

Designing for Best Use of the Downtown I-345 Corridor in Dallas, TX: Stakeholder Perspectives

by

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ABSTRACT

Designing for Best Use of the Downtown I-345 Corridor in Dallas, TX: Stakeholder Perspectives

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What is a city? It's more than a location where many people live and work. It is a conglomeration of shared experience over generations. One generation informs the next, which informs how each subsequent generation adds to the development of their shared home. This is what gives each city its own unique form, character, and identity. But what happens if a city repeatedly outgrows itself, disconnects its communities, and demolishes the physical memory of its own cultural history? Dallas, Texas is one such city confronting these issues and is perceived as one without significant place memory or culture (if not history).

The downtown-adjacent neighborhood of Deep Ellum, in particular, has regularly found itself at the heart of this conflict, much of it having been bulldozed in 1969 to make room for I-345, a raised highway that serves as a connection to several major Dallas highways (Maxwell 2020). Like most modern cities, Dallas has largely been designed and planned to accommodate the automobile at the expense of the pedestrian, with I-345 being one of the largest offenders. Deep Ellum and Downtown see some of the city's heaviest foot traffic but without pedestrian networks, streetscapes, and open spaces that support such activity. Pedestrian pathways between the neighborhoods are few while derelict buildings and parking lots are many.

The purpose of this thesis is to study stakeholders' spatial preferences and needs, and to design an appropriate replacement for I-345 in Dallas, TX that respect the culture and history of the Deep Ellum neighborhood, improves the connection between Deep Ellum and Downtown, and enhances the identity and economy of the city.

This design master thesis follows a four-step process using qualitative methods (Creswell 2008) to assess stakeholders' spatial preferences and needs, and to redesign the I-345 corridor in Downtown Dallas, TX for its best use for the future. First, the histories of urban highways and their removal, as well as Deep Ellum and Downtown, are reviewed and documented. Next, four case studies of similarly affected cities are likewise reviewed and documented. One-on-one in-depth interviews are then conducted with seven people who live and work in Deep Ellum and local design and/or community experts. Finally, the spatial qualities of the area are documented using passive site observation, photography, and GIS mapping techniques. The findings from these steps are then used to produce a design vision for the segment of I-345 corridor that resides between Deep Ellum and Downtown Dallas.

The findings illustrate that the best use for this area based on stakeholders' preferences and needs includes, but is not limited to, uses such as a walkable mixed-use neighborhood, communal green space, promotion of history and culture through public art, and affordable housing. Furthermore, the study concludes a necessity for a depressed highway (I-345) covered with a deck park which connects Downtown and Deep Ellum. As more cities try to correct the design and planning mistakes of the past, landscape architects are uniquely poised to help create new urban connections and green spaces that strengthen their communities. The space occupied by I-345 has the potential to become a new transitional

neighborhood that connects Deep Ellum to Downtown, while simultaneously improving the city's walkability and spotlighting what remains of the rich arts culture of Deep Ellum. Such scrupulous design also has the potential to preserve the culture and history of the Deep Ellum neighborhood, improve the connection between southern Dallas and Downtown, and enhance the identity and economy of the city as a whole.

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CHAPTER 1 - INTRODUCTION

This chapter introduces this design master thesis by offering a background summary and problem statement on the issues surrounding I-345 Highway and its impact on Deep Ellum and Downtown Dallas as context. A purpose statement and research questions which guided the study are then provided. Next, definitions of key terms and concepts are defined before the study methodology is outlined. Lastly, significance and limitations of the study are acknowledged.

1.1 Background & Problem Statement

Dallas, Texas, like many American cities, spent the decades following World War II building large urban expressways that cut through the heart of the city. As a result, Dallas' downtown neighborhood is now surrounded by major highways on all sides, cutting it off from adjacent neighborhoods (Wallach 2009). Perhaps one of the worst offenders is Interstate 345, which connects several Dallas freeways and separates Downtown from the Deep Ellum neighborhood.

