C. Future Context

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The future context of transportation within North Richland Hills (NRH) is defined by anticipated growth, travel patterns, and subsequent transportation infrastructure needs to accommodate this. This future vision is best viewed through multiple lenses to gain a comprehensive understanding of the implications of growth. One lens is the current context and characteristics of the community, as discussed in the previous chapter. Next, a travel forecast model simulates increased mobility demands through demographic growth. This is supplemented with knowledge of planned projects currently programmed for future implementation. A multimodal lens is needed to incorporate an understanding of active transportation integration, often lacking from modeling efforts. Finally, an acknowledgment to the undefined impact and influence of new mobility technologies, like connected automated vehicles (CAV) and rideshare, is needed to frame a system flexible for technological advancement.

Travel Forecast Modeling

A Travel Demand Model (TDM) is a computerized representation of a community or region's transportation system. TDMs use land use and demographic forecasts to simulate the movement of commuters throughout a transportation network under various conditions. Model results are used by transportation planners to display current network conditions and predict what impact changes to the system and/or the environment in which it operates will have on future travel demand. TDMs can be programmed to model all modes of travel utilized in a regional transportation system, including the roadway, transit networks, and bicycle and pedestrian travel.

For this study, the North Central Texas Council of Government's (NCTCOG) 2040 Travel Demand Model formed the basis for modeling efforts. Regional roadway, transit, and bicycle networks are integrated into this model. Local modifications allow additional granularity of the model for local demographic and roadway network expectations.

The model was used to help prioritize projects and aid in making recommendations to the future street network. The model-based analysis was completed through the following steps during the thoroughfare development process:

Modeling Methodology	
1	Update population and employment projections by Travel Survey Zone (TSZ) to reflect 20-year anticipated growth in the City.
2	Update 2040 NCTCOG model networks to match currently adopted Thoroughfare Plan.
3	NCTCOG to run regional network with adjusted demographics and network.
4	Review performance of model outputs on thoroughfare network.
5	Adjust proposed thoroughfare network to reflect needed capacity improvements or possible capacity reductions.

Basic Model Theory

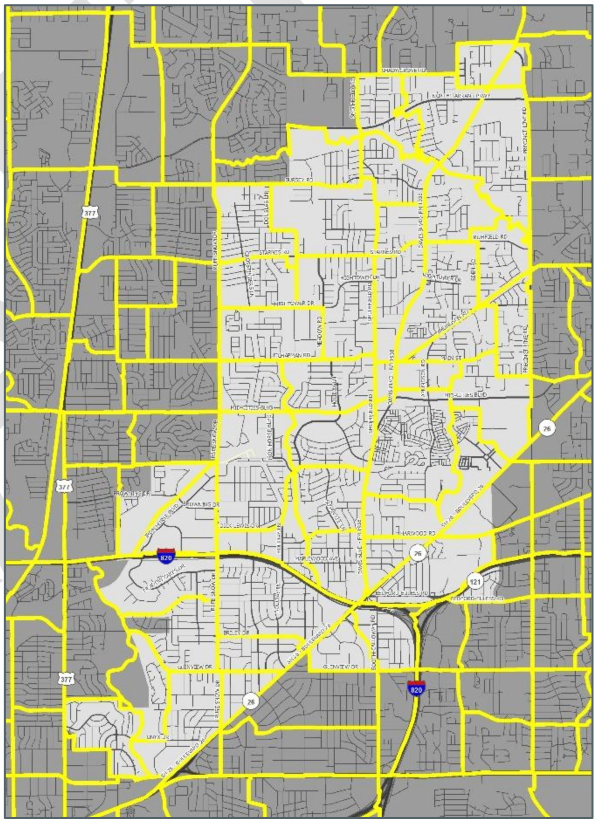
A travel forecast model is comprised of a series of mathematical models that simulate travel on the transportation system. The model divides the city into Travel Survey Zones (TSZ) which have specific demographic and land use data associated with them and are used to determine trip demand and travel patterns. The modeling process encompasses the following four primary steps:

- Trip Generation – the number of trips produced and attracted to a destination or TSZ based on trip purpose.
- Trip Distribution – the estimation of the number of trips between each TSZ, i.e., where the trips are going.
- Modal Split – the prediction of the number of trips made by each mode of transportation between each TSZ.
- Traffic Assignment – the amount of travel (number of trips) loaded onto the transportation network through path-building. This is used to determine network performance.

Methodology

The key demographic data inputs for this TDM were population, households, and employment. Using sociodemographic projections from NCTCOG as a base, the project team evaluated revised sociodemographic projections developed in the recently completed and approved NRH Water/Wastewater Impact Fee Study. Working with the North Richland Hills City Staff, the project team identified any known future growth or development patterns that were altered as part of the land use component of the Strategic Plan. The City provided feedback on NCTCOG's 2017 and 2040 demographics (household population and employment) and helped incorporate planned residential and employment developments into the TSZs for the travel demand model.

Figure C-1. TSZ Structure



After considering the City's feedback, projections for NRH were refined to more accurately reflect where people were expected to live and work in 2040. The project team achieved this by increasing and redistributing the population and employment projection data across the identified TSZs, based on where growth was anticipated to occur.

Base year (2017) and projected year (2040) model runs informed the analysis of travel demand needs. TSZ boundaries, sociodemographics, and the travel network were unaltered from the NCTCOG base information. Refined population and employment projections were not dramatic but were revised for the 2040 model run. The projected year was most affected by network modifications to incorporate the buildout of the City's roadway network with associated additional linkages and ultimate lane configurations.

Travel Demand Model Limitations

As previously noted, the NCTCOG regional travel demand model is regional in nature and not specifically calibrated to assess small area networks or specific corridors. Additionally, the level-of-service derived from the model is a volume to capacity ratio, and does not account for intersection queuing, turning movements, or other operational factors. This is acceptable for a broader view of the network performance, but highly congested arterial facilities may need additional analysis. To better assess the network, key intersections were analyzed using SYNCHRO (see analysis of Target Corridors).

