)	12,500
Total Population (2018)	11,700
Minority population (1990)	6,700
Minority Population (2010)	5,500
Household living below poverty threshold (2018)	1,600
Median annual household income (block group) – lowest	$20,000
Median annual household income (block group) – highest	$58,000

Areas of minority concentration in 1990 (Data: 1990 Census)



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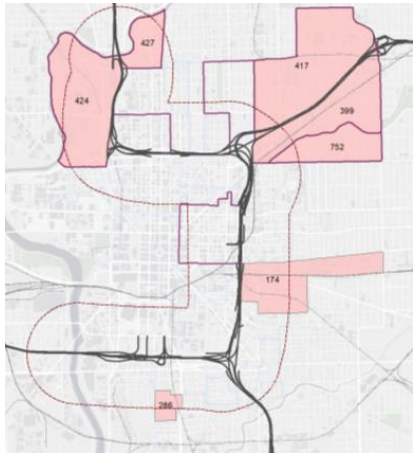
Strategic Narrative

Other at-risk population groups near Inner Loop today

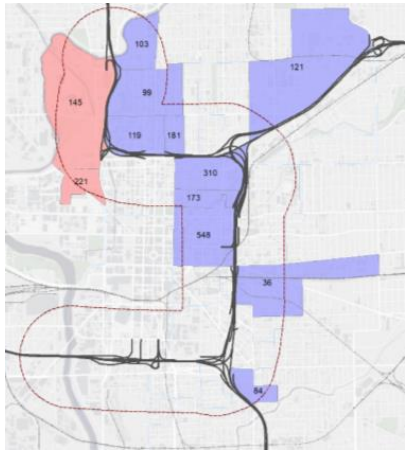
Externalities from traffic and new development associated with the Inner Loop project could disproportionately affect other vulnerable population groups in the corridor.

- **Population at greater risk of displacement:**
  - Renter-occupied households in areas of low housing values: 11,500 households total, 22% (2,500 households) located in EJ Area of Concern
- **Population at risk of greater noise and air pollution:**
  - Senior population: 2,000 population total, 35% in areas with concentrated senior population (>13%)
  - Disabled population: 3,000 households total, 85% located in areas of concentrated disabled population (>15%)
- **Population adversely affected by vehicular priority:**
  - Zero-car households: 3,000 total households, 40% (1,300) located in EJ Area of Concern
  - Active Travel to work: 4,000 total population, 32% (1,300) live in EJ Area of Concern

More than 50% of renter-occupied households and low median housing values

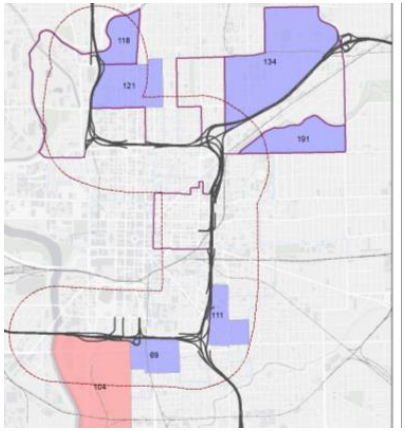


Percentage of zero-car households



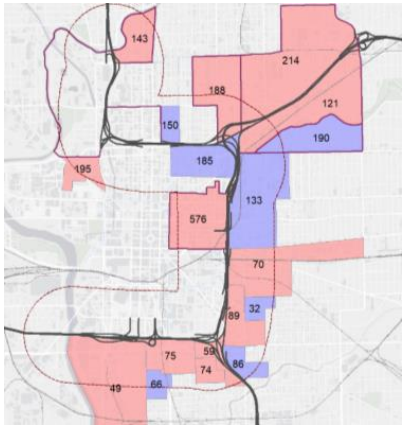
21 - 29%
30 - 34%

Percent population over 65



13 - 22%

Percent households with 1 person on disability



15 - 25%
25 – 51%

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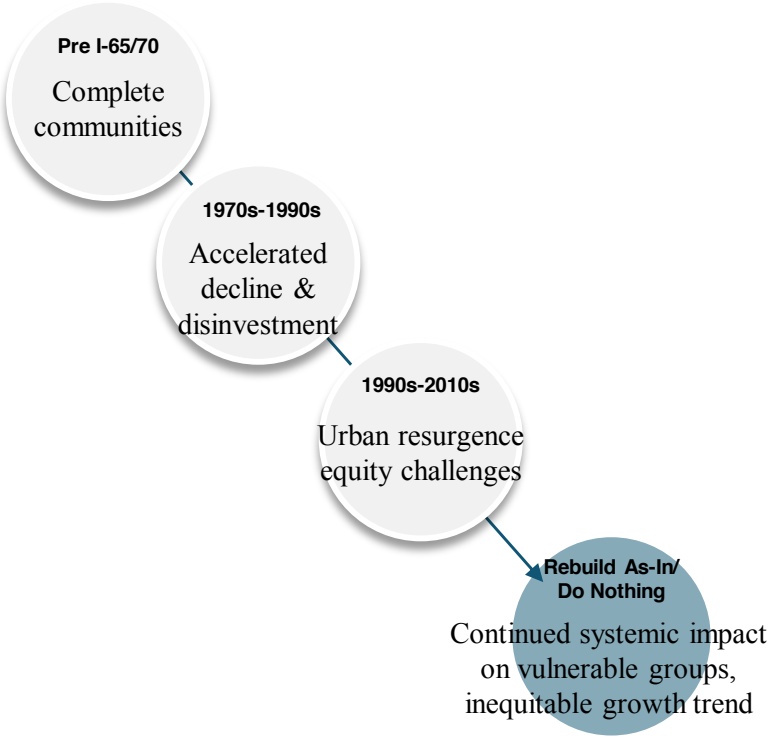
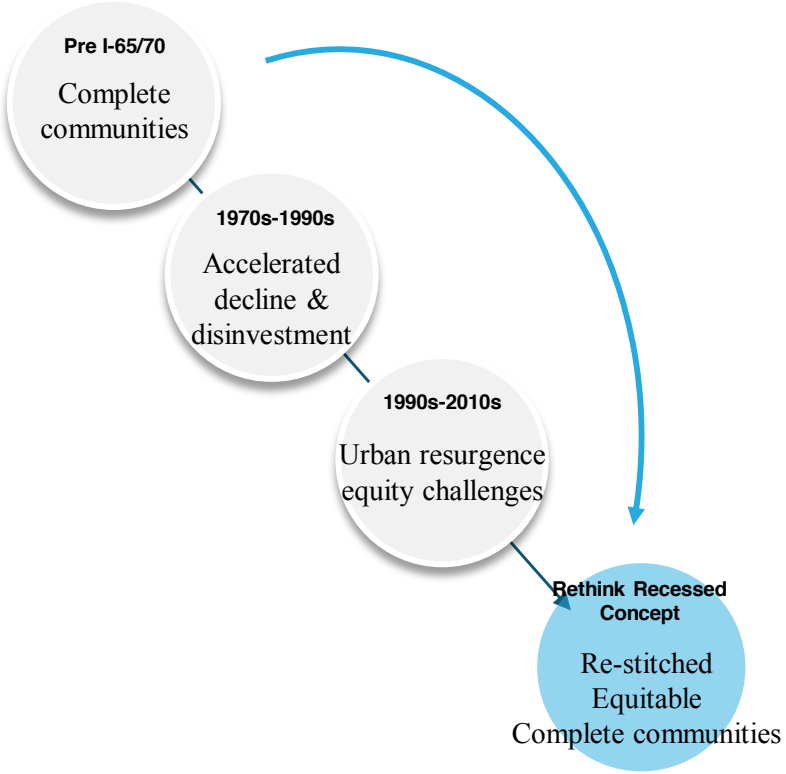
Strategic Narrative

Environmental Justice Imperative

Rebuild-As-Is means continued systemic impact on vulnerable groups and inequitable growth.



ReThink Recessed Concept can help address historic systemic impacts and bring back complete communities*.



***Complete Communities** refers to an urban planning concept of a 15-minute living neighborhood, where homes are located within a walking distance of services, infrastructure, facilities and amenities that serve people's daily needs. Complete Communities concept is support by the idea of 'complete streets' that prioritize alternative mobility modes (walking, bike and transit) over vehicles.

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3. Recessed Highway Concept

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The Coalition Recessed Concept

Key Components

1. Depress interstate lanes for through traffic; resulting in a compact footprint

2. Real estate relinquished from compact footprint will be re-purposed into multiway boulevards, new housing, open space and mixed-use development

3. Multiway boulevards reconnect the city street grid for improved local connectivity. The boulevard system:

- Incorporates a parallel greenway trail and linear park system connecting the White River, Northside, Southside and Eastside neighborhoods
- Incorporates a parallel bus transit route that intersects with the IndyGo bus rapid transit system
- Incorporates on-street parking and wide sidewalks in areas serving new mixed-use development along the boulevards

1. Advance equitable outcomes by creating employment opportunities accessed from walking, biking, or transit from affordable housing incorporated into new development

2. Achieve an urban forest green belt that advances the city's climate resilience and sustainability

3. Provides opportunity for placemaking, landmark design features, and public art

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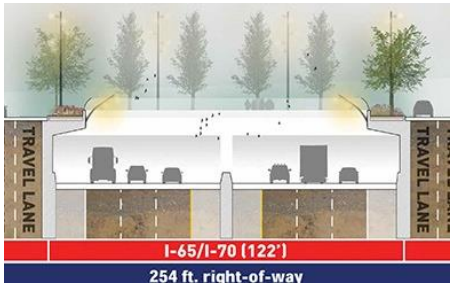
3. Key Components of the Coalition Recessed Concept

The recessed highway concept envisions key physical interventions that could have positive benefits for surrounding local communities and help address the historic social and environmental justice challenges compared to Rebuild-As-Is.

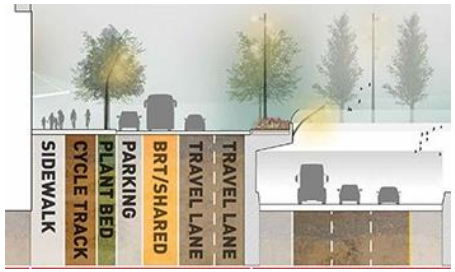
Key vision components

Recessed Interstate



New & improved crossing conditions

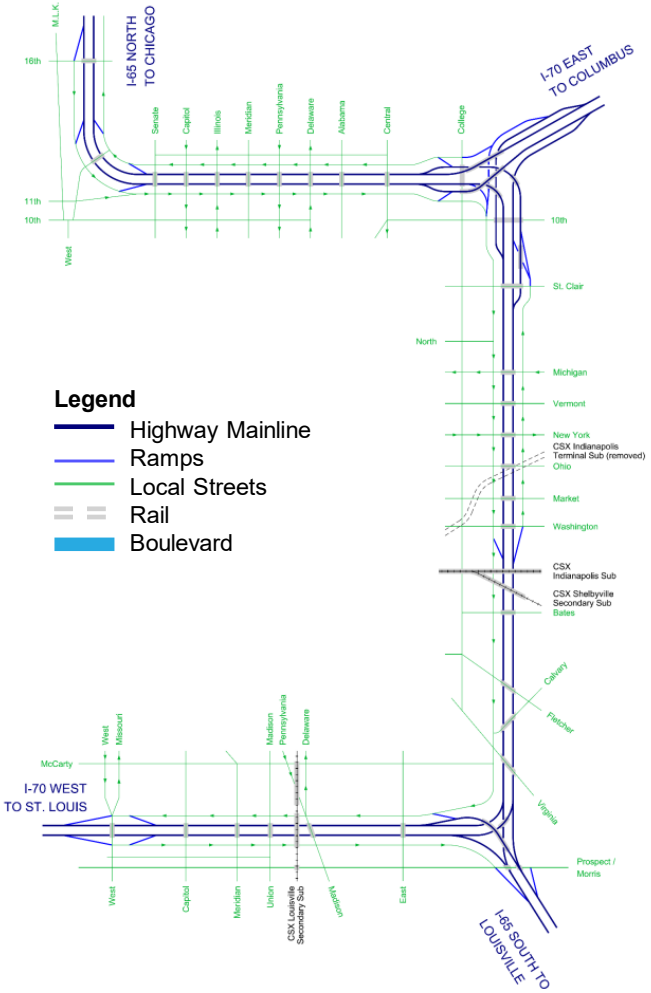
Boulevard and greenway system



New development

The Coalition Recessed Highway Concept can be summarized in four key components below, detailed in the following pages. The network diagram opposite shows a revised network from the Coalition's January concept design that includes a number of refinement for pain points in the network from a traffic and engineering perspective. This study also considers partial capping ('strategic capping'), while additional capping is considered a long-term opportunity.

Recessed Concept Schematic Network Diagram



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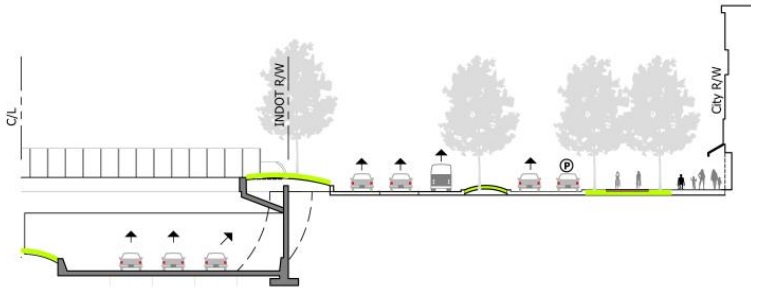
3. Key Components of the Coalition Recessed Concept

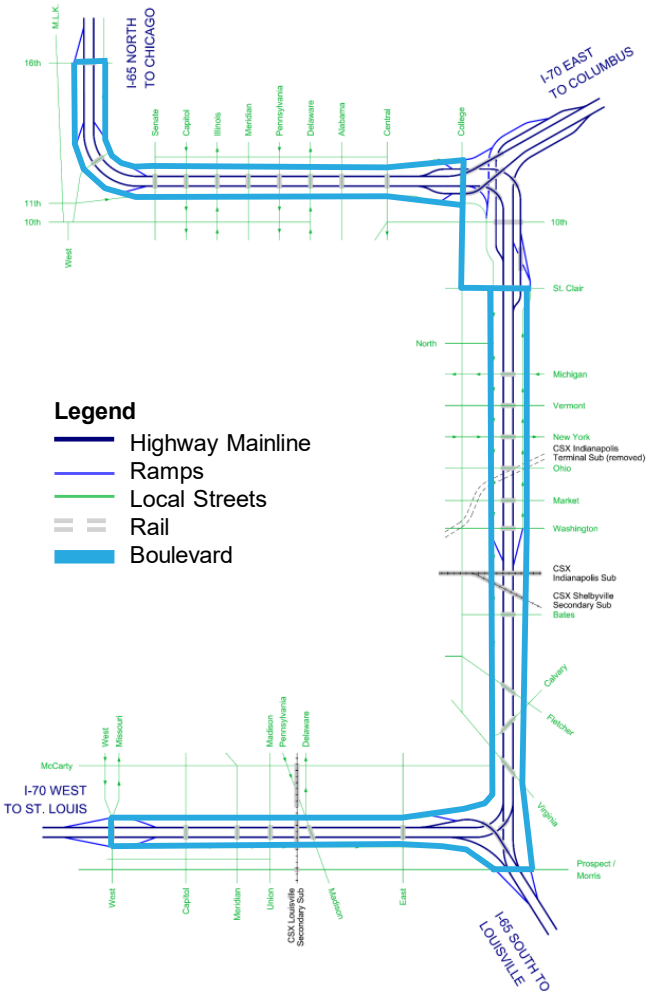
3.1 Boulevard and greenway system

Principle

A central element to the Recessed Highway concept is the introduction of a system of boulevards at grade that span the recessed interstate through traffic. They are generally envisioned as 66' right-of-way on either side of the recessed interstate, with two traffic lanes and one shared lane for turning, parking and/or bus lane in the future. Importantly, the boulevard is supportive of pedestrian and active travel as a greenway, with large sidewalks and a dedicated protected cycle track.



RetThink Coalition Concept Cross Section – boulevard typology



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3. Key Components of the Coalition Recessed Concept

i. Boulevard and greenway system

Benefits

1. Slow local traffic
2. Greenway & greening
3. Dedicated cycle lane
4. Opportunity for BRT corridor

The greenway and boulevard system is understood to increase choice and enhance local network from a connectivity perspective, improving conditions for active travel, capable of supporting new transit service in the future. With upgraded or new crossings, they further help to create sense of reconnected neighborhoods, minimizing the physical and mental barriers the Interstate had created. This will provide residents better physical access to local jobs in and around Downtown employment growth areas.

The boulevards and the new network are also expected to help mitigate traffic impacts from increased traffic volumes on local streets. They help slow traffic speeds to levels of collector roads, compatible with neighborhood comfort and safety levels. They also help distribute vehicles across a larger, more permeable network.

Greening and slower vehicle speeds should improve local air quality and noise pollution, with positive effects on people's health and wellbeing.

Finally, the typology is supportive to a cohesive frontage for new development for residential, mixed-use or commercial, supporting walkable neighborhoods which are in high demand in Indianapolis. Alternatively, where space is limited, it can provide a buffer to adjacent land uses.

Buffered greenway example parrallel to one-way collector road, proposed in existing neighborhoods and campus districts (ReThink Coalition)

Alternative typologies in mixed-use districts with wider right-of-way, could include a bike lane and green median. Optional low-speed local access lane (ReThink Coalition)

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3. Key Components of the Coalition Recessed Concept

ii. Recessed Interstate

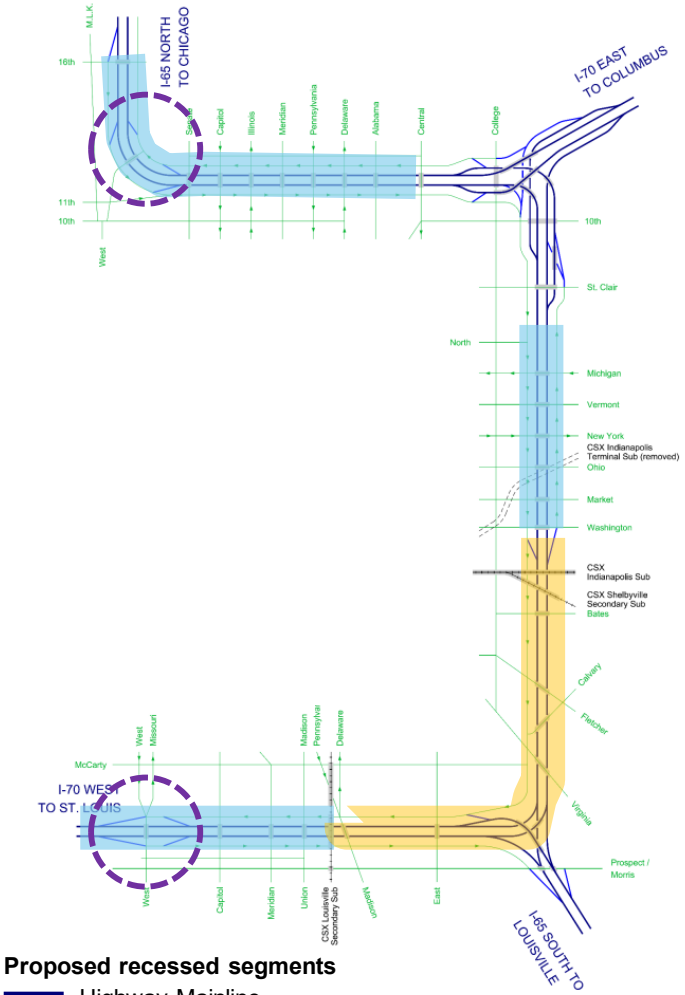
Principle

A primary concept is to reconfigure the Inner Loop interstate highway mainlines with a vertical alignment around 16.5 feet below local streets, replacing current elevated structures either on viaduct or embankments between 16th Street and Central Avenue (North leg), 10th Street and Washington Street (East leg) and Madison Avenue and the White River bridge (South leg), while maintaining the number of through lanes to accommodate similar levels of traffic volumes than currently.

An existing segment – between Washington St. and Madison St, including the South Split – is already recessed and was recently upgraded with the Hyperfix project. The cross-section is much wider than the Coalition Recessed Concept's – with embankments. The proposed concept ties into these segments' alignment.

In addition, the reconfigured system calls for optimizing the design and distribution of interchanges and on/off ramps to reduce the impact of the Interstate on the local network:

- Martin Luther King (MLK) and West Street – called 'northwest interchange' – and West & Missouri interchange in the South – called 'southwest interchange – are envisioned with the mainline passing below grade, new crossings at grade and simplified access ramps that prioritize local movements, pedestrian safety and reduce the interstate's footprint on the surrounding neighborhoods.
- North Split and South Split design are excluded from the scope of this study.



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3. Key Components of the Coalition Recessed Concept

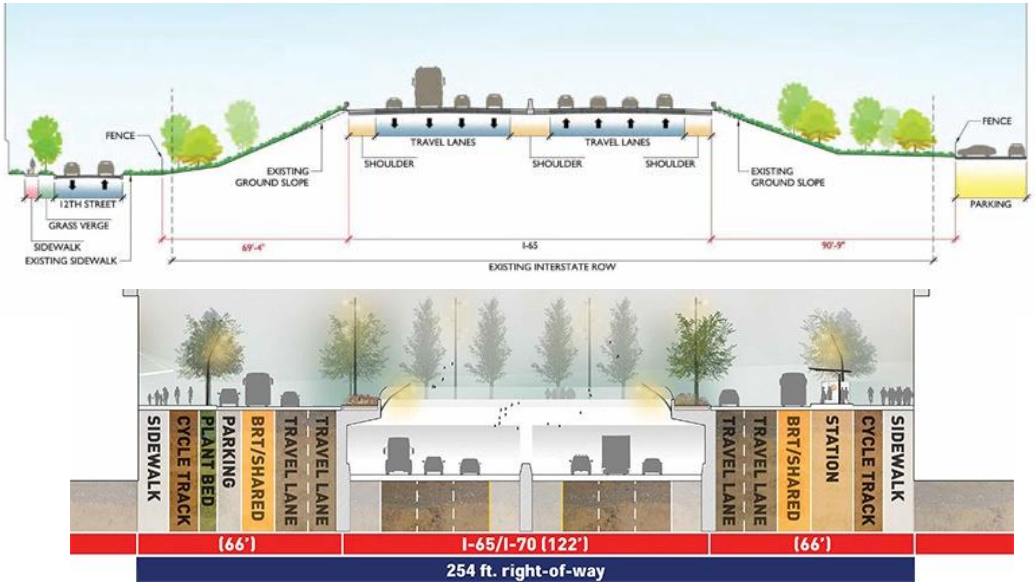
ii. Recessed Interstate

Benefits

1. Tightening Interstate Right-Of-Way
2. Removing barrier walls or embankments
3. Optimizing ramps and interchanges

Main features of the recessing the interstate mainline contribute to mitigating **negative impacts on people's perception of barrier** of the Interstate and their proximity or connection to surrounding neighborhoods – in particular of the inner / outer loop divide – and access to local jobs.

Enhanced interchange design and reduced number of ramps are also likely to improve **pedestrian safety**, and mitigating the overall impact of the Interstate on the surrounding communities – in particular for the South Leg and Northwest interchange.



Cross Section Comparison: Existing (Rebuild-As-Is, INDOT SLA Concept 3) above, Coalition Recessed Concept below

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3. Key Components of the Coalition Recessed Concept

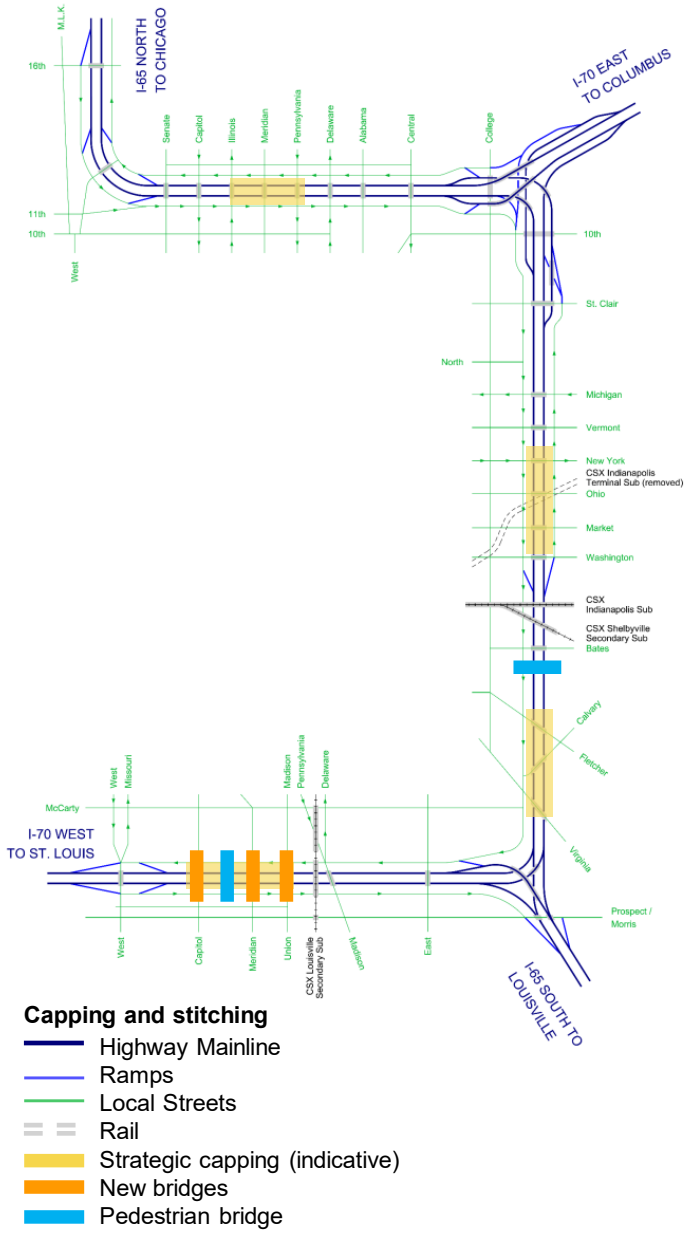
iii. New and improved crossings

Principle

Another key objective of the Coalition Concept is to improve crossing conditions to help reconnect neighborhoods and address the historic physical and mental barrier of the Interstate as is.

The recessed concept proposes a number of interventions depending on the leg and the location, and include:

- **Capping** – Introducing capped parks over the recessed lanes. The tight right-of-way (c. 120') and vertical retaining walls can support capped park structures. This can be done in a staged approach as available funding and community priorities dictate, and may range from small segments to up to 3,300' long in aggregate.
- **New bridges** – new bridges are proposed where neighborhood connectivity to Downtown was poor, and an integrated network solution with boulevards tying into local streets could be proposed. This is seen mostly on the south leg and with northwest interchange options. Enhanced design for these new bridges is also envisioned.
- **Enhanced crossing design** – or land bridges. Most crossings already exist as underpass or bridges, designed in a minimally functional way. Underpasses will be rebuilt as overpass or bridges of shorter span due to a reduced right-of-way requirement, with the distinct objective to create a buffer with the interstate traffic below. This can be done as a land bridge, integrating greening, noise barrier walls, large sidewalks and bike lanes where possible. This concept also applies as a retrofit on existing bridges where the interstate is already depressed - near the South Split, Virginia and Fletcher Avenue for instance.
- **Pedestrian bridges** – At a few locations (near Bates St. on east leg and Capitol Ave on south leg), pedestrian bridges are proposed where improved connectivity is needed but the network does not support an additional vehicular bridge.



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3. Key Components of the Coalition Recessed Concept

iii. New and improved crossings

Benefits

1. 20 acres strategic capping
2. Enhanced crossings
3. New bridges
4. Pedestrian bridges

Overall, these new or enhanced crossing conditions are expected to:

- provide **new open and green spaces** for communities,
- address **the physical and mental barrier** of the Interstate,
- help **mitigate air quality and noise impacts** from traffic volumes.

Research led by academic institutions and the US Department of Agriculture on the services that urban trees and vegetation provide to the environment conclude that urban trees provide a range of environmental services, including improved air and water quality and noise abatement. Trees can act as natural filters for both gases and particulate matter from vehicle emissions.*

New links are a tangible benefit to local communities in **improving access to Downtown and employment centers**, **and reconnect with surrounding neighborhoods**. They also help distribute traffic more equally across the network, reducing pressure from a few crossings only.

*Nowak, D.J. 2002. The Effects of Urban Trees on Air Quality. US Department of Agriculture, Forest Service.

Klyde Warren Park, Dallas TX, is a cap park over the recessed highway

Pedestrian bridges provide new connectivity and possible landmark design for communities (Arup)

Fifth Street bridge, Atlanta GA, has large landscape edges that create a noise and visual buffer the interstate below, and integrate bike and bus lanes

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3. Key Components of the Coalition Recessed Concept

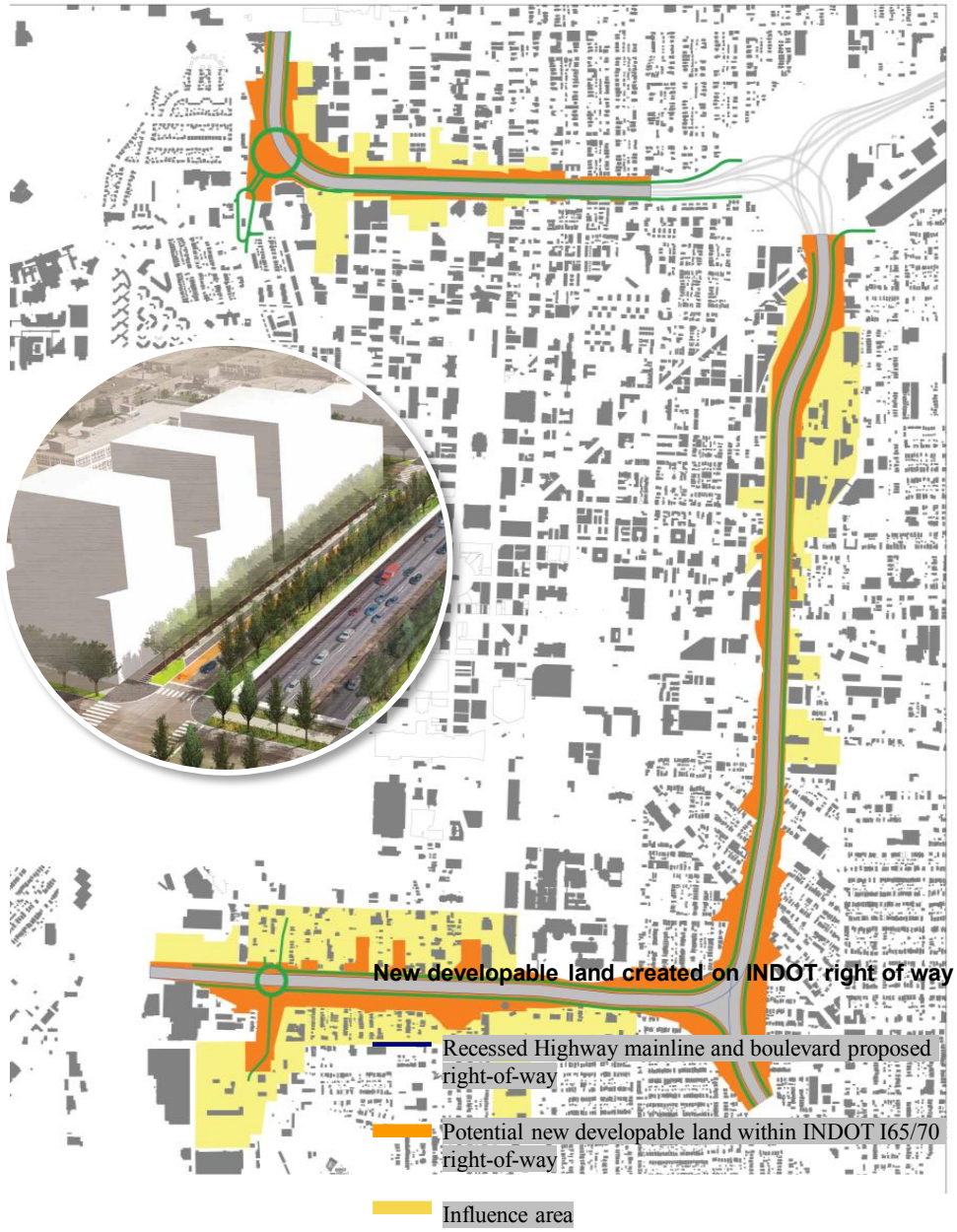
iv. New development potential

Principle

Due to a tightening of INDOT right-of-way and introduction of boulevard and greenway system, the Recessed Concept creates new land that is suitable for new development along each leg. New enhanced urban condition along the boulevard and greenway system can support new types of land uses such as multi-family housing, medium density commercial and mixed-use supporting population and employment growth, infill and intensification along the corridor.

Recessed Concept potential total development and zoning, in million Sq. Ft.
(Source: Arup, ReThink 2018 study)

Segment	Housing	Office	Retail	Total
South Leg	1.4	2.5	0.6	**4.6**
North Leg	1.2	1.3	0.3	**2.8**
East Leg	1.2	1.5	0.4	**3.0**
Total	**3.7**	**5.3**	**1.3**	**10.4**



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3. Key Components of the Coalition Recessed Concept

iv. New development potential

Benefits

1. Publicly-owned developable land
2. New zoning designation
3. Transit-oriented development
4. Mix of uses

The Coalition Recessed Concept could create around 45 acres of new developable land on INDOT right-of-way and around 20 acres of new parks and open spaces (strategic capping). The market value of these parcels was estimated around $93 million*, more than half from development around the South Leg.

New zoning provides opportunity for up to 10.4 million sq. ft. of real estate development to include more than 3,300 new homes and 24,000 new jobs. While development potential does not necessarily mean the creation of new jobs, it can be a catalyst to increase population and employment density along the corridor and boost the positive economic cycle.

The scale of the development potential along the corridor represents $2.1-2.5 billion in real estate investment over the next decades. Property taxes from the new development represent an additional $54 to $66 million in fiscal revenue a year to the City at full build-out.

Overall, half of the total development potential and associated impacts (housing, fiscal, etc.) are supported by the South Leg.

Recessed Concept land created and associated potential uses at full build-out
(Source: Arup, ReThink 2018 study)

Segment	Developable land (acres)	Strategic Capping (acres)	New housing potential (housing units)	Direct new jobs potential (jobs)
South Leg	23	12	1,300	11,000
North Leg	11	3	1,000	6,000
East Leg	11-12	4-8	1,000	7,000
Total	**45**	**19-23**	**3,300**	**24,000**

Recessed Concept developable land value and annual property revenue
(Source: Arup, ReThink 2018 study)

Segment	Potential Market Value from Land	Potential development value	Potential annual fiscal revenue
South Leg	$47 M	$1.0-1.2 bn	$24-29 M
North Leg	$23 M	$0.6-0.7 bn	$14-17 M
East Leg	$24 M	$0.6-0.8 bn	$16-19 M
Total	**$ 93 M**	**$2.2-2.6 bn**	**$54-66 M**

Development potential based on FAR, assumed zoning, 2017-2018 estimated land values and full development completion; figures do not reflect projected market demand, phasing or absorption rates; development values exclude land costs, entitlements and permits, and leasing/sale.

3. Key Components of the Coalition Recessed Concept

Long-term opportunities and additional design options

The Coalition Recessed Concept vision is intended at this stage to remain flexible to design changes in the future as the planning and design process progresses. A number of additional ideas and opportunities were brought forward over the course of this study which – albeit not being included in the core vision presented and assessed in this study – may receive momentum in the future. These are briefly summarized below.

Transit corridor

The current land use patterns do not currently support transit ridership demand along the Inner Loop corridor. However introduction of new development, residential and employment density and completion of a boulevard loop could potentially support a case for a new transit system in the future. The boulevard and greenway typology as envisioned could support of a new bus service, either shared or dedicated Bus-Rapid-Transit system.

CSX removal / relocation

The CSX mainline freight network intersects Downtown and the Inner Loop on the East Leg and the South Leg. CSX current condition and operating levels present major challenges to the feasibility of a the Recessed Highway Concept on the East Leg north of Washington St. in terms of cost and project risks to rebuild the Interstate below an active rail line.

Relocating the CSX Indianapolis Terminal Sub (crossing at Washington St) to the Belt Railroad corridor could not only unlock a barrier for the Recessed Concept at this location, but also present a range of local community, health and safety, environmental and economic benefits for Indianapolis. However this option is not currently viable for a range of factors, including CSX recent investments in the existing network and lack of incentives for CSX in the foreseeable future.

The vision and cost estimate presented in this study assume however that the CSX Indianapolis Terminal Sub is relocated to the Belt RR and decommissioned at Washington St. Other CSX crossings are maintained.

Maximum Capping

The vision and cost estimate presented in this report assume partial capping in strategic location for each leg to optimize project costs to benefits. However the Recessed Highway design can technically support additional capping – up to 1,000 meters to limit need for tunnel-specific life-safety requirements such as ventilation.

Single and multi-way boulevard

REA and SKA introduced a concept of 'multi-way' boulevard in a few locations in addition to the standard boulevard (or Parkway) presented earlier as a Key Component. The multi-way proposes a travel and parking lane for local traffic, separated from through traffic on the main boulevard by a median (for bus stops / greening). The intent is to serve local traffic with lower volumes and speeds than can be expected on the boulevard, located where right-of-way width allows in new mixed-use districts.

Arup has not evaluated this alternative in this study, modelling will need to be performed to mitigate concerns for intersection weaving and wider right-of-way for vehicles compared to the standard boulevard concept.