Deep Ellum is a historic neighborhood and a local hub for art and music. It began as one of Dallas' first African American commerce districts and quickly became a community core. In order to make way for I-345, the 2400 block of Deep Ellum was demolished in 1969 (Figure 1) (Maxwell 1994). Not only did this displace the people living there, but it also impeded the development of Downtown. The elevated freeway has a large footprint that disconnects communities and segregates new development between the two neighborhoods. Additionally, the separation it creates has led to failed businesses, derelict buildings, and vacant lots (CND 2019).



*Figure 1 - I-345 Under Construction in Early 1970s
Source: aiadallas.org*

Downtown is the central business district, and Deep Ellum has a thriving nightlife and music scene, both of which encourage new development to take advantage of these economic hotbeds. With space limited, developers are forced to choose suboptimal site locations or teardown or repurpose existing architecture. As a result, new mid-rise buildings are beginning to encroach and replace Deep Ellum’s historic low-rise composition (Macon 2021). These recent disconnected developments surrounding Interstate 345 in and near Deep Ellum pose a threat to one of Dallas’ few remaining cultural neighborhoods and exacerbate existing problems created by the long-standing I-345 freeway.

1.2 Purpose Statement

The purpose of this design master thesis is to study stakeholders’ spatial preferences and needs and to design an appropriate replacement for Interstate 345 in Dallas, TX. The goals of this thesis are to preserve the culture and history of the Deep Ellum neighborhood, improve

the connection between Deep Ellum and Downtown, and enhance the identity and economy of the city as a whole.

1.3 Research Questions

- How can the land currently occupied by I-345 best be used to unite/connect the urban fabric between the Downtown and Deep Ellum neighborhoods?
- What is the best use (or design strategy) for the land currently occupied by the I-345 corridor in Dallas, TX according to local denizens and experts?
- What design features would protect and emphasize the history, culture, and character of Deep Ellum, TX?

1.4 Definitions

Capping: The practice of covering a depressed highway with a land bridge to facilitate surface development, most commonly parks (Brennan 2022).

Complete Street: A holistic approach to designing streetscapes that deemphasizes auto-centric design and prioritizes the safety and experience of pedestrians, cyclists, and transit users. See Figure 2. (Jordan et al 2022)



Figure 2 - Complete Street Diagram
Source: highways.dot.gov

Deck Park: A park built over a capped highway (Brennan 2022).

Expert: An individual with specific knowledge of and/or experience with urban design, I-345, and/or the Downtown and Deep Ellum neighborhoods. Examples include, but are not limited to, community activists, landscape designers, and city employees.

Highway Teardown: The demolition of an existing elevated highway. Typically, the removed highway is replaced with a different type of infrastructure or development, but in some cases, it is rebuilt in a different manner.

Stakeholder: An individual with personal or professional interest in the future of I-345 and its implications for Downtown Dallas and/or Deep Ellum.

Study Location: Neighborhood boundaries for Downtown and Deep Ellum are shown in Figure 3. The boundaries of Downtown are defined as Woodall Rogers Fwy, I-345, I-30, and I-35E. The boundaries of Deep Ellum are defined as I-345, Good Latimer Expy, the DART Green Line rail track, and I-30.