2040 Network Additions

NRH's 2040 network includes a number of long-term network additions to improve overall connectivity within the city. The recommended improvements should be implemented as development unfolds rather than on a specific planning horizon.

Hightower Drive

To match existing lane configurations, the segment of Hightower Drive from Crosstimbers Lane to Holiday Lane was expanded to reflect a 4-lane roadway section.

An extension of Hightower Drive from Smithfield Road stretching east to Eden Road was added to the network. The functional classification of the roadway will be a 2-lane collector facility, providing additional local access to Davis Blvd.

Smithfield Road

Smithfield Road is a vital north-south corridor from Davis Boulevard to North Tarrant Parkway. To match the previous thoroughfare plan, an ultimate section of a 4-lane configuration was built into the travel demand model. Additionally, the connection to Davis Boulevard was realigned to tie in to Bridge Street.

These changes allowed the corridor to avoid capacity constraints within the model and reveal the potential ultimate travel demand on it. This allows the consideration of roadway rightsizing to align travel lane recommendations with this ultimate travel demand.

Other Modifications

To match existing lane configurations and ultimate section expectations, the following roadway segments were modified:

- Rumfield Road – Immediately west of Precinct Line Road; expanded from a 2-lane section to reflect a 4-lane roadway section
- Meadow Lakes Drive – IH 820 to Rufe Snow Drive; narrowed from a 4-lane section to reflect a 2-lane roadway section
- Rufe Snow Drive – Glenview Drive to Boulevard 26; narrowed from a 6-lane section to reflect a 4-lane roadway section

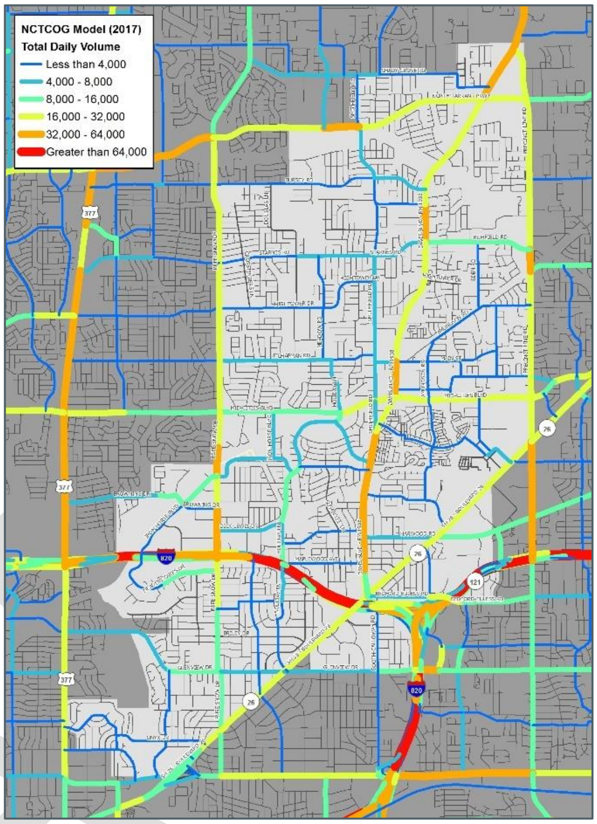
Additionally, to match existing roadway alignments, Amundson Drive was extended from Amundson Road to Main Street to reflect the existing 2-lane roadway section.

Network Operations

The results from the NCTCOG Travel Demand Model help to identify the capacity and thoroughfare needs in the City. The goal of a thoroughfare plan is to balance the supply and demand of the roadways to ensure that the City resources are maximized and the system functions safely and efficiently. The results provide an opportunity for the transportation network to be analyzed to support adjustments where necessary. These adjustments would help to maintain the appropriate network capacity to handle the forecasted traffic volumes, as well as identify areas where other modes of transportation can be incorporated.

The two primary indicators for evaluating the future need is the forecasted traffic volumes and the congestion or level-of-

Figure C-2. Current Modeled Daily Volume



service (LOS). Traffic volumes help to determine the appropriate sizing of a road. Congestion on the other hand compares the projected volumes to the proposed capacity of the roadway; this is known as the Volume-to-Capacity (V/C) Ratio. The results of the V/C Ratio are presented in an A through F grading system with a LOS A roadway representing free flow conditions and LOS F representing extremely congested conditions.

Current Conditions (2017)

A modeling analysis of current thoroughfare network conditions (alignments, lanes, etc.) with current demographics identified several travel characteristics. As expected, the freeway system handles the most traffic for the community, as seen in **Figure C-2**. The traffic is then focused on specific north-south and east-west corridors, such as Boulevard 26, Rufe Snow Drive, Davis Boulevard, Precinct Line Road, North Tarrant Parkway, and Mid-Cities Boulevard. These corridors have higher speeds with 6 travel lanes.

Also significant, traffic volumes highlighted on secondary corridors, such as Rumfield Road, Harwood Road, and Glenview Drive, serve as inter-city connectors and draw higher volumes.