MLK & 10th Street intersection

Arup noted a challenge in the current intersection at MLK and 10th street, with access to/from I65/70, and related to turning vehicle movements and current volumes. REA / SKA presented possible intersection designs that tie into the proposed alternatives for the northwest interchange that may address these issues. These were not included in this study as it falls beyond Arup's scope, but could be further reviewed for feasibility in the next stages of planning and design with the northwest interchange.

4. Feasibility, Flexibility and Strategic Phasing

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3. Feasibility, flexibility and strategic phasing

A technical review assessed the Recessed Highway concept's feasibility for traffic operations, performance and functionality compared to existing conditions and from a highways and civil engineering review.

Approach and objectives

A technical review of the Coalition Recessed Concept was conducted to provide a pragmatic and objective assessment of traffic performance and civil engineering, and identify areas that require further refinement to address traffic or physical challenges.

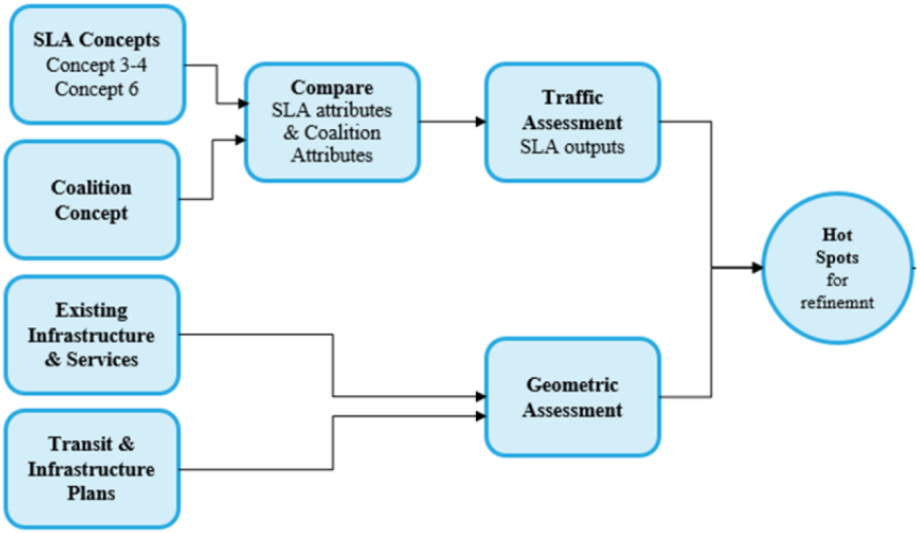
A traffic assessment used traffic outputs from INDOT's System Level Analysis (SLA) as reference, based on comparison with SLA Concepts 4 (Depressed Highway) and 6 (Boulevard + Tunnel) – shown on the following page.

A technical review was done by Arup civil, structural and highway experts as design reviews to include considerations such as: alignment, elevation change and clearances, ground water and soil conditions, best practice design and operations of interchanges, and general constructability. Soil, geotechnical and structural reports were shared by INDOT to inform the review.

Arup also held meetings with INDOT strategic planning, civil and highway engineers to collect local knowledge to the objective assessment.

A handful of 'hot spot' areas were identified in the Coalition concept design for further refinement. Arup identified and compared a number of alternative solutions informed by industry best practices and Arup expertise. Feasibility was evaluated using a **multi-criteria assessment** framework and discussed with Indy Chamber of Commerce, INDOT, ReThink and MPO representatives.

Feasibility conclusions are summarized in this section, and detailed in Appendix A.



Technical review methodology diagram (Arup)

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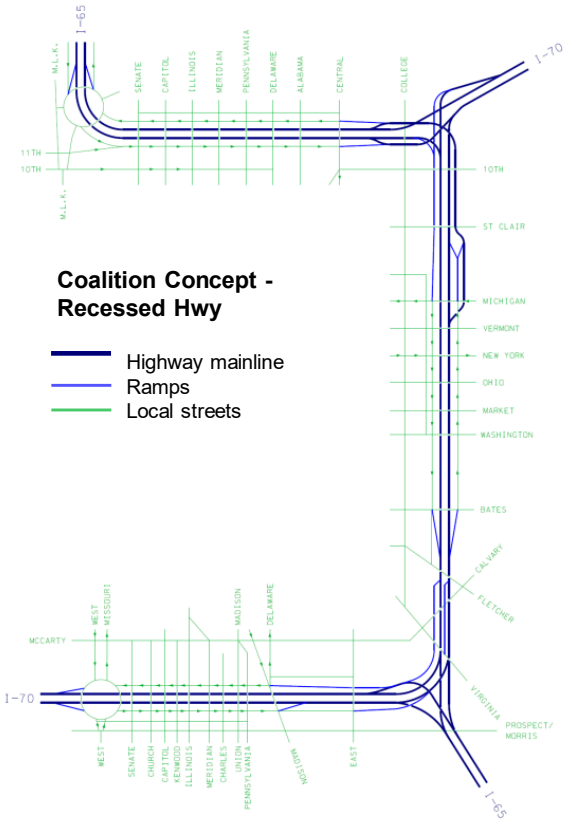
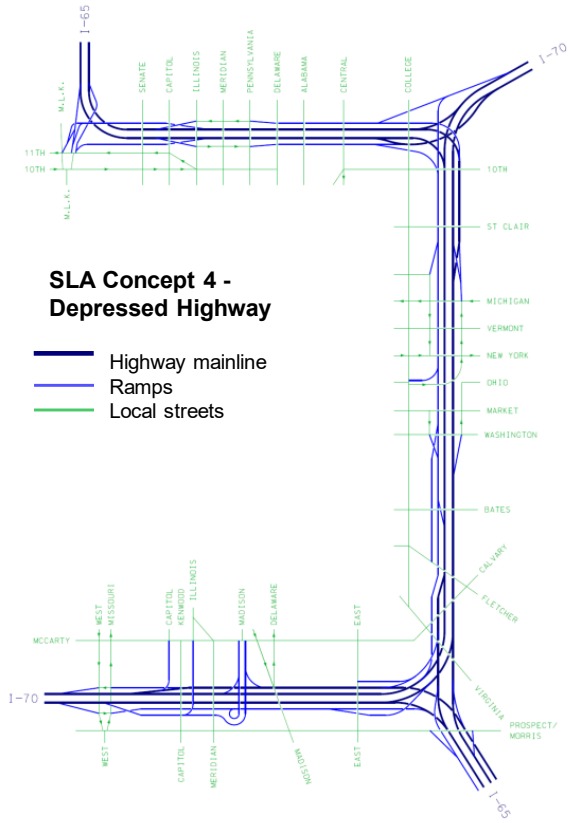
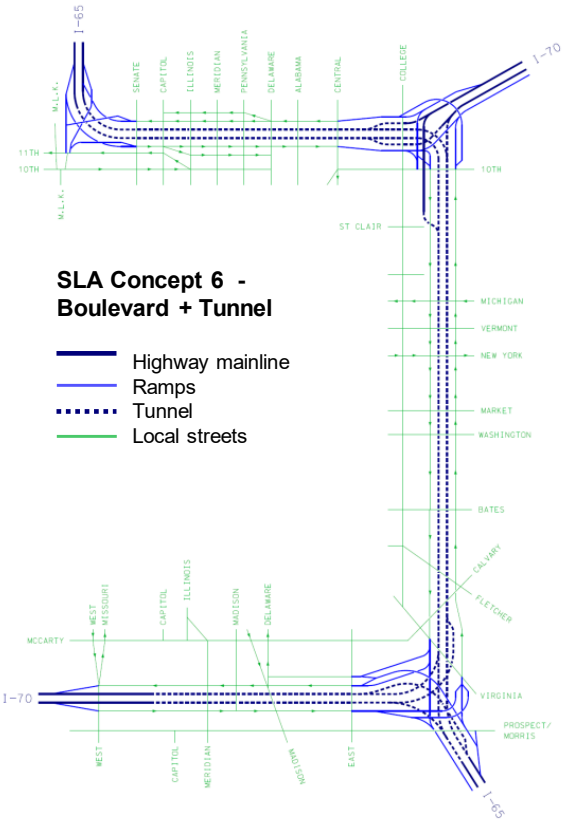
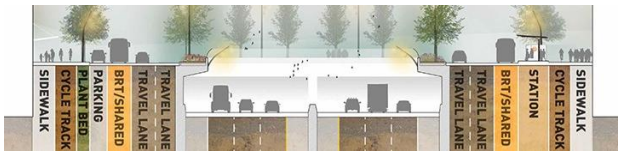
3. Feasibility, flexibility and strategic phasing

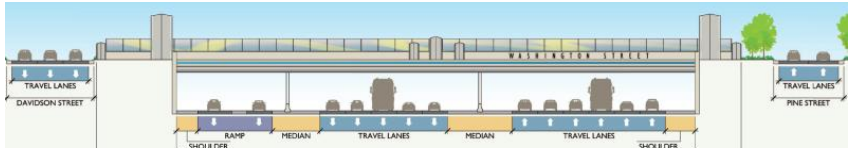
Comparative roadway networks

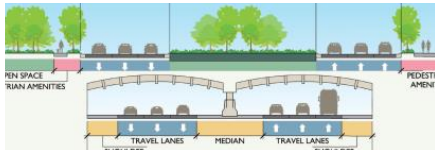












3. Feasibility, flexibility and strategic phasing

The network traffic performance of Coalition Concept is estimated to be similar to the existing conditions.

Traffic analysis

Arup qualitatively evaluated the overall traffic performance of the Coalition Recessed Highway Concept by evaluating the high-level organization and connectivity of roadway network links of the Concept compared to either the current network or either SLA concept outputs used as reference.

Overall function and performance is determined by how access is provided between the highway mainline and local network. In our case, the Coalition Concept is a hybrid of the existing Inner Loop and SLA Concept 6 roadway networks from a network functionality perspective.

Because the roadway network performance of Concept 6 during peak periods is similar to the existing network (within 10 percent range), it can be reasonably expected that the **network traffic performance of Coalition Concept would also be similar**.

Caveats -

This analysis is based on 2016 traffic counts included in the SLA model, and excludes future travel demand projections. Additional detailed modelling is recommended to reflect the exact configuration of network links resulting from the North Split project and the Coalition Recessed Highway concept.

Aggregate traffic performance metrics (percentages relative to No-Build performance), Source: May 2018, INDOT System Level Analysis.

	Concept 4	Concept 6
Vehicle-Miles Travelled AM Peak	314,337 (+1%)	310,996 (0%)
Vehicle-Miles Travelled PM Peak	349,398 (-1%)	375,371 (+7%)
Vehicle-Hours Travelled AM Peak	42,051 (-4%)	44,323 (+1%)
Vehicle-Hours Travelled PM Peak	46,962 (-4%)	51,516 (+6%)
Delay (hours) AM Peak	19,156 (-10%)	19,506 (-9%)
Delay (hours) PM Peak	22,034 (-6%)	24,197 (+3%)

Note: based on 2016 traffic counts and model outputs, inclusive of planned network improvements, future excluding demand projections. North Split prior to approved design for reconstruction.

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3. Feasibility, flexibility and strategic phasing

An alternatives analysis of challenge areas confirms the overall feasibility of the Recessed Highway concept, providing flexibility in viable design solutions subject to future community and stakeholder engagement.

Approach to design refinement for feasibility

A handful of 'hot spot' areas were identified in the Coalition concept design for further refinement – listed in the diagram.

Arup identified and compared a number of alternative solutions to address feasibility or performance challenges.

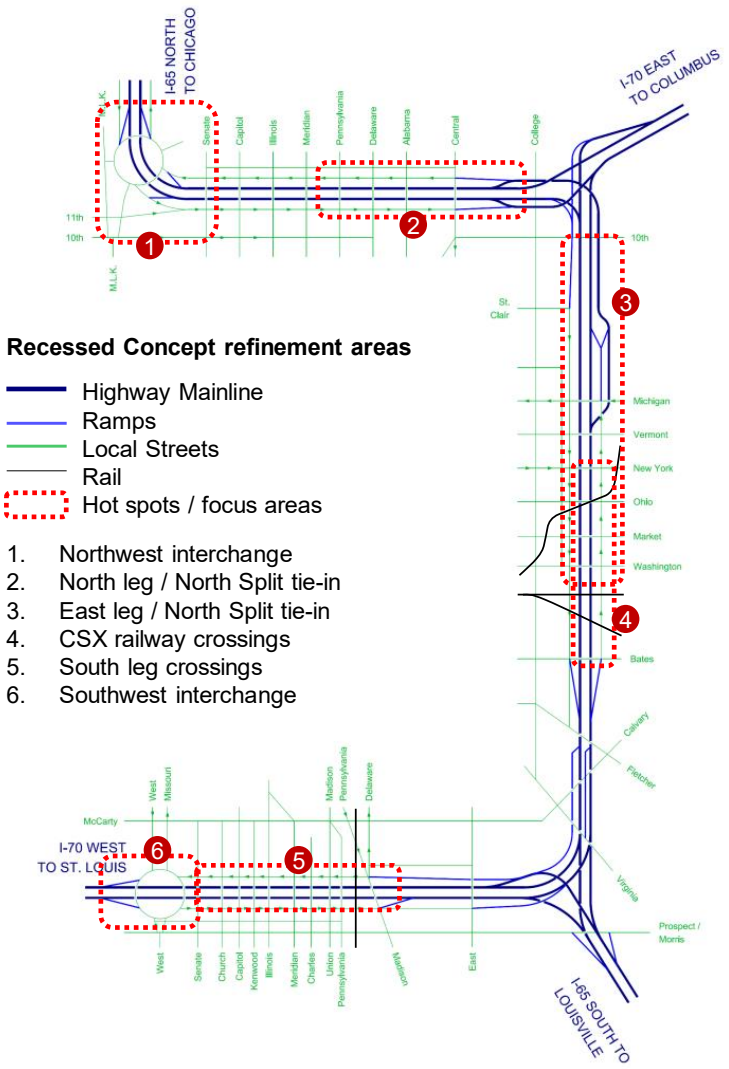
The alternatives' feasibility was evaluated using a **multi-criteria assessment** framework and qualitative rating for the following criteria.

- **Traffic performance**: traffic impacts or congestion on local streets or interstate mainline, and user safety;
- **Context sensitivity**: includes local neighborhood connectivity, project footprint, urban design and aesthetics, equity and environmental justice;
- **Long-term opportunities**: economic / real estate development; future transportation technologies or transit integration;
- **Technical feasibility**: constructability, technical complexity and cost, operations and maintenance challenges, technical unknowns / risks;
- **Stakeholder risks**: ownership or decision-maker involvement, public opposition or political risk.

Options were given a qualitative Red-Amber-Green rating against each criteria based on qualitative assessment, technical review and traffic data where possible, and discussed with Indy Chamber of Commerce, INDOT, ReThink and MPO

- Red - Option not recommended or unviable - risks or disbenefits significantly outweigh potential benefits
- Amber - Option feasible with noticeable but manageable risks – requires further study
- Green - Option feasible with minimal risks / disbenefits.

Detailed alternatives and assessment matrix are included in Appendix A.



3. Feasibility, flexibility and strategic phasing

While there are multiple viable options for the northwest interchange design, a partial scheme is not recommended. Feasibility of a recessed highway concept on the North leg is subject to trade-off between realizing the full length of the vision – which implies rebuilding part of North Split structures – or rebuild the viaduct as is at end of useful life.

North Leg

The alternatives analysis of hot spots on the North Leg supports the feasibility and vision for a full scheme recessed concept between 16th St. and College Ave. to fully achieve the social, economic and environmental benefits along this leg of the Inner Loop.

A range of options for a new Northwest Interchange - other than a signalized circle interchange – are feasible. However, a preferred solution for the interchange will require further analysis, and community and stakeholder engagement.

Alternatives tie-in points to the North Split from a recessed interstate mainline are unfeasible as they require closing down important local streets for the elevation change. The full scheme with a tie-in at College Ave. would require reconstruction of structures delivered under the North Split project.

Current conditions are preferable to a partial scheme, until replacement of the viaduct provides incentives to plan for the full recessed highway vision on the North leg compared to replacing the structure as-is.

North Leg Hot Spot areas alternative analysis outcomes (Arup)

	Northwest Interchange (1)	North leg / North Split Tie-in (2)
Coalition Recessed Highway concept challenges	Signalized traffic circle: insufficient traffic capacity, with user safety concerns	Requires to demolish an reconstruct North Split segment (Alabama – College)
Alternatives studied	• Do Nothing • Traditional interchanges (diamond, single point) • Part / full grade separated	Shortened recessed segments, with tie-in a Alabama St. or Central Av. to minimize reconstruction of North Split new structures
Recommendations	Various traditional interchange alternatives (traffic circle) enable a recessed highway and have adequate traffic capacity for current demand.	Alternative tie-in points unfeasible Recommended option is full segment per Coalition Concept subject to project phasing, and Do Nothing (no Recessed Highway on North Leg segment) in meantime.

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3. Feasibility, flexibility and strategic phasing

Under current planning and operating conditions, a partial recessed concept on the East Leg would not only provide insufficient benefits compared to costs but remains unfeasible if CSX Mainline spur remains active. Short-term focused investments on local connectivity enhancements are possible in the meantime.

East Leg

Under current planning and operating conditions, a partial recessed concept would not only provide insufficient benefits compared to costs but remains unfeasible if CSX Mainline spur remains active. Two scenarios or potential phasing are recommended for this leg of the project:

1. **Short Term: Capping on existing depressed segment**

   Focus investments on enhancing the aesthetic and urban design conditions on the I-65/70 segment south of Georgia St. with capping, enhanced crossing conditions and potential new pedestrian bridges.

2. **Long-Term: Full Recessed Highway Concept on the East Leg**

   The full Coalition Concept vision on the East Leg remains most desirable to maximize anticipated social and economic benefits for this leg. Long-term feasibility remains subject to aligning INDOT capital plans as the North Split structures wear-out and CSX plans to relocate the mainline spur, which would improve neighborhood connectivity, traffic safety, and noise abatement.

East Leg Hot Spot areas alternative analysis outcomes (Arup)

	South leg / North Split Tie-in (3)	CSX crossings (4)
Coalition Recessed Highway concept challenges	North Split project extents to Washington St. Coalition Concept would demolish 8 bridges, 5,000ft of new embankments and pavements.	3 CSX rail crossings conflicts with Coalition Concept at-grade boulevard system flanking interstate mainline.
Alternatives studied	Do Nothing + Shortened recessed segment to minimize reconstruction of North Split new structures: tie-in at Vermont St, or Michigan St. (all assume CSX Mainline relocation to Belt RR)	Do Nothing + Various boulevard crossing conditions with rail lines (at-grade, depressed) + CSX Mainline relocation options.
Recommendations	• Alternative tie-in are either not feasible or not recommended due to closures of local streets, and minimized benefits that could be expected. • Full length remains preferred alternative to maximize wider benefits. However feasibility subject to North Split useful life and CSX relocation. • Do Nothing is preferable to a partial scheme in the meantime.	• Feasible alternative is for Boulevards to be recessed below rail lines* and CSX Mainline relocated / decommissioned. • Do Nothing is preferred until this becomes viable for planning with CSX. • Building I-65/70 below active CSX mainline are cost prohibitive if not technically unfeasible.

* CSX Indianapolis Subdivision and CSX Shelbyville Secondary Subdivision

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3. Feasibility, flexibility and strategic phasing

The South Leg is the most viable segment compared to other legs in the short term because it does not present major physical and technical challenges, while offering the highest economic development opportunities.

South Leg

The South Leg presents no major traffic performance, planning, technical or operational challenges to deliver the full Coalition Concept Recessed Concept.

Serves as a proof of concept for the Coalition Recessed Highway vision for the rest of the Inner Loop. Once the South Leg is constructed and impacts observed, stakeholders and the community will be empowered with evidence-based costs and benefits for remaining segments.

Preferred alternatives for the southwest interchange, the number / location of crossings on the segment and location and length of strategic capping remain flexible with multiple viable configurations. Further traffic analysis and community involvement will help determine preferred alternatives as design and planning progresses.

Any preferred alternative should prioritize active travel, right-sizing to control vehicle speed near ramps and create a sense of gateway into Downtown Indianapolis.

South Leg Hot Spot areas alternative analysis outcomes (Arup)

	South leg crossings (5)	Southwest Interchange (6)
Coalition Recessed Highway concept challenges	Frequency and distance of signalized north-south links impact optimal traffic operations between Madison and Missouri Ave.	Signalized traffic circle: insufficient traffic capacity, with user safety concerns
Alternatives studied	Number and frequency of vehicular signalized crossings	• Existing • Other traditional interchange design (half-diamond, single-point)
Recommendations	Introduce new links compared to current conditions to improve local connectivity to the extent where congestion on local streets can be mitigated to levels acceptable to urban boulevard / neighborhood comfort levels. Additional pedestrian bridges can further improve north-south local connectivity.	All alternative (traditional) interchange designs appear viable, support enough capacity and enable a recessed highway on the South Leg.

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3. Feasibility, flexibility and strategic phasing

Prioritizing investment in the South Leg as a proof-of-concept is a reasonable approach to phasing that creates tangible benefits in the short-term for south-side communities while galvanizing evidence and incentives to implement the two other legs as full vision.

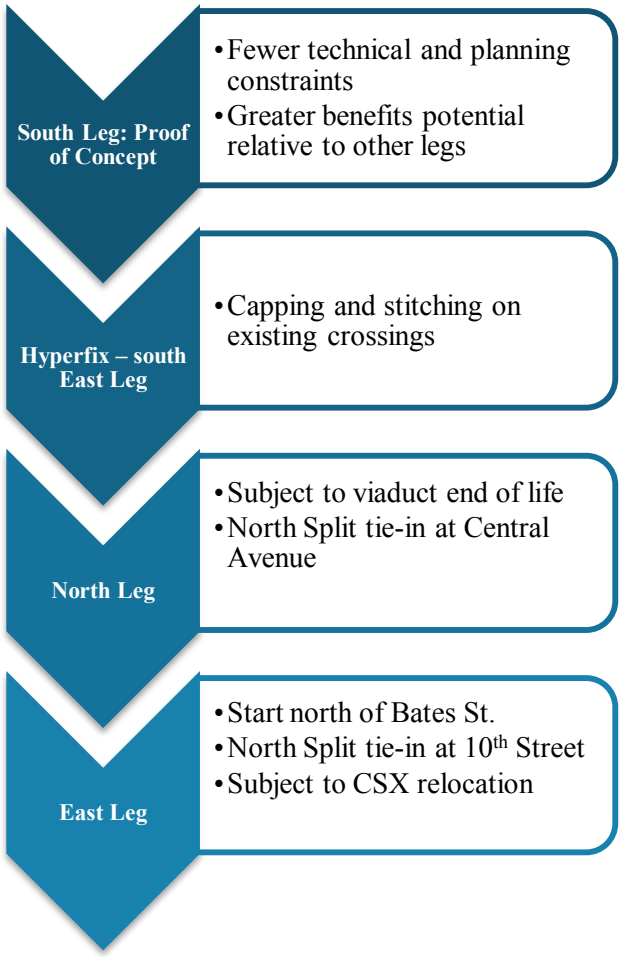
Viable Phasing Recommendations

South Leg

- Prioritize as proof of concept, with strategic capping in a first stage, potentially extending capping in later stages with available funding
- Greater development opportunities and value capture relative to other segments:
  - 50% total developable land and development potential
  - Up to $47M in land value created
- Significant potential social and environmental justice impact relative to other segments:
  - 1,300 new housing could more than double the number of housing units and population within a 1/2mile,
  - Around $25M in property taxes per year from new development
  - Improved quality of life for low income households and senior/ disabled population
  - Likely increase of existing property values redistribute benefits to +50% home-owners in the area
- Catalyze infill and new development in disinvested area, rebalancing growth prospects compared to North, East and Downtown districts.

North Leg and East Leg

- Current planning and infrastructure constraints (North Split project and CSX Mainline) hinder feasibility in the short to medium term
- Partial recessed highway either not feasible or not recommended as costs would outweigh minimized benefits
- Full vision remains preferable alternative to partial scheme in the future as main planning constraints are lifted
- Capping and enhanced crossing (stitching) possible in the short-term in Hyperfix segment, which could expand opportunities in one of the city's most vibrant cultural areas.



5. Comparative costs and benefits

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Cost Comparison

The Recessed Highway concept was compared to the alternative baseline cost of rebuilding the Interstate in its current form to understand their cost difference vis a vis their respective environmental, social, and economic benefits.

Approach

Arup estimated and compared the cost of rebuilding the Interstate system as-is with the alternative of the Recessed Concept with strategic capping. Cost estimate objectives are to:

- Provide an independent estimate based on best practices and limited stakeholder bias,
- Present a comparative cost between two alternatives: the rebuild-as-is, serving as the baseline cost, and Recessed Concept, serving as the alternative.

Baseline or Rebuild-As-Is

Assumes Demolishing existing infrastructure and replace it with:

- Same structures (at-grade, elevated bridges or embankments, ramps, pavement etc.) ,
- Same quantities (number of lanes, lane miles, etc.),
- Current design standards.

Cost estimates were generated based on information from the Federal Highway Administration adjusted to 2020 Indiana's cost. More detail on the methodology used by Arup can be found on the Cost Estimation memorandum.

Coalition Recessed Concept

Demolish existing and replace with:

- Recessed highway mainline with approximately 16.5ft clearance below grade level,
- Reconstructed street crossings as overpasses or bridges,
- At-grade northbound and southbound boulevard roads, parallel to the recessed highway mainline,
- Partial capping with parks,

Assumed using steel sheet piles to manage ground water and reduce construction footprint.

See Section 3 for Key Concept Components and schematic network.

Exclusions & Limitations

Excluded from the cost estimate:

- Escalation costs
- Replacement of the North Split interchange, the White River bridge; CSX relocation to the Belt RR
- Development construction costs
- Waterproofing the walls and base slab – but included as contingency as it is still a risk.

The high level concept design of the Recessed Concept and Rebuild-As-Is are rough order of magnitude (ROM) cost estimates. Both use similar methodology, and are compared on a relative level.

Cost estimate break-down

The cost estimates presented in the following page are broken-down as:

- Direct costs - includes labor, material and equipment needed for the construction,
- Indirect costs – includes all contractor costs, management of traffic related to construction, contingency, as a percentage of direct costs,
- Soft costs – includes various design and project management costs, as a percentage of construction costs,
- General contingency – appropriate for ROM and level of design.

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Cost Comparison

For an additional 24% investment compared to the baseline or Rebuild-As- Is, the Inner Loop can be reconstructed as a recessed interstate system with boulevards, greenways, cap-parks, enhanced neighborhood connections and smaller footprint – in addition to other social justice, economic development and quality of life benefits for local communities.

Outcomes

- Arup's estimates suggest that the Coalition Concept cost difference compared to Rebuild- As-Is Concept is $195 million for the South Leg, $213 million for the North Leg, and $127 million for the East Leg. This means that for an additional 24% investment cost, the Inner Loop could be rebuilt as a recessed highway that better integrates the local grid and supports social justice, economic development and quality of life benefits for local communities.

- Although the Recessed Highway Concept is 45% more expensive to build per lane-mile ($102 million compared to $70 million), its design is more efficient, reducing the total lane miles by 16% or around 5 miles.

Total cost estimate for Rebuild-As-Is and Coalition Recessed Highway concept, in $ million (2020 prices)

	Rebuild-As-Is	Coalition Recessed Highway	Change
South Leg total cost	$ 560 M	$ 755 M	$ 195 M +34%
North Leg total cost	$ 932 M	$ 1,145 M	$ 213 M +23%
East Leg total cost	$ 789 M	$ 916 M	$ 127 M +16%
Total cost	**$ 2,270 M**	**$ 2,810 M**	**$ 540 M + 24 %**

Lane-miles and cost-per-lane-mile for Rebuild-As-Is and Coalition Recessed Highway concept

	Rebuild-As-Is	Coalition Recessed Highway	Change
Total lane miles (miles)	32.6 miles	27.4 miles	- 5.2 miles - 16%
Cost per Lane Mile ($ M / lane mile)	$70 M	$102 M	$32 M + 45%

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Comparative Benefits

The Coalition Recessed Highway vision aims to achieve a broader range of tangible benefits for local stakeholders and communities compared to what rebuilding the interstate as is could achieve.

1. **Continue to support regional connectivity** as a regional transportation corridor and provide vehicular access to Downtown Indianapolis.
2. **Improve local neighborhood connectivity**, by
   - Increasing mobility choices between neighborhoods along the corridor,
   - Promoting safe active travel,
   - Breaking down physical and mental historical barriers,
   - Supporting potential transit in the future.
3. **Achieve higher quality of life for residents** in the surrounding neighborhoods, by
   - Mitigating traffic and local environmental impacts on neighborhood streets,
   - Prioritizing pedestrian safety and comfort levels adequate for neighborhood streets,
   - Creating new green public spaces.
4. **Strengthen complete and inclusive communities**, by
   - Creating urban design conditions supportive of complete communities development patterns (mixed-use, housing, local employment and active frontage),
   - Providing opportunities to experiment with innovative equitable development policy on new developments, such as affordable housing.
5. **Accelerate inclusive economic development**, by
   - Creating conditions supportive of new development that can boost local economic development for Indianapolis,
   - Improving local access to neighboring employment centers and increasing employment density along the corridor.

Regional connectivity	Regional transportation corridor
	Vehicular access to Downtown
Local connectivity	Increase mobility choices along & across I65
	Safe active travel
	Break down barriers
	Support future transit
Quality of life	Mitigate traffic impacts for neighborhood safety and comfort
	Mitigate environmental impacts from local traffic
	New open and green spaces
Complete& inclusive communities	Opportunity for equitable development models
	Addresses historic environmental justice issues
Economic development	Supportive of cohesive frontage & new development
	New fiscal revenue for local community investment

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Comparative Benefits

The Inner Loop primary function was to serve regional transportation demand and provide access to Downtown Indianapolis from surrounding counties, historically to the detriment of local movement, safety and connectivity. The Coalition Recessed Highway rebalances local and regional transportation demand along the corridor.

Inner Loop Integrated Goals	Rebuild-As-Is	Coalition Recessed Highway
1. Continue to support regional connectivity* :		
as a regional transportation corridor and providing access to Downtown Indianapolis *based on 2016 traffic analysis, excluding future travel demand projections	Traffic performance on highway mainline is comparable to existing conditions (based on SLA Concept 3/4 comparative analysis) No change to existing links to/from Downtown	Traffic performance on highway mainline is comparable to existing conditions (based on SLA Concept 6 comparative analysis) New interchange options maintain key gateways to/from Downtown with adequate capacity
2. Improve local neighborhood connectivity, by :		
• Breaking down physical and mental historical barriers	• No change to retaining walls / embankments barriers • Opportunity for better quality urban design features for bridges and underpasses	New and enhanced crossing conditions, tightened right-of-way Major transformation of Inner Loop experienced as a key factor in social justice and urban decline of black and brown communities historically
• Increasing mobility choices between neighborhoods along the corridor	Inner Loop mainline also serves local vehicular movements between neighborhoods in the corridor	Demand for local movement shifts to boulevards but also support other transportation modes
• Promoting safe active travel	n/a	Greenways and enhanced crossing supportive of active travel
• Supporting potential transit in the future	No change to surrounding land uses will make a case for transit in the future	Circular boulevards system envisioned as potential bus rapid transit corridor. New residential and employment density may support need for new transit system.

High likelihood to achieve the goal
Medium likelihood to achieve the goal
Low likelihood to achieve the goal

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Comparative Benefits

The Recessed Highway aims to address historic systemic social and environmental impacts induced by the construction of the Inner Loop on vulnerable communities by improving quality of life and strengthening complete and cohesive communities – while rebuilding as is would mean entrenching such historic impacts and widening gap for the next 50 years.

Inner Loop Integrated Goals (cont.)	Rebuild-As-Is	Coalition Recessed Highway
3. Achieve higher quality of life for residents in the surrounding neighborhoods, by :		
• Prioritizing pedestrian safety and comfort levels adequate for neighborhood streets	Vehicular safety and performance prioritized over pedestrian safety; high safety risks near access ramps crossings	Priority given to pedestrian safety; Right-sizing access points weaving in boulevard system reduces average vehicular speeds and improves pedestrian comfort levels near Interstate
• Mitigating traffic and local environmental impacts	All areas eligible for noise barriers; no change to air quality unless more traffic is redirected to I-465.	Noise from mainline mitigated by depressed retaining walls Potential additional air quality / noise impacts from diverted traffic to boulevards, mitigated by planted greenways and land bridges.
• Creating new green public spaces	May include opportunity for improved trail, planted embankments and pocket parks	Around 25 acres of highly accessible green public spaces created as capped parks
4. Strengthen complete and inclusive communities, by :		
• Creating urban design conditions supportive of complete communities development patterns (mixed-use, housing, local employment and active frontage)	No change to land use opportunities in the surrounding communities. Reinvesting in infrastructure that has had detrimental historic impact on the character of existing complete communities.	Transforming urban conditions on edge of interstate, supportive of 10M sq.ft. of new development, including 3,300 new homes and 6.6M sq.ft of office and ground-floor retail.
• Providing opportunities to experiment with innovative equitable development policy on new developments, such as affordable housing	Any inclusion and equity objectives addressed through S106 process.	45 acres of publicly-owned new developable land created can be an asset to support social and inclusive development policies that can help address unwanted negative externalities from development on surrounding communities.

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Comparative Benefits

The Recessed Highway creates new development opportunities and attractive urban conditions that can help catalyze growth and investment in declining communities, in particular near the South Leg – while rebuilding as is would continue current trends of unbalanced growth and left behind communities.

Inner Loop Integrated Goals (cont.)	Rebuild-As-Is	Coalition Recessed Highway
5. Accelerate inclusive economic development, by :		
• Creating conditions supportive of new development that can boost inclusive local economic development for Indianapolis.	Interstate continued role as key infrastructure support to Indianapolis' economic prosperity and regional access to employment centers in and near Downtown. No change to economic development trends in the corridor: widening gap between growth hubs (north, northeast) and struggling areas (e.g south).	Improved urban conditions support land values for 6.6M sq.ft suitable for commercial land uses – more than half near the south leg – can help catalyze local economic development in areas such as the south that would not benefit from investment. New uses will generate (at completion) new fiscal revenue to the City –which can be partly reinvested in local economic development and community improvement programs.
• Improving local access to neighboring employment centers and increasing employment density along the corridor	No change to current conditions where Interstate is a physical barrier to local residents to access neighboring employment hubs (such as IU Health), in particular for those with no access to vehicle. No change to land use patterns or density in the corridor.	New land uses in corridor can increase employment density and choice both directly in impacted communities. Boulevard system and new / improved crossings increase physical access to existing and emerging employment hubs along the corridor.

High likelihood to achieve the goal
Medium likelihood to achieve the goal
Low likelihood to achieve the goal

Environmental Justice impacts

Summary by leg

South Leg : Wealth creation and inclusive development opportunities

Proposed changes to the south leg could impact around 2,700 people including up to 500 African American, more than 230 households living below poverty levels, more than 300 senior residents and 300 or more people on disability. In addition, they could encourage more people to use alternative modes of transport to work and attract new residents and employees.

Although housing values are low to median, the area could see significant uplift in property values. Around 500 owner-occupied households could benefit from this uplift in value. However, mitigation policies to address unintended displacement risk on rental tenure households (c. 500), low income and minority groups are recommended.

North Leg: Equitable distributing of benefits to EJ areas

The north leg stands apart for EJ because it has seen such important demographic changes in the past decades. There are currently over 4,300 African American residents along the North leg, almost half of 1990 population. Neighborhoods in the Northwest / Near North (near IU Health Campus) and northeast (Martindale) remain majority black neighborhoods with 2,700 African American (average 65%). Other areas (Northside, Downtown North) still count 1,700 Black residents yet in mixed communities (16%). Similar divergence patterns are seen in median housing values and income levels; low values and income levels in Northwest / Near North versus high values and income levels in Northside / Downtown North.

Infrastructure improvements to this area would dramatically improve quality of life conditions for minority communities that were historically disproportionately affected by the interstate construction, in particular those established minority communities that remain today in the northwest and northeast, and that are under pressure from development and demographic changes in surrounding areas even without the recessed highway project.

Project benefits would also fall to other population groups that are not disadvantaged. With $700 million in real estate development potential along the leg and existing higher real estate values, the unintended risk of further displacement is heightened for minority and at-risk groups here.

Adequate mitigation policies and prioritized investment in EJ Areas could help address this risk and address the historical EJ issues of the interstate construction.

South-east (capping): continued growth of diverse community

The EJ narrative for the southeast improvements focuses on a large African American community of 2,000 people in a mixed community of 6,500 total, with a sustained population growth in the black community and high home ownership rates with median-to-high house values.

Improvements to the crossing conditions will further contribute to attracting diverse demographics as well as encourage further shift to sustainable modes in one of the most vibrant and culturally diverse neighborhoods in the city.

East Leg (north of Washington St.)

When planning can move forward for this leg, changes could impact more than 9,700 people in total, including more than 2,500 African American residents and 1,200 low income households, but also more than 1,000 people on disability and 880 senior residents, and over 1,000 households with zero cars. Between 70-85% of these people and households are located in EJ Areas of Concern north of Cottage Hill and west of I65/70 between Washington Street and North Street.

6. Funding and Financing

Funding and Financing

Megaprojects tend to rely on various funding sources including leveraging on land located in proximity to the project or created by the project.

Overview

Funding and financing are of primary consideration for the implementation of any project. Megaprojects tend to rely on various funding sources: local, regional, state, and federal. Indiana has experience delivering large projects and relying on multiple sources of funding.