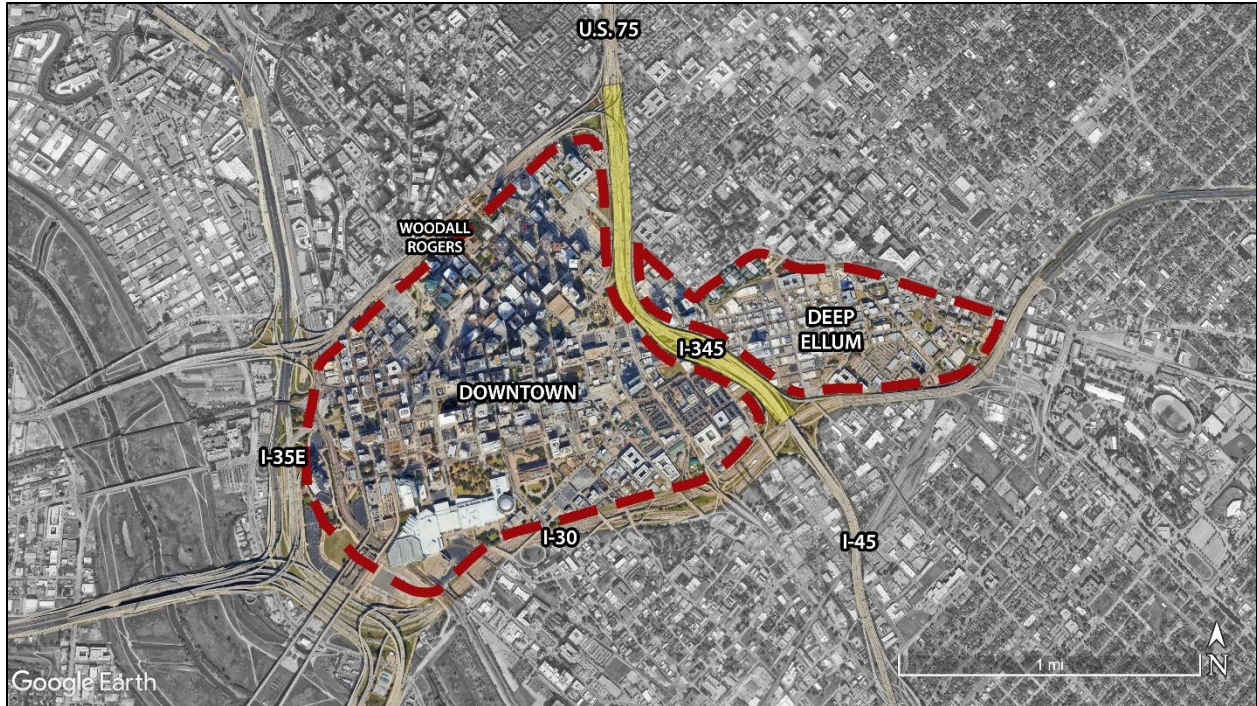


Figure 3 - Neighborhood Boundaries Map

Stakeholder Perspective: The thoughts, opinions, and attitudes of stakeholders regarding interactions with I-345 and how it relates to Downtown and Deep Ellum.

1.5 Methodology

This design master thesis follows a four-step process primarily using qualitative methods (Creswell 2008) to assess stakeholders' spatial preferences and needs, and to redesign the I-345 corridor in Downtown Dallas, Texas for its best use for the future. The first step is historical review and documentation. The histories of urban freeways and their removal are covered to understand their impact, followed by the histories of Downtown and Deep Ellum to provide context. Next, precedent studies examine four other similarly affected cities to provide examples of solutions and hindrances. The third step is the conducting of one-on-one in-depth interviews with seven local denizens and experts. Finally, the spatial qualities of the

area are documented using passive site observation, photography, and GIS mapping techniques. After independently reviewing the findings from each source with analytical methods detailed in Chapter 3, the data from all sources is then triangulated (Deming & Swaffield 2011) to synthesize the best use for I-345. The findings from these steps are then used to produce a design vision for the segment of I-345 corridor that resides between Deep Ellum and Downtown, Dallas.

1.6 Significance & Limitations

Dallas is neither the first nor the last city facing the issues caused by urban expressways. This study has the potential to guide landscape architects in designing new urban centers that strengthen their communities. However, this study is also tied to Dallas, TX. The data received and the findings made may not be applicable to other regions.

1.7 Chapter Summary

This chapter introduced and outlined this thesis study. The next chapter reviews the current literature regarding highway teardowns, the histories of Downtown and Deep Ellum, as well as the current state of Interstate 345. Chapter 3 provides a comprehensive description of the research methods used in this study, and Chapter four covers the resulting findings and their analysis. Next, the design process is thoroughly detailed in Chapter 5, including the final schematic urban design renderings. Chapter 6 then review the study's conclusions and discusses current relevance and future implications.