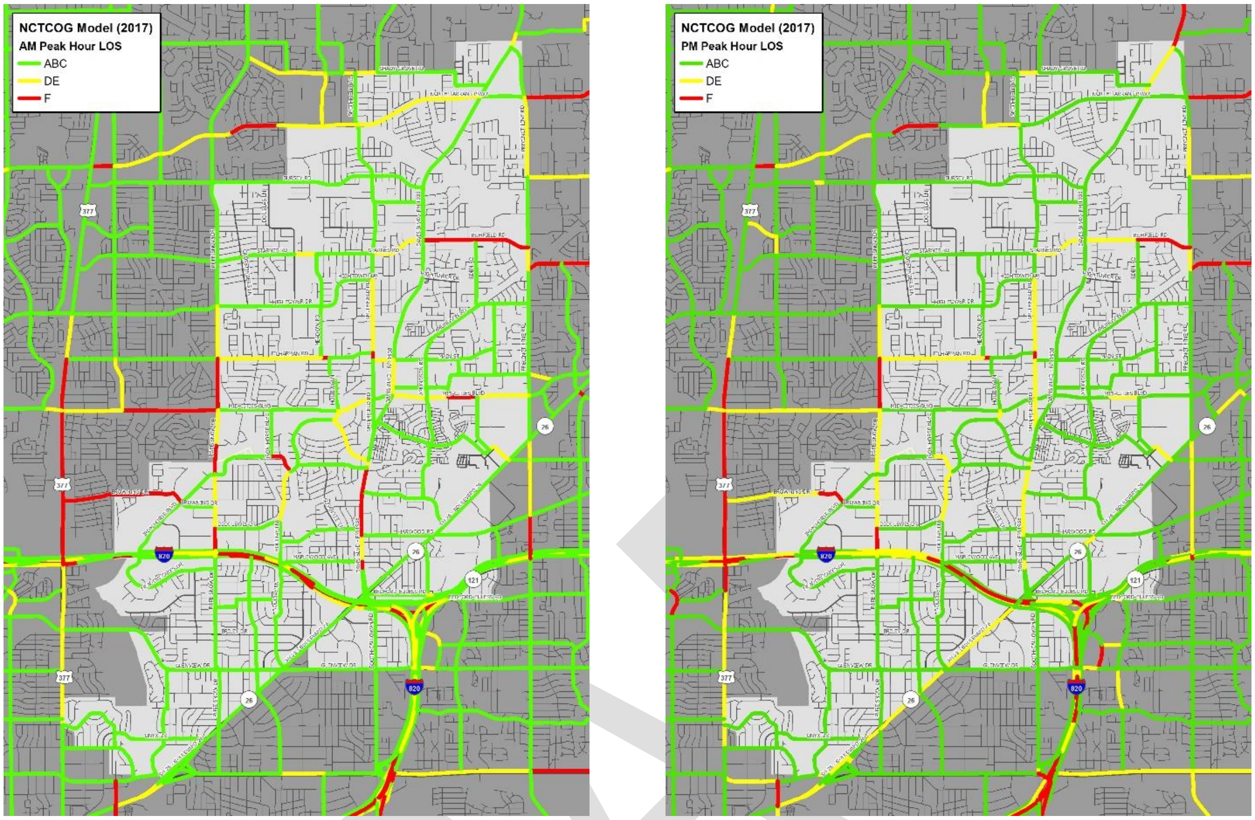
Many of these congested corridors have enough demand for additional lanes but widening may not be feasible due to right-of-way (ROW) and environmental constraints or high cost of implementation. An example of this is Rumfield Road east of Davis Boulevard. Although the model indicates the demand for four (4) lanes, the limited ROW and proximity of adjacent homes limit the viability of capacity improvements along the corridor. This excess demand is considered further through relief in the form of additional parallel routes.

Congestion, as depicted through LOS, reveals the areas where demand is near or exceeds capacity of the current roadway network. Specifically considering peak period congestion, **Figure C-3** shows the morning (AM) and evening (PM) LOS for the City. Heavy volumes on Rufe Snow Drive, Davis Boulevard, and North Tarrant Parkway reveal deficiencies (LOS "F") or maximum usage (LOS "D" and "E") on these corridors. Environmental and ROW constraints limit the potential capacity expansion of these facilities but this realization points toward the need for

Table C-1. Level-of-Service Descriptions

LOS A-B-C	LOS D-E	LOS F
		
Traffic flow in this category moves at or above the posted speed limit. Travel time in this category is not hindered as a result of congestion because traffic volumes are much less than the actual capacity.	This category is slightly more congested LOS A-B-C, however traffic volumes are beginning to reach their capacity of the thoroughfare. Traffic move along at an efficient rate and posted speeds are maintained.	Congestion is apparent in this LOS category. Traffic flow is irregular and speed varies. The posted speed limit is rarely, if ever, achieved in this category. In more congested corridors traffic can be at a mere standstill with limited progression during peak hours.

Figure C-3. Current Modeled Congestion in Peak Hours



future analysis to maximize the capacity potential of these corridors. This can include traffic signal synchronization, access management, and development of alternative routes to shift some traffic.

Future Conditions (2040)

Looking to the future in a potential build-out condition of the City, a modeling analysis of the full thoroughfare network (alignments, lanes, etc.) with build-out demographics identified several travel characteristics. This included the demographic revisions as described earlier as well as network revisions, like the Hightower Drive extension and Smithfield Road lane configuration.

Key traffic corridors, as listed in **Table C-2** and **Table C-3** and seen in **Figure C-4**, remain the same from the current conditions with elevated volumes forecasted for the major north-south and east-west roadways, such as Boulevard 26, Rufe Snow Drive, Davis Boulevard, Precinct Line Road, North Tarrant Parkway, and Mid-Cities Boulevard. Inter-city connectors, including Harwood Road and Glenview Drive, also are forecasted to mature with higher volumes. The extension of Hightower Drive from Davis Boulevard to Eden Road, along with the minimal demographic growth in the northern neighborhoods, reveal traffic along Rumfield Road to remain stable into the future.

Table C-2. Key North-South Traffic Corridors

Key North-South Traffic Corridors	
Name	Forecasted Daily Volume
N. Rufe Snow Drive	30,000-40,000
S. Rufe Snow Drive	15,000
Davis Boulevard	40,000-50,000
Precinct Line Road	40,000
Boulevard 26	35,000
Smithfield Road	5,000-10,000
Holiday Lane	5,000-15,000

Table C-3. Key East-West Traffic Corridors

Key East-West Traffic Corridors	
Name	Forecasted Daily Volume
N Tarrant Parkway	30,000
Mid-Cities Boulevard	25,000-30,000
Harwood Road	25,000
Glenview Drive	10,000-15,000
Bursey Road	5,000
Starnes Road	5,000
Rumfield Road	10,000
Hightower Drive	5,000
Chapman Road	5,000-10,000