To accelerate project delivery, funding sources are used to secure financing. Here is a brief overview of funding vs. financing:

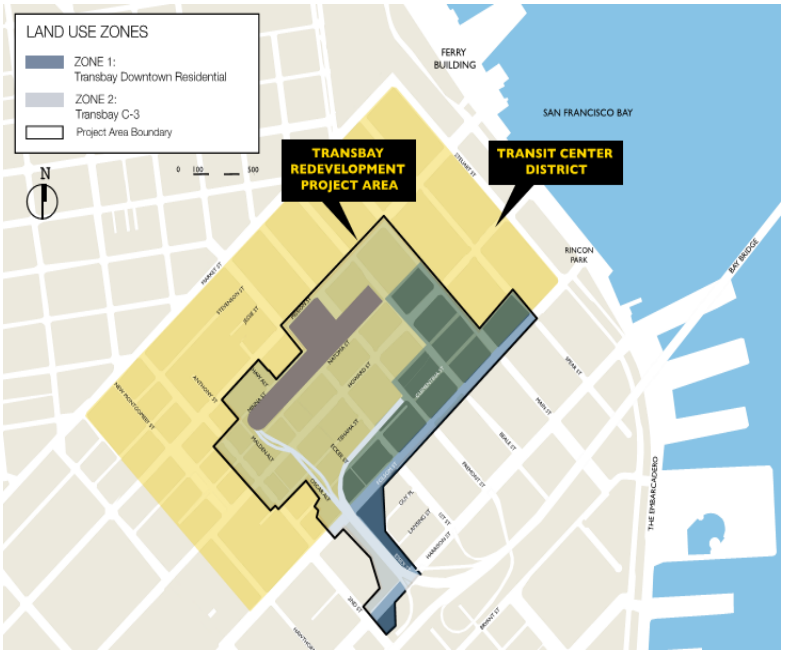
- Funding is defined as the public spending or the revenue that pays for the development and maintenance of an infrastructure asset. The funding is the money that does not have to be paid back.
- Financing is defined as the structure and related instruments used to securitize future funding sources. It's the money that is borrowed to develop a project, and that is later paid back from the project funding sources.

Case study

Transbay Transit Center (formerly the Transbay Program) is a new $2.2 billion, 1-million square foot transportation facility in downtown San Francisco that delivered both the transportation vision and a development program that changed downtown San Francisco. This megaproject was funded with:

- 45% local and regional funding
- 29% state funding
- 26% federal funding

The state of California transferred the land to the city of San Francisco and the land sales proceed contributed $700M of funding. An additional stipulation of the state land transfer required the city to use 80% of the property tax increment financing to further fund other expenses related to the program. These funds flow into the program over 40 years. The city also established a special tax assessment over the entire redevelopment site to pay for additional public infrastructure, and the on-going upkeep and maintenance of parks, streets and other public facilities.



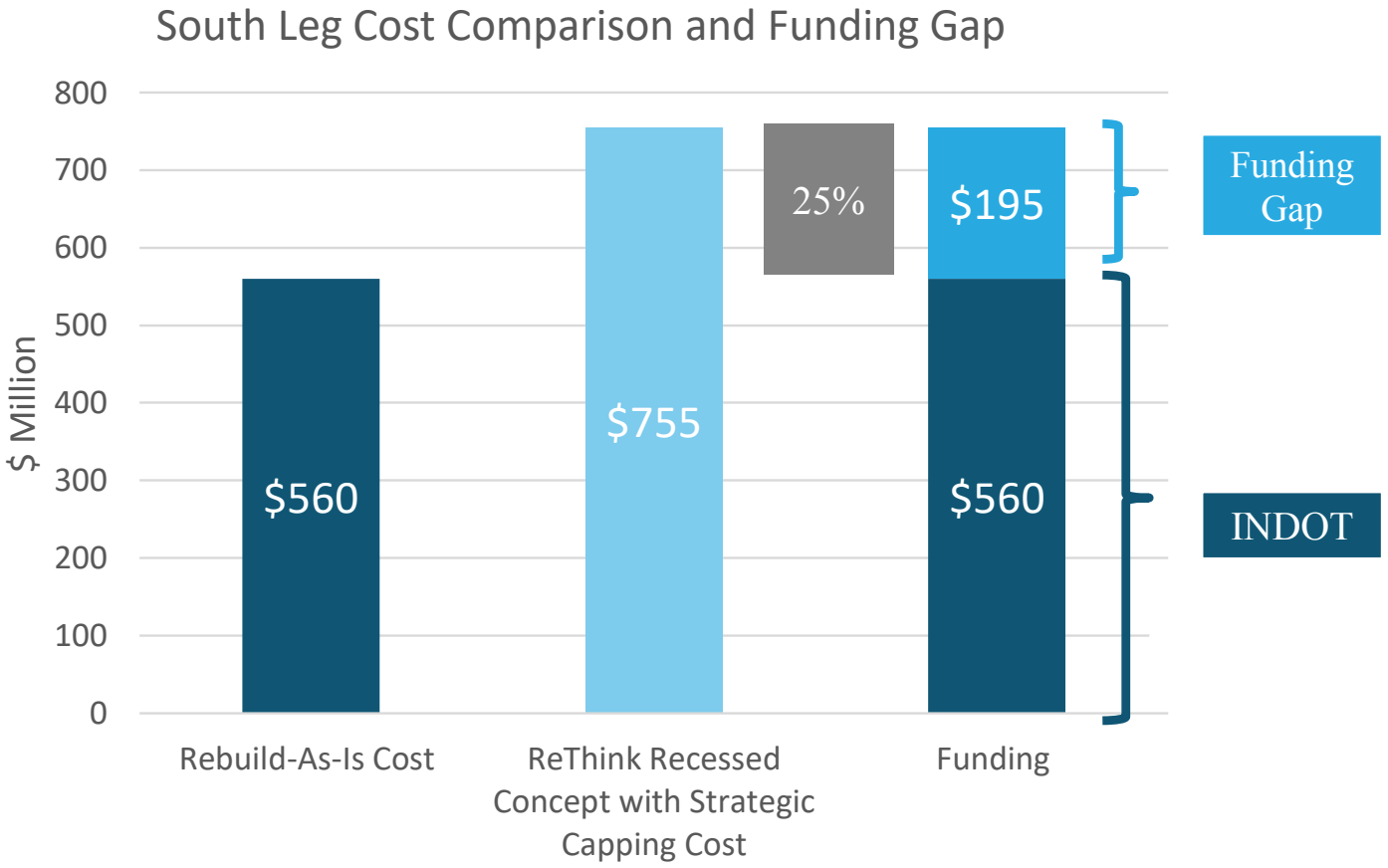
Redevelopment area around Transbay Transit Center

Closing the Funding gap: The South Leg Example

The ReThink Recessed Concept would create more than 45 acres of developable land to leverage upon to close the funding gap between the recessed concept and the rebuild-as-is option. Below we illustrate the case for the South Leg.

Overview

- The following funding approach for South Leg is provided for illustrative purposes.
- Cost for South leg:
  - Rebuild-as-is cost is $560 million
  - ReThink Recessed Concept with strategic capping cost is $755 million
  - An additional 25% investment of $195 million is the funding gap for the South leg. Arup assumes that the $560M of the $755M equivalent to the rebuild-as-is cost will be funded by INDOT as INDOT will be funding the rebuild-as-is option.

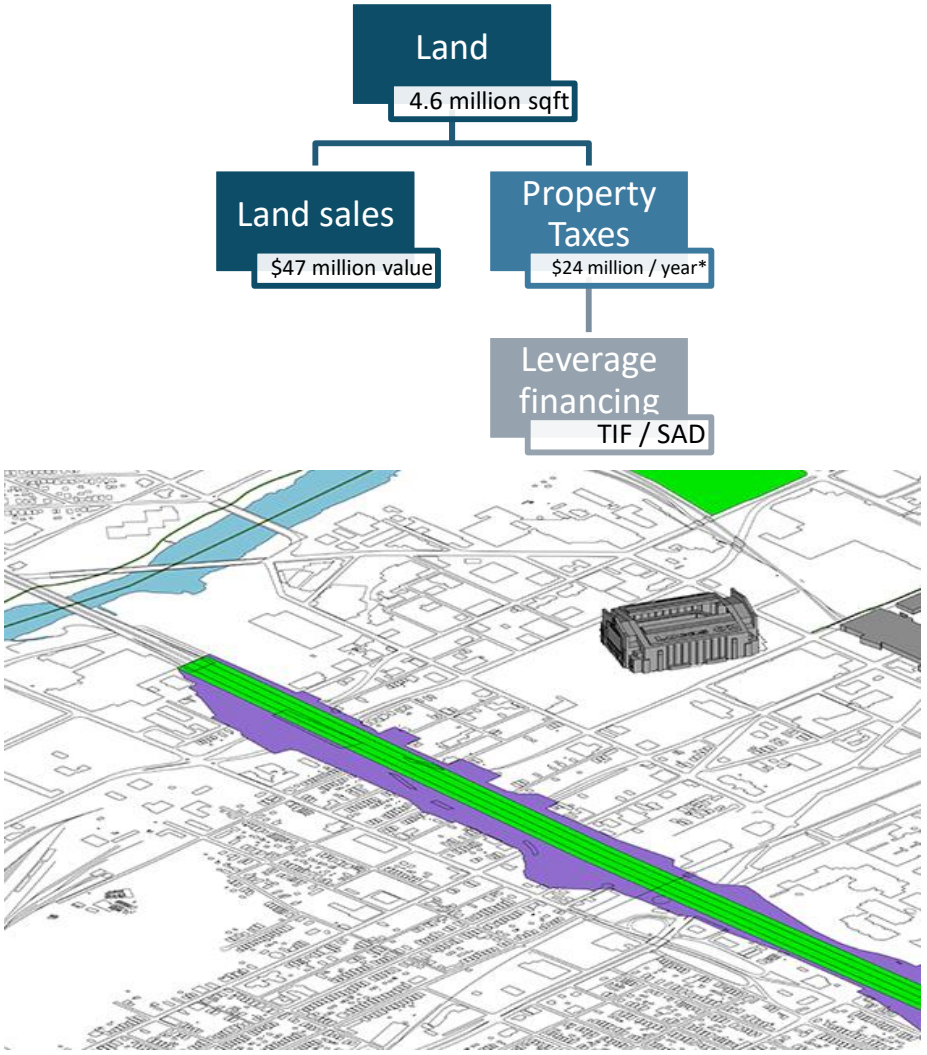


Potential funding sources

South Leg has nearly 50% of the available land for redevelopment or 4.6 million square feet. Land sales and property taxes of new development have the potential to significantly contribute to reduce the funding gap

Overview

- ReThink 65/70 Recessed Highway Concept will create 10 million square feet of land available for redevelopment.
- South Leg has nearly 50% of the available land for redevelopment or 4.6 million square feet.
- Land sales and property taxes of new development have the potential to significantly contribute to reduce the funding gap.
- Land sales value for South Leg is estimated at $47 million.
- At full development, property taxes can generate $24 million per year. Tax Increment Financing (TIF)/Special Assessment District (SAD) will be created to leverage financing by diverting future property tax revenue increases from a defined toward development of the Inner Loop.

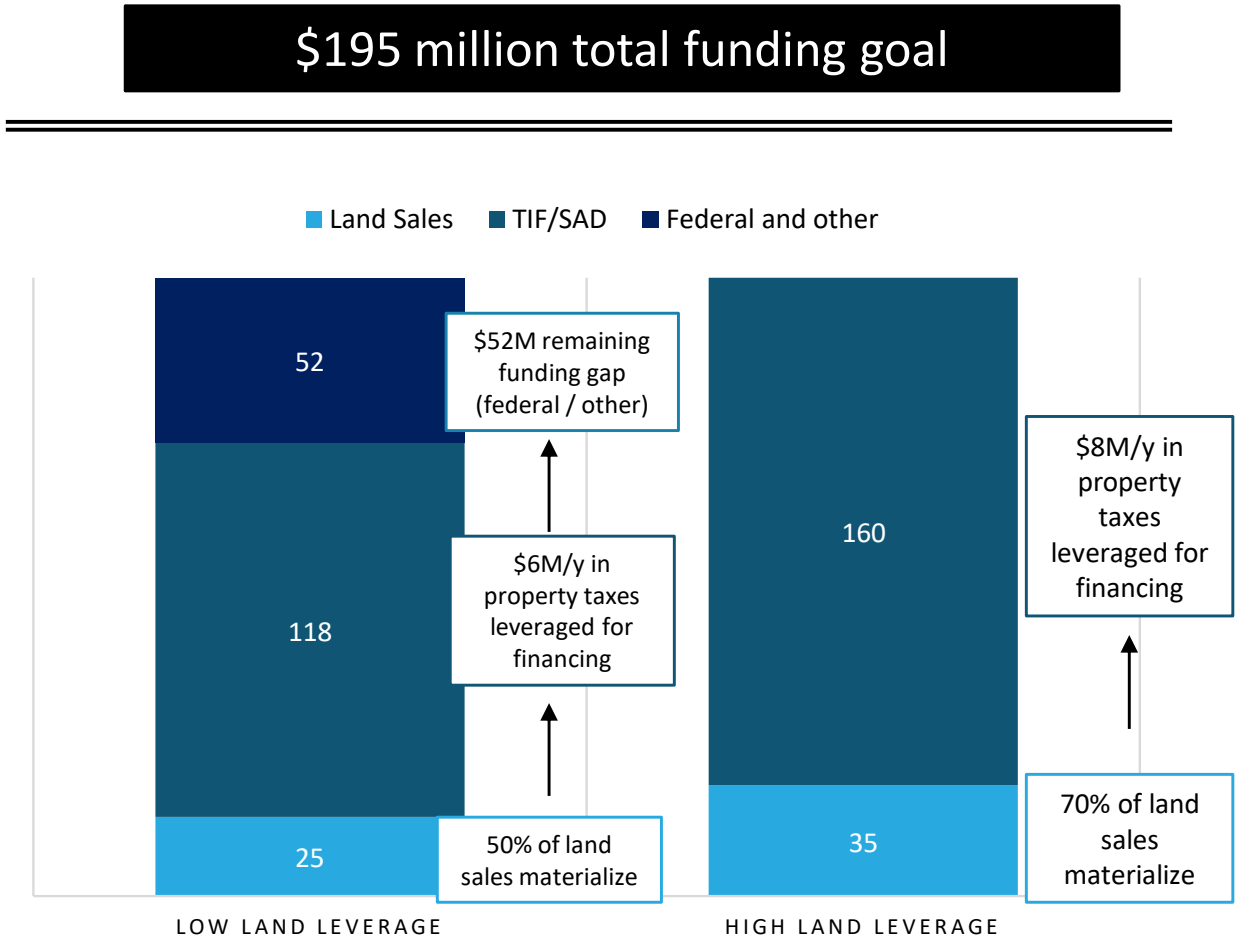


South Leg: Funding Sources Sensitivity Test

For an additional 25% investment, the South Leg can be rebuilt as recessed interstate system with boulevards, greenways, cap-parks, enhanced neighborhood connections and smaller footprint. Land sales/taxes can contribute significantly to close the funding gap.

Overview

- Arup performed a sensitivity analysis and examined two land leverage scenarios for the South Leg: low land leverage and high land leverage.
- Low land leverage scenario:
  - 50% of land sales materialize, which will contribute $25M of funding and generate $12M in property taxes
  - $6M/year in property taxes are leveraged with 30-year TIF/SAD financing for a total amount of $118M
  - Remaining $52M funding gap will be funded with federal/state grants and other sources
- High land leverage scenario:
  - 70% of land sales materialize, which will contribute $35M of funding and generate near $17M in property taxes.
  - $8M/year in property taxes are leveraged with 30-year TIF/SAD financing for a total amount of $160M.



7. Implementation

Schedule and Process, Governance, and Procurement

Schedule & Process

The development of a megaproject requires the development of a project concept, an assessment of environmental and project impacts, a formal adoption of the project, engineering design, financing, and finally project delivery.

Overview

The development of a megaproject requires the development of a project concept, an assessment of environmental and project impacts, a formal adoption of the project, engineering design (at various phases of the project), financing, and finally project delivery (the construction and commissioning phases).

The proposed program consists of three distinct projects – the South Leg, the North Leg and the East Leg. Arup assumes that due to rules on segmentation in the environmental process, all three legs would be studied in the draft environmental document, and the South Leg would proceed into preliminary design as part of a Final Environmental Impact Statement (FEIS) and federal Record of Decision. The North and East Legs would proceed separately into their respective FEIS processes as appropriate.

Arup developed a sample schedule to illustrate key activities and their duration that is required for the development of a megaproject.

Summary of Key Activities

Pre-Draft Environmental Impact Statement (DEIS): duration up to 18 months

Prior to the initiation of the DEIS, pre-environmental activities, including conceptual planning, policy discussions, funding considerations, and formal or informal agreements among the stakeholders is completed.

DEIS: 18-24 months

After a Notice of Intent (NOI) is issued, work starts on the NEPA environmental impact reporting process. During this period, design alternatives for all three Interstate segments are developed, considered and assessed for their technical feasibility and for their overall impact on the environment, on the community and on the economy.

FEIS: 12-16 months

In the FEIS, emphasis is placed upon developing a 30% engineering design for the preferred alternative, allowing a full review of environmental and social impacts.

Associated Studies and Agreements: 18 months

As the DEIS is proceeding, the South Leg Land Use and Redevelopment Plans are initiated and executed. These are critical to financing, as proceeds from land are expected to assist in financing the project.

In addition, other studies include financing and governance and project delivery structures.

Design and Construction:

Duration

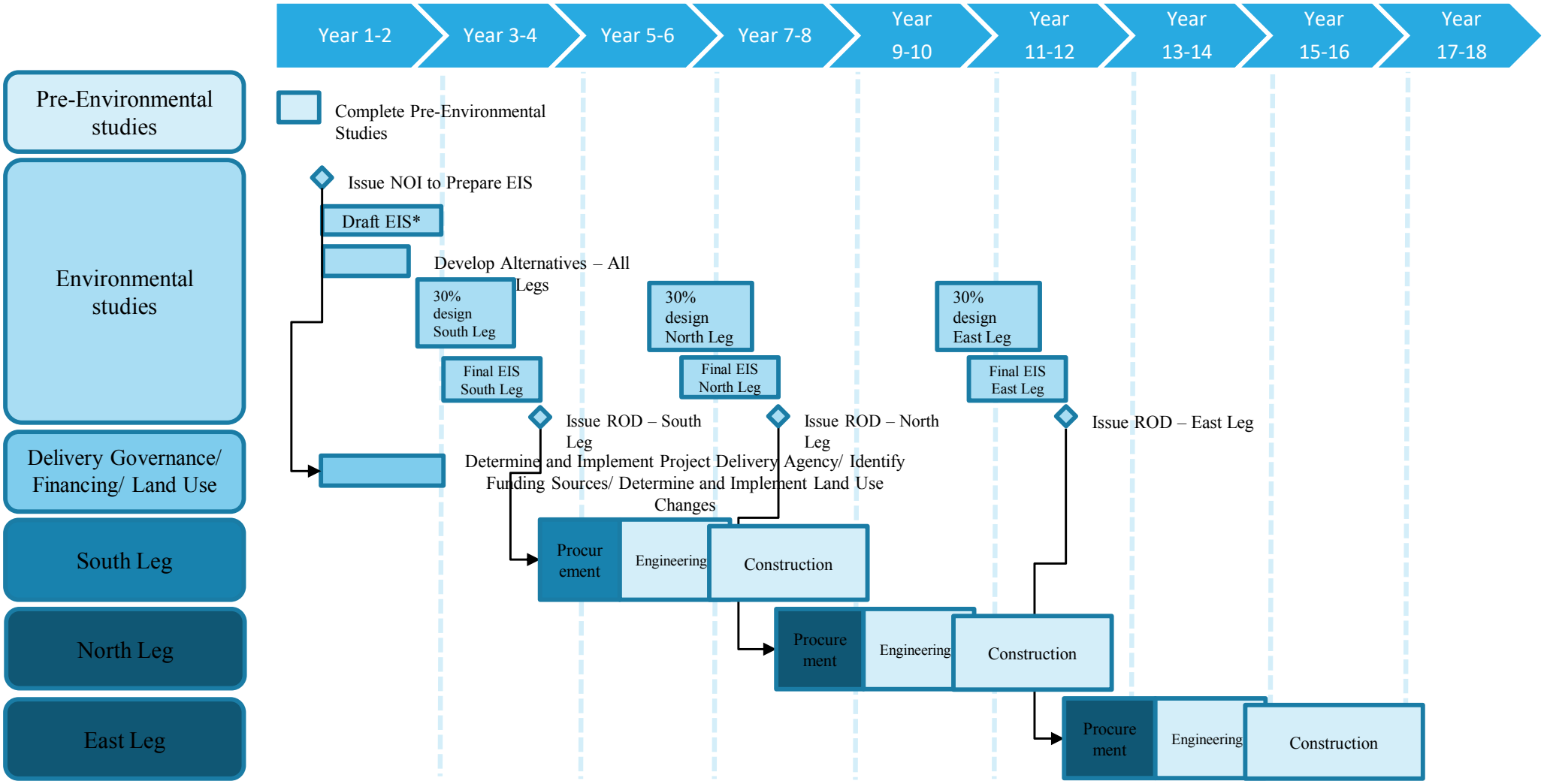
- South Leg – 47 months
- East Leg – 48 months
- North Leg – 50 months

Design and Construction process and duration will depend on the preferred procurement method and overall phasing. Given the preference for a Design-Build procurement method for similar projects, the schedule has been developed assuming design-build procurement for the project.

The overall sequence of awarding scope of work for each leg could change without major impact on the overall program duration.

The sample program schedule is illustrated on the next page.

Schedule Example



Governance: Stakeholder groups and agencies

New stakeholder collaboration to deliver a project with greater goals and benefits

Overview

- Reconstruction of the I-65/70 Inner Loop needs to put forward a new stakeholder collaboration to deliver the project with improved goals and benefits. The project would involve various stakeholders who represent differing roles and interests, similar to other megaprojects of its nature.

- The stakeholder group could include:
  - INDOT
  - State of Indiana (MPO)
  - City of Indianapolis
  - Chamber of Commerce & ReThink Coalition
  - Local community groups
  - Developers/equity investors

Partnership towards achieving social equity

Various entities would play a role in achieving social equity with the Reconstruction of the I-65/70 Inner Loop

Entity	Role
INDIANA DEPARTMENT OF TRANSPORTATION INDOT	• **Design** an alternative that addresses the partnership's wider connectivity, social equity and economic development goals
THE CITY OF INDIANAPOLIS	• Adapt land use policy for equitable and inclusive development • Integrate **land use and transportation** policies • Establish special district for **value capture & funding**
INDY CHAMBER RETHINK 65 70 COALITION	• **Leadership building** for equity, transit integration and regional economic development • **Ongoing community engagement** to align design with equity and social objectives

Governance structures

The governance structure will impact the options available to the governing authority for the planning, design and construction and operations and maintenance phases of the project.

Overview

The governance structure will have a significant impact on the options available to the governing authority for the planning, design and construction and operations and maintenance phases of the Project. The best alternatives should be evaluated against the goals of the Project, technical, financial or political constraints and the extent to which there is a desire and will to leverage private sector innovation.

Establishing a clear and robust governance structure will be key to successfully navigating applicable permitting and regulatory processes and realizing efficiency and the long-term goals of the Project. In addition, the governance structure will determine the array of contracting options available to deliver the individual components of the program and establish the decision-making powers and scope of involvement of INDOT and the State of Indiana. For example, a governance model suited for the creation and maintenance of transit-oriented development projects may not be the same structure suitable for public open space. Similarly, the use of a design-build construction method may be feasible under one governance structure but not under a different structure. In this report, Arup will discuss two principal governance structures: co-sponsors and joint power authority.

Governance structures

Any form of governance structure will have pros and cons. The success of the governance structure relies on understanding each other's priorities and creating incentives to ensure cooperation.

Overview

The two governance structures are defined as following.

- Co-sponsors – two or more sponsors sign a cooperative agreement under which the entities jointly procure a project. Each entity will have their own set of responsibilities based on a Memorandum of Understanding (MOU).
- Joint power authority – is a an entity established under a joint powers agreement between two or more public authorities i.e. local governments, transportation agencies. A separate operating boards of directors is established and the board can be given any of the powers inherent in all of the participating agencies. The joint power agreement states the powers the new authority will be allowed to exercise.

Key elements for a successful partnership

- Any form of governance structure will have pros and cons. It is important to establish a governance structure that will efficiently deliver a project.
- With any governance structure, it is crucial for the key stakeholders to work together in understanding each other's priorities.
- Additionally, incentives and drivers for all key stakeholders are essential to ensure cooperation.

Procurement

Different procurement methods can be considered to efficiently deliver the project in function of stakeholders' goals and priorities.

Overview

Different procurement methods, from Design-Build (DB) to Design, Build, Finance, Operate, Maintain (DBFOM), can be considered to deliver the project. Each entails different levels of involvement from the private sector, which are a function of the stakeholders' goals and priorities. Including:

- Allocate design, construction and schedule risks to the private sector. This is typically done via DB procurement.
- Allocate design, construction and schedule risks to the private sector in addition to some maintenance and operation components (potholes, incidents response, etc.). This is typically done via a DB procurement including a 5 to 10 year renewable operations contract. By including a short to medium operations and maintenance contract, a good state of repair of the infrastructure is guaranteed.
- Allocate design, construction and schedule risks to the private sector in addition to securing the financing and providing long term maintenance and operations. This involves 30 to 35 year contract in which the private sector is required to maintain and rehabilitate the infrastructure to high-level standards to adequately serve future generations.
- Short-term or long-term private financing of the project. Private infrastructure developers can facilitate financing to expedite project delivery. Yet, private financing is generally more expensive than public finance. Therefore, considerations need to be made as to the value or innovation brought by the private sector versus the cost of private financing.

Procurement alternatives considerations

- Understand stakeholders' project priorities and goals.
- Understand risks that are better managed by the private sector vs. public sector
- Assess value/innovation brought by the private sector.
- Assess stakeholders' project affordability or ability to commit funds over the life of the asset.

Procurement Alternatives

Risks	DB	DBF+OM	DBFOM
Design	✓	✓	✓
Construction/ Schedule	✓	✓	✓
O&M		5-10 year renewable contract	✓
Lifecycle Maintenance		Some components	✓

8. Closing Statement

Conclusions

Once in a lifetime opportunity to transform the city infrastructure, catalyze inclusive economic development, and improve quality of life

Key Takeaways

- ✓ The ReThink Recessed Interstate Concept is technically feasible. The land created by the smaller footprint of the interstate can be a major contributor to fund the cost difference or delta between the Recessed Concept and the Rebuild-As-is.
- ✓ The recessed highway concept envisions key physical interventions that could have positive benefits for surrounding local communities and help address the historic social and environmental justice challenges compared to Rebuild-As-Is.
- ✓ The Reconstruction of the I-65/70 Inner Loop is a once in a lifetime opportunity to transform the city's infrastructure, catalyze inclusive economic development, enhance neighborhood connectivity, and drive job creation and improve the community's quality of life.
- ✓ The ReThink Recessed Interstate Concept is part of a recovery strategy for downtown, the economic driver of the regional and state economy, which was hit hard during the COVID pandemic.

Memorandum

ARUP

To	Indianapolis Chamber of Commerce	Date	April 14, 2021
Copies	REA + SKA	Reference number	001
From	Arup	File reference	273507-03
Subject	Task 3 - Environmental Justice Memorandum_Final		

1 Introduction

1.1 Memorandum contents

This memorandum provides detailed methodology, analysis and findings for Task 3: Environmental Justice for the Indianapolis Inner Loop study with the Chamber of Commerce, and is structured as follows:

- Section 1 - Introduction
- Section 2 – Historic Environmental Justice background
- Section 3 –Recessed Highway Concept key features and anticipated social and environmental benefits
- Section 4 – Methodology
- Section 5 – Environmental Justice and at-risk sociodemographic metrics analysis
- Section 6 – Comparative Environmental Justice narrative by leg
- Section 7 – Take-aways
- Appendices –
    - A | Full page maps
    - B | Detailed data tables
    - C | Comparative benefits summary table

1.2 Analysis objectives

This aspect of the study aims to achieve the following results:

- Frame the Inner Loop reconstruction project with the historic systemic impacts the original design decisions and construction has had on local population;
- Identify environmental and social justice concerns within an immediate impact area of proposed Inner Loop interventions
- Identify areas where at-risk population groups are disproportionately impacted by decisions pertaining to Inner Loop interventions
- Ground recommendations for next steps in community engagement and/or policy advocacy in social and environmental justice evidence base
- Provide an evidence-based narrative of the opportunity for the Recessed Highway Concept project to address historic and systemic impacts on vulnerable population compared to Rebuild-As-Is.

2 Environmental Justice Legacy

The planning, routing, and design decisions pertaining to the construction of the Inner Loop have long been criticized for the detrimental impact these decisions had on low income minority communities of Indianapolis, and for its underlying social injustice that stems from decades of reinforcing racial inequality policies.

In the 1960s, 20% of the population of the city of Indianapolis included Black African American residents, almost exclusively concentrated in areas northwest and northeast of downtown where I-65, I-70, and North Split are now built. Other neighborhoods on the eastern and southern edges of Downtown were primarily low-income white immigrant communities. These areas were categorized by the Home Owners' Loan Corporation (HOLC) "Residential Security" maps (or 'redlining maps') since the 1940s as 'hazardous' or 'declining,' restricting people's ability to access bank loans to buy property in such areas. These maps and associated policies are key factors that led to the continued decline and disinvestment in these areas and helped engrain racial geographic inequalities and generational wealth gap for over a century.

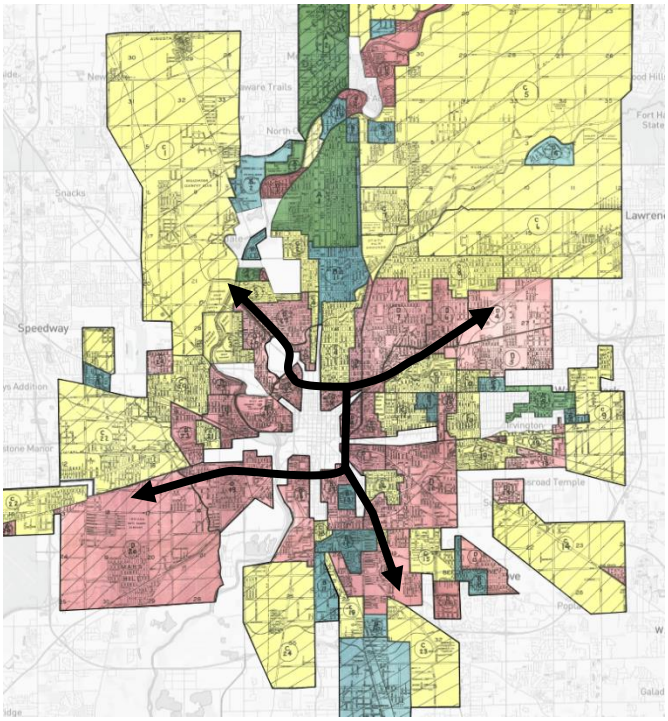


Figure 1: HOLC redlining rating 1937; overlay with Interstate system constructed 1970 (Source: Mapping Inequality)

Construction of the Inner Loop interstate system in the 1970s cut through these 'declining' or 'deprived' neighborhoods, which were in fact complete communities of low income and/or minority concentration. The direct and indirect impact of the Inner Loop's construction on residents, communities, and local businesses was radical. Upwards of 17,000 residents were displaced and thousands of housing stock built in the 1870-1910s were demolished[1]. Local business and social services such as schools suffered not only from drastic population loss, but also from loss of local access routes and pedestrian connectivity across the neighborhood – replaced or interrupted by the interstate barriers.

In addition to the direct shock, these communities were – and are still – disproportionately affected by the negative externalities from traffic that include air and noise pollution, congestion, and safety risks which adversely impact population health, economic development, and population retention.

[1] Flats Lost: I-65 Construction, Historic Indianapolis, Jordan Ryan, June 15, 2013, modified.

The scale of these historic environmental, racial, and social injustices to Indianapolis residents and communities are important to acknowledge and address with any major intervention to or reconstruction of the Inner Loop. The Rethink Coalition, Indy Chamber, and other stakeholder groups engaged in the visioning effort for the future of the Inner Loop system are committed to addressing these historic injustices.

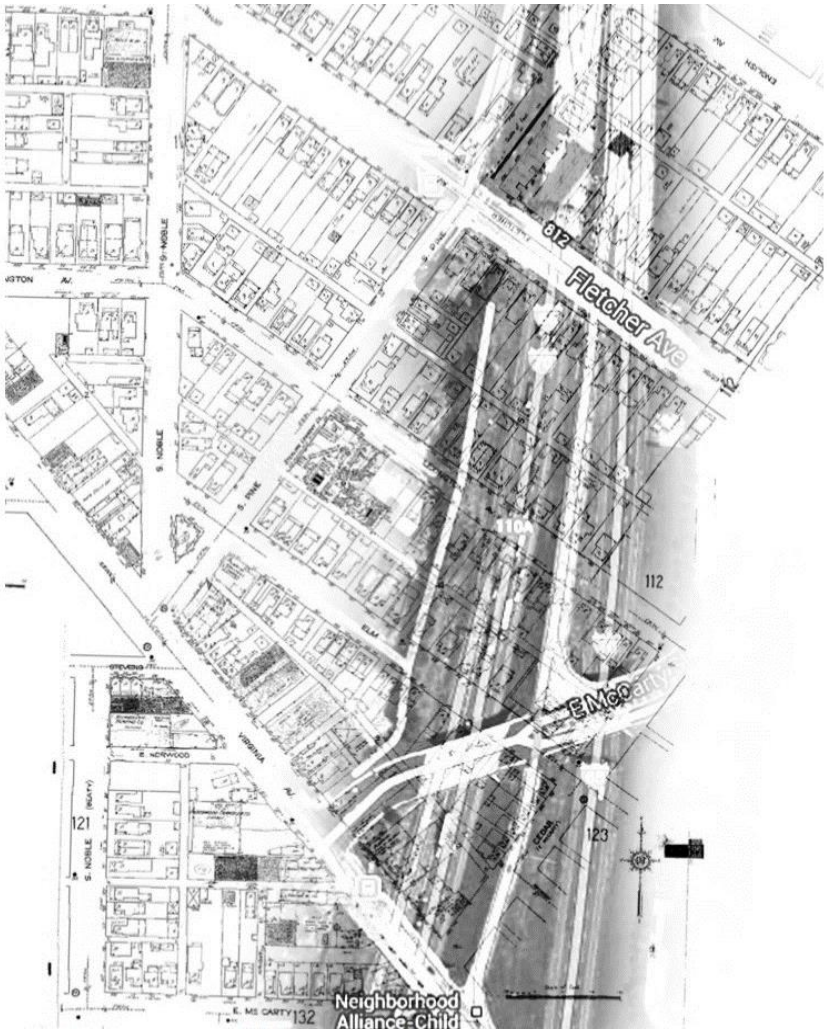
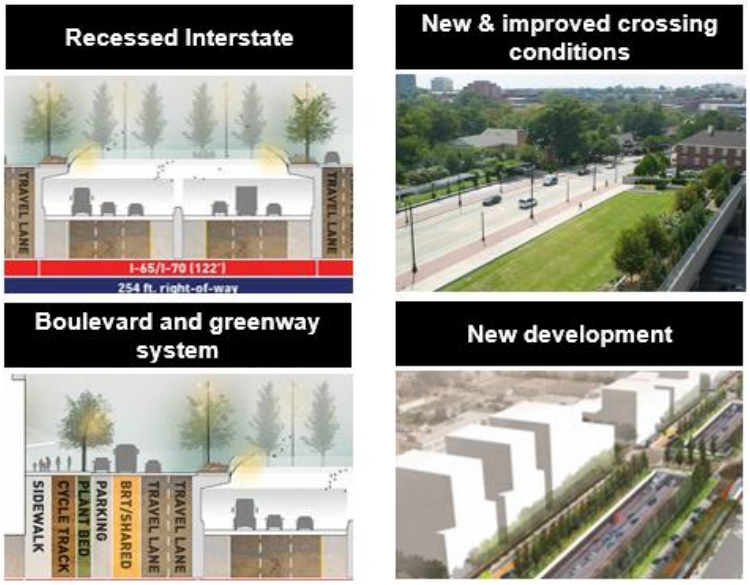


Figure 2: Layered map of I-65 on 19500 Sanborn map; Fletcher Place and Fountain Square neighborhoods southeast of downtown Indianapolis.

3 Recessed Concept design features and anticipated benefits

The Recessed Highway Concept deploys four key physical intervention concepts that could yield tangible benefits for local communities and help address the systemic social and environmental justice challenges compared to a Rebuild-As-Is alternative. Four key moves are summarized below and include:

1. Boulevard and greenway system
2. Recessed Interstate
3. New and improved crossing conditions, and
4. New development



3.1 Boulevard and greenway system

Principle

A central element to the Recessed Highway concept is the introduction of a system of at-grade boulevards that span the recessed interstate through traffic contained within interstate and local street rights-of-way. They are generally envisioned as ~60-70' right-of-way (within the existing INDOT right-of-way) on either side of the recessed interstate, with two traffic lanes, one shared traffic/BRT lane, and one parking lane. In addition, and importantly for enhanced multimodal connectivity, walkability, and commerce, the boulevard includes dedicated facilities for pedestrian and active travel, with wide sidewalks and a protected cycle track (similar in concept to the Indianapolis Cultural Trail) called 'greenways'.