CHAPTER 2 – LITERATURE REVIEW

This chapter reviews data from literature, secondary, and archival sources to provide context for the research that follows as well as the design process. First the histories of the specific locations that concern this study – the Dallas neighborhoods of Downtown and Deep Ellum and I-345 itself – will be reviewed. This is followed by a historical examination of urban highways, including their impacts on adjacent communities.

2.1 History of Downtown Dallas, Deep Ellum Neighborhood, and I-345

This section covers the histories and evolution of the Downtown and Deep Ellum neighborhoods, including I-345. These will then be supplemented by an examination of TxDOT's I-345 feasibility study.

2.1.1 Downtown, Dallas

By the time Dallas was officially incorporated in 1856, there were already two distinct street grids in the city (Figure 4). The first was laid out by the city's founder, John Neely Bryan, and oriented along the original bank of the Trinity River and now comprises the core of Downtown and Deep Ellum. The second grid was laid out by landowner John Grigsby at a 45-degree angle to the cardinal directions according to Spanish planning tradition. It covers what is now the northern part of Downtown, as well as the surrounding neighborhoods to the north, east, and south (Benjamin 2014).

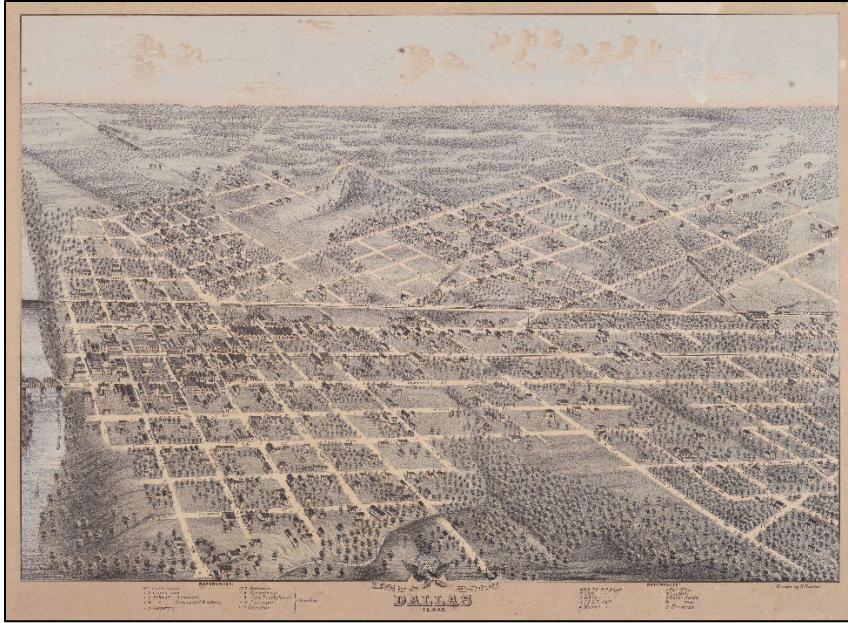


Figure 4 – Bird's Eye View of Dallas by Herman Brosius 1872
Source: flashbackdallas.com

With the arrival of the Texas & Pacific Railway and the Houston & Texas Central Railway in the 1870s, Dallas became a regional hub for trade and finance and quickly began to grow and expand as a result (McElhaney & Hazel 2022). Land adjacent to the Trinity River to the west and south was considered undesirable at the time, and wealthy citizens began to migrate north, away from the central business district, a trend that never stopped (Wallach 2009).

The availability of undeveloped land in the region and racial and economic tensions led to urban sprawl (Krupala 2019) and a separation of land uses, which combined to necessitate a dependency on the automobile in Dallas. The city seemed more than happy to accommodate this by embracing auto-centric design. Starting in 1950, the Central Expressway (U.S. 75) began to open along the former Houston & Texas Central Railway to connect Downtown with residents in the northern neighborhoods (Wallach 2009). Interstate 35E soon followed in 1959 between the river and Downtown's western border. In 1964 Interstate 30 cut off Downtown

from the mostly Black and Hispanic south Dallas neighborhoods. Deep Ellum and Old East Dallas were cut off next by I-345 in 1973 (CND 2019). Finally, Woodall Rogers Freeway was built to connect I-35 and U.S. 75 in 1981 (Wallach 2009). Downtown Dallas was now completely surrounded by highways.