Figure C-4. Future Modeled Daily Volume

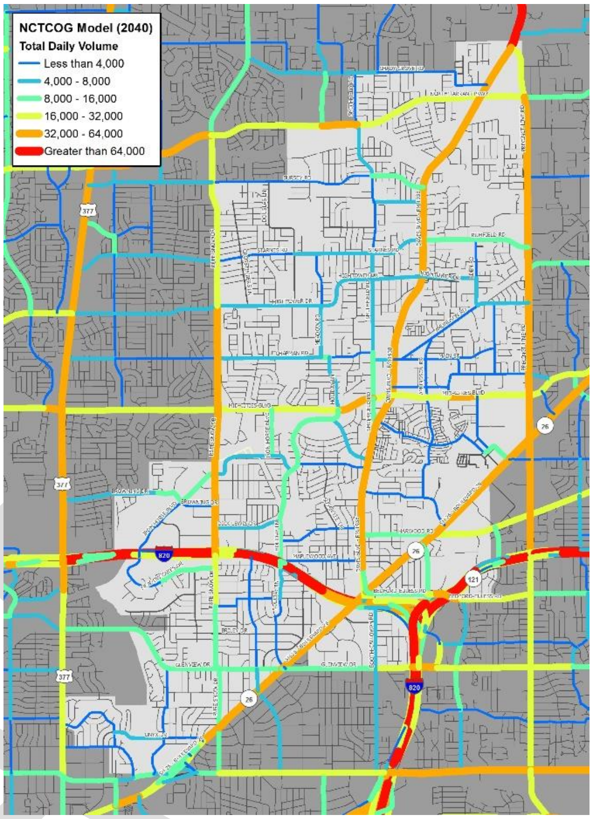
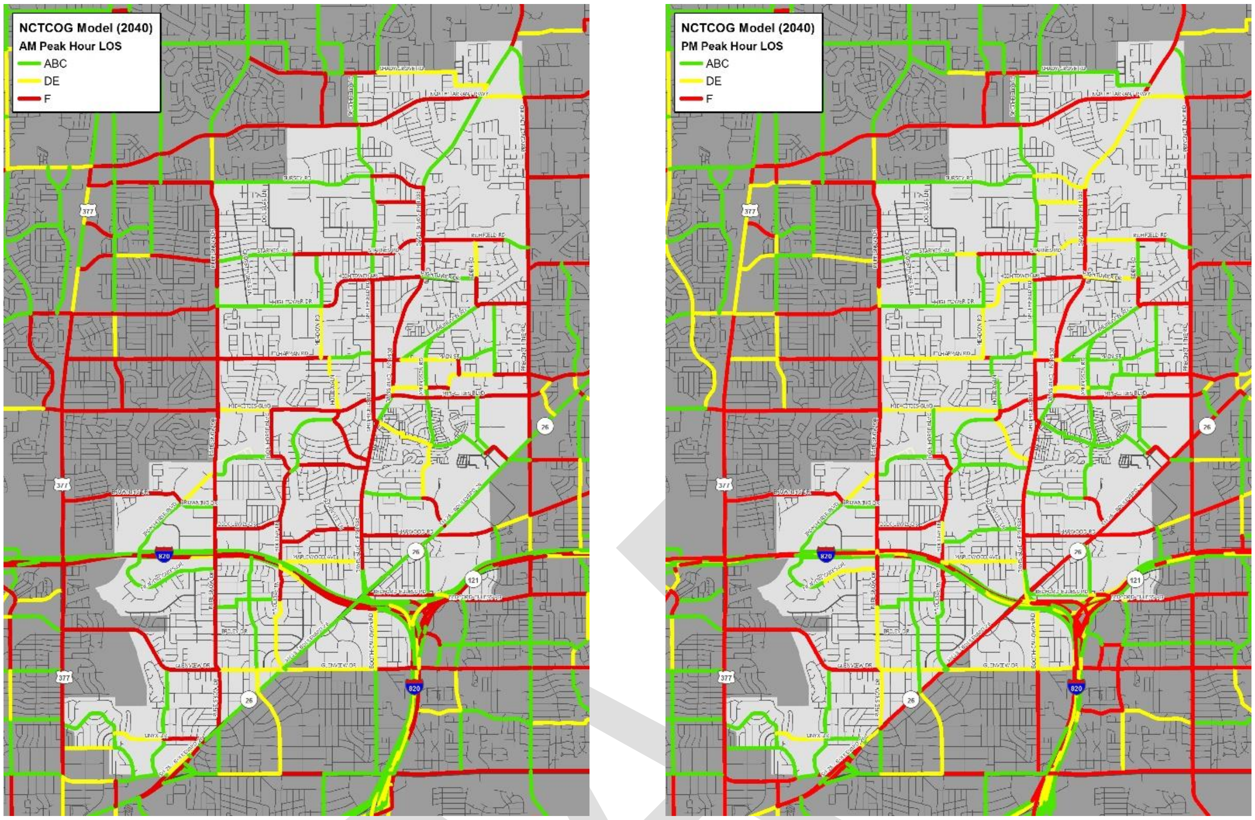


Figure C-5. Future Modeled Congestion in Peak Hours



In regard to LOS, some of these major corridors that are experiencing high projected daily traffic volumes are also experiencing a poor LOS. The LOS depicted in **Figure C-5** corresponds to the NCTCOG Travel Demand Model methodology for LOS determination. This is noteworthy because the peak hour calculation places a burden on lower LOS thresholds (LOS D-E, LOS F) with a passenger car equivalent (PCE) which adjusts volumes in the calculation by a premium of 18-25 percent. By analyzing the effect of this adjustment factor compared to the forecasted volumes, a more precise recommendation for ultimate corridor capacity need was determined.

Key corridors, such as Rufe Snow Drive, Davis Boulevard, Precinct Line Road, North Tarrant Parkway, and Mid-Cities Boulevard, draw concern for the poor LOS. Due to ROW restrictions and current 6-lane configuration, there may not be feasible ways to significantly improve the LOS on the corridor. As mentioned earlier, this LOS may rather be improved through signal synchronization, access management, and development of parallel routes.

Boulevard 26 remains a significant traffic corridor that has not reached its ultimate lane configuration. With 4 existing travel lanes, TxDOT has plans to widen the segment north of IH 820 to a 6-lane section, thereby increasing the long-term capacity. A 6-lane section is also anticipated south of IH 820 in the future to respond to the forecasted travel demand.