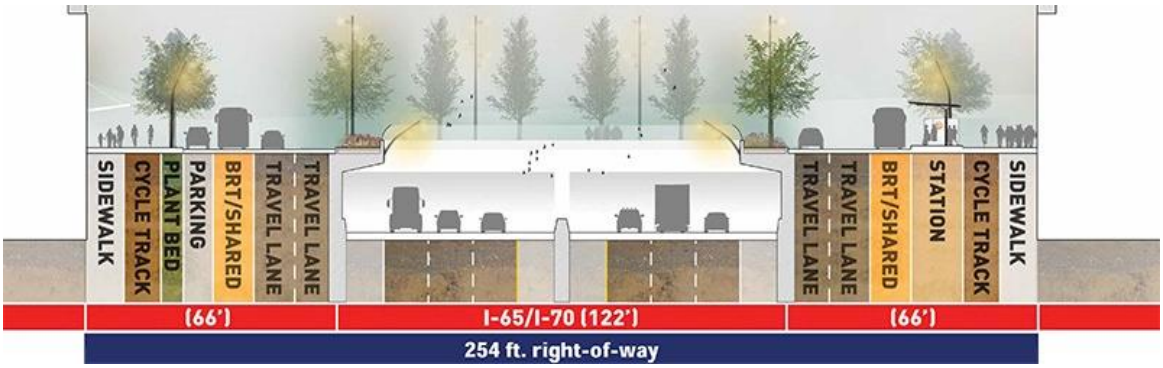


Figure 3: Recessed highway and boulevard concept conceptual cross-section (ReThink 65/70 Coalition)

Benefits

The boulevard and greenway system is understood to increase **mobility** choice and enhance local network from a **connectivity** perspective, improving conditions for **active travel**, and capable of supporting new **transit** service in the future. With upgraded or new crossings over the recessed highway (see Crossings), neighborhoods fragmented by the inner loop's construction can be reconnected, **eliminating the physical and mental barriers** the Interstate had created. This will provide residents **better physical access to local jobs** in and around Downtown employment growth areas. Arup recommends to further study physical access to local jobs to quantify the impact.

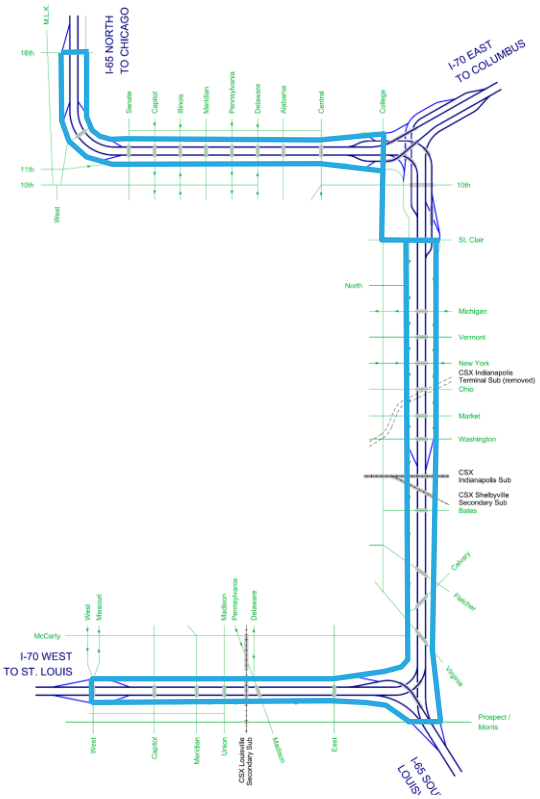


Figure 4: Schematic diagram of boulevard and greenway system for the Recessed Highway Concept

The boulevards and new local street network are also expected to help **mitigate traffic impacts** from increased traffic volumes on local streets. They help slow traffic speeds to levels of collector roads, compatible with **neighborhood comfort and safety levels.** They also help distribute vehicles across a larger, more permeable and connected city grid network. Green streets best practices and slower vehicle speeds should also help improve **local air quality** and **noise pollution**, with additional positive effects on people's health and wellbeing. There is robust and increasing research led by academic institutions and the US Department of Agriculture on the services that urban trees and vegetation provide to the environment. Urban trees provide a range of environmental services that make cities healthier places, including

improved air and water quality and noise abatement. Trees can act as natural filters for both gases and particulate matter from vehicle emissions.[2] (Nowak, 2002)

Finally, the typology is supportive to a cohesive frontage for **new mixed-use development** for residential, office, retail, or commercial. Alternatively, where space is limited, it can provide a buffer for adjacent land uses.

Figure 5 : Buffered greenway example parrallel to one-way collector road, proposed in existing neighborhoods and campus districts (ReThink Coalition)

Figure 6 : Alternative typologies in mixed-use districts with wider right-of-way, could include a bike lane and green median. Optional low-speed local access lane (ReThink Coalition)

3.2 Recessing the interstate mainline

Principle

A primary concept is to reconfigure the Inner Loop interstate highway mainlines with a vertical alignment around 16.5 feet below local streets, replacing current elevated structures either on viaduct or embankments between 16th Street and Central Avenue (North leg), 10th Street and Washington Street (East leg) and Madison Avenue and the White River bridge (South leg), while maintaining the number of through lanes to accommodate similar levels of traffic volumes than currently.

[2] Nowak, D.J. 2002. The Effects of Urban Trees on Air Quality. US Department of Agriculture, Forest Service.

The reconfigured system calls for optimizing the design and distribution of interchanges and on/off ramps to reduce the impact of the Interstate on the local network.

- Martin Luther King (MLK) and West Street – called 'northwest interchange' – and West & Missouri interchange in the South – called 'southwest interchange – are envisioned with the mainline passing below grade, new crossings at grade and simplified access ramps that prioritize local movements, pedestrian safety and reduce the interstate's footprint on the surrounding neighborhoods.
- Optimized number and location of on/off ramps, in particular on the South Leg, focus access points to the interstate mainline at the interchanges while enabling surface access for local traffic with the boulevards.
- An existing segment – between Washington St. and Madison St, including the South Split – is already recessed and was recently upgraded with the Hyperfix project.
- North Split and South Split are excluded from the scope of this study.

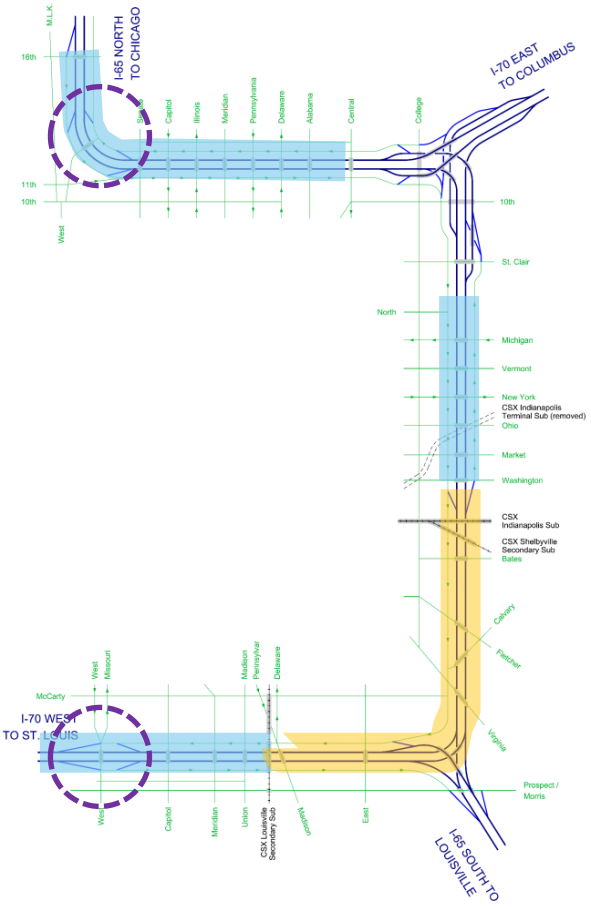


Figure 7: Proposed recessed segments (blue) and interchange optimization (purple)

Benefits

The above components of the Recessed Concept contribute to mitigating the negative impacts associated with people's daily interface with **the physical barrier** of the Interstate, improving **connectivity and walkability** of interstate-adjacent neighborhoods, and **enhancing access to local jobs.** Enhanced interchange design and reduced number of ramps will also improve pedestrian **safety** and mitigate the overall impact of the Interstate on the surrounding communities – in particular for the South Leg and Northwest interchange.

3.3 New improved crossing conditions

Principle

Another key objective of the Recessed Concept is to improve crossing conditions to help reconnect neighborhoods and address the historic physical and mental barrier of the existing Interstate. The recessed concept proposes a number of interventions depending on the location.

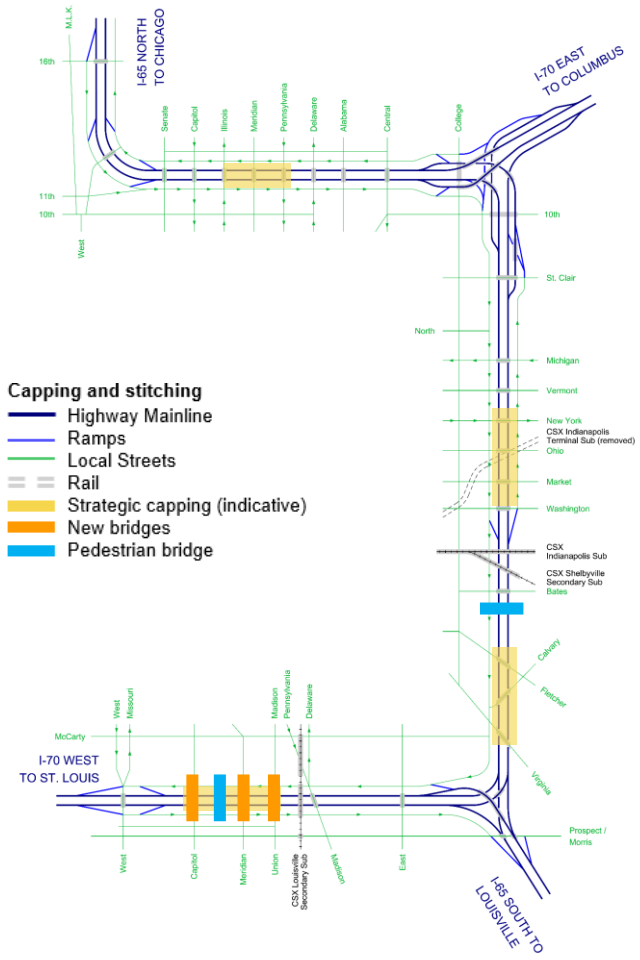


Figure 8: Proposed capping and stitching

1. **Capping**

The tight right-of-way (c. 120') and vertical retaining walls proposed for the newly recessed segments can support capped parks. This can be done in a staged approach as available funding and community priorities dictate and can range from one to three blocks long approximately[3].

2. **Stitching (new bridges)**

The reconfiguration of interchanges and ramp system provides opportunities to 'stitch back' local links that have been previously disconnected by the interstate system. New bridges are proposed on the south leg and with the northwest interchange to create enhanced connectivity between neighborhoods and downtown.

3. **Enhanced Stitching with Partial Caps:**

Current crossings of the interstate corridor by local streets exist as underpasses or bridges, designed in a minimally functional way. With the Recessed Highway concept, all crossing conditions can be enhanced with the distinct objective to create a buffer from the interstate below, provide greening and prioritize pedestrian walkability and active mobility. This applies to underpasses that are being rebuild as bridges over the recessed mainline, new bridges and retrofitting existing bridges where the interstate is already depressed (for example Virginia, and Fletcher Avenue). Enhanced design features and partial capping can include green street features, noise barrier walls, large sidewalks and bike lanes.

[3] Conceptually, caps should be limited to 1,000m total length to require no additional fire and life safety equipment.

4. **Pedestrian bridges:**

   At a few locations (south of Bates St. on east leg and Kenwood / Illinois St. on south leg), pedestrian bridges are proposed where improved connectivity is needed but the network does not support an additional vehicular bridge. Exact location is indicative at this stage and should be further refined through community engagement.

Figure 9: Klyde Warren Park, Dallas TX, is a cap park over the recessed highway

Figure 10: Fifth Street bridge, Atlanta GA, has large landscape edges that create a noise and visual buffer the interstate below, and integrate bike and bus lanes

Benefits

Overall, these new or enhanced crossing conditions are expected to provide **new open and green spaces** for communities, address the **physical and mental barrier** of the Interstate, help mitigate **air quality and noise impacts** from traffic volumes. New links are a tangible benefit to local communities in **improving access to Downtown and employment centers** and reconnecting with surrounding neighborhoods. They also help distribute traffic more equally across the network, alleviating pressure from a few crossings only.

3.4 New Development

Principle

Due to a tightening of INDOT right-of-way and introduction of boulevard and greenway system, the Recessed Concept creates new land that is suitable for new development. New enhanced urban condition along the boulevard and greenway system can support new types of land uses such as multi-family housing, medium density commercial and mixed-use supporting population and employment growth, infill and intensification along the corridor.

- The Coalition Recessed Concept could create around 45 acres of new developable land on INDOT right-of-way and around 20 acres of new parks and open spaces. The market value of these parcels was estimated around $93 million, with more than half from development near the South Leg.
- New zoning provides opportunity for up to 10.4 million sq. ft. of real estate development
- The scale of the development potential along the corridor represents $2.1-2.5 billion in real estate investment over the next decades.

Table 1: Recessed Concept development potential

Segment	Developable land (acres)	Strategic Capping (acres)	Proposed Housing (million sq.ft)	Proposed Office (million sq.ft)	Proposed Retail (million sq.ft)	Total new development (million sq.ft)	Potential land market value ($ million)	Potential development value ($ billion)
South Leg	23	12	1.4	2.5	0.6	**4.6**	$47 M	$1.0-1.2 bn
North Leg	11	3	1.2	1.3	0.3	**2.8**	$23 M	$0.6-0.7 bn
East Leg	11-12	4-8	1.2	1.5	0.4	**3.0**	$24 M	$0.6-0.8 bn
Total	**45**	**19-23**	**3.7**	**5.3**	**1.3**	**10.4**	**$ 93 M**	**$2.2-2.6 bn**

(Source: Arup, ReThink 2018 study)

Note: Development potential based on FAR, assumed zoning, 2017-2018 estimated land values and full development completion; figures do not reflect projected market demand, phasing or absorption rates; development values exclude land costs, entitlements and permits, and leasing/sale.

Benefits

The potential for new development creates a framework for creation of 3,300 new housing units and more than 5 million sq.ft of commercial space that could support around 24,000 new jobs (excluding construction jobs).

- It can be a catalyst to boost economic development in the corridor, in particular in areas like the South Leg that have been lagging compared to other legs in terms of infill, land values and local economic growth.
- Between $54 million to $66 million could be collected in property taxes from new development at full build-out (in 2018 prices), which can help pay for the enhancements to quality of life in historically disinvested local communities with the Recessed Highway features, compared to the Rebuild alternative.
- Increasing the population and employment density will help make a case for new transit demand in the future along the corridor to help further improve connectivity between neighborhoods and access to new jobs in the corridor.
- Scale of new housing potential and publicly owned land create additional opportunities to integrate development goals that address the legacy of systemic impact of the interstate construction, such as inclusive and equitable goals, housing mix, affordable housing, etc.

Table 2: Potential impact from new development

Segment	New housing potential (housing units)	Direct new jobs potential (jobs)	Potential annual fiscal revenue
South Leg	1,300	11,000	$24-29 M
North Leg	1,000	6,000	$14-17 M
East Leg	1,000	7,000	$16-19 M
Total	**3,300**	**24,000**	**$54-66 M**

(Source: Arup, ReThink 2018 study)

4 Environmental Justice Analysis Methodology

4.1 Study area

The EJ analysis is primarily a geospatial analytical exercise using publicly available socio-economic data published by the Census Bureau and the most recent available data and historic data for trends and change analysis. We used Census Block Groups as a spatial unit basis, and Census Tracts on a few instances when data is not available at Census Block Group level. Census Block Groups are the smallest geographical unit available for American Community Survey published data, which provides 2018 estimates for majority of indicators used. Their population ranges between 600 and 3,000. The study focuses on Block Groups approximately within a half-mile distance from I-65/70 corridor based on best practice environmental impact analysis for urban highways.

Figure 11 shows the study area, block groups included in the analysis, and proposed spatial groupings for reporting purposes in this Memorandum.

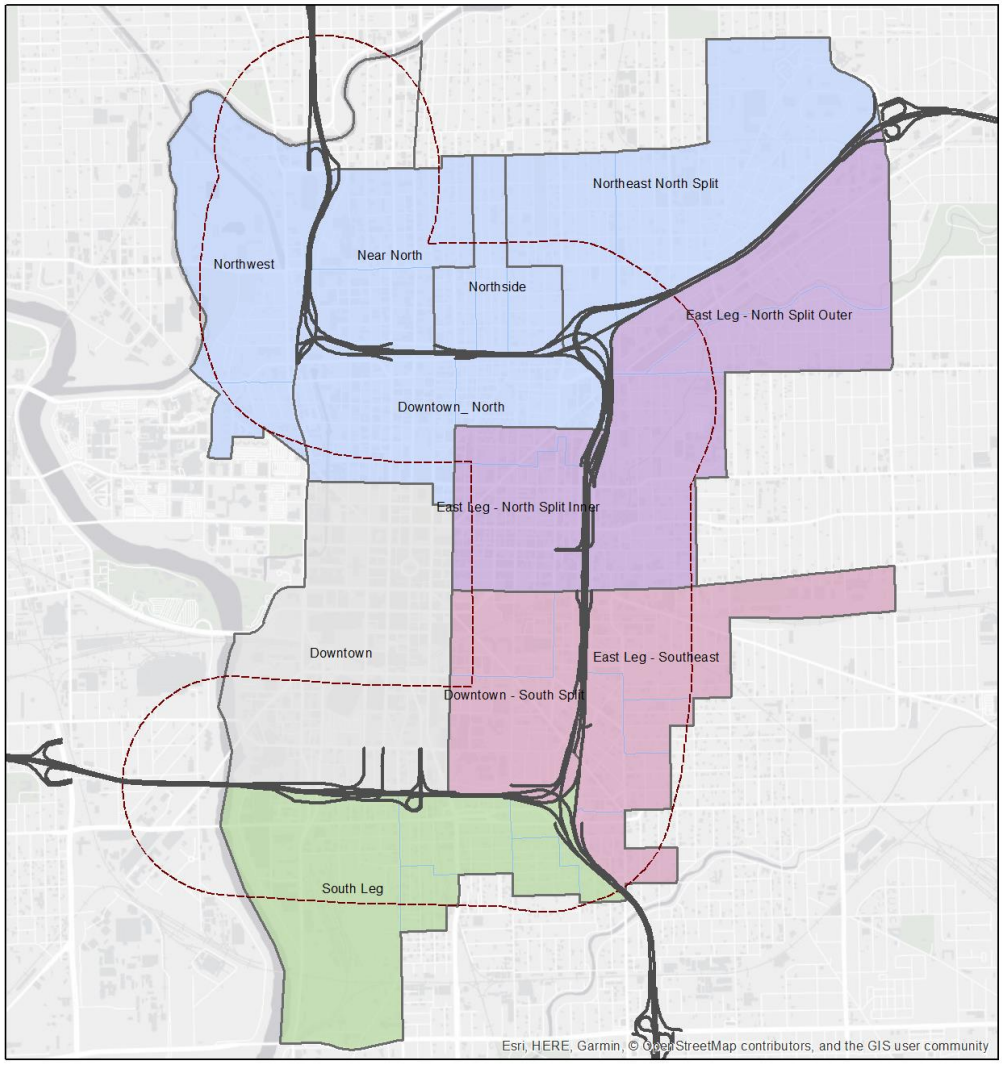


Table 3 provides a description of the sub-area groupings' neighborhood characteristics, with general land use patterns and key interventions proposed by the Recessed Concept compared to Rebuild-As-Is.

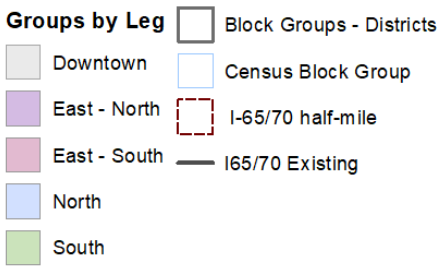


Figure 11: Study Area block groups and sub-area groupings for reporting purposes (Arup)

Table 3: Districts description by leg

Sub-area	Neighborhood / places included	Key interventions proposed for Recessed Concept	General land use patterns
North Leg – Conditional to North Split new structures reconstruction approval – Medium / Long Term			
Northwest	Ransom Place Historic District IUPUI 16 Tech	Recessed Highway/Boulevard system starting at 16th street New interchange Opportunities for further improvements to MLK / 10th street intersection New development frontage	Residential south of 11th Street Utilities / industrial north of 16th Street
Near North	IU Health Campus (approved masterplan for densification) Residential community in northern block group	New interchange design Recessed Highway/Boulevard system starting at 16th street New pedestrian and vehicular crossing from Northwest New development frontage	Healthcare, office and commercial Residential north of 16th St, east of Pennsylvania Street Residential north of 22nd Street along Fall Creek
Northside	Old Northside & Herron Morton Place Historic Districts, Near North Neighborhood	Viaduct removal Recessed Highway/Boulevard system New development frontage	Residential Vacant lots north of 16th Street
Northside – North Split	Martindale – Brightwood Neighborhood, Old Northside & Herron Morton Place Historic Districts, O'Bannon Park, Monon Trail	Improved crossing conditions, embankments removal North and East boulevard system connect via College / 10th Street	Residential & vacant Industrial / light industrial north of 19th street Park space New mixed-use development
Downtown North	Fayette Street, Upper Canal, North Meridian, St. Joseph, Chatham Arch & Mass Ave. Historic Districts, Bottleworks Mixed Use Development	See North Leg & East Leg North Split	Office / Commercial: north and west of Legion Mall Commercial / light industrial and residential near Upper Canal Residential east of Legion Mall in Chatham Place and Renaissance Place
East Leg North Split – Conditional to CSX relocation and North Split new structures reconstruction approval – Long Term			
East Leg – North Split Outer	Cottage Home, Holy Cross, Industrial corridor along I-70	CSX mainline relocated / decommissioned – opportunity for new trail (condition for recessed) North and East boulevard system connect via College / 10th Street	Light / Heavy industrial between I65/70 and CSX corridor Residential Arsenal Technical High School

Sub-area	Neighborhood / places included	Key interventions proposed for Recessed Concept	General land use patterns
East Leg – North Split Inner	Chatham Arch, Mass Ave, & Lockerbie Square Historic Districts, Cole Noble Commercial Arts District, Market East	Same as above	Residential with some commercial activity north of Ohio St Light industrial with commercial / office and mixed-use along I65/70 and between Washington Street and Ohio Street.
East Leg South Split – Short term capping opportunities			
East Leg – South Split	Washington St / Irish Hill Fountain Square	New pedestrian bridge Continuous boulevard system creates new frontage Bridge enhancements & capping & Fletcher Ave – Virginia Ave)	Heavy / light industrial and commercial between Washington Avenue and Bates Street, along I65/70 and CSX lines Pocket residential (Irish Hill) Southeastern Avenue Generally residential south of Bates Street with commercial uses along Virginia Avenue, Prospect Street and Shelby Street
Downtown South Split	Fletcher Place, Lily Corporate Headquarters Campus	Same as above	Office campus (Lily Headquarters) east of East Street Generally residential east of South East Street and south of E. South Street Commercial uses along Virginia Avenue and S. East Street
South Leg – Short Term, first implementation			
South	Bates Hendricks Old Southside south of I-70	Recessed Highway/Boulevard system Redesigned West / Missouri interchange, fewer ramps New stitch bridges, caps, and pedestrian bridges New development frontage	Heavy industrial along White River and CSX corridor line Generally residential elsewhere with pockets of commercial and light industrial
Downtown			
Downtown	Old South Side (north of I-70), Lucas Oil Stadium, Wholesale District, western parts of Canal & White River State Park	Recessed Highway/Boulevard system South of block group along South Leg: same as South Leg New development frontage	Wholesale District (north of E. South Street) mixed use, office and commercial uses Large plots for special uses (Lucas Oil Stadium, Convention Center, Post Office and Station), with surface lots Residential and commercial, mostly vacant lots between McCarty St and I-70

4.2 Indicators

The Environmental Justice chapter of the Metropolitan Planning Organization's (MPO) Long Term Transportation Plan (LRTP) provides an analytical framework for Environmental Justice (EJ) that was used as a basis for this analysis. Similar to the MPO's approach, we have identified Key Characteristics that define what are Areas of Concern for EJ, and additional At-Risk Characteristics that provide further insights on population groups more at risk of exposure from the Inner Loop or proposed changes. Indicators are compared to Marion County average rates and presented either as percent of population, or location quotient ratios (where 1.0 = Marion County).

4.2.1 Key Environmental Justice Characteristics

Areas that have a concentration of minority population or population living under poverty levels compared to Marion County are defined as EJ Areas of Concern.

- Areas that have more than 27%[4] minority population are areas of minority concentration compared to Marion County.
    - **Minority population change** – Comparing minority population between 1990 and 2010 helps identify historic EJ areas, communities that were directly impacted by the Interstate construction but have seen recent ethnic diversification and/or loss of minority population in the past two decades to the extent they are no longer statistically communities of concentrated minority.
- Areas that have more than 19%[5] of households live on an income below poverty threshold are areas of concentrated poverty compared to Marion County.

4.2.2 Additional characteristics of at-risk population

Additional characteristics used to identify other at-risk population groups and unintended project impacts in EJ Areas include:

- **Concentrated senior population** – Areas where more than 12%[6] population are aged over 65
- **Concentrated disabled population** - Areas where more than 15%[7] of households have at least one person on disability
- **Concentrated rental tenure households and low housing value** – Areas where more than 46%[8] of households have a rental tenure and median housing value is below $155,000[9].

[4] Census 2010
[5] American Community Survey, 5-year average 2018
[6] ibid
[7] ibid
[8] ibid
[9] ibid

- **Low car ownership / no-car commute** – Areas where more than 20% of residents use public transport or active travel to commute to work, and where 20% households do not own a car.

4.3 Environmental Justice concerns for the Inner Loop reconstruction

The table below summarizes key concerns for social and environmental justice considerations with regards to the characteristics included in this analysis.

Table 4: Characteristics included in EJ analysis

Characteristic / Indicator	Environmental Justice concern
Population & Minority Groups • Minority concentration* • Population change	• Areas of higher concentration of minority population have historically disproportionately suffered from I65-70 construction; • Trends for population and ethnic diversity change indicators of places additional pressure on communities from economic growth and urban renewal
Wealth • Percent population living under poverty threshold* • Median household income • Housing tenure • Median housing value	• Low income neighborhoods with low homeownership and low housing values are most at risk of gentrification and displacement; • Areas with higher home-ownership rates may capitalize on values growth from project
Mobility • Zero car ownership • Travel to work mode	• Population groups with low car-dependency and high reliance on active travel and/or public transit are most disproportionately affected by vehicular prioritization • They benefit most from public realm, ped/bike safety and local connectivity improvements for access to jobs & amenities
Health • Senior population • Disability	• Senior / Disabled population groups are disproportionately affected by poor air quality and noise pollution, and poor physical conditions for non-auto-dependent local movement.

* Key EJ Characteristic

5 Characteristics Analysis

5.1 Key EJ Areas of Concern

5.1.1 Minority Population

The northwest and northeast Inner Loop have the highest concentration of minority population in the study area (2010). Over 2,700 African American residents in four block groups that include Martindale – Brightwood and IU health Campus / Northwest neighborhoods represent upwards of 40-65% of block group residents, and up to 90-95% of residents in the more preserved African American communities of Martindale and North-West.

The north leg has seen significant demographic changes since 1990 with an ethnic diversification and loss of African American residents.

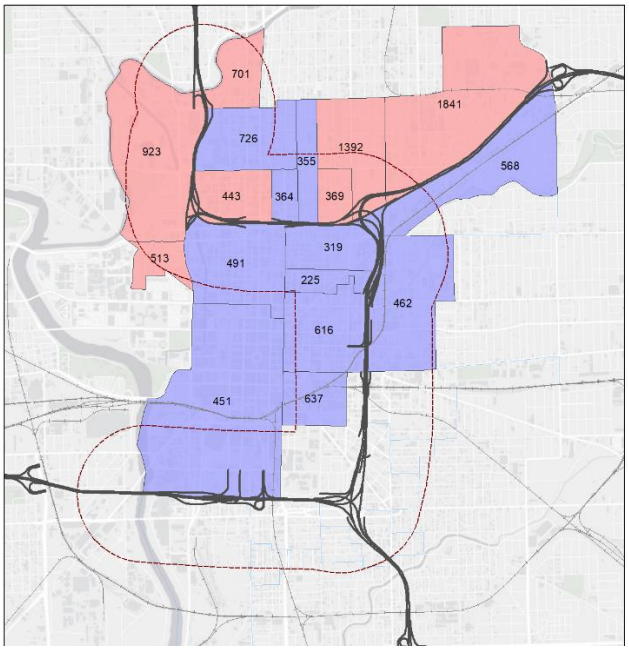


Figure 13: Minority population share greater than Marion County average 1990 (full map in appendices)

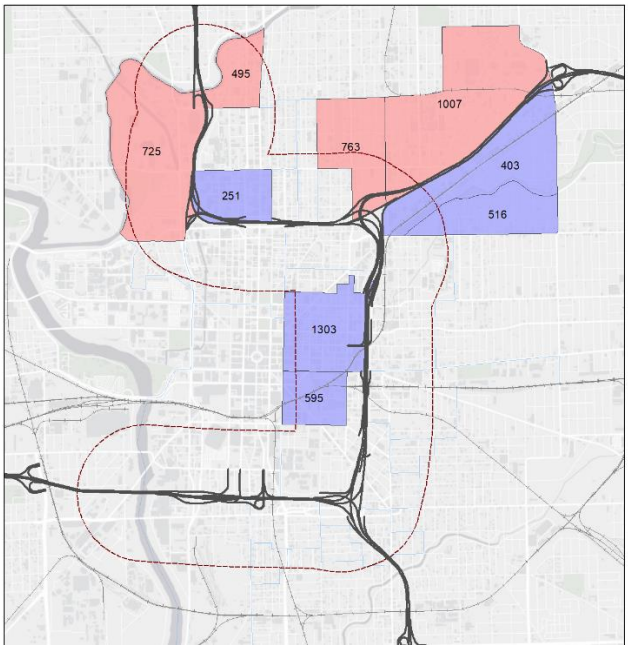


Figure 13: Minority population share greater than Marion County average, 2010 (full map in appendices)

- All block groups spanning the north leg were considered to be communities of concentrated minority population where African-American residents represents between 35-70% of block group residents, with highest communities in Martindale and northwest reaching over than 95% representation. This is compared to the Marion County average 21% minority population in 1990.

- Total minority population also declined by over 3,700, from close to 8,000 residents in 1990 to 4,300 in 2010, with population loss across all block groups. Most block groups lost over half of their 1990 Black population.
- However, this area of Indianapolis has also seen growth in white residents, mostly south of I-65/70, in Ransom Place and in Old Northside neighborhoods to the extent that total population change was relatively net across the north of Indianapolis Inner Loop in 20 years.

Table 5: Minority characteristics in block groups with concentrated minority population in 2010 (Source: Census)

Geography Groups	Minority Population (%)		African American Population		|Change	
	1990	2010	1990	2010	African-American Change	Total Change
Marion County	21%	27%	169,654	207,964	71,321	106,234
North Leg	66%	40%	7,735	4,268	-3,467	-866
Downtown_ North	41%	19%	810	548	-262	998
Near North	54%	32%	1,169	497	-672	-633
Northeast North Split	97%	77%	3,233	1,770	-1,463	-1,051
Northside	47%	19%	1,088	405	-683	-170
Northwest	77%	56%	1,435	1,048	-387	-10
South Leg	5%	14%	224	456	232	-1,003
East - North	26%	31%	2,147	2,545	398	-140
East Leg - North Split Inner	32%	30%	841	1,338	497	1,842
East Leg - North Split Outer	23%	32%	1,306	1,207	-99	-1,982
East - South	15%	18%	813	866	53	-623
Downtown - South Split	33%	29%	665	632	-33	133
East Leg - Southeast	4%	9%	148	234	86	-756
Downtown	45%	13%	451	233	-218	848

5.1.2 Poverty and low income

Poverty

The majority of block groups in the study area have a higher concentration of people living in poverty than Marion County average (at 19%), representing over 3,500 people. Most of block groups have 20-40% of residents who live below the poverty threshold, but in three (Northwest, I-70 industrial corridor and Irish Hill) these represent up to 60% of residents (300-480 people per block group).

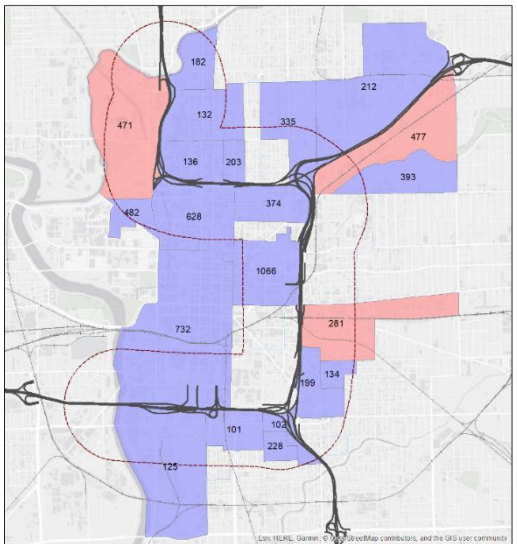


Figure 14: EJ Areas of concern for poverty concentration

Table 6: Population living below poverty threshold in areas with concentrated households living in poverty (2018)

Geography Groups	Population		Percent Population	
	Total	Living in Poverty	Average by Leg / District	Range by Block Groups
Marion County	925,168	83,441	19%	n/a
Total Areas with Concentrated Minority Population	25,451	3,528	14%	61%
North Leg	**12,088**	**1,611**	**13%**	**19-43%**
Downtown_ North	4,618	641	14%	22-23%
Near North	1,443	168	12%	19-22%
Northeast North Split	2,556	242	9%	21-22%
Northside	961	156	16%	23%
Northwest	2,510	404	16%	34-43%
South Leg	**2,015**	**200**	**10%**	**24-32%**
East - North	**7,414**	**1,036**	**14%**	**26-46%**
East Leg - North Split Inner	4,869	654	13%	29%
East Leg - North Split Outer	2,545	382	15%	26-46%
East - South	**1,598**	**246**	**15%**	**28-61%**
East Leg - Southeast	1,598	246	15%	61%
Downtown	**2,336**	**435**	**19%**	**33%**

Low median household income

Median income is very inequal across the study area compared to Marion County median income ($50,000, in 2018). Fourteen block groups have a median household income at or below 80% of Marion County average, 9 of which have a median income between 40-60% of Marion County's median income. Lowest income levels can be found in northwest (near IU Health Campus and Ransom Place), in the northeast (Martindale and south of I-70 industrial corridor), in the southeast (Irish Hill), and in the southside (Bates Hendricks) neighborhoods.

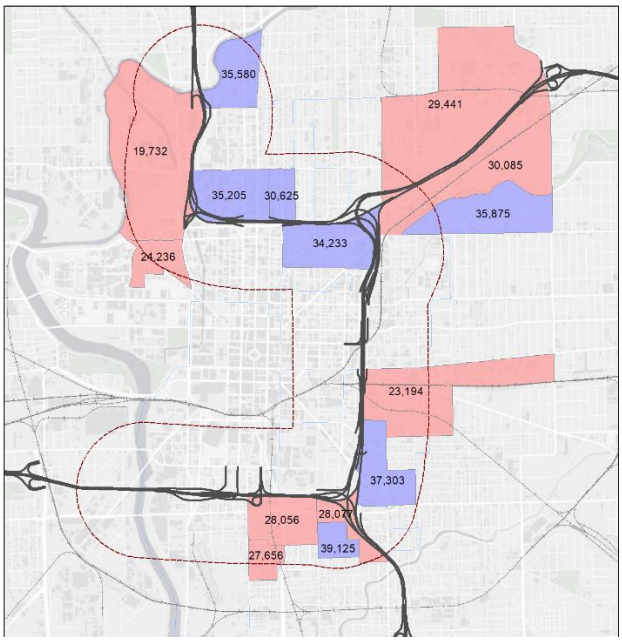


Figure 15: EJ Areas of Concern with low median household income

Table 7: Median household income in low income block groups (80% or lower than Marion County median), 2018

Study Area Districts (Groups of Block Groups)	EJ Area Block Groups (count)	Minimum median income ($)	Higher Median Income ($)
Marion County	-		$50,000
Northwest	2	$ 20,000	$ 24,000
Near North	1	$ 35,000	$ 35,000
Northside	1	$ 31,000	$ 31,000
Northeast North Split	1	$ 29,000	$ 29,000
East Leg - Southeast	2	$ 23,000	$ 37,000
East Leg - North Split	2	$ 30,000	$ 36,000
South Leg	4	$ 28,000	$ 39,000
Downtown_ North	1	$ 34,000	$ 34,000
Downtown - South Split	0	$ -	$ -
Downtown	0	$ -	$ -

5.1.3 Combined concentration of poverty and minority population

Areas that have a combined concentration of minority population, and low-income population (living below the poverty threshold) are key EJ Areas of Concern. There are 8 block groups mostly spread between the northwest, northeast and east leg (west of I65/70 north of Washington Street) that account for over 12,000 residents, half of which are African American, and 3,300 live below the poverty threshold.