Throughout all of this, the Downtown central business district remained the seat of power for the Dallas Citizens' Council, the oligarchy of business elites that governed Dallas from behind-the-scenes for decades. Much of this power was used to stunt the local civil rights movement and implement development that favored the wealthy white communities of Dallas (Schutze 2021). In addition to the highways themselves, much of this development manifested as hostile infrastructure, such as parking lots around the perimeter of Downtown to services the freeways (Barta 1971), or the Central District Development Plan of 1970 which proposed additional ramps for I-345 and connecting Elm and Commerce streets, which would have required further demolition of the Deep Ellum neighborhood (Department of Planning and Urban Development 1970). Fortunately, neither of the latter came to fruition. In 1909, Downtown Dallas built its first skyscraper, Praetorian Tower, and in 1914 the Neiman Marcus department store arrived, painting a glamorous picture of the city in its aggressive advertising (Wallach 2009). While most of the city's growth was lateral, Downtown did slowly grow vertically with the construction of various hotels and office towers during the 40s and 50s. Unfortunately, businesses began to increasingly leave Downtown, following the middle class to the suburbs. Between 1980 and 1985, there was a boom in development Downtown, and 21 new high-rise office buildings were built; however, it was more than two decades until another building over 300 feet was constructed in the neighborhood (Wallach 2009).

The early 80s also saw the establishment of two new subdistricts in Downtown. The West End Historic District is a collection of preserved buildings from the late 19th century repurposed as restaurant, retail, and office space. The Dallas Arts district was formed on the north side of Downtown beginning with the Dallas Museum of Art, followed by a slew of other museums and theaters (McElhaney & Hazel 2022). However, Downtown soon began to decline as commerce continued to decentralize. By the early 1990s, approximately one third of the neighborhood's office space was left empty and abandoned. Fortunately, this didn't last, and by the early 2000s Downtown began to revitalize as vacant offices were converted into apartments and condos (Wallach 2009).

Downtown has benefitted greatly in the 21st Century thanks to strategic planning efforts by the city and local organizations. Downtown Dallas, Inc first put forth "The 360 Plan" in 2011 as a vision to promote the improvement of public space, multimodal mobility, and economic value in the neighborhood through urban design (Downtown Dallas Inc 2017). In 2015 TxDOT conducted the Dallas CityMAP study of the interstate corridors surrounding Downtown to determine challenges and solutions for a more walkable and livable Dallas urban core (TxDOT 2015). Recent projects in Downtown include the AT&T Discovery District mixed-use plaza, the redevelopment of the East Quarter district, and the addition of several parks.

Six new parks have been built, with another soon to come, most on land reclaimed from parking lots and aging infrastructure. Main Street Garden opened in 2009 followed by Belo Garden in 2012. West End Square was completed in 2021 in the once again thriving district which hosts offices, retail, and dining. Klyde Warren Park, also built in 2012, is a deck park covering Woodall Rogers Freeway, and provides critical connection between Downtown and

Uptown Dallas. Most recently, Pacific Plaza opened in 2019, Carpenter Park in 2022, and Harwood Park is currently under construction. Urban parks such as these are invaluable for cultivating economic growth and social vitality (Özdil 2019).

2.1.2 Deep Ellum

Deep Ellum began as a freedman's town after the Civil War and served as a center of commerce for the African American and Jewish communities of Dallas during the late 19th and early 20th centuries. In addition to small family-owned businesses, industry also had an early presence in the neighborhood with the Munger cotton gin factory arriving in 1884 and a Ford assembly plant arriving in 1913. The presence of the railroad was so vital Deep Ellum's development that the name "North Central Track" became synonymous with the neighborhood (Ward 1925a). By the 1920s Deep Ellum had evolved into a mostly retail and entertainment district famous for its "Pawnshop Row," night clubs, and backroom gambling (Figures 5-7). It was the regional heart of the blues and jazz music scenes and frequently hosted musicians such as Blind Lemon Jefferson and Lightnin Hopkins. (Maxwell 2020).