Additionally, many corridors in NRH are experiencing low volumes and LOS between A and D. These corridors, such as Bursey Road, Starnes Road, Hightower Drive, Chapman Drive, Holiday Lane, Smithfield Road, and Amundson Drive, provide excellent opportunities where ROW is available to provide additional accommodations for multimodal elements.

Multimodal Basis

An efficient transportation system must serve diverse demands. It would be inadequate for parents to chauffeur kids to neighborhood destinations because of a lack of sidewalks where they would have walked or biked, or force commuters to drive cars when they would rather use public transit or ride share. Physically, socially, and economically disadvantaged people in particular need a way of getting around that does not depend on them owning and operating a vehicle. Multimodal options are important in that everyone can benefit and reach their destination.

RIGHTSIZING
is the process of reallocating pavement and right-of-way space to **better serve** the *context of the roadway* and *goals of the community*

Roadway Rightsizing

Rightsizing is the process of reallocating pavement and right-of-way space to better serve the context of the roadway and goals of the community. A road built many years ago in an undeveloped or developing area was sized for a predicted future condition, but now housing, shops, schools, and other destinations have matured in the community. Traffic conditions have stabilized and are more predictable and the needs of adjacent development is better known. These conditions, prevalent in parts of North Richland Hills, allows the opportunity to rightsize roadways to optimize these assets for the community. Using data from the travel demand model, corridors were identified for rightsizing under two scenario types which both reduce the ultimate number of lanes on the facility.

1. Reallocation - Reducing the number of existing travel lanes
2. Redesignation - Preempting roadway widening by acknowledging a new ultimate sizing

Reallocations consider ultimate vehicular demands and reallocate existing pavement and/or right-of-way space to other uses when excess vehicular capacity remains. Reallocations identified within NRH include both straight lane reductions, such as 5-lane to 3-lane conversions, and conventional 4-lane (undivided) to 3-lane rightsizing conversions. The former are straightforward in the reallocation of space with similar intersection and driveway traffic operations and reducing existing vehicular capacity by the travel lane loss. The latter, the 4 to 3 rightsizing, adds a center turn lane which provides turn movement benefits that often offset the loss in travel lanes (further described in **Appendix C**) and may not impact overall roadway capacity.

Redesignations reconsider future investments in expansion, but existing pavement conditions are unaffected. These are made to align traffic demands with roadway capacity supply, reducing excess infrastructure liabilities and reducing overall City costs. No existing vehicular capacity is lost, only potential future capacity.

It is **important** to note that vehicular capacity is made up of two parts: link-level segments and intersections. While roadway rightsizing reduces link segment lane configurations, **typical capacity bottlenecks are found at intersections so the reduced lane configuration between intersections does not affect true corridor capacity**. Intersection treatments through dedicated turn bays, traffic control devices, and signal timing and coordination can offset reduced link-level capacities of roadway rightsizing.

By analyzing the travel demand model for anticipated demand on the network in the future, major movements could be tracked to determine vehicular capacity needs that need absorbed in the collector and arterial network. For new roadways, like the Hightower extension, movement between Smithfield-Davis-Precinct Line were evaluated to appropriately size roadways for the total east-west roadway network in that area accommodate that demand.

Table C-4 and **Figure C-6** identify the roadways considered for rightsizing and adjustments to the ultimate lane sizing which will maintain adequate vehicular capacity while providing opportunity for other uses and reducing overall City expense. Roadways highlighted in the table and figure in red are reallocation rightsizings, while those in green are redesignation rightsizings.

Roadway Rightsizing			
Name	Existing Lanes	**Ultimate Lanes Proposed**	2007 Plan (Proposed)
Roadway Reallocation			
Smithfield Road (North of Turner)	4	3	4
Hightower Drive (Crosstimbers to Meadow)	4	3	4
Amundson Drive (Mid-Cities to Main)	4	2	4
Iron Horse Boulevard (Rufe Snow to Mid-Cities)	5	3	4
Holiday Lane (Dick Lewis to Mid-Cities)	4	3	4
Bedford-Euless Road (Boulevard 26 to Strummer)	5	3	5
Strummer Drive (Boulevard 26 to Bedford-Euless)	5	3	5
Boulder Drive (Iron Horse to IH 820 FR)	4	2	4
Roadway Redesignation			
Smithfield Road (Mid-Cities to Turner)	2-3	3	4
Holiday Lane (Starnes to Hightower)	2	2	4
Meadow Road (Hightower to Chapman)	2	2	4
Holiday Lane (Chapman to Mid-Cities)	2	2	4
Chapman Drive (Rufe Snow to Smithfield)	2	2	4
Hightower Drive (Meadow to Eden)	0-2	2	4
Eden Road (Rumfield to Amundson)	2	2	4
Amundson Drive (Main to Precinct Line)	2	2	4
Main Street (Davis to Amundson)	2	2	4
Liberty Way (Iron Horse to Holiday)	2	2	4
Booth-Calloway Road (IH 820 FR to Glenview)	2	2	4