Table 8: Summary of EJ Areas characteristics

	Key EJ Areas of concern
Total Population (1990)	12,500
Minority population (1990)	6,700
Total Population (2018)	11,600
Minority Population (2010)	5,500
Population living below poverty threshold	3,300
Median annual income (block group) – lowest	$20,000
Median annual income (block group) – highest	$58,000

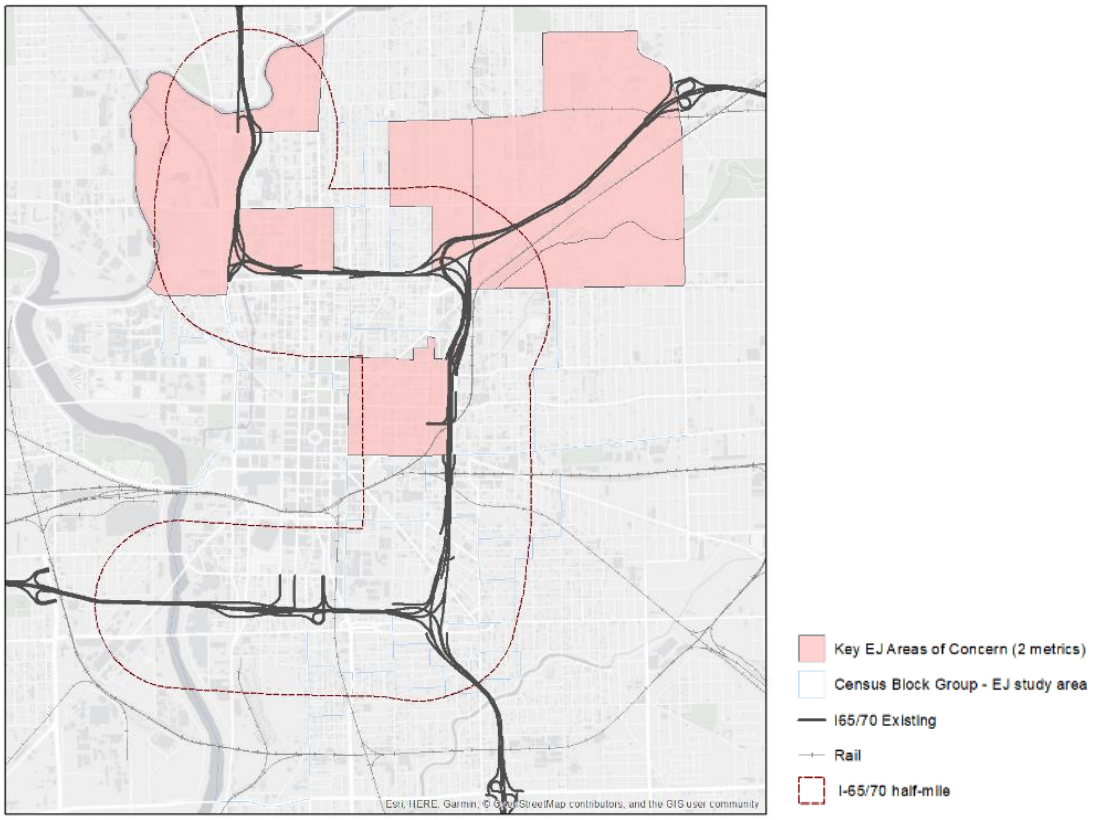


Figure 16: Key EJ Areas of Concern, combined poverty and minority concentration

5.2 Other at-risk population characteristics

5.2.1 Senior & Disabled Population

Senior population

In the study area, seven block groups have a higher concentration of senior population than Marion County average (of 12%), that range between 13-22% and representing a total of 730 residents. These are broadly distributed across Near North (north of IIU Health Campus), the northeast (Martindale and Cottage Hill neighborhoods), the southeast (Fountain Square) and Old Southside (south of I-70). With the exception of blocks in the northeast, the other areas that have higher rate of senior residents are not Key EJ Areas of Concern (minority and poverty concentration).

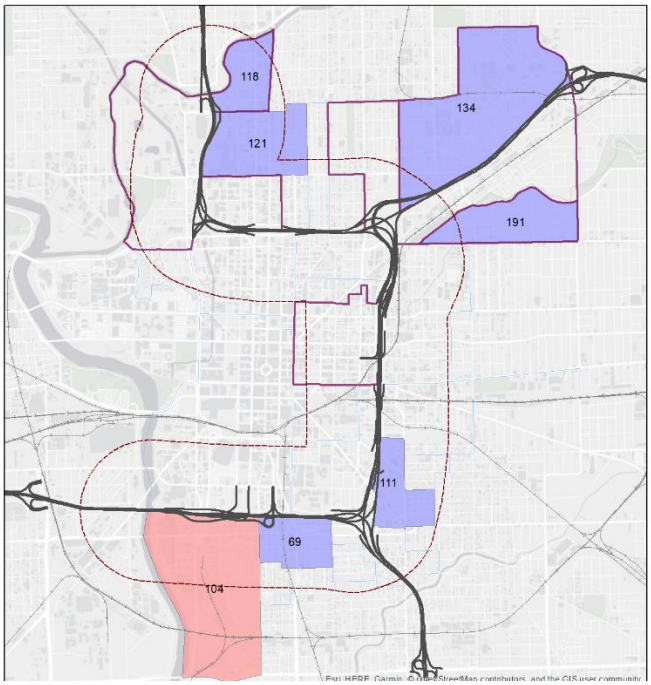


Figure 17: Senior population concentration, overlay with Key EJ Area of Concern

Table 9: Senior population (65 and above) in areas of higher concentration than Marion County average

Geography Groups	Population		Percent Population	
	Total	Senior (65 and above)	Average	Range by Block Groups
Marion County	925,168	113,355	12%	
Total Areas with Concentrated Senior Population	4,915	730	15%	13-22%
North Leg	**1,812**	**255**	**14%**	**13-15%**
Near North	813	121	15%	15%
Northeast North Split	999	134	13%	13%
South Leg	**902**	**173**	**19%**	**16-22%**
East - North	**1,493**	**191**	**13%**	**13%**
East Leg - North Split Outer	1,493	191	13%	13%
East - South	**708**	**111**	**16%**	**16%**
East Leg - Southeast	708	111	16%	16%
Other areas	29,527	2,075	7%	3-11%

Population with disability

Nineteen block groups show higher concentration of households with at least 1 person on disability, compared to Marion County (at 15%), representing around 2,500 households mostly in the northeast, along the east leg and the south side of the Inner Loop. For more than half of block groups, between one in two to one in four households are affected by disability. Key EJ Areas of Concern where disability in households is also an issue include North Leg North Split, south of I-70 east of the North Split, and East Leg neighborhood north of Washington St. and west of I-65/70.

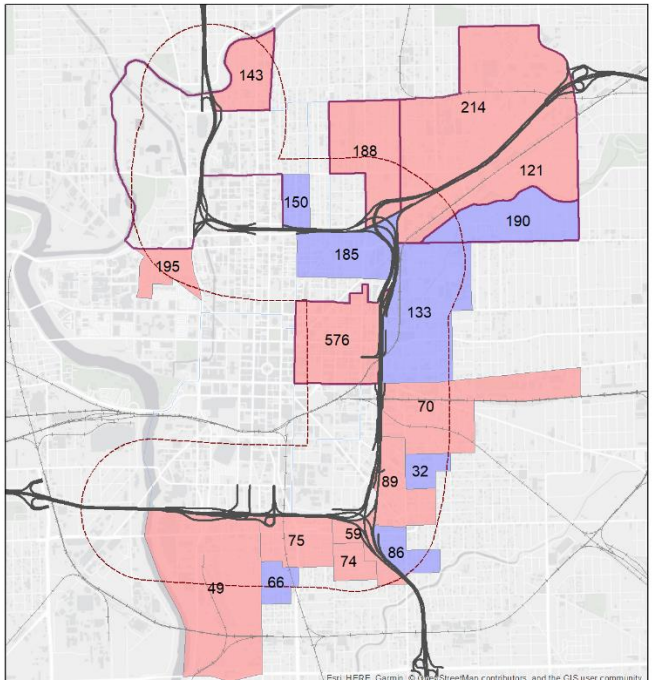


Figure 18: Concentration of households with at least 1 person on disability, overlay with Key EJ Area of Concern

Table 10: Households with at least 1 person on disability, in areas of higher concentration than Marion County average

Geography Groups	Households		Percent	
	Total	With at least 1 person with disability	Average	Range by Block Groups
Marion County	369,033	53,987	15%	n/a
Total Areas with concentrated households with 1 person on disability	9,763	2,552	26%	15-51%
North Leg	**3,723**	**932**	**25%**	**15-51%**
Downtown_ North	1,265	185	15%	15%
Northeast North Split	1,130	402	36%	26-51%
Northside	683	150	22%	22%
Northwest	645	195	30%	30%
South Leg	**999**	**323**	**32%**	**23-48%**
East - North	**4,054**	**1,020**	**25%**	**20-30%**
East Leg - North Split Inner	2,236	576	26%	26%
East Leg - North Split Outer	1,818	444	24%	20-30%
East - South	**987**	**277**	**28%**	**21-40%**
East Leg - Southeast	987	277	28%	21-40%
Other areas	6,462	417	6%	3-14%

5.2.2 Tenure & Housing Value

Areas with high rental unit rates and low housing values are at risk of displacement due to uplift in real estate values and rapid economic development without policies to mitigate these negative externalities. This applies to over 2,500 households. Approximately 780 households in Northwest and Near North (around IU Health Campus) and 915 households in the northeast (250 in Martindale and 665 south of I-70 North Split leg) are also in EJ Areas of Concern (concentrated minority and low-income population). Other pockets can be found in Irish Hill (80 households) and Old Southside (170 households).

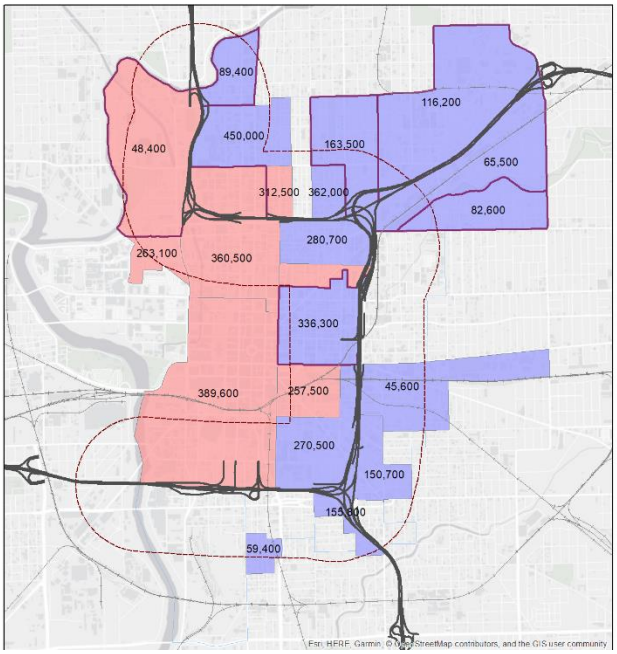


Figure 19: Percent households' renter-occupied, higher concentration than Marion County average (2018)

Areas with low median housing values and high rates of homeownership are generally less at risk of displacement, and better positioned to benefit financially from uplift in value. This applies to over 550 households of Old Southside and Bates-Hendricks neighborhoods. Other areas with high concentration of rental units are also higher value homes, and as such are not a focus for Environmental Justice risks. These areas include all neighborhoods of the inner loop, Ramson Place, Northside and Fountain Square. Cottage Hill tends to have high home ownership rates and higher housing values compared to Marion County, and is also excluded from at-risk areas.

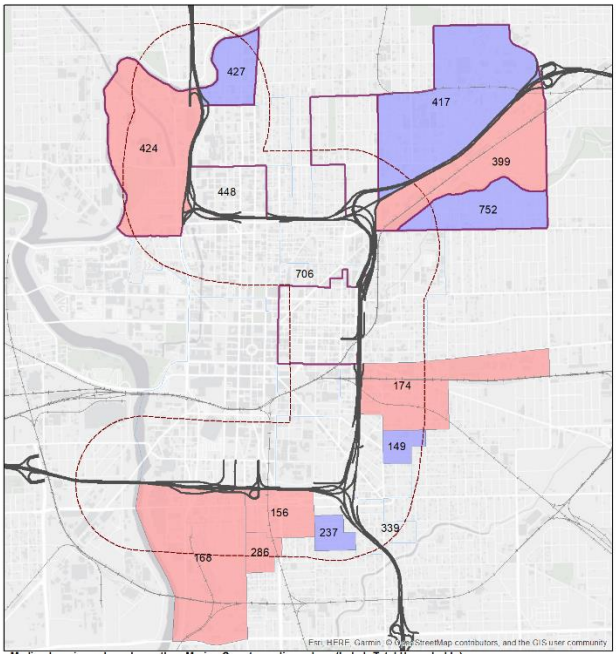


Figure 20: Lower median house values than Marion County

Table 11: Block group with low median values and high rates of rented units

Geography Groups	Households		Percent		Median House Value ($)
	Total	Rental Tenure	Average	Range by Block Groups	Low-High Median Value by District per block group
Marion County	369,000	170,000	46%	n/a	$155,000
Areas of interest	**3,606**	**2,527**	**70%**	**48-98%**	**45,600 – 116,200**
North Leg	**1,289**	**1,028**	**80%**	**60-98%**	**48,400 – 116,200**
Near North	448	439	98%	98%	-
Northeast North Split	417	250	60%	60%	11,6200 – 116,200
Northwest	424	339	80%	80%	48,400 – 48,400
South Leg	**286**	**172**	**60%**	**60%**	**59,400 – 59,400**
East - North	**1,857**	**1,243**	**67%**	**56-82%**	**65,500 – 82,600**
East Leg - North Split Inner	706	579	82%	82%	n/a
East Leg - North Split Outer	1,151	665	58%	56-61%	65,500 – 82,600
East - South	**174**	**84**	**48%**	**48%**	**45,600 – 45,600**
East Leg - Southeast	174	84	48%	48%	45,600 – 45,600
Other areas	12,619	8,750	69%	39-91%	64,400 – 45,0000

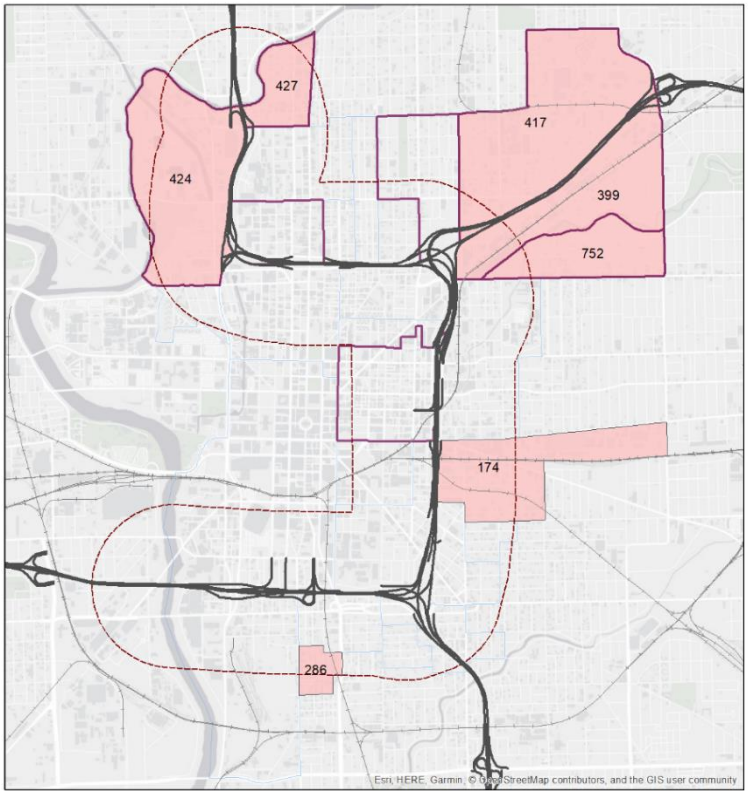


Figure 21: Areas with combined low median housing values and high rates of reter-occupied households

High rental and low median housing values Labels: Total Households)
Key EJ Areas of Concern
Census Block Group - EJ study area
I65/70 Existing
Rail
I-65/70 half-mile

5.2.3 Car dependency

Households with no car ownership and those that rely on alternative modes of transportation from driving to commute to work are both disproportionately affected by the Interstate systems and traffic volume on streets and would reversely benefit more from improved conditions proposed by the project.

Around 3,000 households do not own a car in the study area, of which 1,300 (40%) live in an EJ Area of Concern. The northwest and northeast count 480 households with no car ownership (25-34% of households). The 'East Leg - North Split Inner' block counts over 550 households (25%) with no car.

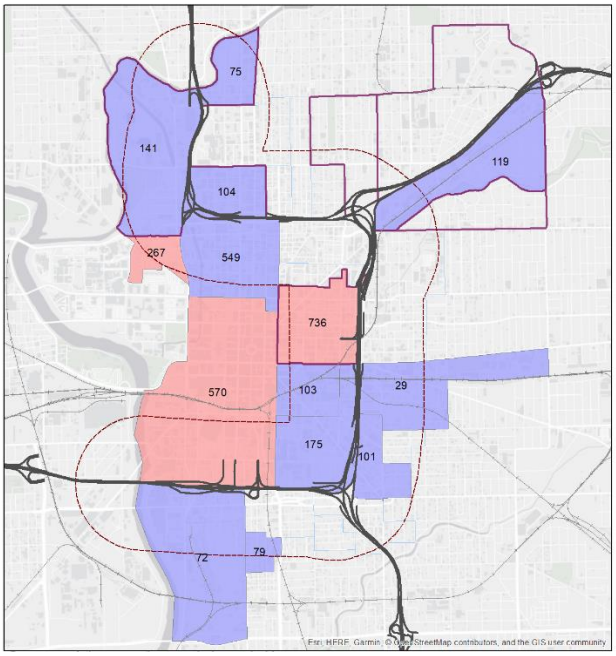


Figure 22: Figure 22: Population using alternative modes to driving to travel to work (public transit, walking, biking), population share higher than 20%.

Table 12: Zero car households in EJ Areas of Concern

Geography Groups	Zero Car Ownership Households (occupied housing units)		Percent	
	Total	Zero Car Household	Average	Range by Block Groups
Marion County	723,000	69,000	9%	n/a
In EJ Areas	5,389	1,229	23%	13-34%
North Leg	**2,002**	**478**	**24%**	**13-34%**
Near North	448	119	27%	26%
Northeast North Split	1,130	215	19%	13-29%
Northwest	424	145	34%	34%
East - North	**3,387**	**750**	**22%**	**17-24%**
East Leg - North Split Inner	2,236	548	25%	24%
East Leg - North Split Outer	1,151	203	18%	17%
Other areas	10,836	1,905	18%	7-34%

Commute patterns follow a similar pattern to zero car ownership, where around 4,000 workers use alternative modes to driving to travel to work, and 1,300 of which live in EJ Areas, in similar distribution to that described above.

Table 13: Workers using alternative modes of transport to drive to work, in EJ Areas of Concern

Geography Groups	Workers		Percent	
	Total	Using Alternative modes of transport	Average	Range by Block Groups
Marion County	450,566	18,567	4%	n/a
In EJ Areas	11,705	1,301	11%	6-36%
North Leg	**4,291**	**368**	**9%**	**6-27%**
Near North	630	104	17%	21%
Northeast North Split	2,556	123	5%	6-14%
Northwest	1,105	141	13%	27%
East - North	**7,414**	**933**	**13%**	**11-36%**
East Leg - North Split Inner	4,869	736	15%	36%
East Leg - North Split Outer	2,545	197	8%	11-27%
Other areas	22,737	2,660	12%	3-44%

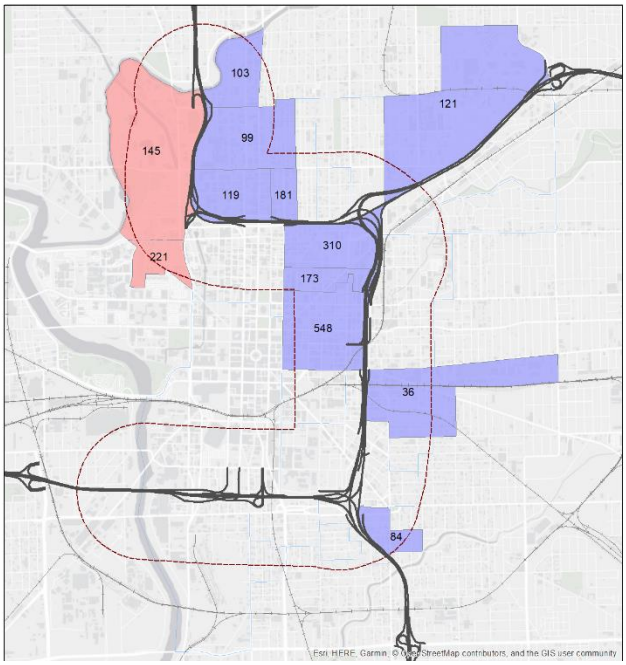


Figure 23: Percent of households with zero car ownership

6 Environmental Justice Strategic Narrative by Leg

This section summarizes key social and environmental justice characteristics by leg framed by the reconstruction of the Inner Loop either as a Recessed Highway or the alternative of Rebuild-As-Is. Detailed data tables are available in Appendix B.

6.1 South Leg

The south leg has been recommended as an initial phase for the Recessed Highway implementation.

A $755 million investment in transformative infrastructure with the Recessed Highway Concept, compared to a $560 million alternative to rebuild as is, could catalyze unprecedented change in this area and create up to $24-29 million in new property tax revenue each year.

Estimated outcomes of the Recessed Highway with strategic capping represents more than half of the total estimated economic impact for the whole Inner Loop Recessed Highway. Although there are no areas of concern for Environmental Justice characteristics on the South Leg (minority and low-income population), reconstruction of I-70 as a Recessed Highway compared to Rebuild-As-Is would benefit other at-risk population groups.

- Proposed changes to the south leg could impact around 2,700 people in total including up to 500 African Americans. New development could more than double the current population with up to 1,300 new housing units potential and help curb the trend of population loss.
- While half of households (~ 500 total) live in rental units and around 230 live below poverty levels, another 500 households live in owner-occupied units that have low to median property values. Proximity to $1 billion in real estate development potential and enhanced conditions of a Recessed Highway could have an important an uplift in property and/or rental values relative to historic trends for the area. Owner-occupiers may benefit on the one hand, however creating pressure and potential displacement effects on rental low-income population. Mitigation strategies are recommended to help address such unintended effects and guide sustainable and equitable community development.
- At least 600 residents are senior and/or people with disability on the South Leg, relatively more concentrated than Marion County, and disproportionately more at risk of health complications due to poor air quality and noise pollution created by traffic speed and traffic volumes from the interstate. The Recessed Highway project has embedded design features to help mitigate air quality and noise impacts for traffic volumes (either from mainline on at-grade network), lower traffic speeds, improve pedestrian safety and provide new quality green spaces to the area.

The alternative (Rebuild-As-Is) would entrench current trends of population loss, ageing population and continued exposure to air and noise pollution (noise barriers required), low property values, and poor connectivity to Downtown and neighboring communities. Urban conditions would continue to be unfavorable to attracting market demand, less so supportive of sustainable and equitable development goals for the foreseeable future.

6.2 North leg

The recessed highway concept for the north leg introduces boulevards and a recessed condition from 16th St. though College Avenue, and continuous boulevard system connecting to east leg boulevard. It also provides an opportunity to drastically transform the design of the MLK interchange and reduce the number of ramps along the segment.

The north leg stands apart for Environmental Justice concerns because it has seen such important demographic changes in the past decades. There are currently over 4,300 African American residents along the North leg, almost half of 1990 population. Neighborhoods in the Northwest / Near North (near IU Health Campus) and northeast (Martindale) remain majority Black neighborhoods with 2,700 African American (average 65%). Other areas (Northside, Downtown North) still count 1,700 Black residents yet in mixed communities (16%). Similar divergence patterns between the block neighborhoods and the others are observed in median housing values and income levels; low values and income levels in Northwest / Near North versus high values and income levels in Northside / Downtown North.

Infrastructure improvements to this area would dramatically improve quality of life conditions for minority communities that were historically disproportionately affected by the original construction, in particular those established minority communities that remain today in the northwest and northeast, and that are under risk pressure from development and demographic changes in surrounding areas even without the recessed highway project.

The proposed improvements will contribute to:

- Mitigate the traffic impact on local streets from employment hub growth at IU Health Campus and 16th Tech in the northwest, with a system that puts people first
- Create safer and a better experience for people in these communities to access low- and median-income level jobs in neighboring employment hubs
- Provide opportunity for new crossing between 16th and 10th Street with a new interchange design that ties in with the boulevard system and provides enhanced experience for other users to vehicles
- Provides to integrate further improvements to local movement than is included in the scope of this project (such as addressing the 10th Street / MLK bottleneck)
- Support community and economic development with up to 1,000 new residential units, and 6,000 jobs which – with proper housing policies – can help retain and grow minority population and provide access to new jobs along the continuous boulevard system

These benefits would also fall to other population groups that are not disadvantaged or at risk in any key characteristic area in particular. With $700 million in real estate development potential along the leg and existing higher real estate values, the unintended risk of further displacement and

gentrification is heightened for minority and at-risk groups along the north leg. Adequate mitigation policies and prioritized investment in EJ Areas could help address this risk and address the historical EJ issues of the interstate construction.

However, the north leg phasing is subject to balancing competing needs between managing the end of useful life of the viaduct with recent investments in North Split structures east of Alabama Avenue. A partial recessed highway concept (shorter segment between 16th Street and Alabama Avenue for instance) was not recommended (see Concept Refinement Memorandum).

Until planning can move forward on this leg, none of the benefits associated with a Recessed Concept can be realized, and current urban renewal trends may very likely continue to impact remaining minority and low-income communities in the northwest and northeast.

6.3 East Leg – strategic capping

This area was recommended for targeted strategic capping and enhanced crossing between inner and outer Loop neighborhoods to focus on connectivity benefits. This area is attracting an important and growing African American population of 2,000 in a mixed community of 6,500 total, that have high home ownership rates with median-to-high house values.

While the direct economic and social impact of the Recessed Highway interventions are somewhat limited for this section compared to others, the concepts and goals of strategic capping are aligned with recent upgrades to transit with Red Line BRT and TOD corridor enhancements (Virginia Avenue) that are having a positive impact on the area's population growth, attractiveness and values[10].

Strategic capping could further contribute to attracting diverse demographics as well as encourage further shift to sustainable modes of transport with proximity to employment hubs in Downtown and Lily headquarters.

Irish Hill neighborhood is the most segregated from Downtown compared to the other neighborhoods along this segment. Introducing boulevards - in particular when tied with changes to the northern section of the east leg – and a new pedestrian crossing near Bates Street will help improve accessibility conditions for up to 200 low income households, and access from surrounding areas to employment opportunities in the district.

6.4 East Leg – Recessed Highway north of Washington Street

The recessed highway concept for the northern half of the east leg was recommended for planning for the long-term subject to two conditions: when CSX Mainline spur can be decommissioned and relocated, and when the new structures being replaced under the North Split project could be considered for demolishing to be replaced by a Recessed Highway.

When planning can move forward for this leg, benefits anticipated include 1,000 new residential units, up to 1.6 million sft of additional commercial space, 6,000 new jobs and up to $700 million in real

[10] Anecdotal only. No data was available at the time of the study.

estate development (2018 prices). A continuous boulevard system would extend from Washington St to the North Leg boulevards, a number of ramps would be improved or removed, and a new trail on the decommissioned CSX viaduct may be proposed. In addition, the new development potential, tighter right-of-way and enhanced crossing conditions will further reduce the physical and mental barrier that was the elevated interstate between Cottage Hill and the neighborhoods to the west.

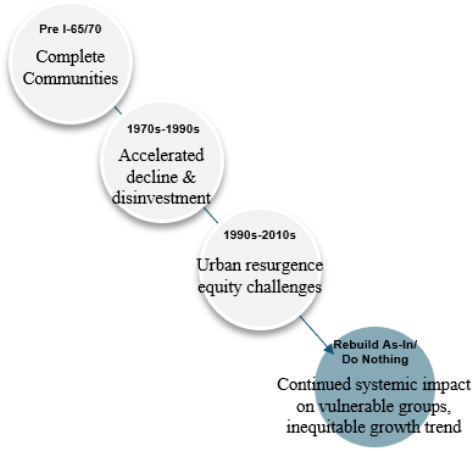
These changes could impact more than 9,700 people in total, including more than 2,500 African American residents and 1,200 low income households, but also more than 1,000 people on disability and 880 senior residents, and over 1,000 households with zero cars. Between 70-85% of these people and households are located in EJ Areas of Concern north of Cottage Hill and west of I65/70 between Washington Street and North Street.

Until planning can move forward, no change to the current conditions is recommended. Social, economic and community development trends will likely continue on recent trends depending on market conditions. Market demand, population and income levels in Cottage Hill, Chatham Arch, Mass Ave, & Lockerbie Square Historic Districts are likely to continue to increase as demand for sustainable urban living conditions and proximity to Downtown continues. Displacement impacts on remaining low income and minority population in neighboring EJ Areas of Concern could also continue.

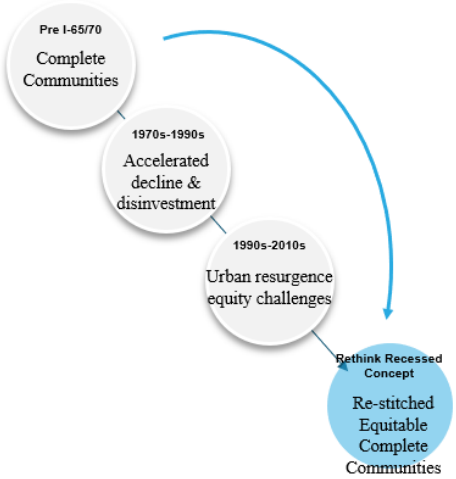
7 Take-Aways

This analysis provides evidence of social and environmental justice concerns for communities immediately surrounding the I65/70 Inner Loop. The construction of the Inner Loop has had detrimental impact on majority Black/Brown and low income communities in the 1960s, drastically accelerating trends of decline and disinvestment to levels where they were no longer functional as complete communities. Over the last 10-20 years, urban renewal trends have seen increased population growth and investment in Downtown and parts of North and North-East Inner Loop. However market-led growth patterns created further displacement effects on vulnerable residents in the north and inner east leg, as well as unbalanced distribution of investment with areas left behind in particular in the south leg.

Rebuild-As-Is means continued systemic impact on vulnerable groups and inequitable growth.



ReThink Recessed Concept can help address historic systemic impacts and bring back complete communities.



The Recessed Highway aims to address historic systemic social and environmental impacts induced by the construction of the Inner Loop on vulnerable communities by improving quality of life and strengthening complete and cohesive communities. In addition, the Recessed Highway creates new development opportunities and attractive urban conditions that can help catalyze growth and investment in declining communities, in particular near the South Leg. Rebuilding as is would entrench social and environmental historic impacts of the construction, and continue current trends of unbalanced growth and widening gap between Inner Loop residents for the next 50 years.

Appendix C provides a comparative table between Rebuild-as-is and Coalition Recessed Concept performance against such wider goals.

Appendix A | Full page maps

Appendix B – | Data Tables

B1 South leg

	Leg / District	South Leg
EJ Key Characteristics	Population (2018)	2,627
	Households (2018)	999
	African American Population (2010)	456
	African American Population Change (1990-2010)	232
	Households living below poverty threshold	236
Other Characteristics	Households with at least 1 person on disability	323
	Senior Population (65 and over)	320
	Renting Households	488
	Median House Value (lowest block group)	$59,400
	Median House Value (highest block group)	$155,800
	Workers using alternative travel to work modes to driving	199
	Households with no car	150

B2 East Leg

B2.1 South-east section

South of Washington Street, already recessed section of Hyperfix project.

	Leg / District	East leg South	Downtown - South Split	East Leg - Southeast
EJ Key Characteristics	Population (2018)	6,426	4,041	2,385
	Households (2018)	1,984	997	987
	African American Population (2010)	866	632	234
	African American Population Change (1990-2010)	53	-33	86
	Households living below poverty threshold	366	74	292
Other Characteristics	Households with at least 1 person on disability	342	65	277
	Senior Population (65 and over)	420	201	219
	Renting Households	1,136	672	464
	Median House Value (lowest block group)	$45,600	$257,500	$45,600
	Median House Value (highest block group)	$270,500	$270,500	$150,700
	Workers using alternative travel to work modes to driving	444	278	166
	Households with no car	237	75	163

B2.2 North-east section

North of Washington Street

	Leg / District	**Total**	**EJ Areas**	East Leg - North Split Inner	East Leg - North Split Outer	**Non EJ Areas**	East Leg - North Split Inner	East Leg - North Split Outer
EJ Key Characteristics	Population (2018)	**9,743**	**7,414**	4,869	2,545	**2,329**	918	1,411
	Households (2018)	**4,760**	**3,387**	2,236	1,151	**1,373**	706	667
	African American Population (2010)	**2,545**	**2,222**	1,303	919	**323**	35	288
	African American Population Change (1990-2010)	**398**	**762**	687	75	**-364**	-190	-174
	Households living below poverty threshold	**1,189**	**1,036**	654	382	**153**	62	92
Other Characteristics	Households with at least 1 person on disability	**1,065**	**887**	576	311	**178**	45	133
	Senior Population (65 and over)	**879**	**726**	485	241	**153**	34	119
	Renting Households	**3,042**	**2,163**	1,498	665	**879**	579	300
	Median House Value (lowest block group)	**$65,500**	**$65,500**	$336,300	$65,500	**$210,000**		$210,000
	Median House Value (highest block group)	**$336,300**	**$336,300**	$336,300	$82,600	**$210,000**		$210,000
	Workers using alternative travel to work modes to driving	**1,162**	**933**	736	197	**229**	89	140
	Households with no car	**1,009**	**750**	548	203	**259**	173	86

B3 North Leg

	Leg / District	**Total**	**EJ Areas**	Near North	Northeast North Split	Northwest	**Non EJ Areas**	Downtown_North	Near North	Northside	Northwest
EJ Key Characteristics	Population (2018)	**13,310**	**4,291**	630	2,556	1,105	**9,019**	4,618	813	2,183	1,405
	Households (2018)	**7,177**	**2,002**	448	1,130	424	**5,175**	2,868	372	1,290	645
	African American Population (2010)	**4,268**	**2,746**	251	1,770	725	**1,522**	548	246	405	323
	African American Population Change (1990-2010)	**-3,467**	**-1,853**	-192	-1,463	-198	**-1,615**	-262	-480	-683	-190
	Households living below poverty threshold	**1,672**	**521**	97	242	182	**1,150**	641	71	217	221
Other Characteristics	Households with at least 1 person on disability	**1,173**	**492**	29	402	61	**681**	228	40	218	195
	Senior Population (65 and over)	**1,098**	**396**	39	266	91	**702**	254	121	171	156
	Renting Households	**5,489**	**1,520**	439	742	339	**3,969**	2,278	234	896	561
	Median House Value (lowest block group)	**$48,400**	**$48,400**		$116,200	$48,400	**$263,100**	$280,700	$450,000	$312,500	$263,100
	Median House Value (highest block group)	**$450,000**	**$163,500**		$163,500	$48,400	**$450,000**	$360,500	$450,000	$375,500	$263,100
	Workers using alternative travel to work modes to driving	**1,586**	**368**	104	123	141	**1,218**	669	66	216	267
	Households with no car	**1,572**	**478**	119	215	145	**1,093**	514	99	261	221

Appendix C | Comparative Summary Table

The Coalition Recessed Highway vision helps address systemic environmental justice impacts of the Inner Loop system on vulnerable and minority population by achieving a broader range of tangible benefits compared to rebuilding the interstate a-is.

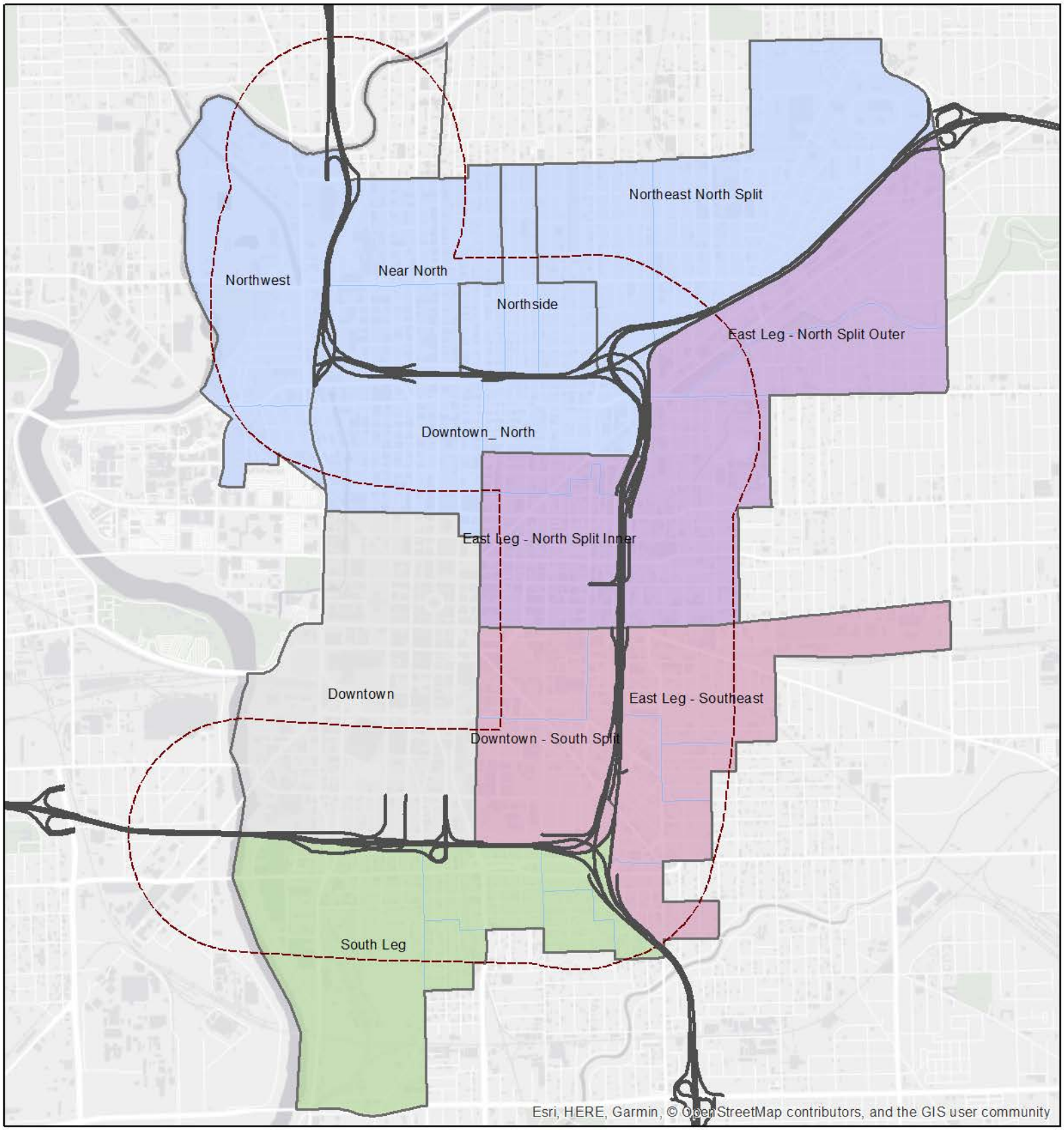
The table below compares the Rebuild-As-Is and the Coalition Recessed Concept likely performance against a range of wider goals that address social and environmental justice legacy challenges.