Figure 5 - Elm St 1930
Source: Dallas Public Library



Figure 6 - Honest Joe's Pawn Shop, Deep Ellum 1959
Source: Dallas Public Library



*Figure 7 - Gypsy Tea Room, Deep Ellum 1930s
Source: Dallas Public Library*

Prosperous though it may have been, the historic Black community was not considered a desirable neighbor by the White establishment of Downtown, whose development began to encroach into Deep Ellum as early as the 1920s (Dallas Morning News 1925, Ward 1925b). Later, Deep Ellum began to experience decline during the 40s and 50s due to the removal of the Central and Pacific railroads, as well as the local streetcar line, and increased auto-centric development. In 1969, the 2400 block Deep Ellum was demolished to make way for Interstate 345, which was completed in 1973. Soon afterward, the neighborhood was mostly deserted (Maxwell 2020). Dallas was in the middle of trying to paint over its besmirched reputation after the Kennedy assassination with a picture of progress, and media coverage at the time portrayed Deep Ellum's dismantling as a mysterious phenomenon (Simek 2021).

The neighborhood would eventually experience a period of revitalization during the 1980s. Prices were low on the warehouses and storefronts that managed to survive, so they were quickly bought up and converted into art galleries, studios, clubs, and music venues (Simek 2021). As redevelopment threatened Deep Ellum's physical character, its identity as an eclectic self-sustaining neighborhood was replaced with one that better suited the desires of its new, mostly White, population (Dillon 1983, Tatum 1983). Deep Ellum was once again a thriving entertainment district and the center for art and music culture in Dallas. However, this time it catered to the city's punk scene rather than blues and jazz (Maxwell 2020). This is an important distinction as, rather than a continued culture or identity, the neighborhood's history manifested as more of a "brand" (Simek 2021).

Another downturn would hit the neighborhood in the 2000s, however, as rent prices rose, zoning restrictions limited development, and it gained a reputation as an unsafe neighborhood rife with crime. Nevertheless, the art and music scene endured. Recovery came in the 2010s due to concerted efforts by the city and local non-profits, Deep Ellum Community Association and Deep Ellum Foundation, to bring in multi-family housing, retail business, historic preservation, and community programs (Maxwell 2020).

Today, Deep Ellum continues to thrive, but the historic low-rise neighborhood is now bookended by new mid-rise development that threatens to over-shadow it. The Epic is a large mixed-use development on Deep Ellum's western border (Figure 8). It consists of two office towers, one residential tower, and a hotel (Macon 2021). The hotel incorporates the former Grand Temple of the Black Knights of Pythias and is named for its architect, William Sidney Pittman. In addition to serving the Knights of Pythias fraternity, the building provided office

space and a community center to local Black residents during the early 20th century (Maxwell 2020).



Figure 8 - Disparity in Scale Between The Epic (center) and Deep Ellum (lower left)
Source: Google maps

Except for the Pythian temple and a few others, most of the buildings that make up Deep Ellum are not considered architecturally relevant. However, it is the *collection* of historic buildings that gives Deep Ellum its character. The removal of individual buildings here and there may seem insignificant, but it breaks up the coherency of the neighborhood's overall form and could be detrimental if it continues unchecked. In an effort to protect from this outcome, Deep Ellum Foundation and Preservation Dallas are working to have Deep Ellum added to the National Registry of Historic Places (Macon 2021).

That is not to say that Deep Ellum should not be developed. According to Deep Ellum Foundation president, Jon Hetzel, mixed-use development is necessary to end the neighborhood's cycle of decline and revitalization. However, that does not necessitate the demolition of its historic fabric. Adaptive reuse is much preferable and has already