Table C-4: Roadway Rightsizing

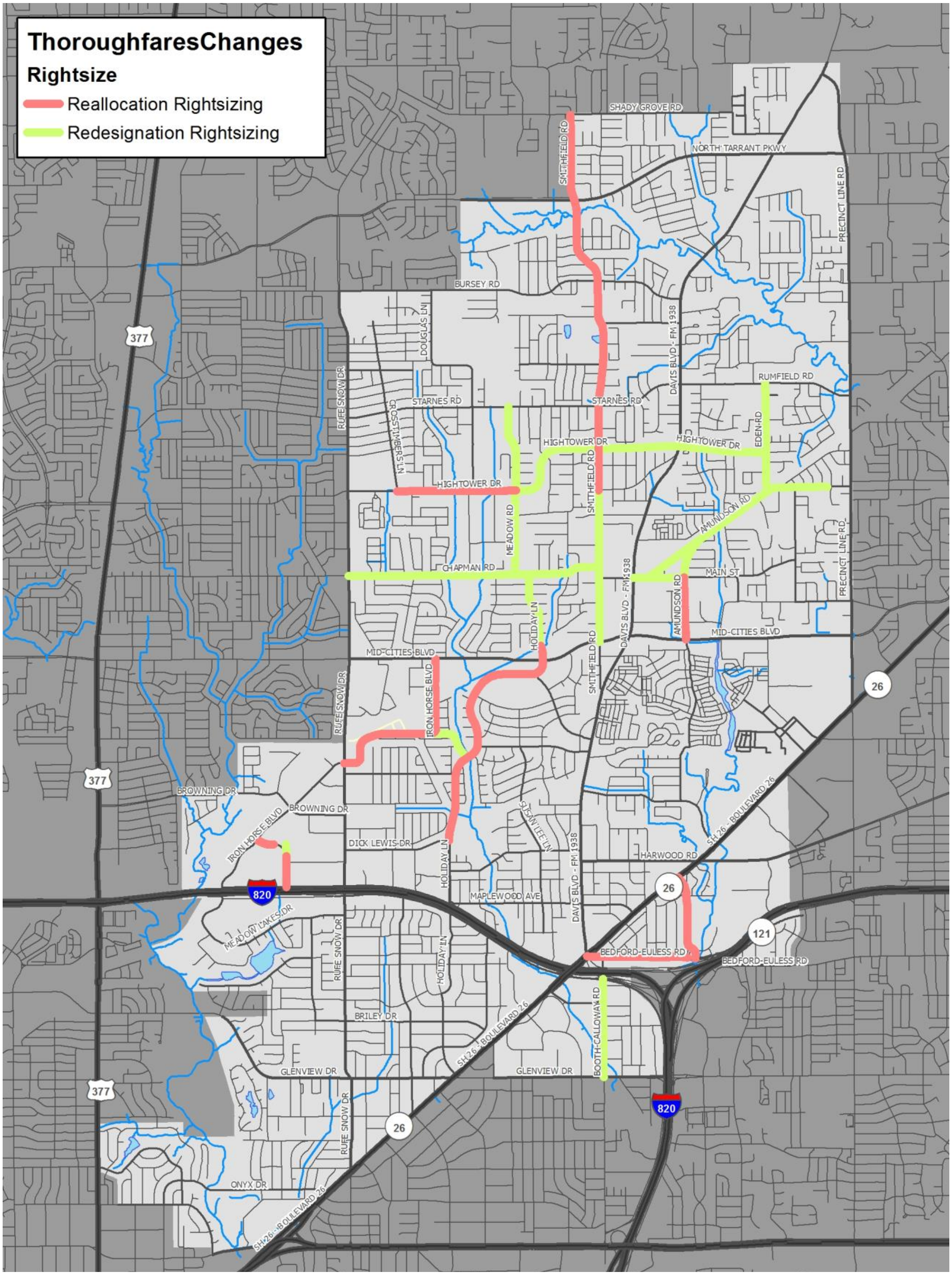


Figure C-6: Roadway Thoroughfare Rightsizing

Regional Active Transportation

Active transportation refers to any non-motorized mode of travel, including walking, bicycling, skating, and scootering. An active transportation network allows people to get from point A to point B through a series of trails and bike lanes, much like a roadway system, yet without the use of a vehicle.

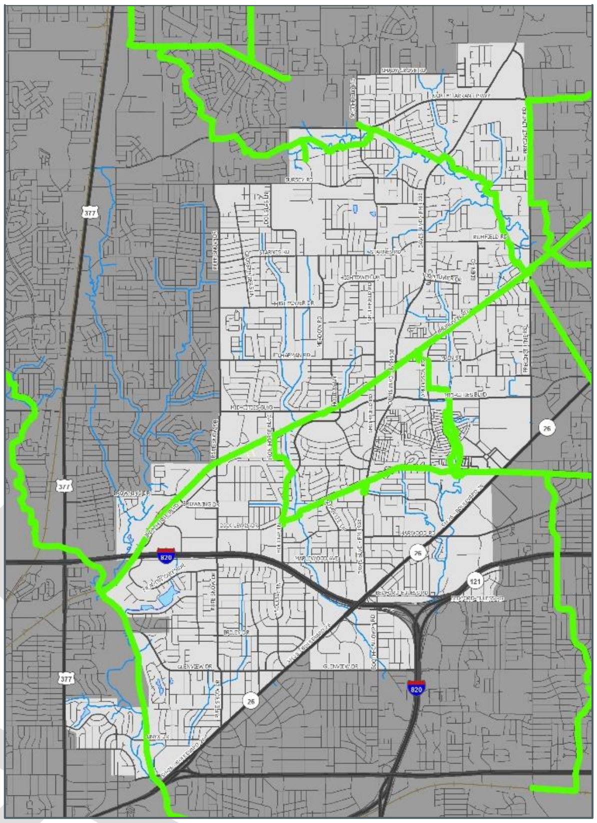
NCTCOG 2045 Veloweb

The Regional Veloweb is a 1,883-mile network of off-street shared-use paths (trails) designed for multi-use trip purposes by bicyclists, pedestrians, and other non-motorized forms of transportation. The Veloweb serves as the regional expressway network for active transportation, and it extends the reach of the region's roadway and passenger rail transit network for non-motorized transportation.

The Veloweb will provide connectivity throughout NRH and the greater Dallas-Forth-Worth region. With more than 20 miles of shared use path in the NRH city limits, commuters can access transit locations by bicycle.

The Veloweb also provides a way to get to the TexRail stations, as they intersect them on the routes. With the robust connections by the Veloweb network, transit will be seen as a more enticing option as bicyclists can supplement their commute with a bus ride.

Figure C-7. NCTCOG 2045 Veloweb



Safe Routes to School

The Federal Safe Routes to School (SRTS) Program was established in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users Act (SAFETEALU) in August, 2005. Safe Routes to School programs and initiatives seek to create safe, equitable, accessible, and convenient routes for children to walk and bike to schools. Additional goals include the increase in neighborhood awareness, walking and biking safety, the reversal of the upward nationwide trend in childhood obesity, and the promotion of physical activity and engagement. Programs are intended to utilize infrastructure enhancements to improve pedestrian mobility and safety (including bicyclists), as well as non-infrastructure strategies.