Inner Loop Integrated Goals	Rebuild-As-Is	Coalition Recessed Highway
1. **Continue to support regional connectivity** (see Traffic Analysis)		
2. Improve local neighborhood connectivity, by :		
Breaking down physical and mental historical barriers	No change to retaining walls / embankments barriers. Opportunity for better quality urban design features for bridges and underpasses.	New and enhanced crossing conditions, tightened right-of-way. Major transformation of Inner Loop experienced as a key factor in social justice and urban decline of Black and Brown communities historically.
Increasing mobility choices between neighborhoods along the corridor	Inner Loop mainline also serves local vehicular movements between neighborhoods in the corridor.	Demand for local movement shifts to boulevards but also support other transportation modes.
Promoting safe active travel	n/a	Greenways and enhanced crossing supportive of active travel.
Supporting potential transit in the future	No change to surrounding land uses will make a case for transit in the future.	Circular boulevards system envisioned as potential bus rapid transit corridor. New residential and employment density may support need for new transit system.
3. Achieve higher quality of life for residents in the surrounding neighborhoods, by :		
Prioritizing pedestrian safety and comfort levels adequate for neighborhood streets	Vehicular safety and performance prioritized over pedestrian safety; high safety risks near access ramps crossings.	Priority given to pedestrian safety; Right-sizing access points weaving in boulevard system reduces average vehicular speeds and improves pedestrian comfort levels near Interstate.
Mitigating traffic and local environmental impacts	All areas eligible for noise barriers; no change to air quality unless more traffic is redirected to I-465.	Noise from mainline mitigated by depressed retaining walls. Potential additional air quality / noise impacts from diverted traffic

			to boulevards, mitigated by planted greenways and land bridges.
Creating new green public spaces		May include opportunity for improved trail, planted embankments and pocket parks.	Around 25 acres of highly accessible green public spaces created as capped parks.
4. Strengthen complete and inclusive communities, by :			
Creating urban design conditions supportive of complete communities development patterns (mixed-use, housing, local employment and active frontage)		No change to land use opportunities in the surrounding communities. Reinvesting in infrastructure that has had detrimental historic impact on the character of existing complete communities.	Transforming urban conditions on edge of interstate, supportive of 10M sq.ft. of new development, including 3,300 new homes and 6.6M sq.ft of office and ground-floor retail.
Providing opportunities to experiment with innovative equitable development policy on new developments, such as affordable housing		Any inclusion and equity objectives addressed through S106 process.	45 acres of publicly-owned new developable land created can be an asset to support social and inclusive development policies that can help address unwanted negative externalities from development on surrounding communities.
5. Accelerate inclusive economic development, by :			
Creating conditions supportive of new development that can boost inclusive local economic development for Indianapolis.		Interstate continued role as key infrastructure support to Indianapolis' economic prosperity and regional access to employment centers in and near Downtown. No change to economic development trends in the corridor: widening gap between growth hubs (north, northeast) and struggling areas (e.g south).	Improved urban conditions support land values for 6.6M sq.ft suitable for commercial land uses – more than half near the south leg – can help catalyze local economic development in areas such as the south that would not benefit from investment. New uses will generate (at completion) new fiscal revenue to the City –which can be partly reinvested in local economic development and community improvement programs.
Improving local access to neighboring employment centers and increasing employment density along the corridor		No change to current conditions where Interstate is a physical barrier to local residents to access neighboring employment hubs (such as IU Health), in particular for those with no access to vehicle. No change to land use patterns or density in the corridor.	New land uses in corridor can increase employment density and choice both directly in impacted communities. Boulevard system and new / improved crossings increase physical access to existing and emerging employment hubs along the corridor.

Memorandum

Appendix A | Full page maps

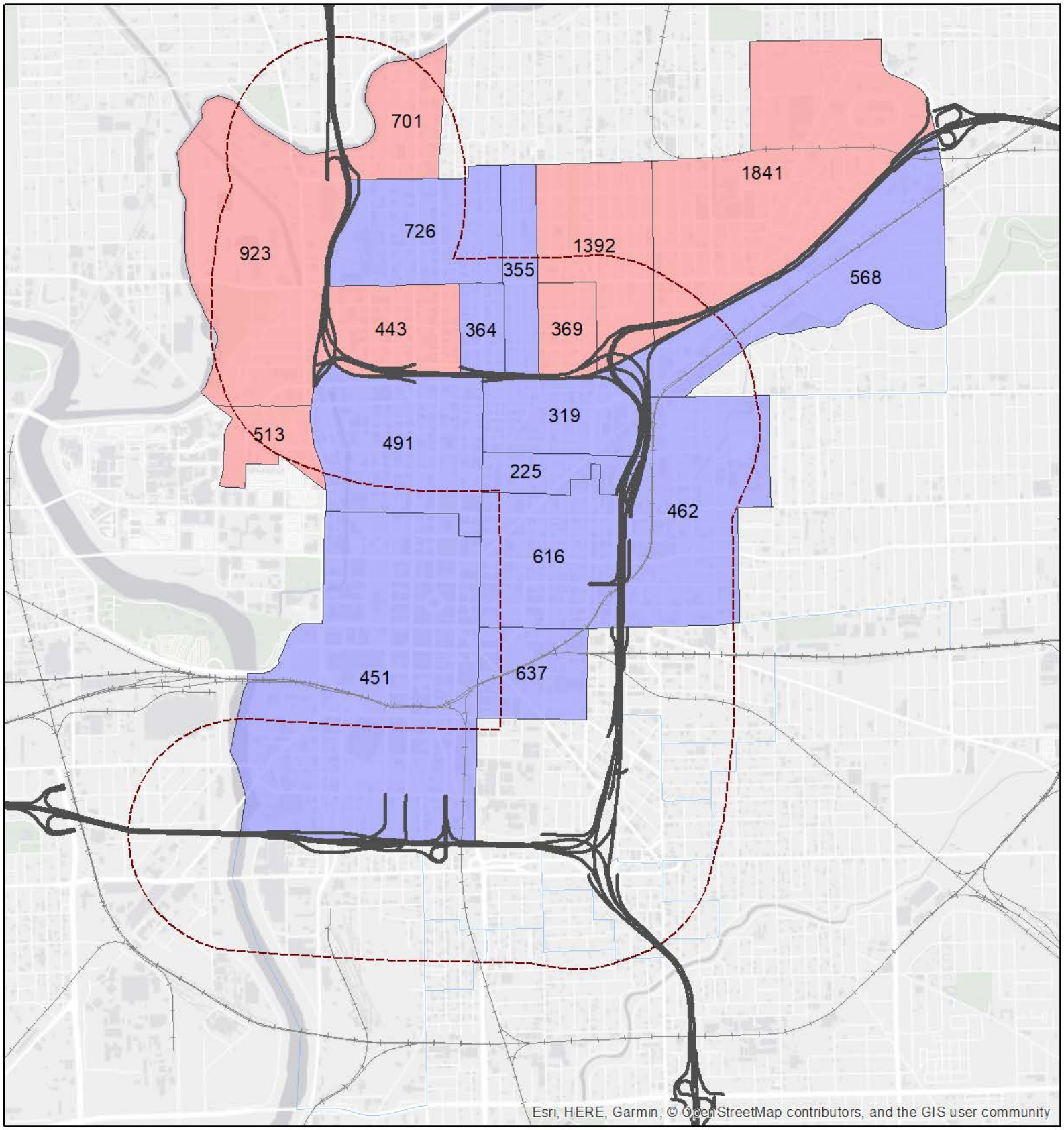


Census Block Groups, by district and leg

Groups by Leg

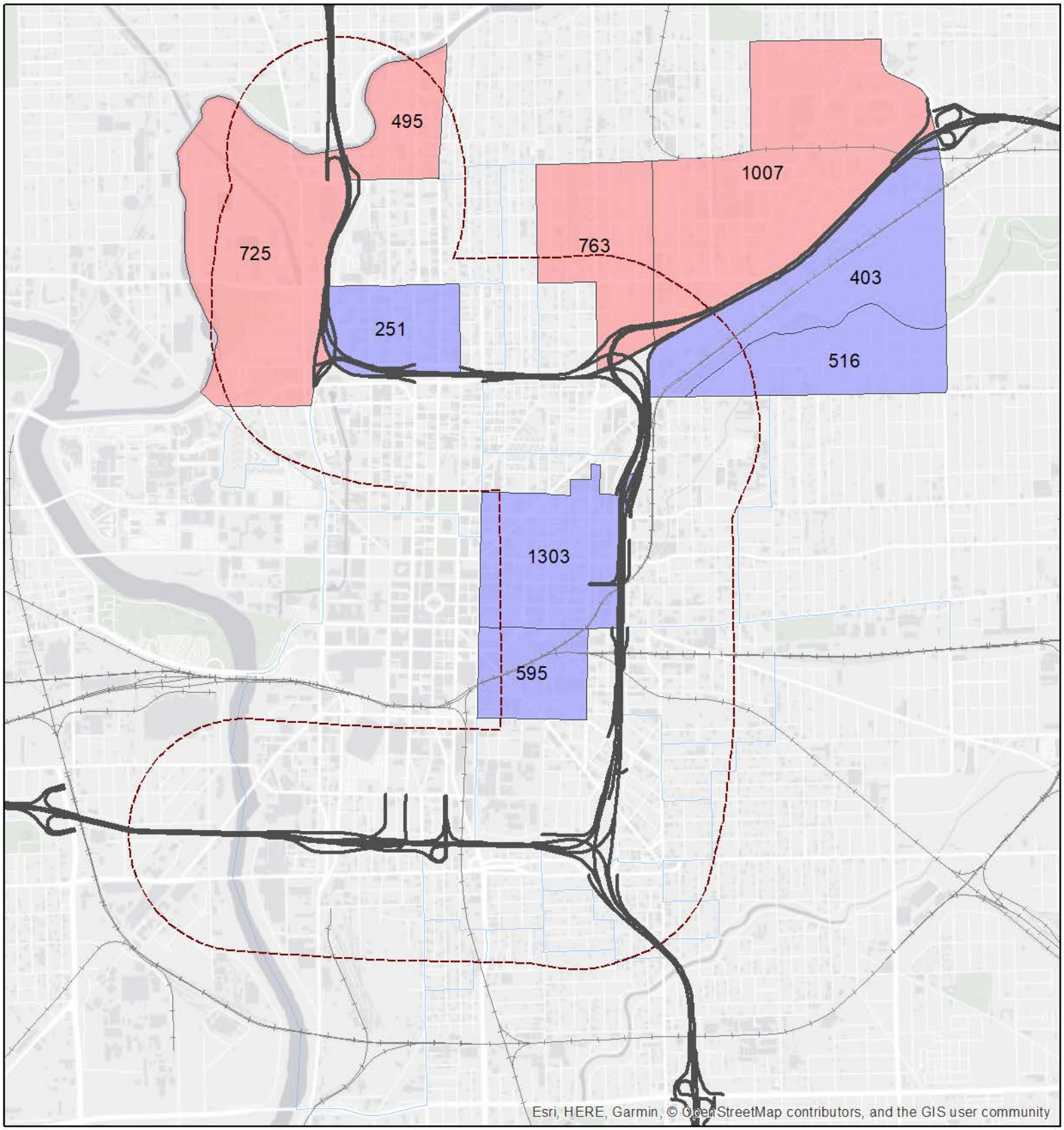
- Downtown
- East - North
- East - South
- North
- South

- Block Groups - Districts
- Census Block Group
- I-65/70 half-mile
- I65/70 Existing



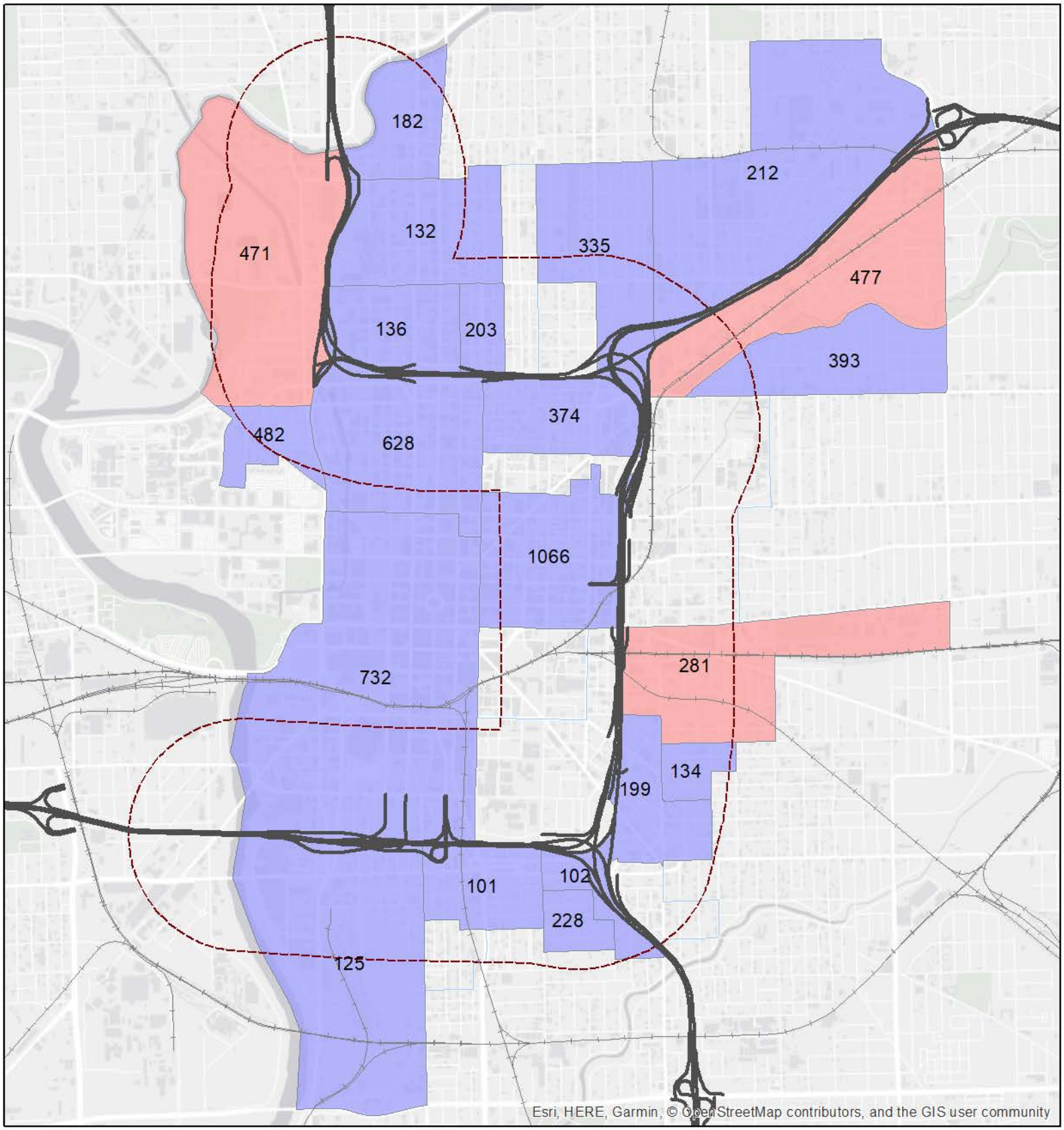
African American Population
(% of total)

- 26% - 55%
- 56% - 98%
- Census Block Group - EJ study area
- I-65/70 half-mile
- I65/70 Existing
- Rail



African American Population, 2010 (% of total)

- 34% - 55%
- 56% - 95%
- Census Block Group - EJ study area
- I-65/70 half-mile
- I65/70 Existing
- Rail

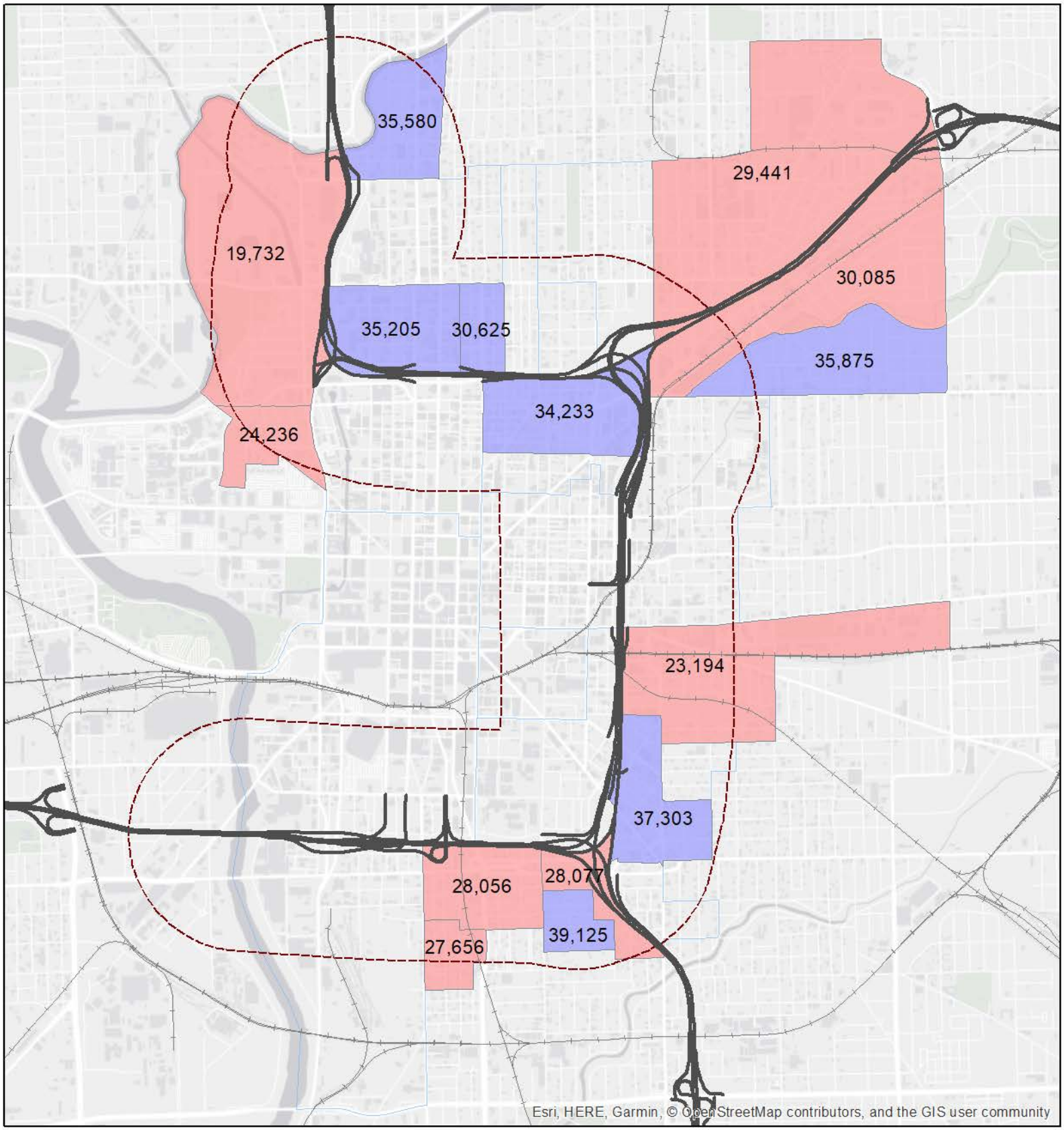


Percent households living under poverty levels (greater than Marion County); Values: Household count (2018)

- 19% - 40%
- 43% - 61%
- Census Block Group - EJ study area

I-65/70 half-mile

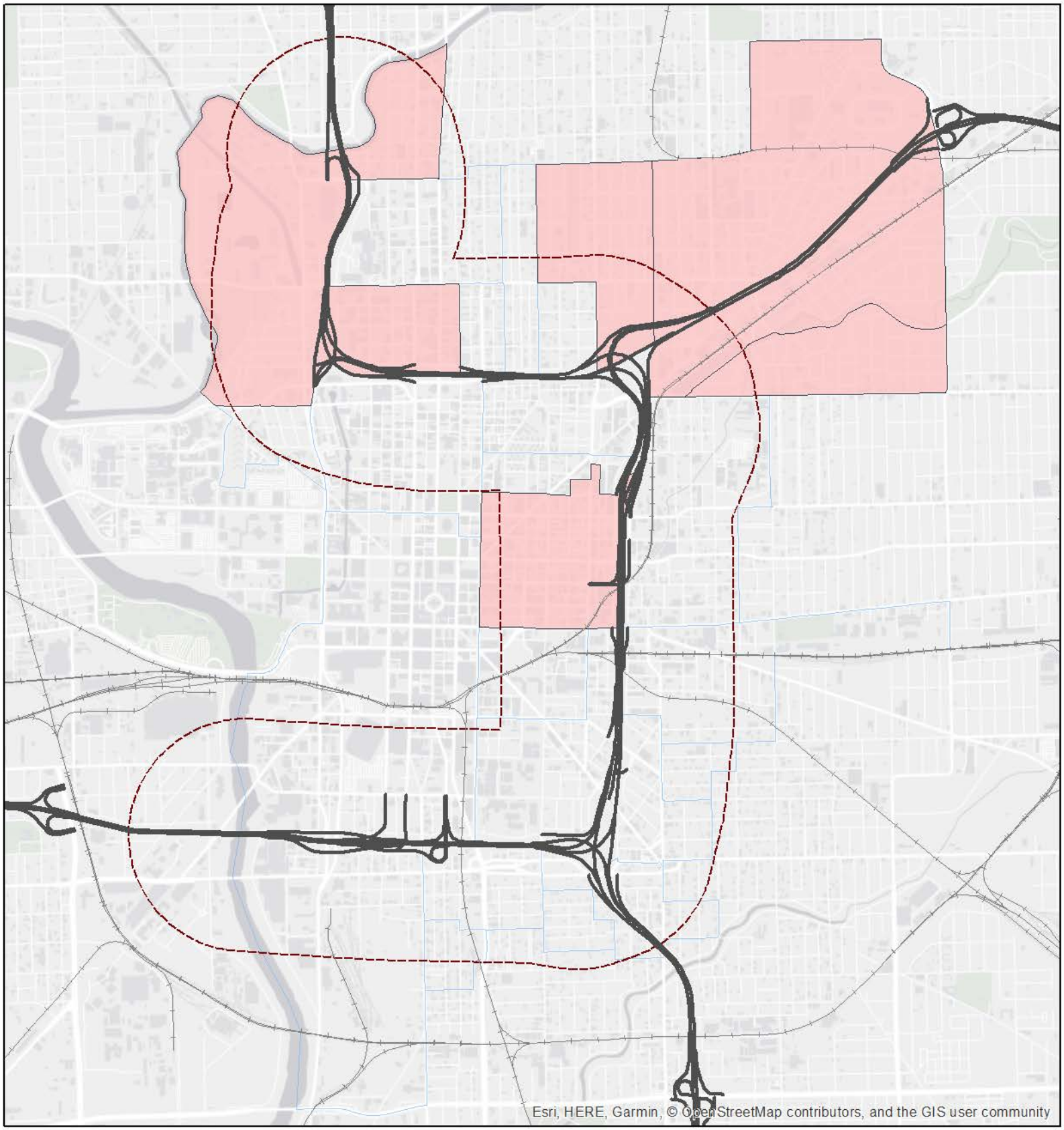
- I65/70 Existing
- Rail



Lower income households

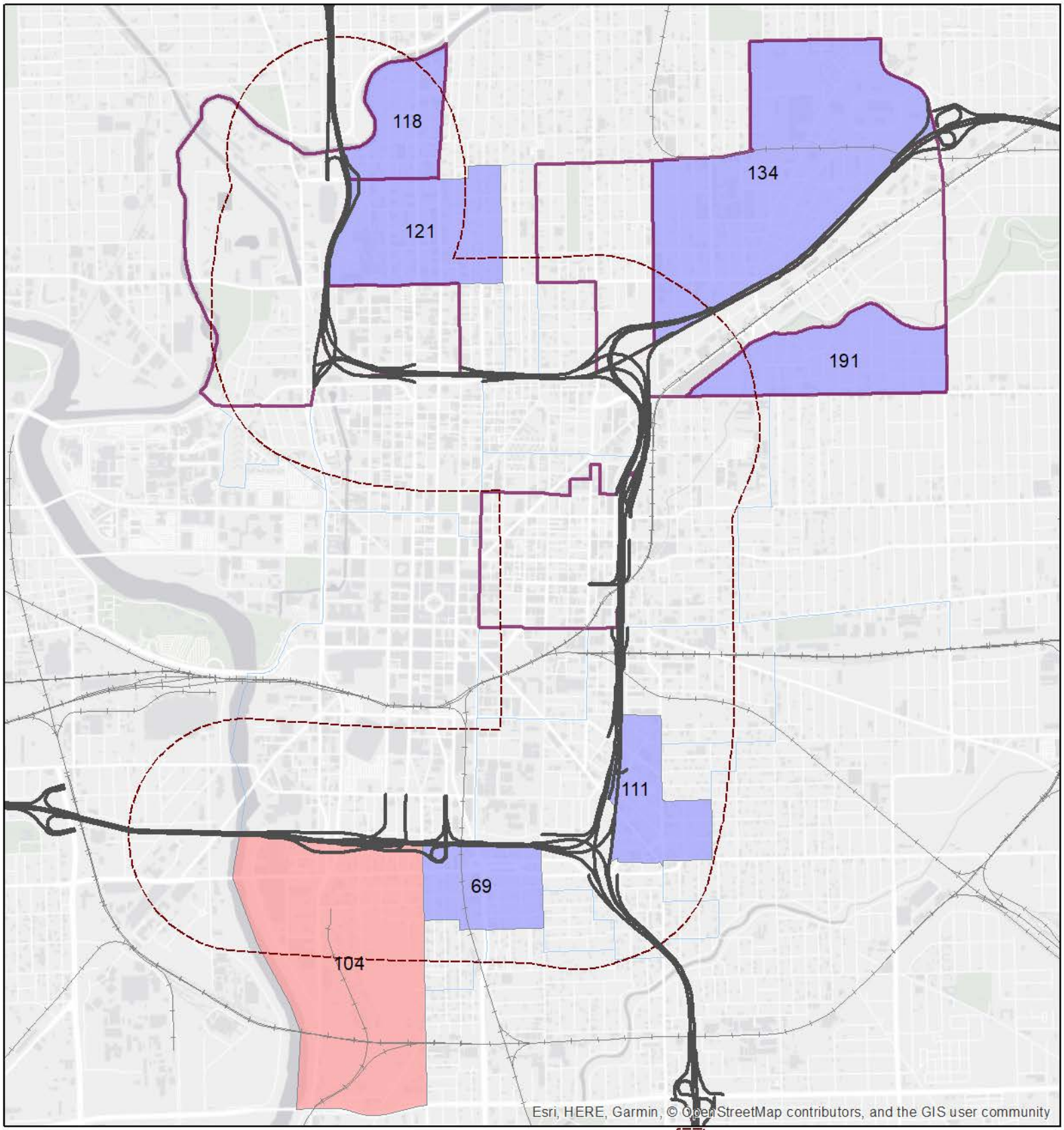
Median household income ration to Mario County median income

- 0.39 - 0.60
- 0.61 - 0.97
- Census Block Group - EJ study area
- I65/70 Existing
- Rail
- I-65/70 half-mile



Combined concentration of poverty and minority groups

- Key EJ Areas of Concern (2 metrics)
- Census Block Group - EJ study area
- I65/70 Existing
- Rail
- I-65/70 half-mile



Percent population 65 and over, higher than Marion County (Labels = count)

13% - 16%

17% - 22%

I-65/70 half-mile

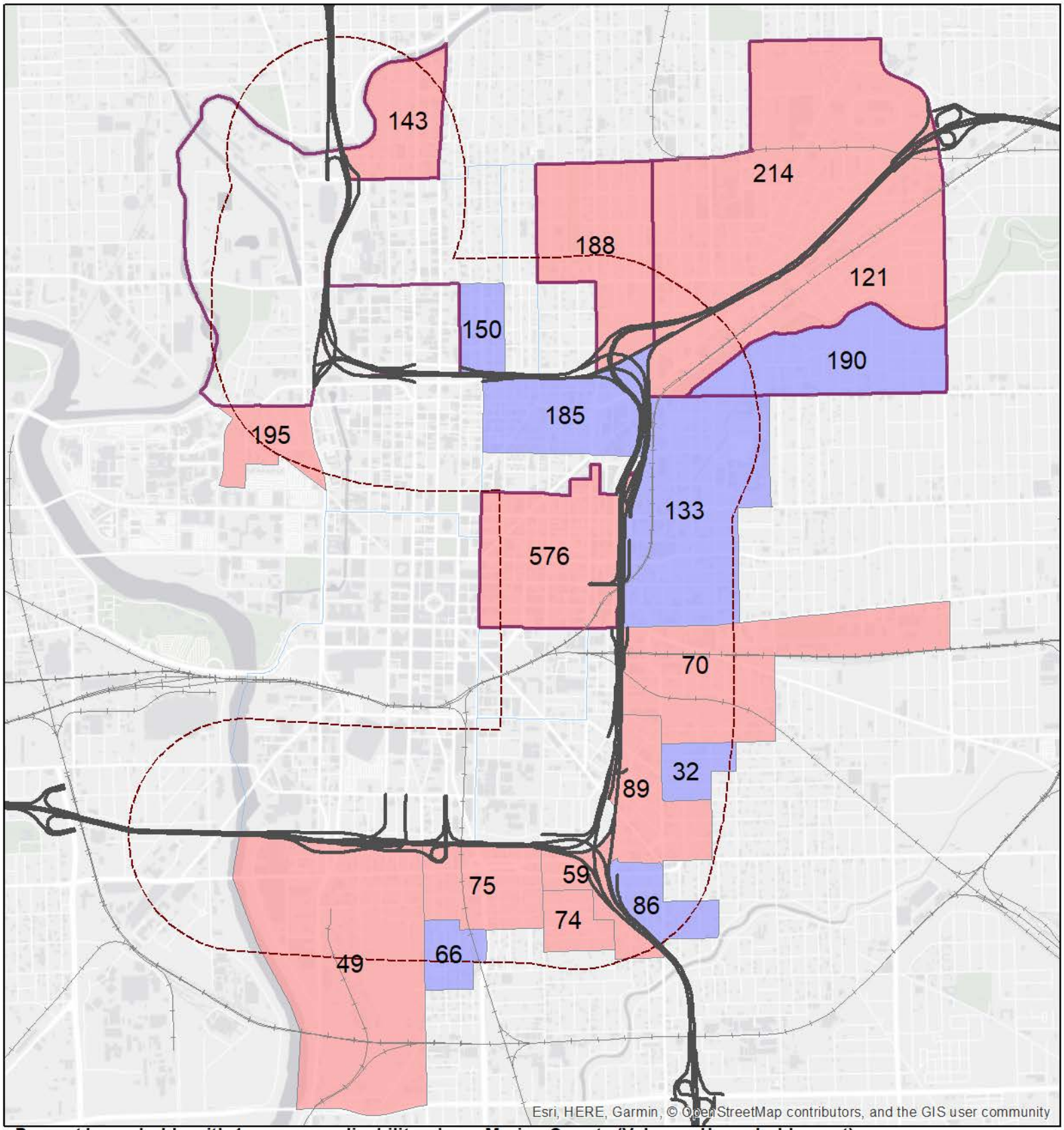
Key EJ Areas of Concern

Key EJ Areas of Concern

Census Block Group - EJ study area

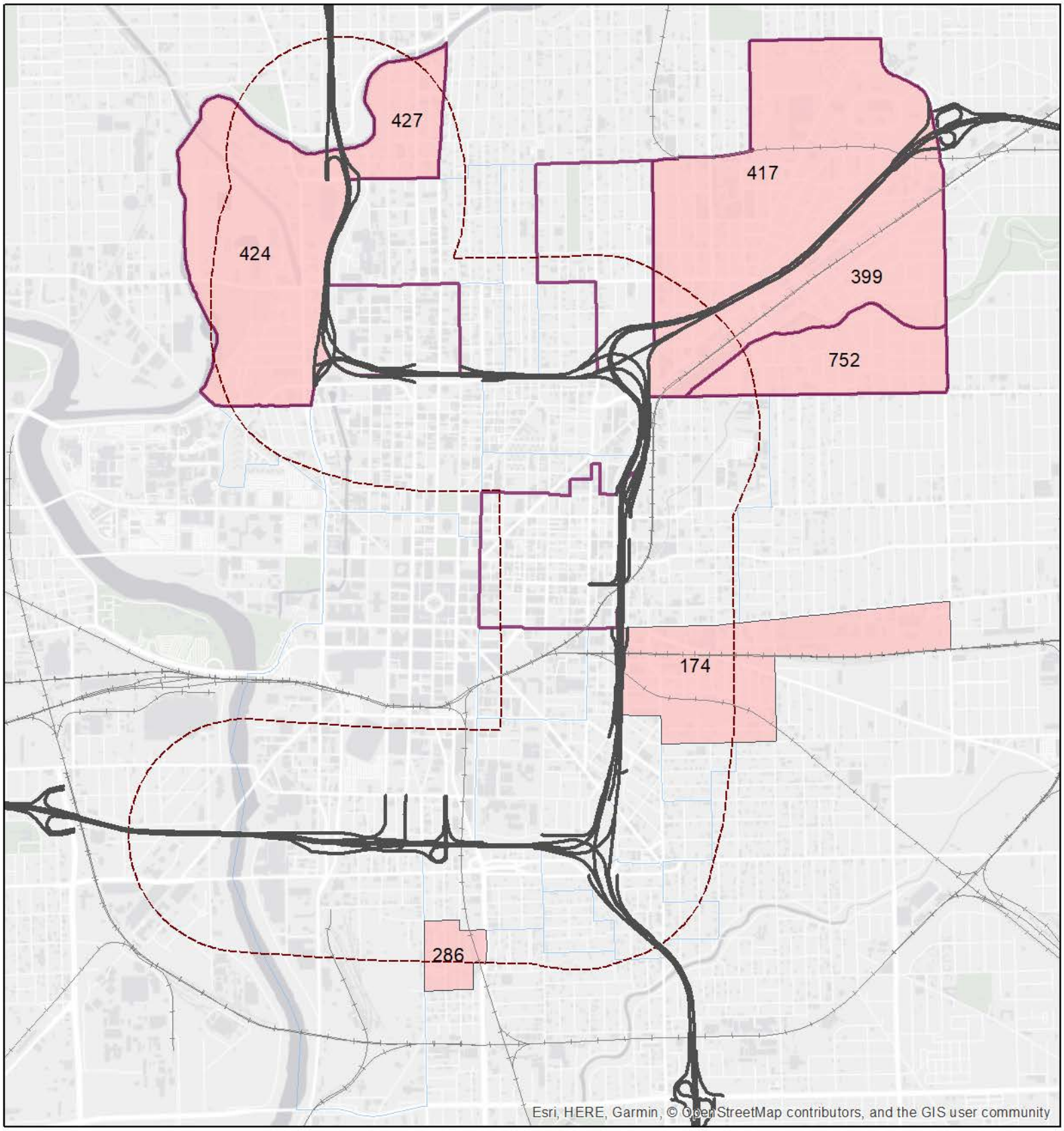
I65/70 Existing

Rail



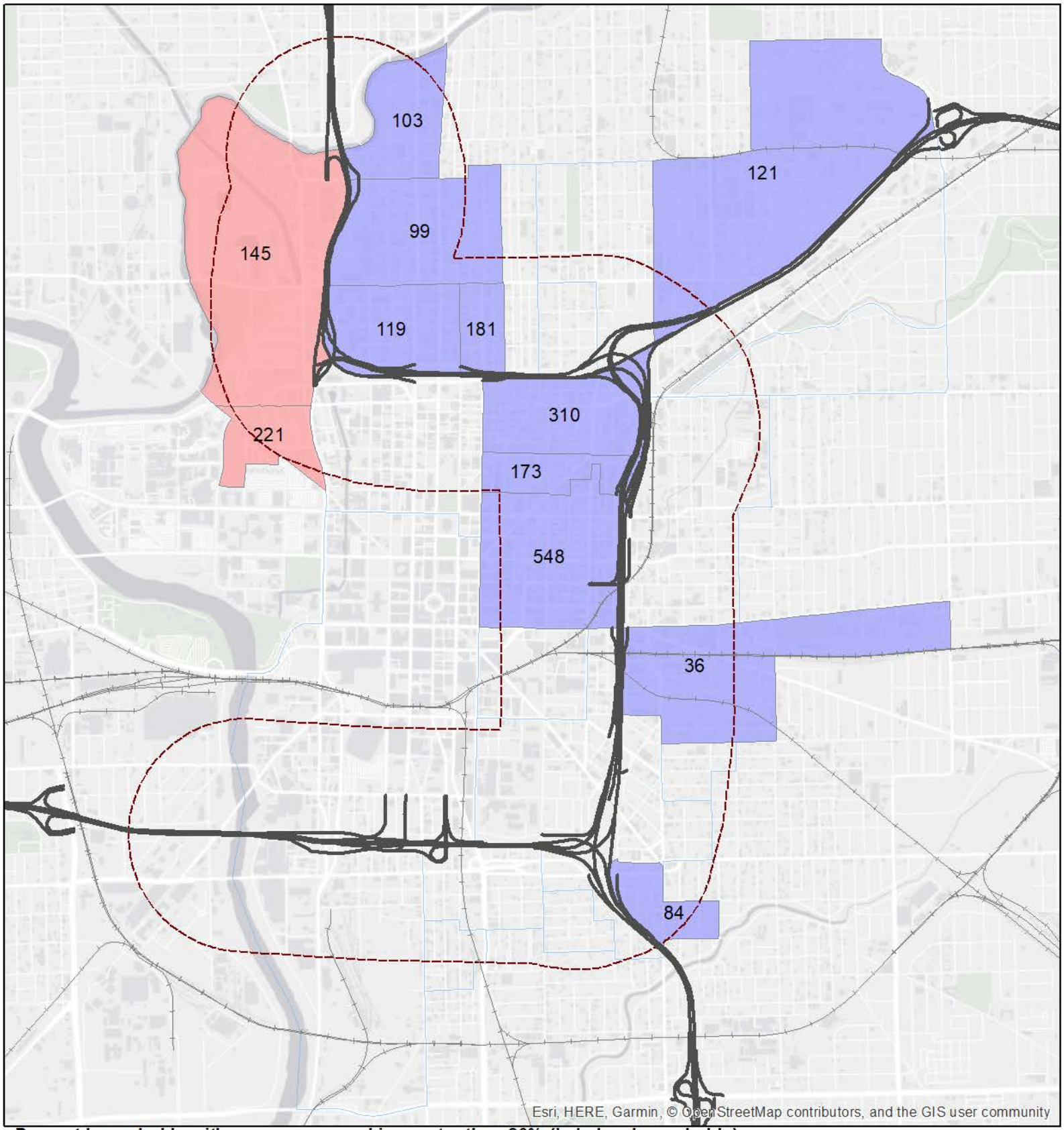
Percent households with 1 person on disability, above Marion County (Values = Household count)

- 15% - 25%
- 25.01% - 51%
- Key EJ Areas of Concern
- Census Block Group - EJ study area
- I65/70 Existing
- Rail
- I-65/70 half-mile



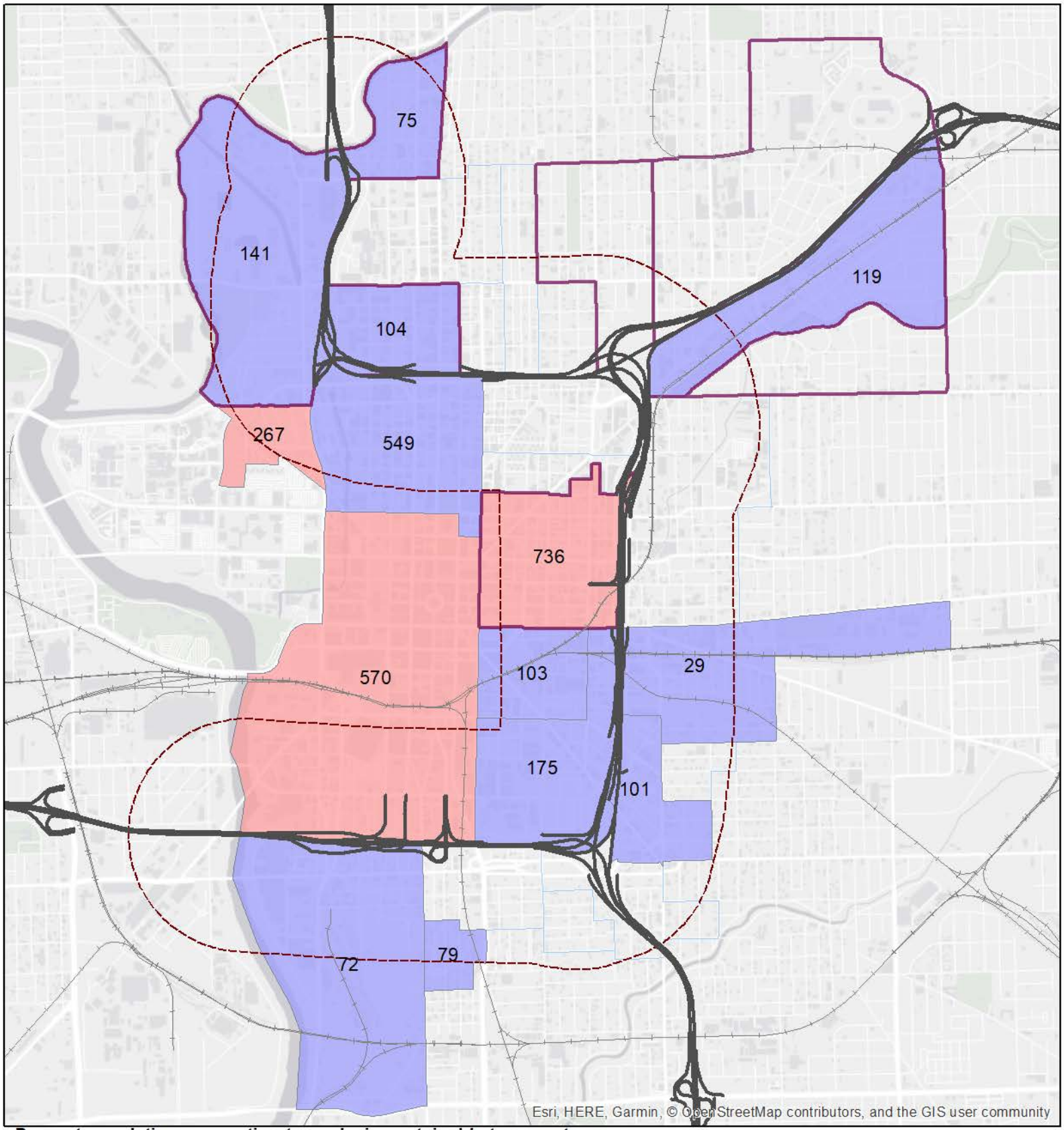
High rental and low median housing values Labels: Total Households)

- High rental and low median housing values Labels: Total Households)
- Key EJ Areas of Concern
- Census Block Group - EJ study area
- I65/70 Existing
- Rail
- I-65/70 half-mile



Percent households with zero car ownership greater than 20% (Labels = households)

- 21% - 29%
- 30% - 34%
- Key EJ Areas of Concern
- I-65/70 half-mile
- Census Block Group - EJ study area
- I65/70 Existing
- Rail



Percent population commuting to work via sustainable transport

- 21% - 31%
- 31.01% - 44%
- Key EJ Areas of Concern
- Census Block Group - EJ study area
- I65/70 Existing
- Rail
- I-65/70 half-mile

Appendix B – | Data Tables

B1 South leg

	Leg / District	South Leg
EJ Key Characteristics	Population (2018)	2,627
	Households (2018)	999
	African American Population (2010)	456
	African American Population Change (1990-2010)	232
	Households living below poverty threshold	236
Other Characteristics	Households with at least 1 person on disability	323
	Senior Population (65 and over)	320
	Renting Households	488
	Median House Value (lowest block group)	$59,400
	Median House Value (highest block group)	$155,800
	Workers using alternative travel to work modes to driving	199
	Households with no car	150

B2 East Leg

B2.1 South-east section

South of Washington Street, already recessed section of Hyperfix project.

	Leg / District	East leg South	Downtown - South Split	East Leg - Southeast
EJ Key Characteristics	Population (2018)	6,426	4,041	2,385
	Households (2018)	1,984	997	987
	African American Population (2010)	866	632	234
	African American Population Change (1990-2010)	53	-33	86
	Households living below poverty threshold	366	74	292
Other Characteristics	Households with at least 1 person on disability	342	65	277
	Senior Population (65 and over)	420	201	219
	Renting Households	1,136	672	464
	Median House Value (lowest block group)	$45,600	$257,500	$45,600
	Median House Value (highest block group)	$270,500	$270,500	$150,700
	Workers using alternative travel to work modes to driving	444	278	166
	Households with no car	237	75	163

B2.2 North-east section

North of Washington Street

	Leg / District	**Total**	**EJ Areas**	East Leg - North Split Inner	East Leg - North Split Outer	**Non EJ Areas**	East Leg - North Split Inner	East Leg - North Split Outer
EJ Key Characteristics	Population (2018)	**9,743**	**7,414**	4,869	2,545	**2,329**	918	1,411
	Households (2018)	**4,760**	**3,387**	2,236	1,151	**1,373**	706	667
	African American Population (2010)	**2,545**	**2,222**	1,303	919	**323**	35	288
	African American Population Change (1990-2010)	**398**	**762**	687	75	**-364**	-190	-174
	Households living below poverty threshold	**1,189**	**1,036**	654	382	**153**	62	92
Other Characteristics	Households with at least 1 person on disability	**1,065**	**887**	576	311	**178**	45	133
	Senior Population (65 and over)	**879**	**726**	485	241	**153**	34	119
	Renting Households	**3,042**	**2,163**	1,498	665	**879**	579	300
	Median House Value (lowest block group)	**$65,500**	**$65,500**	$336,300	$65,500	**$210,000**		$210,000
	Median House Value (highest block group)	**$336,300**	**$336,300**	$336,300	$82,600	**$210,000**		$210,000
	Workers using alternative travel to work modes to driving	**1,162**	**933**	736	197	**229**	89	140
	Households with no car	**1,009**	**750**	548	203	**259**	173	86

B3 North Leg

	Leg / District	**Total**	**EJ Areas**	Near North	Northeast North Split	Northwest	**Non EJ Areas**	Downtown_ North	Near North	Northside	Northwest
EJ Key Characteristics	Population (2018)	**13,310**	**4,291**	630	2,556	1,105	**9,019**	4,618	813	2,183	1,405
	Households (2018)	**7,177**	**2,002**	448	1,130	424	**5,175**	2,868	372	1,290	645
	African American Population (2010)	**4,268**	**2,746**	251	1,770	725	**1,522**	548	246	405	323
	African American Population Change (1990-2010)	**-3,467**	**-1,853**	-192	-1,463	-198	**-1,615**	-262	-480	-683	-190
	Households living below poverty threshold	**1,672**	**521**	97	242	182	**1,150**	641	71	217	221
Other Characteristics	Households with at least 1 person on disability	**1,173**	**492**	29	402	61	**681**	228	40	218	195
	Senior Population (65 and over)	**1,098**	**396**	39	266	91	**702**	254	121	171	156
	Renting Households	**5,489**	**1,520**	439	742	339	**3,969**	2,278	234	896	561
	Median House Value (lowest block group)	**$48,400**	**$48,400**		$116,200	$48,400	**$263,100**	$280,700	$450,000	$312,500	$263,100
	Median House Value (highest block group)	**$450,000**	**$163,500**		$163,500	$48,400	**$450,000**	$360,500	$450,000	$375,500	$263,100
	Workers using alternative travel to work modes to driving	**1,586**	**368**	104	123	141	**1,218**	669	66	216	267
	Households with no car	**1,572**	**478**	119	215	145	**1,093**	514	99	261	221

Appendix C | Comparative Summary Table

The Coalition Recessed Highway vision helps address systemic environmental justice impacts of the Inner Loop system on vulnerable and minority population by achieving a broader range of tangible benefits compared to rebuilding the interstate a-is.

The table below compares the Rebuild-As-Is and the Coalition Recessed Concept likely performance against a range of wider goals that address social and environmental justice legacy challenges.

Inner Loop Integrated Goals	Rebuild-As-Is	Coalition Recessed Highway
1. **Continue to support regional connectivity** (see Traffic Analysis)		
2. Improve local neighborhood connectivity, by :		
Breaking down physical and mental historical barriers	No change to retaining walls / embankments barriers. Opportunity for better quality urban design features for bridges and underpasses.	New and enhanced crossing conditions, tightened right-of-way. Major transformation of Inner Loop experienced as a key factor in social justice and urban decline of black and brown communities historically.
Increasing mobility choices between neighborhoods along the corridor	Inner Loop mainline also serves local vehicular movements between neighborhoods in the corridor.	Demand for local movement shifts to boulevards but also support other transportation modes.
Promoting safe active travel	n/a	Greenways and enhanced crossing supportive of active travel.
Supporting potential transit in the future	No change to surrounding land uses will make a case for transit in the future.	Circular boulevards system envisioned as potential bus rapid transit corridor. New residential and employment density may support need for new transit system.
3. Achieve higher quality of life for residents in the surrounding neighborhoods, by :		
Prioritizing pedestrian safety and comfort levels adequate for neighborhood streets	Vehicular safety and performance prioritized over pedestrian safety; high safety risks near access ramps crossings.	Priority given to pedestrian safety; Right-sizing access points weaving in boulevard system reduces average vehicular speeds and improves pedestrian comfort levels near Interstate.
Mitigating traffic and local environmental impacts	All areas eligible for noise barriers; no change to air quality unless more traffic is redirected to I-465.	Noise from mainline mitigated by depressed retaining walls. Potential additional air quality / noise impacts from diverted traffic

			to boulevards, mitigated by planted greenways and land bridges.
Creating new green public spaces		May include opportunity for improved trail, planted embankments and pocket parks.	Around 25 acres of highly accessible green public spaces created as capped parks.
4. Strengthen complete and inclusive communities, by :			
Creating urban design conditions supportive of complete communities development patterns (mixed-use, housing, local employment and active frontage)		No change to land use opportunities in the surrounding communities. Reinvesting in infrastructure that has had detrimental historic impact on the character of existing complete communities.	Transforming urban conditions on edge of interstate, supportive of 10M sq.ft. of new development, including 3,300 new homes and 6.6M sq.ft of office and ground-floor retail.
Providing opportunities to experiment with innovative equitable development policy on new developments, such as affordable housing		Any inclusion and equity objectives addressed through S106 process.	45 acres of publicly-owned new developable land created can be an asset to support social and inclusive development policies that can help address unwanted negative externalities from development on surrounding communities.
5. Accelerate inclusive economic development, by :			
Creating conditions supportive of new development that can boost inclusive local economic development for Indianapolis.		Interstate continued role as key infrastructure support to Indianapolis' economic prosperity and regional access to employment centers in and near Downtown. No change to economic development trends in the corridor: widening gap between growth hubs (north, northeast) and struggling areas (e.g south).	Improved urban conditions support land values for 6.6M sq.ft suitable for commercial land uses – more than half near the south leg – can help catalyze local economic development in areas such as the south that would not benefit from investment. New uses will generate (at completion) new fiscal revenue to the City –which can be partly reinvested in local economic development and community improvement programs.
Improving local access to neighboring employment centers and increasing employment density along the corridor		No change to current conditions where Interstate is a physical barrier to local residents to access neighboring employment hubs (such as IU Health), in particular for those with no access to vehicle. No change to land use patterns or density in the corridor.	New land uses in corridor can increase employment density and choice both directly in impacted communities. Boulevard system and new / improved crossings increase physical access to existing and emerging employment hubs along the corridor.

Memorandum

Memorandum

ARUP

To	Mark Fisher (Indy Chamber of Commerce) Taylor Hughes (Indy Chamber of Commerce)	Date	April 14, 2021
Copies		Reference number	4-054-05
From	Arup	File reference	273507
Subject	Final Report on Implementation		

1 Introduction

This memorandum is an interim report to discuss potential project implementation, this involves considerations on governance structures, funding and financing mechanisms, and procurement methods.

2 Governance Structures

2.1 Stakeholder groups and agencies

The reconstruction of the Inner Loop I-65 / I-70 (the "Project") requires putting forward a new stakeholder collaboration to deliver the project with improved goals and benefits for the community surrounding the project and for the users of the highway system. The project would involve various stakeholders who represent differing roles and interests, like other megaprojects of its nature.

The stakeholder groups and agencies identified are as following:

- INDOT – INDOT owns the right of way and is responsible for the operations and maintenance and rehabilitation of the Inner Loop. INDOT as the lead transportation agency, and potential Project sponsor, is a key decision maker regarding the project's design performance, approvals, operation and maintenance, and funding.
- Indiana Metropolitan Planning Organization (MPO) - MPO is a relevant stakeholder as the redevelopment potential generated by the Project may have regional implications in terms of employment and housing and the trips associated with these.
- City of Indianapolis - City of Indianapolis could be a co-project sponsor with INDOT. The City is key in adapting land use policy for inclusionary development and integrating land use and

transportation policies and facilitating the creation of land value capture mechanisms to fund the project.

- Private developers /equity investors – private developers and equity investors will develop and potential finance the Project and new developments nearby.
- Community groups & organizations – community groups and organizations are one of the major stakeholders as they will be the prime benefiters of the Project. The local community does not own the right of way nor will co-fund the Project. However, it is important that their voices are heard, and measures are put in place to protect these groups while supporting the area's growth.

The table below describes potential partnerships to achieve social equity goals for this Project. Various entities would play a role in achieving social equity with the Reconstruction of the I-65/70 Inner Loop.

Figure 1. Reconstruction of the Inner Loop and Stakeholders

Entity	Role
	• **Design** an alternative that addresses the partnership's wider connectivity, social equity and economic development goals
INDIANAPOLIS	• Adapt land use policy for equitable and inclusive development • Integrate **land use and transportation** policies • Establish special district for **value capture & funding**
INDY CHAMBER RETHINK 65 70 COALITION	• **Leadership building** for equity, transit integration and regional economic development • **Ongoing community engagement** to align design with equity and social objectives

2.2 Governance Structures

The governance structure will have a significant impact on the options available to the governing authority for the planning, design and construction and operations and maintenance phases of the Project. The best alternatives should be evaluated against the goals of the Project, technical, financial or political constraints and the extent to which there is a desire and will to leverage private sector innovation.

Establishing a clear and robust governance structure will be key to successfully navigating applicable permitting and regulatory processes and realizing efficiency and the long-term goals of the Project. In addition, the governance structure will determine the array of contracting options available to deliver the individual components of the program and establish the decision-making powers and scope of

involvement of INDOT and the State of Indiana. For example, a governance model suited for the creation and maintenance of transit-oriented development projects may not be the same structure suitable for public open space. Similarly, the use of a design-build construction method may be feasible under one governance structure but not under a different structure. In this memo, Arup discusses two principal governance structures: co-sponsors and joint power authority. The two governance structures are defined as following.

- Co-sponsors – two or more sponsors sign a cooperative agreement under which the entities jointly procure a project. Each entity will have their own set of responsibilities based on a Memorandum of Understanding (MOU).
- Joint power authority – is an entity established under a joint power agreement between two or more public authorities i.e. local governments, transportation agencies. A separate operating board of directors is established, and the board can be given any of the powers inherent in all of the participating agencies. The joint power agreement states the powers the new authority will be allowed to exercise.

Sections 2.2.1 and 2.2.2 illustrate both structures based on empirical examples.

2.2.1 Presidio Parkway – Co-sponsors

Presidio Parkway is a complete replacement of San Francisco's primary access to the Golden Gate Bridge, approximately 1.6 mile stretch of roadway. Handling 100,000 vehicles per day, the roadway was nearly 75 years old, deteriorating, and not up to current seismic standards. The project involved an investment of $1.1B and was completed in two phases: phase I was delivered as a design-bid-build (DBB) and phase II as a design-build-finance-operate-maintain (DBFOM).

Stakeholders

The project entailed a complex stakeholder environment including the City of San Francisco, the California Department of Transportation, the National Parks, and residents.

Governance

A co-sponsor agreement was established between the City of San Francisco and the California State Department of Transportation to deliver the project. Here are some elements of the co-sponsor governance that worked:

- Stakeholder priorities: Stakeholders goals and priorities were clearly understood and addressed in a systematic way.
- Responsibilities: Each entity had their own set of responsibilities based on a Memorandum of Understanding.

- Funding: Funding sources were maximized by bringing sources from the co-sponsors and from other government agencies or counties benefiting from facilitating the access from the city to tourist-oriented destinations.
- Environmental documents: The City of San Francisco and the California State Department of Transportation became co-sponsors for NEPA & CEQA.
- Hiring of consultants: The consultants were hired and managed by SFCTA, which reassured the City and the Community that the design approved would incorporate their goals and vision.

As in any project involving multiple stakeholders some of the challenges that came with the co-sponsor governance structure include:

- An extensive planning phase
- Bringing in consultants who can effectively deliver a project while staying independent

2.2.2 Transbay Transit Center – Joint Power Authority

The San Francisco's Salesforce Transit Center (formerly the Transbay Program) is a new $2.2 billion, 1-million square foot transportation facility in downtown San Francisco that delivered both the transportation vision and a development program that changed downtown San Francisco.

As the program nears completion, it will have delivered the following on formerly public lands:

- A new transportation facility for regional and intercity buses, replacing a degraded 1939 building.
- 2.5 million square feet of commercial development, including a 1.6 million square foot 1,050-foot tower.
- 3,000 new residential units

As part of the program, other privately-owned parcels were up- zoned and catalyzed by the Transbay development, resulting in a total forecast delivery of about 6.5 million square feet commercial, about 4.300 residential units and 1,000 hotel rooms.

Later phases include additional private development, public amenities (parks under freeway ramps), and an extension of the San Francisco to San Jose commuter rail system into Salesforce Transit Center.

Stakeholders

The project entails serving different transportation modes (regional buses and rail) and leverages on City's and formerly state-owned land and thus demands the interaction of multiple stakeholders: The City of San Francisco, San Francisco Municipal Transportation Agency, California High Speed Rail, and other regional agencies.

Memorandum

Governance

The TJPA was formed for the single purpose of developing, approving and then managing the Salesforce Transit Center. It consists of four voting member agencies – the City and County of San Francisco, the Alameda-Contra Costa Transit District (the regional bus operator), the Peninsula Corridor Joint Powers Board (the San Francisco to San Jose rail operator), and the California High Speed Rail Authority (which will also use the facility). There are seven voting members of the Board: San Francisco has four, and the other agencies have one each. Here are some elements of the joint power authority that worked:

- Transparency: Stakeholders interact and make decisions during public forums
- Responsibilities: Mid-level City staff was committed to do the project
- Funding: Funding sources were maximized by bringing sources from multiple agencies and regional tax measures. A key contributor to the project funding has been the land redeveloped within one mile from the Transit Center. The City sold public land[1] and created a tax increment financing district and a special assessment district.
- Environmental documents: City was the lead agency for CEQA/NEPA and TJPA assumed the document
- No bureaucratic history: More streamlined agency

Here are some of the challenges that came with the joint power authority governance structure:

- Contractors knew that they could not form a long-term relationship with TJPA – it was challenging to get bids in a hot market.
- Train operating agencies did not have incentives to cooperate with TJPA. The regional commuter rail agency perceived the project as a hurdle rather than as an opportunity to improve operations. A lesson learned from this experience is that stakeholders need to have tangible incentives to participate, otherwise, the project may not advance or may be excessively delayed.

[1] All the 19 acres in downtown San Francisco were former freeway rights-of-way or the old Transbay Terminal. The city zoning was P-Public, meaning that only a public use (park, police station, etc.) was allowable. As a result, technically, the land had zero value. It was possible for the state department of transportation (Caltrans) to develop the property itself and then sell it off, but that was an activity the agency was/is not familiar with which entailed potential legal issues for non-compliance with the zoning. Instead, Caltrans negotiated with the city. The incentive for Caltrans to negotiate with the city was the opportunity to allocate to the latter the responsibility to fund the new Transbay Terminal and its operating expenses. Caltrans agreed to transfer the land to the city under the following conditions:

- all direct property sales proceeds could only be used for the hard costs (construction related expenses) of the new terminal
- all tax increment financing (TIF) less the required school district share needed to be dedicated to the project. TIF could pay for both construction and operations.
- the new Transbay Terminal needed to be operational at a certain date, otherwise Caltrans would take back all the property.

2.3 Conclusions

Any form of governance structure will have pros and cons. It is important to establish a governance structure that will efficiently deliver a project. With any governance structure, it is crucial for the key stakeholders to work together in understanding each other's priorities. Additionally, incentives and drivers for all key stakeholders are essential to ensure cooperation. Financial incentives may be considered as an incentive for stakeholders to productively engage in the project, this could mean provisional budget for operation and maintenance or for expansions.

3 Funding and Financing

3.1 Overview

Funding and financing are of primary consideration for the implementation of any project. Megaprojects tend to rely on various funding sources: local, regional, state, and federal. Indiana has experience delivering large projects and relying on multiple sources of funding.

To accelerate project delivery, funding sources are used to secure financing. Funding is defined as the public spending or the revenue that pays for the development and maintenance of an infrastructure asset. The funding is the money that does not have to be paid back. Financing is defined as the structure and related instruments used to securitize future funding sources. It's the money that is borrowed to develop a project, and that is later paid back from the project funding sources.

This section presents three case studies to illustrate how large projects rely on multiple funding sources to secure financing, including land located in proximity to the project, as is the case of the Transbay Transit Center in San Francisco and the West Lake Corridor Commuter Rail in Indiana. Using the South Leg as an example we illustrate how the land created by Recessed Concept can significantly contribute to fund the Project.

3.2 Case Studies

3.2.1 Presidio Parkway Case Study

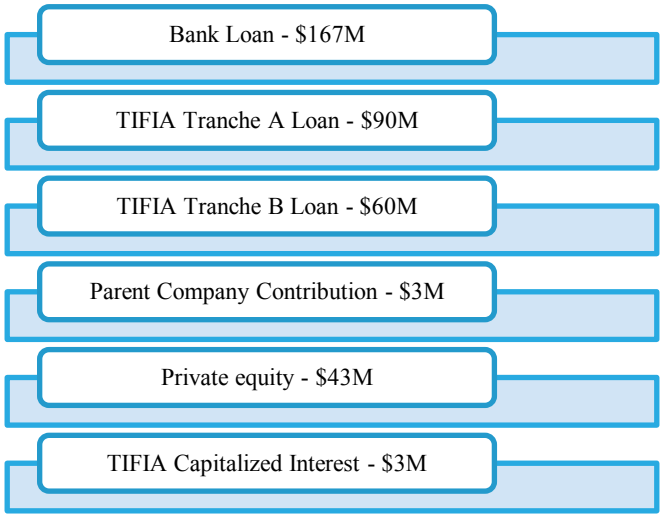
The funding plan for Presidio Parkway consisted of 17 sources as shown in the table below. The sources can be broken down as follows: federal funding contributed to 28%, state funding contributed to 36%, local and regional funding contributed to 36%.

Table 1. Presidio Parkway Funding Sources

Source of Fundings:	Phase I	Phase II	Total
Federal Earmarks and Discretionary Grants	$ 70.8	$ 5.9	$ 76.7
American Recovery & Reinvestment Act	$ 85.8	$ 46.0	$ 131.8
MTC STP/CMAQ	$ -	$ 34.0	$ 34.0
Total Federal Funds	**$ 156.6**	**$ 85.9**	**$ 242.5**
State Highway Operations & Preservation Program	$ 198.0	$ 72.2	$ 270.2
Traffic Congestion Relief Program	$ 15.0	$ -	$ 15.0
Prop K Sales Tax	$ 29.6	$ 36.0	$ 65.6
Regional Improvement Program (SFCTA)	$ 17.1	$ 67.0	$ 84.1
State Local Partnership Program	$ -	$ 19.4	$ 19.4
MTC Bridge Tolls	$ 80.0	$ -	$ 80.0
GGBHTD1	$ -	$ 75.0	$ 75.0
Transportation Authority of Marin	$ -	$ 4.0	$ 4.0
Sonoma County Transportation Authority	$ -	$ 1.0	$ 1.0
Total State and Local Funds	**$ 339.7**	**$ 274.6**	**$ 614.3**
Total Project Funds	**$ 496.3**	**$ 360.5**	**$ 856.8**

Source: Arup with Information from Transbay Transit Center

Phase II of Presidio Parkway tapped into private financing as well Transportation Infrastructure Finance and Innovation Act ("TIFIA"). TIFIA provides credit assistance for qualified projects of regional and national significance. Phase II financing sources are listed in table below.



3.2.2 Transbay Transit Center Case Study

Of the $2.2 billion Phase 1 program cost, almost $700 million was funded by the land sales of previous, excess state highway rights-of-way. This property, which had no zoning prior to program initiation and hence was not developable, was rezoned by the city to high density residential and commercial uses. The state transferred the land to the city and the TJPA with the requirement that the sales proceeds could only be used for hard construction costs. The TJPA retained some land for transportation uses and the city transferred the remainder to the Redevelopment Agency (now the Office of Community

Investment and Infrastructure) to market and dispose of the lands for specific uses with as-of-right entitlements.

An additional stipulation of the state land transfer required the city to use 80% of the property tax increment to further fund other expenses related to the program. These funds flow into the program over 40 years. The city also established a special tax assessment over the entire redevelopment site to pay for additional public infrastructure, and the on-going upkeep and maintenance of parks, streets and other public facilities.

Other funding sources have also contributed to the project including federal, state, and regional.

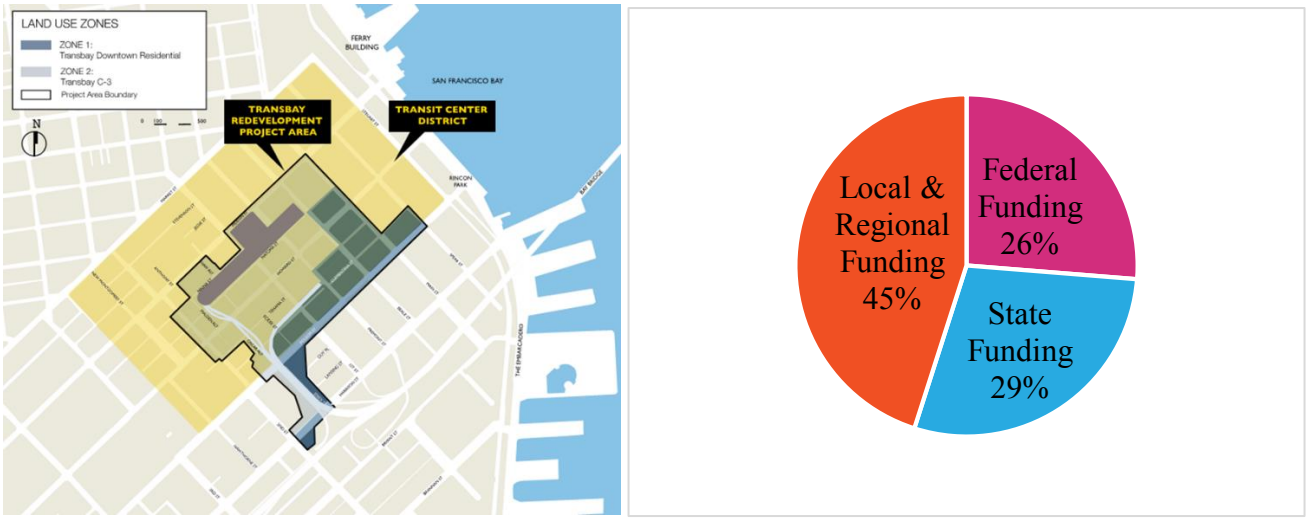


Figure 2: Redevelopment area around the Transbay Transit Center and funding sources

Funding continues to flow into the project, however, there is a funding gap between available resources and the costs of extending the rail service into Salesforce Transit Center. Salesforce bought naming rights to Transbay Transit Center for $110 million in 2017. The sponsorship deal gives it naming rights on the asset for 25 years.[2] A similar naming rights deal could be used to close the funding gap for the Inner Loop Project.

TJPA continues to pursue studies to identify ways to close this gap.

3.2.3 West Lake Corridor Commuter Rail Expansion Case Study

West Lake Corridor commuter rail ("WL Corridor") is a new commuter rail corridor between Dyer/Munster & Hammond for service to Millennium Station/Chicago in Lake County, Indianapolis. This project aims to bring regional economic development and to mitigate highway congestion. The expansion project includes an 8-miles long rail extension, 1.5-mile long elevated structures and 157

[2] SF Chronicle, "Salesforce buys naming right to Transbay Transit Center", July 7, 2017; https://www.sfchronicle.com/bayarea/article/Salesforce-buys-naming-rights-to-Transbay-Transit-11274011.php

acquisition parcels. The construction cost is $555 million and total project cost estimated at $933M. The funding sources are as following: Federal Transit Authority New Starts around 50%, State funding 20%, NW Indiana Regional Development Authority and local governments funding, which include State disbursements to RDA, around 30%.

Significant West Lake project funding support from local governments is based on recent State-enabled Transit Development District designation (special purpose Tax Increment Finance districts) for underdeveloped areas associated with new stations, essentially funding the four stations and their district infrastructure as a necessary part of the project's capital cost and funding. Unified development plans for the districts focus on accelerating their market potential.

West Lake Corridor commuter rail is funded through a complex bundle of federal, state, regional Development Authority and local government funding over the project's 30-year bonding period.

3.3 South Leg Potential Funding and Finance Sources

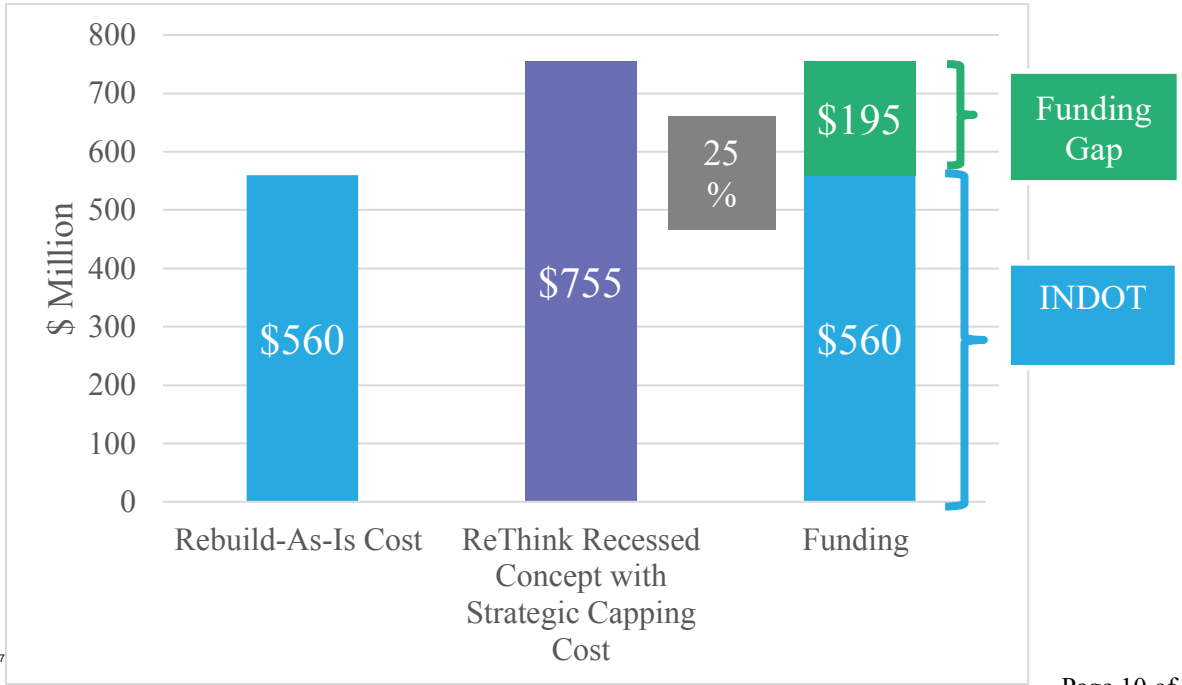
The ReThink Recessed Concept can create more than 45 acres of developable land to leverage upon to close the funding gap between the recessed concept and the rebuild-as-is option. The following funding approach for South Leg is provided for illustrative purposes.

Arup's cost estimates for the South Leg are as follows:

- Rebuild-as-is cost is $560 million
- ReThink Recessed Concept with strategic capping cost is $755 million

This means that an additional 25% investment or $195 million is the funding gap for the South leg. Arup assumes that the $560M of the $755M equivalent to the rebuild-as-is cost will be funded by INDOT.

Figure 3. South Leg Funding Gap

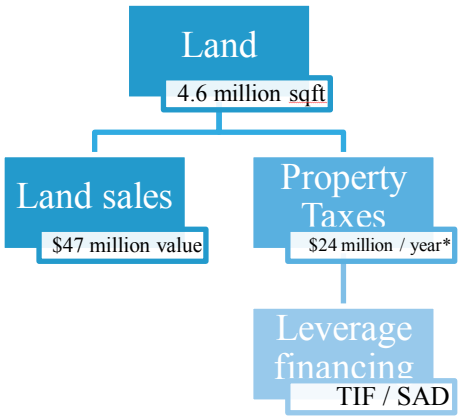


The ReThink Recessed Highway Concept could create 10 million square feet of land for redevelopment and the South Leg is estimated to contribute with near 50% of it or 4.6 million square feet. Land sales and property taxes of new development have the potential to significantly contribute to reduce the funding gap.

Arup estimates land sales for the South Leg to be approximately $47 million. At full development, property taxes from new development can generate $24 million per year and a share of this could be allocated to fund the project through a Tax Increment Financing (TIF) and/or a Special Assessment District (SAD). The revenue from property taxes could be used as a source to secure financing and accelerate project delivery. There precedent in the market of mega projects relying on value capture mechanisms to secure financing, such is the Transbay Transit Center.

The Figure below illustrates how lands sales and property taxes can contribute to reduce the funding gap.