25% The increase in walking and biking to school as seen through successful SRTS engineering, education, and encouragement programs.

10-14% The amount of traffic during morning commutes associated with K-12 school vehicle trips.

Sources:
1. National Center for Safe Routes to School. (2011). How children get to school: School travel patterns from 1969 to 2009.
2. McDonald et. al. (2014). Impact of the safe routes to school program on walking and bicycling. Journal of the American Planning Association, 80(2), 153-167.

The University of North Texas and the Institute for Urban Studies at the University of Arlington (UTA) have been assisting the City of NRH in developing SRTS plans and recommendations. The initial schools for analysis included Smithfield Middle School, North Richland Middle School, Snow Heights Elementary School, North Ridge Middle School, and North Ridge Elementary School. A public outreach survey was conducted by UTA to identify barriers to walking to these schools in NRH as well as an infrastructure analysis to identify physical and traffic operations barriers. The continuation and implementation of this program will help NRH to increase the student population walking and biking to schools within the City.

Transit

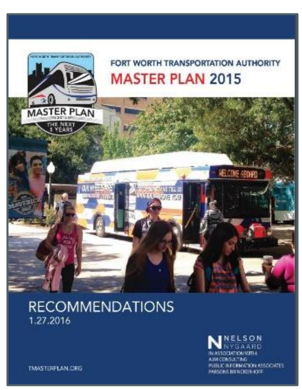
Currently, NRH does not fund or operate any fixed route form of transportation such as bus, rail shuttle, or trolley.

TEXRail

The new commuter rail line extends from downtown Fort Worth, northeast through North Richland Hills to downtown Grapevine and then into DFW airport. NRH has two stations on the route: Iron Horse and Smithfield. Construction began in 2016 and routine operation began in January 2019.

NCTCOG Transit

Although NRH does not operate its own transit service, the city does participate in Northeast Transportation Service (NETS) which is a demand-response small transportation provider that offers door to door service to individuals in the city who are disabled or 55 years of age and older. NRH is also serviced by Hurst-Eueless-Bedford (HEB) transit, which operates independently of the city, and is a small transportation service that focuses on transporting people to and from work and work-related activities. People in the HEB service area are provided with transportation services to the workforce solutions for Tarrant county mid-cities workforce center.



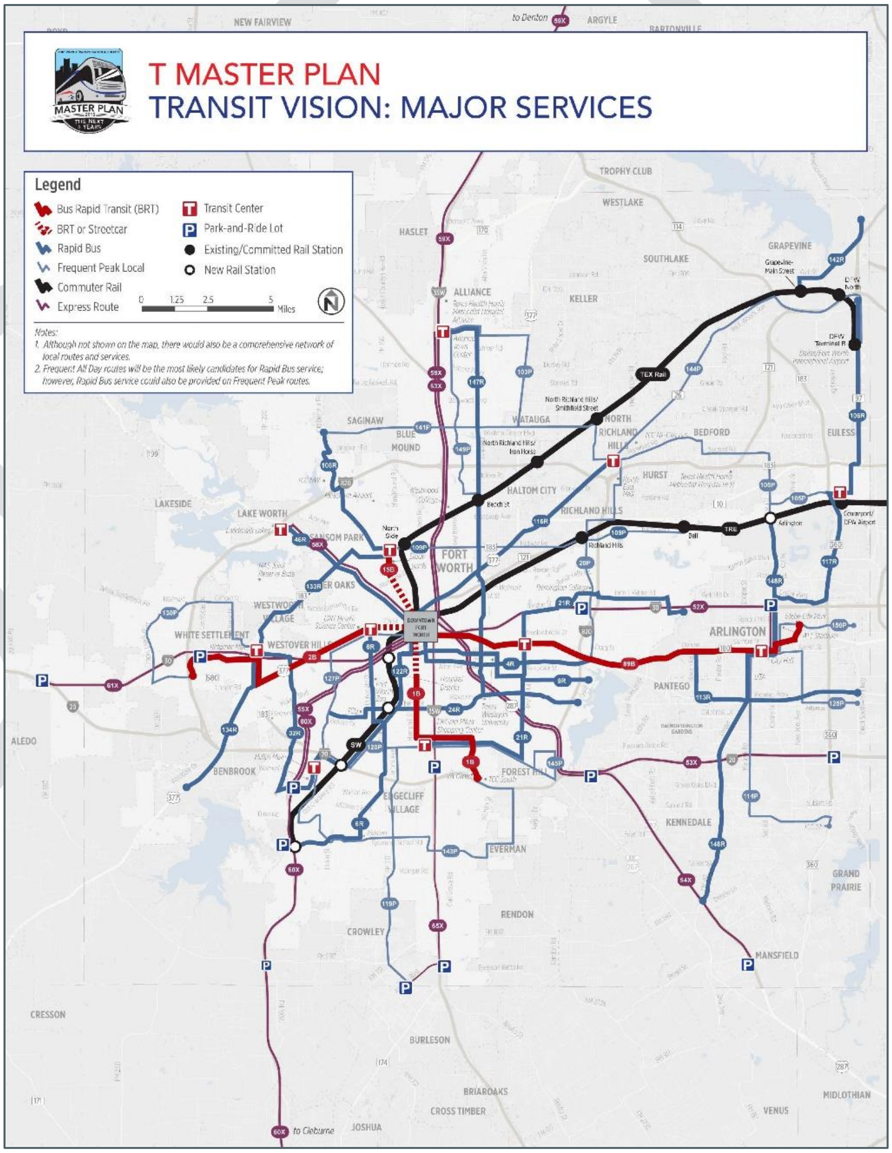
Trinity Metro Master Plan

The Trinity Metro 2015 Master Plan provides a blueprint for transit projects in the Fort Worth-Tarrant county region over the next twenty years. Its goal is to identify opportunities to expand transit service to meet the growing needs of the region.

NRH is an area of significant growth and demand identified in the plan. Within the plan's major service vision, there is a frequent peak local bus that runs east into NRH connecting to the Smithfield TexRail station and then heading south to a transit center just north of the intersection of SH 183 and IH 820.