Figure 4. Land as an asset to reduce the funding gap



Arup performed a sensitivity analysis and examined two land leverage scenarios for the South Leg: low land leverage and high land leverage.

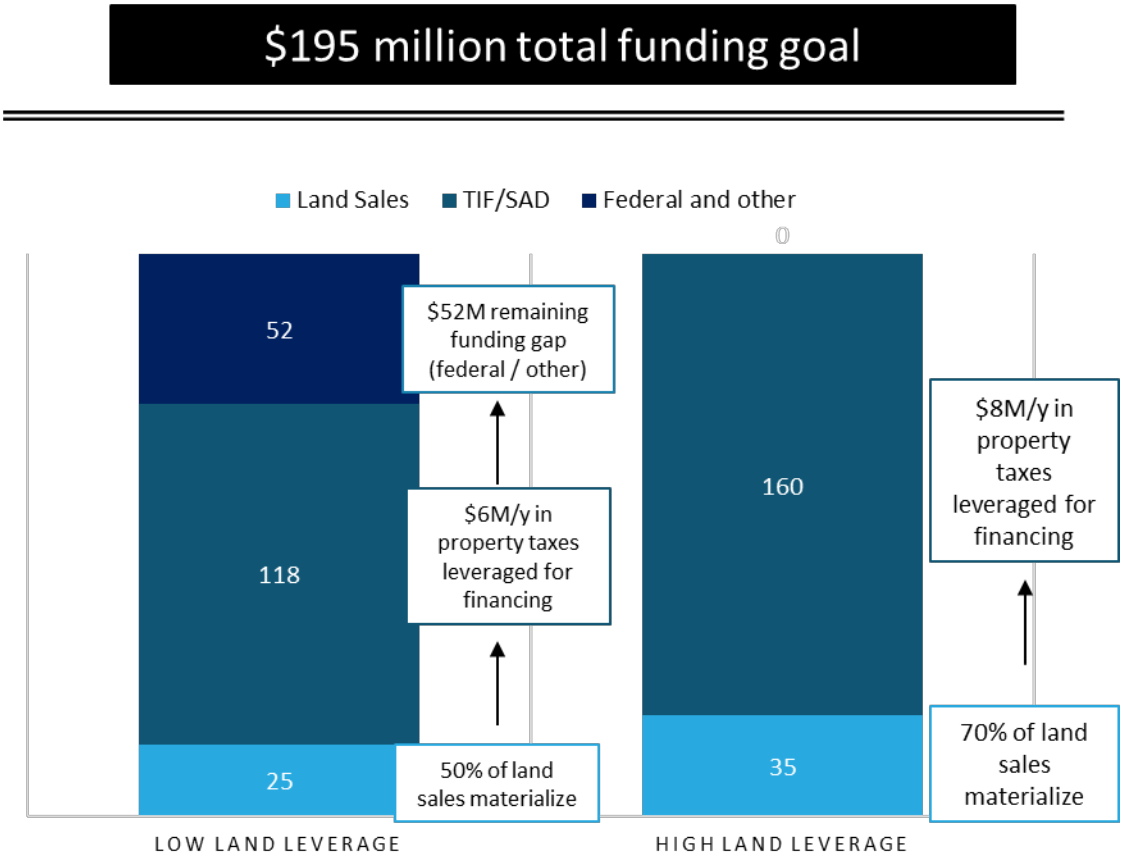
The low land leverage scenario assumes that:

- 50% of land sales materialize, this means sales equivalent to $25 million out of the near $50 million total estimates for the South Leg and $12 million potential in property taxes.
- $6 million per year in property taxes or 50% of the tax revenue potential are leveraged with TIF/SAD to secure 30-year debt for $118M,
- The remaining $52 million funding gap would be funded with federal/state grants and other sources.

The high land leverage scenario assumes that:

- 70% of land sales materialize or $35 million and generate near $17 million per year in property taxes
- $8 million per year in property taxes are leveraged with TIF and/or SAD to secure 30-year financing for $160M.

Figure 5. Low and High Land Leverage Scenarios



3.4 Conclusions

As the South Leg funding and financing example illustrates, the land created by the Recessed Concept can be a major contributor to reduce the funding gap via land sales and property taxes on new land to secure financing.

4 Schedule and Planning

The development of a megaproject requires the development of a project concept, an assessment of environmental and project impacts, a formal adoption of the project, engineering design (at various phases of the project), financing, and finally project delivery (the construction and commissioning phases). This section provides an overview of the potential schedule and planning process associated with the Project.

The proposed program consists of three distinct projects – the South Leg, the North Leg and the East Leg. We assume that due to rules on segmentation in the environmental process, all three legs would be studied in the draft environmental document, and the South Leg would proceed into preliminary design as part of a Final Environmental Impact Statement and federal Record of Decision. (The North and East Legs would proceed separately into their respective Final Environmental Impact Statement (FEIS) processes as appropriate).

Pre-DEIS: Prior to the initiation of the DEIS, pre-environmental activities, including conceptual planning, policy discussions, funding considerations, and formal or informal agreements among the stakeholders. At the end of the process, the stakeholders, including the MPO, agree that the process will proceed and issue a Notice of Intent (NOI), which is a formal announcement of intent to prepare an EIS.

Duration: Up to 18 months.

DEIS: After a NOI is issued, work starts on the NEPA environmental impact reporting process. During this period, design alternatives for all three Interstate segments are developed, considered and assessed for their technical feasibility and for their overall impact on the environment, on the community and on the economy. At the end of this process, a draft Environmental Impact Statement is issued, along with a Locally Preferred Alternative. We assume the LPA will be limited to one of the three segments, to allow that highest-priority project to move forward.

Duration: 18 to 24 months.

FEIS: In the FEIS, emphasis is placed upon developing a 30% engineering design for the preferred alternative, allowing a full review of environmental and social impacts. As part of this analysis, associated land use changes – especially those that create funding for the project – will also be assessed. The 30% design can start immediately after the DEIS is issued, or can proceed at-risk concurrently with the DEIS, saving about six months. Revised cost estimates will also be performed as the 30% design is completed. At the end of this process, the FEIS is issued, and FHWA issues a record of decision.

Duration: 12 to 16 months

Associated Studies and Agreements: As the DEIS is proceeding, the South Leg Land Use and Redevelopment Plans are initiated and executed. These are critical to financing, as proceeds from land are expected to assist in financing the project. These studies will:

- Determine and obtain approval for land use designations
- Determine 'development envelope': maximum allowed FAR and land use per parcel, to be included in EIS certification,
- Linking to value capture and other financing mechanisms (included in F.EIS)
- Optional: entitlements for new parcels (to then bid to developers)

In addition, other studies include financing and governance and project delivery structures.

Duration: 18 months

Design and Construction: Design and Construction process and duration will depend on the preferred procurement method and overall phasing. Given the preference for Design-Build procurement method for similar projects, schedule has been developed assuming design-build procurement for the project. Developed design and construction schedule is only indicative of one possible execution plan and may not be the most efficient plan as all constraints (financing, contractor availability, etc.) and opportunities have not been considered in developing it. Following assumptions have been made in development of design and construction schedule:

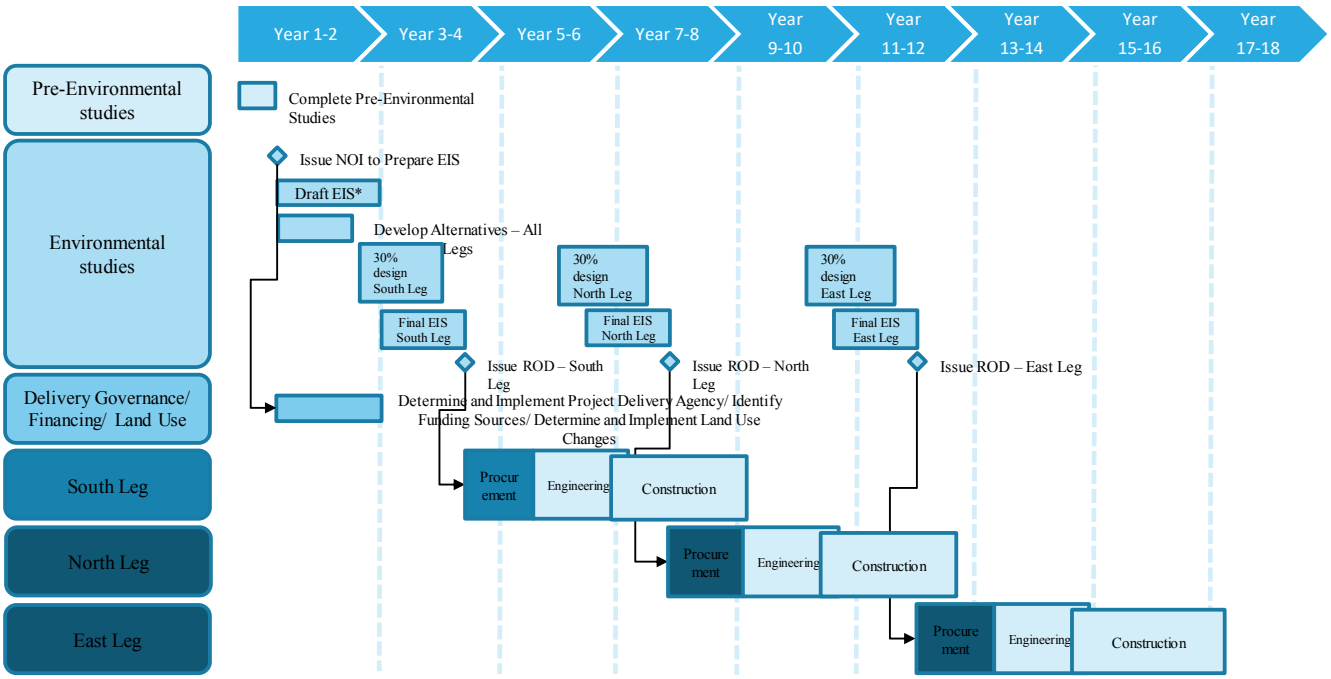
- Design-Build procurement will be used as a contracting method
- South, North and East legs would be awarded in a separate contract
- F.EIS process for each leg would be performed separately
- Design and construction for each phase would have overlap to realize benefit from using DB procurement method.
- Contracting and FEIS for (to be awarded) 2nd and 3rd legs would be planned such that construction for each leg is sequential and pre-construction activities such as procurement and F.EIS are completed "just in time" to enable contract award.
- Contract procurement duration – 8-9 months for each leg
- Post award design duration – 21 months with 7 months of construction overlap
- Construction would be phased such that current freeway in one direction for each leg is de-commissioned and rebuilding work is performed efficiently

Design and Construction Duration

- South Leg – 47 months
- East Leg – 48 months
- North Leg – 50 months

Overall sequence of awarding scope of work for each leg could change without having major impact on the overall program duration.

Figure 6: Project Schedule Example



5 Procurement Alternatives

Different procurement methods, from Design-Build (DB) to Design, Build, Finance, Operate, Maintain (DBFOM), can be considered to deliver the Project. Each entails different levels of involvement from the private sector, which are a function of the stakeholders' goals and priorities, such as:

- Allocate design, construction and schedule risks to the private sector. This is typically done via DB procurement.
- Allocate design, construction and schedule risks to the private sector in addition to some maintenance and operation components (potholes, incidents response, etc.). This is typically done via a DB procurement including a 5 to 10-year renewable operations contract. By including a short to medium operations and maintenance contract, a good state of repair of the infrastructure is guaranteed.
- Allocate design, construction and schedule risks to the private sector in addition to securing the financing and providing long-term maintenance and operations. This involves 30 to 35-year contract in which the private sector is required to maintain and rehabilitate the infrastructure to high-level standards to adequately serve future generations.

Private infrastructure developers can facilitate financing to expedite project delivery. Yet, private financing is generally more expensive than public finance. Therefore, considerations need to be made as to the value or innovation brought by the private sector versus the cost of private financing.

Procurement alternatives considerations to determine the most appropriate procurement method include:

- Understanding stakeholders' project priorities and goals.
- Understanding which risks are better managed by the private sector vs. the public sector
- Assessing the value and innovation brought in by the private sector.
- Assessing stakeholders' project affordability or ability to commit funds over the life of the asset.

Table 2. Procurement Methods and Risk Allocation to the Private Sector

Risks	DB	DBF+OM	DBFOM
Design	✓	✓	✓
Construction/ Schedule	✓	✓	✓
O&M		5 to 10- year renewable contract	✓
Lifecycle Maintenance		Some components	✓

Memorandum

ARUP

To	Mark Fisher (Indy Chamber of Commerce) Taylor Hughes (Indy Chamber of Commerce)	Date	April 12, 2021
Copies		Reference number	4-05
From	Arup	File reference	273507
Subject	Cost Estimation Memorandum		

1 Introduction

This cost memorandum is a part of the analysis Arup has performed to assess the feasibility and prepare a vision statement for the Coalition Concept for a Recessed I65/70 Interstate around Indianapolis downtown area.

This memorandum focuses on the analysis of the Coalition Concept and Rebuild Concept and compares their respective construction costs.

2 The Inner Loop Reconstruction Concepts

The Coalition Concept proposes recessing existing highway below the existing at-grade highway with strategically capping the recessed highway in specific places around the downtown Indianapolis area. In addition, the main streets are proposed to be reconstructed as overpass or bridges across the recessed highway. It also includes construction of at-grade northbound and southbound boulevard roads running parallel to the recessed highway.

The Rebuild Concept assumes the demolition of existing highway structures (elevated bridges, at grade pavement and on/off ramps) and replacing them as-is, which is replacing at-grade structures with at-grade structures and elevated structures with elevated structures.

The goal of this memo is to present the scope, costing methodology and findings of the cost estimate for both concepts described above. For ease of communication, we shall refer to the recessed highway option with strategic capping as ‘Coalition Concept’ for the entirety of the memorandum.

3 Cost Estimating Methodology

3.1 Estimate Classification

Cost estimates are used primarily as inputs for budgeting cost, value analysis, decision-making, asset/project planning, and schedule control processes.

Each project is defined by scope, cost, and time. It is important to understand the correlation among these factors as a change in any of them will stimulate variations in the other two. If the scope of the project changes, that could have implications on both project duration and project cost. In case duration is increased, it would have impact on the project cost. From planning and project development to the construction of the project, significant changes may occur.

The main objective of the cost estimation process is to provide an estimate based on best practices, independent from potential stakeholder bias and uninfluenced by overly optimistic tendencies or other external factors that can influence the estimations. Arup's Cost Classification Matrix, in Table 1, which is consistent with Association for the Advancement of Cost Engineering (AACE) International recommended practices delineates the methodology used and the resulting estimate accuracy based on the project's design phase. As Table 1 shows at a planning stage, as is the case with the Coalition Concept, the cost estimation level appropriate for this stage is a rough order of magnitude, classified as level 5, where the accuracy is limited and this is reflected by the broad range of the estimates. As the Project moves to more advanced phases of designs, the cost estimates accuracy increases.

Table 1 Cost Classification Matrix

Estimate Level	Description	Design phase	Level of completion	Methodology	Accuracy range
5	Rough order of magnitude	• Planning • Schematic design	0% to 5%	• Parametric models • Capacity factored • Historical costs	L: -20% to -50% H: +30% to +100%
4	Concept feasibility	• Planning • Schematic design	1% to 15%	• Equipment factored • Parametric models	L: -15% to -30% H: +20% to +50%
3	Budget authorization	• Planning • Schematic design • Design documents	10% to 40%	• Unit costs • Assembles	L: -10% to -20% H: +10% to +40%
2	Budget control estimate	• Preliminary design • Engineering • Design documents • Construction	30% to 70%	• Detailed unit cost • Detailed take-off	L: -5% to -15% H: +5% to +30%
1	Bid	• Detailed design • Engineering • Construction	50% to 100%	• Detailed unit cost • Detailed take-off • Production based estimate	L: -2% to -5% H: +3% to +15%

3.2 Methodology

Arup has developed an independent cost estimate for Coalition Concept. Based on the analysis recommended in Section 2.1 we have developed a Work Breakdown Structure (WBS) to capture all elements of the construction.

Major categories for WBS include:

- Direct cost
- Indirect cost
- Soft costs
- Contingencies/reserves

3.2.1 Direct cost

Direct cost includes labor, material and equipment needed for the construction.

3.2.2 Indirect cost

Indirect cost captures all cost for the contractor, which cannot be directly appropriated to a single construction item. It includes all site related cost, temporary utilities, parking, laydown areas, cost for quality control and surveying. It also includes equipment mobilization and demobilization, as well as all construction related management of traffic.

At the planning phase all indirect cost is estimated as a % of direct cost:

- Indirect cost (General conditions and general requirements) – 15%
- Management of traffic – 3%
- Mobilization and demobilization – 5%
- Overhead and Profit – 10%
- Construction Contingency – 10%

This is common industry practice and is based on the previous projects, similar in size and scope, as well as estimators experience.

3.2.3 Soft Costs

Soft costs for typical construction projects include, but are not limited to the following:

- Preliminary Engineering – 2%
- Final Design – 10%
- Geotech and environmental investigation – 2%
- Project and Construction Management – 2%
- Permits, Bonds, insurance, legal fees – 3%

Similarly, to the indirect cost, at this stage of the project development, all the above soft costs are estimated as a percentage of the construction cost (Direct cost + Indirect cost). This is based on previous projects' and Arup internal data base.

3.3 Quantities

Arup used plans provided by the Coalition design team to quantify major construction elements. Given the level of design, all quantities are measured using Google Earth. Assumptions were made in order to estimate major construction elements costs – demolition, earth works, pavement and structures.

Majority of work can be divided into the following categories:

- Demolition
- Earthwork
- Structure, including foundations, retaining walls, ramps and bridges
- Pavement, including roadside apprentices

3.4 Assumptions & Exclusions

Arup engineering team evaluated possible options for the construction means and methods to build a recessed interstate in a highly urbanized area to provide the relevant information needed for the cost estimate and the construction work needed to develop the required infrastructure.

Arup has done analyses for various geological factors that could have implications on construction methods, construction duration and future asset management. In evaluation and analysis of groundwater impacts, we analyze different factors such as ground water table, its depth, type of soil, drainage of the soil, etc. that eventually helps to decide additional project scope entities such as waterproofing and drainage needs and if required, to what extent. It also aids in concluding the type of footing and foundation that needs to be constructed, depth of base slab, etc. These factors can heavily impact construction duration and methods. To accurately evaluate all our analysis, Arup has implied the following list of technical assumptions and exclusions to estimate the cost for recessed highway with utmost accuracy:

3.4.1 Assumptions

- **Project Phasing** – To minimize traffic change impacts in the downtown area of Indianapolis, a carefully executed construction and phasing plan is indispensable. The Coalition Concept is divided into three areas – North, South and East leg (described further in Section Concepts Scope). All legs (north, south and east) of the highway are assumed to be constructed independently and to be done sequentially for each bound (northbound and southbound) direction to ascertain easy flow of traffic throughout construction without any disruption or major detours. Refer to the Implementation Task Memorandum for more details on scheduling and planning.
- **Recessed Interstate** – The main structure assumed for the new interstate is recessed under the level of local streets, with retaining walls. Total width includes 3 lanes in each direction, with shoulders and median in between.
- **Height clearance** –The required height clearance needed for cross street bridges and strategic capping over recessed interstate is assumed to be 16.5 feet.
- **Construction methodology** –To manage existing ground water and reduce construction footprint, sheet piles are assumed.
- **Strategic Capping** – the length for the strategic capping over the recessed interstate is assumed to be no more than 3,280 feet (1,000 meters), as anything longer than the specified length would be classified as a tunnel and will require emergency ventilation.

3.4.2 Exclusions

Following exclusions were considered in the estimating process:

- **Escalation** – any escalation beyond the day of the estimate is excluded. Cost presented in the estimate is in 2020 Q4 US dollars.

- **North Split Interchange** – Replacement of the North Split Interchange, which is currently in the design and construction phase is excluded from the project cost estimate.
- **White River Bridge** – Replacement of the White River Bridge is not included in the project scope and excluded from the project estimate.
- **CSX relocation** – Any major interventions on the CSX line are not included in the project scope.
- **Right of Way** – Any ROW or land acquisition cost are not included in the estimate, as we assume same footprint for recessed interstate.
- **Additional real estate development** – Any additional real estate development construction cost in the vicinity of the project area or building and infrastructure constructed on the interstate capping is not included in the scope of the estimate.
- **Waterproofing & Drainage** – Though Arup was informed that at the moment this report was developed, soil investigations (deep geotechnical borings) were undertaken for the North-South Split project, Arup did not have access to such information. Arup assumed the recessing of the highway will occur above the depth of existing water table, and hence waterproofing the walls and base slab for the recessed highway is excluded. However, waterproofing in case is needed is accounted for in the contingency, as it is still a risk. Additionally, drainage allowance is assumed for the entire length of the recessed highway.

4 Comparative Approach

Arup estimated and compared costs for the Coalition Concept, and the alternative which is Rebuild As-Is. The intent to compare rebuild option to recessed highway is to first evaluate the cost to rebuild the highway, a cost which is inevitable in due time, due to imminent end of useful age of the structure and then, evaluate the cost to build a recessed the highway around the downtown, a concept that can provide colossal sociological and environmental benefits compared to merely rebuilding the highway structure as-is that adds minimal additional value to downtown Indianapolis area.

4.1 Concepts Scope

- The **Coalition Concept** includes recessing I-65/70 approximately 16.5 feet below ground (clearance), building overpass for cross streets, and strategically capping the highway as shown in Figure 1 Coalition Concept – Recessed Highway with Strategic Capping project limits. The cost estimate includes demolition of existing structures, pavement and ramps, recessing the highway, and building cross streets over the recessed highway to reconnect the local network. It also includes building boulevard roads, northbound and southbound. The estimate also has cost for new lighting, conduits and cables for electrical works, new signs, striping, traffic lights, utilities relocation, etc. Detailed cost estimate is provided in Section 9.

- **The Rebuild-As-Is** alternative entails the demolition of the existing structures and pavement of I-65/70 highway and replacing like with like in the current configuration (elevated or at-grade structures as present, and on/off ramps as present). The Rebuild-As-Is assumes design and construction use current updated design standards as an improvement to current conditions. Detailed cost estimate is provided in Section 10.

The project scope includes interstate I-65 and I-70 around downtown Indianapolis area from E 16th St in the north to the White River bridge in the south. The estimate is broken down for the three segments – North Leg, East Leg and South Leg. The project limits are the same for the two estimates and are:

1. North Leg – 16th St to College Ave
2. East Leg – 10th St to E Washington St
3. South Leg – S East St to White River bridge

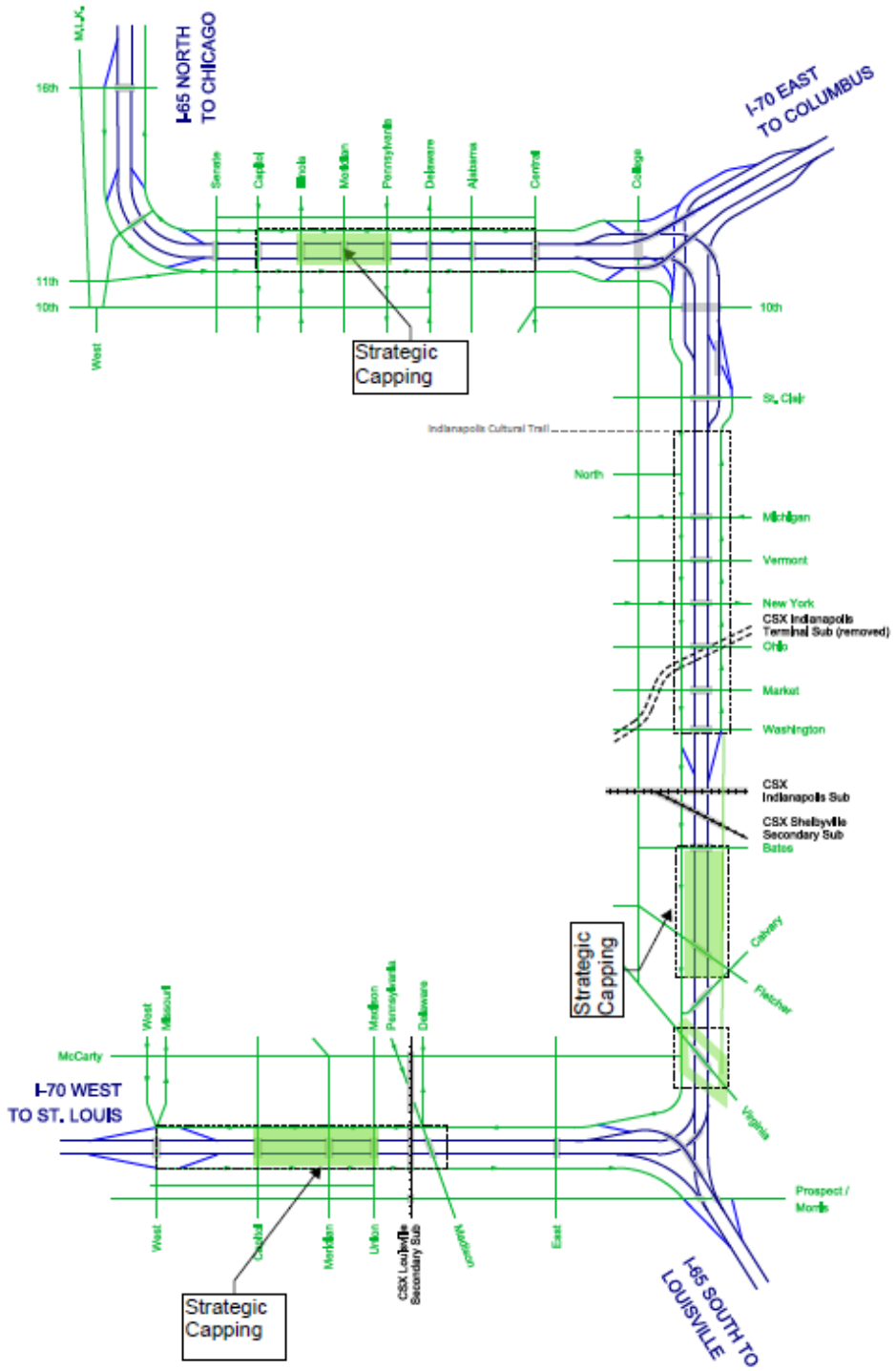


Figure 1 Coalition Concept – Recessed Highway with Strategic Capping project limits

4.2 Lane Miles

The cost estimates are based on the lane miles required for each concept. Lane miles include lengths of the mainline highway as well on on/off ramps. There are higher number of on/off ramps in Rebuild Concept which increases the number of lane miles for this option. The Coalition Concept, on the other hand, has less number and lengths for on/off ramps. The table below shows the total lane miles required for each leg of the highway.

Table 2 Lane miles for each leg of Interstate. Source: Arup

	North Leg	East Leg	South Leg	**Total**
Coalition Concept	12.5	8.2	6.7	**27.4**
Rebuild	14.4	7.5	10.7	**32.6**

5 Comparative Cost Estimates

5.1 Coalition Concept Cost Estimate

Detailed cost breakdown for the coalition concept is given in Table 3. The total direct cost is divided into 6 major categories:

- Demolition – includes removal of existing structures, relocation of existing utilities, etc.
- Earthworks – includes all earthworks related to recessing the highway
- Pavement – includes all pavement for highway, on/off ramps and boulevard roads.
- Structures – includes all cross streets running over the recessed highway, including strategic capping between certain cross streets.
- Lighting – includes lights, traffic lights, all cabling and conduit associated with electrical works
- Roadway – includes all roadway appurtenances

Table 3 Detailed Cost Estimate – Coalition Concept

Coalition Concept - Recessed highway with strategic capping (in $2020 million)					
		North Leg	South Leg	East Leg	Total
Demolition		$99.6	$39.6	$76.0	$215.09
Earthworks		$161.3	$121.3	$109.3	$391.79
Pavement		$78.4	$42.2	$58.3	$178.84
Structures		$202.2	$153.9	$181.0	$537.00
Lighting		$5.9	$3.5	$5.2	$14.51
Roadway		$12.2	$7.9	$17.7	$37.74
Total Direct Cost		$560	$369	$448	1,377
Indirects	15%	$84	$55	$67	$206
MOT	3%	$17	$11	$13	$41
Mobilization & Demobilization	5%	$28	$18	$22	$69
OH&P	10%	$56	$37	$45	$137
Construction Contingency	10%	$56	$37	$45	$13
Subtotal		$241	$159	$193	593
Total Construction Price		$800	$527	$641	$1,966
Final Design	10%	$80	$53	$64	$197
Geotech and Environmental Investigations	2%	$16	$11	$13	$39
Preliminary Engineering	2%	$16	$11	$13	$39
PM/CM	2%	$16	$11	$13	$39
Permits	3%	$24	$16	$19	$59
Subtotal		$153	$101	$122	$376
Total Construction Price with Soft Costs		$953	$628	$761	$2,342
General Contingency	20%	$191	$126	$153	$470
Total Construction Price with Risk Based Contingency		$1,145	$755	$916	$2,808
High Cost Range	50%	$1,714	$1,128	$1,370	$4,212
Low Cost Range	-30%	$800	$526	$639	$1,965
Average cost per lane mile		$91	$112	$111	$102

5.2 Rebuild Concept Cost Estimate

Detailed cost breakdown for rebuilding the existing highway is given in Table 4 Detailed Cost Estimate – Rebuild Concept). The total direct cost is divided into four categories:

- Demolition - includes removal of existing structures, relocation of existing utilities, etc.

- Structures – includes elevated highway
- At grade pavement – includes all at grade pavement of highway and on/off ramps
- Additional services - includes all roadway appurtenances

Table 4 Detailed Cost Estimate – Rebuild Concept

Rebuild Highway (in $2020 million)						
			North Leg	South Leg	East Leg	Total
	Demolition		$89.9	$61.5	$70.5	$222
	At grade pavement		$73.6	$119.9	$109.7	$304
	Structures		$250.7	$66.9	$169.9	$488
	Additional Services		$41.4	$24.8	$35.01	$102
Total Direct Cost			$456	$274	$386	$1,116
	Indirect/Overhead	23%	$105	$63	$89	$256
	OH&P	10%	$46	$27	$39	$111
	Construction Contingency	10%	$46	$27	$39	$111
Subtotal			$196	$118	$166	$480
Total Construction Price			$652	$392	$552	$1,596
	Final Design	10%	$65	$39	$55	$159
	Geotech and Environmental Investigations	2%	$13	$8	$11	$32
	Preliminary Engineering	2%	$13	$8	$11	$32
	PM/CM	2%	$13	$8	$11	$32
	Permits	3%	$20	$12	$17	$48
Subtotal			$124	$75	$105	$ 304
Total Construction Price with Soft Costs			$775	$465	$655	$1,895
General Contingency		20%	$156	$93	$132	$381
Total Construction Price with Risk Based Contingency			$932	$560	$789	$2,281
High Cost Range		50%	$1,395	$837	$1,180	$3,411
Low Cost Range		-30%	$651	$390	$551	$1,592
Average Cost per lane mile			$ 64	$52	$105	$70

5.3 Coalition Concept v/s Rebuild Highway

To compare the cost for both options, the graph below shows the different costs of recessed highway with strategic capping versus the cost of rebuilding it.

The first bar in Figure 2 shows the cost to rebuild North Leg as is ($932 million) with further breakdown of direct cost ($456 million), indirect cost ($196 million), soft cost ($124 million) and

contingency ($156 million). This cost is compared to the cost of recessing North Leg ($1,145 million) in the second bar.

Similar comparison is made in subsequent bars for South Leg and East Leg. Markups used for calculating indirect, contingency and soft costs are shown in Table 3 and Table 4 in Section 5.1 and Section 5.2 of the report. The differences in direct costs for both concepts lie in the additional scope of strategic capping, earthworks, building concrete walls, placing base slab and building overpass in the recessed highway option. The cost delta between the two options increases with each markup as all mark up costs (contingency, indirect and soft costs) are derived as a percentage of direct cost.

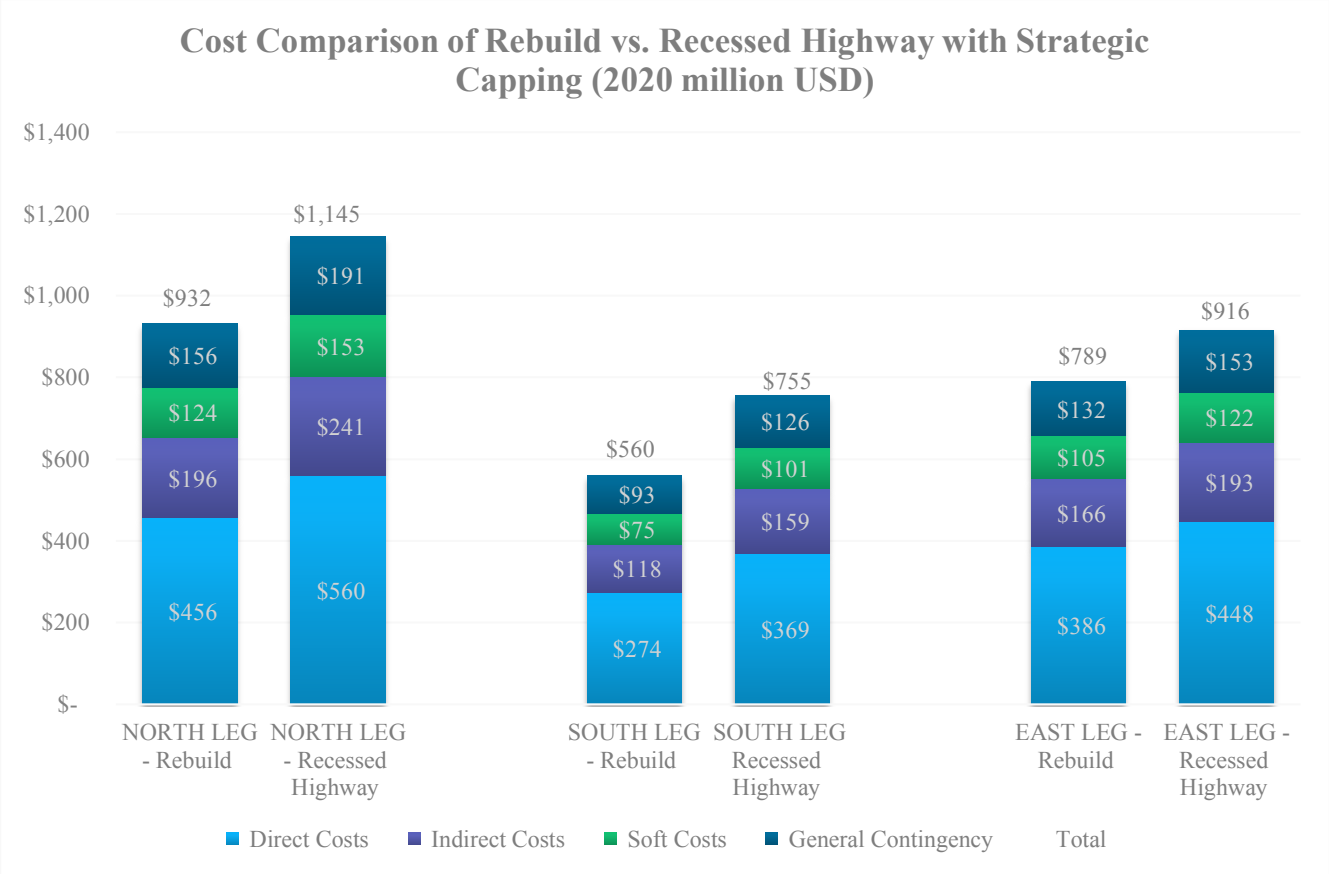


Figure 2 Cost estimate for each leg for Rebuild Concept v/s Coalition Concept (in $2020 Million)

6 Conclusion

This cost estimate is made based on the experience, qualifications, and best judgment of the professional consultant familiar with the construction industry. Arup has no control over the cost of labor and materials, general contractor's or any subcontractor's method of determining prices, or

competitive bidding and market conditions. Arup cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from this or subsequent cost estimates.

Based on the information about this project available to Arup and analysis we have performed on the current market and similar nation-wide data we have come to the following conclusive numbers:

- Arup's average cost estimated per lane mile to rebuild the highway, is approximately $70 million, while that of the Coalition Concept is approximately $102 million. The $102 million per lane-mile cost includes the additional earthwork, overpass as well as strategic capping cost associated with recessing the highway.
- The total construction price with risk-based contingency for Coalition Concept is approximately $2.81 billion while that of Rebuild Concept is approx. $2.27 billion.
- The difference in cost for Coalition Concept compared to Rebuild Concept for North Leg is $213 million, for South Leg is $195 million, and for East Leg is $127 million.

  The delta between the two concepts is not as significant mainly due to the fact that the Rebuild Concept entails rebuilding 5.2 more lane-miles, including ramps, (32.6 lane miles) than the Coalition Concept (27.4 lane miles).

The above discussion concludes that for an (approx.) additional 23.7% cost on a $2.27 billion project, we can build a recessed highway with strategic capping around downtown Indianapolis area. There are many qualitative and quantitative benefits of Coalition Concept over rebuilding the highway as-is. They are discussed at length in 'Implementation Task Memorandum'. A few of them are:

- Reroute and recess interstate traffic to avoid congestion on city streets.
- Better connectivity within the city
- Strategic capping area over recessed highway opens the potential and possibility for its use in community development in the form of recreational parks, open spaces etc.
- Development of a project of such size will require careful planning and procurement for implementation. Meticulous phasing of the project is of utmost importance to ensure flow of traffic within and around the city during the construction.
- Phasing of the project will also impact the final cost of the project in future as escalation costs will be included. Currently, we are assuming 2020 USD only for estimation purposes.