As transit continues to develop in Tarrant County, it is important that NRH provide input and coordinate closely with Trinity Metro on the location of transit routes and stops within the City. Accessibility to local transit should be considered by NRH to enhance service to the entire community and fully leverage the two TEX Rail stations within the City.

Figure C-8. Trinity Metro Master Plan Transit Vision



New Mobility Technologies

A convergence of mobility technologies is developing in the marketplace, including:

- Data and connected technology
- Autonomous vehicles
- Shared-use mobility
- Electrification of vehicles

Advances in these key areas will change the way people travel through cities. Each trend or technology is developing at an independent rate, but the maturation of all will be transformative to the mobility environment in cities.

Data and Connected Technology

Big Data is a term used to describe the real-time information that is transmitted from internet-enabled devices, such as: cell phones, cars, wearables, kitchen appliances, or thermostats. Individually, the data collected by a device is of limited use, such as location, speed, motion, vibration, or temperature. However, when the data of all devices in use is compiled and analyzed, it can provide powerful, real-time information about important factors that impact cities; such as congestion or electrical and water consumption.

Data collection and management have a long history in cities, but a wider variety of sources are appearing, including Bluetooth and smart phone data as well as connected Dedicated Short-Range

Parking

The location, capacity, and demand for parking can have major impacts on traffic. Today there are numerous apps and devices related to parking. This technology includes:

- Web-connected sensors in pavement that help people find, reserve and/or book a parking spot,
- Smart-meters that allow drivers to pay and reload their parking meter via phone, and
- Sensors that count, and in some cases, display where and how many open spots are in a parking structure.

With a greater understanding of parking needs, cities can identify parking improvement projects that could help improve traffic circulation and flow along roadways.

Communications (DSRC) infrastructure. Partnerships with private companies collecting app and crowdsourced data, such as Waze and Strava, are vital to increasing the data streams available for NRH to continue making strategic decisions and tracking specific outcomes.

Autonomous Vehicles

Autonomous, or self-driving, vehicles are beginning to emerge in pilot programs throughout North Texas and the United States. These tests are needed to understand the impact of this technology, the current shortcomings, and begin to educate the public on this technology. Autonomous vehicles are expected to enter the mainstream marketplace within the 2030 horizon of this planning study. Organizations like NCTCOG and the Texas Innovation Alliance, along with universities and research institutions, are a valuable research to municipalities, like NRH, to understand the impacts of this technology.

Shared-use Mobility

Shared-use mobility includes an array of modes but all founded on a behavioral model of shared transportation services. This includes public transit, carsharing, ridesharing (car-pooling, van-pooling), ride-hailing (i.e. Uber, Lyft), bikesharing, scooter sharing, and shuttle services. Through this shared use of capital assets, mobility transforms into a service, i.e. mobility-as-a-service (MaaS). The combination of these shared services leads to increased mobility options and reducing car-dependence. With public transit, such as TEX Rail, in place, shared-use mobility can also provide a first-mile/last-mile solution to feed that service.

Electric Vehicles

The electrification of vehicles, replacing the internal combustion engine, leads to reduced emissions, total cost of vehicle ownership, and energy usage in the transportation sector. While automation and shared-use mobility offer a shift in travel behavior, electrification's major impact is to the environment and supportive infrastructure. The movement toward electrification of vehicles necessitates the evaluation of economies and land uses that support driving. This includes developments such as gas stations and oil change facilities, which could become increasingly obsolete or transform to serve new needs in electric vehicles. This also includes the rise in a need for electric charging stations in parking lots and garages.

Applicability

Mobility in a community is a pathway to opportunity. New mobility technologies emerging in the marketplace must be shaped to serve the needs of the City by providing access, safety, and affordability to all users. Cities must stand united in partnering to advance these technologies while also providing policies and actions that harness them for the good of the community.

Mapping and Analytics

With more and more data being made available to cities, data mapping and analytics is a significant and broad area of municipal operation that stands to be greatly improved. Many applications, such as GIS, now have data collection tools related to transportation and issue reporting. In order to interpret and articulate data trends, it is important that the cities begin to create databases about mappable issues.

Crowdsourcing is a form of data collection in which, through an app linked to GIS, members of the public can upload photos, text, and create reports that are georeferenced and uploaded to the city in real-time. In addition to saving city resources, crowdsourcing can help cities continually gather information about current issues and needs.

Mobility Hubs

"Mobility Hubs provide a focal point in the transportation network that seamlessly integrates different modes of transportation, multi-modal supportive infrastructure, and place-making strategies to create activity centers that maximize first-mile last mile connectivity." – *LADOT Mobility Hubs: A Reader's Guide*

Mobility Hubs

Mobility hubs, developed around the intersection of different transportation modes, can help bring these new mobility technologies together and develop an atmosphere for easier multimodal travel. Through a concentration of working, living, shopping, and/or playing, it matches land use energy with transportation and placemaking functions to support diverse transportation options.

Figure C-9. LADOT Mobility Hub Typologies; Source: LADOT Mobility Hubs A Reader's Guide

Mobility Hub Amenities	Bicycle Connections			Vehicle Connections			Bus Infrastructure		Information-Signange			Support Services				Active Uses		Pedestrian Connections	
	2.1. Bike Share	2.2. Bike Parking	2.3. Bicycling Facilities	3.1. Ride Share/Pick up-Drop off	3.2. Car Share	3.3. EV Charging Stations	4.1. Bus Layover Zone	4.2. Bus Shelters	5.1. Wayfinding	5.2. Real-time Information	5.3. Wi-Fi / Smartphone Connectivity	6.1. Ambassadors	6.2. Waiting Area	6.3. Safety and Security	6.4. Sustainable Approach	7.1 Retail	7.2. Public Space	8.1. To the Mobility Hub	8.2. At the Mobility Hub
(N) Neighborhood	●	●	■	■	○	○	■	○	●	○	○	■	○	○	○	■	■	○	○
(C) Central	●	●	○	●	●	●	○	●	●	●	●	○	○	●	●	○	●	●	●
(R) Regional	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●

Legend: Vital: ● Recommended: ○ Optional: ■