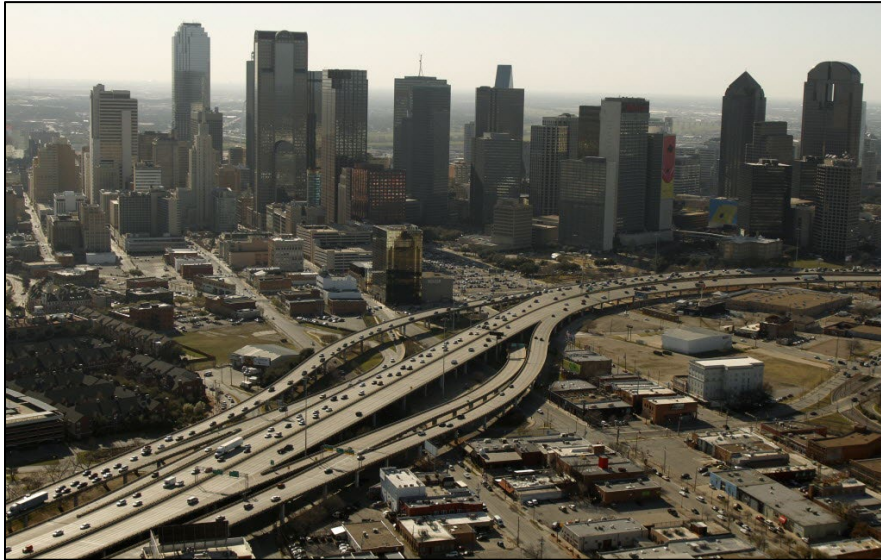
successfully been implemented in Deep Ellum. Two of the most notable examples are the previously mentioned Knights of Pythias temple and the Ford assembly plant which has since been converted to residential lofts (Macon 2021).

2.1.3 Interstate 345

Interstate 345 (Figure 9) is a 1.4-mile-long elevated highway completed in 1973 as a means of connecting I-45 and I-30 to U.S. 75 in Dallas, TX. The freeway has been highly used link for commuters moving north and south, hosting approximately 105,000 cars a day (McKeag 2019). However, multiple Black communities, including a significant portion of Deep Ellum were demolished to clear a path for I-345 (Figure 1). It has since stood as a physical and visual barrier between neighborhoods and communities (CNU 2019a). Much of the land under and surrounding the highway is vacant or devoted to surface parking. Notable exceptions include The Epic and Carpenter Park, both newly built and located right up against I-345.

Several organizations have been advocating for the removal of I-345 in recent years. Coalition for a New Dallas (CND) envisions a future in which I-345 has been completely removed and replaced by surface boulevards and a mixed-income, mixed-used neighborhood. They argue that the demolition of I-345 would free up 245 acres for the city to use for development that would create jobs, provide housing, and improve quality of life, all with negligible impact on traffic (CND 2019). The CityMAP study done by TxDOT confirms these claims, but also offers a capped, depressed alternative which CND and Congress for the New Urbanism (CNU) contend would not only be more expensive, but severely limit social and economic growth potential compared to complete removal (McKeag 2019).

Today, the highway is nearing the end of its designed lifespan, and due to the considerable cost of repairs, both the city of Dallas and the Texas Department of Transportation are looking into alternative solutions.



*Figure 9 – I-345 Facing Downtown from Deep Ellum Before Construction of The Epic
Source: dallasnews.com*

2.1.3.1 TxDOT Feasibility Study

In 2019, TxDOT began a feasibility study, working closely with the city of Dallas, in order to recommend a course of action regarding I-345. After collecting traffic, environmental, and safety data, five conceptual alternative design scenarios generated from the 2016 Dallas CityMAP study were presented and refined in an iterative process involving the public, stakeholders, and city officials before making a final recommendation (TxDOT 2022).

The five alternative scenarios for I-345 were No Build/Leave As-Is, Remove, Elevated, Depressed, and Hybrid. The No Build and Remove alternatives, while straightforward, represented opposing extremes. Do nothing or remove the highway completely and replace it with a boulevard. The Elevated scenario proposed keeping the highway but significantly

reducing its footprint, and the Depressed alternative proposed rebuilding the highway below-grade with bridges connecting the surface streets. Lastly, the Hybrid alternative (Figure 10) combined the Remove and Depressed concepts by putting the highway below-grade but with a smaller footprint that would allow for a more cohesive street grid (TxDOT 2022).

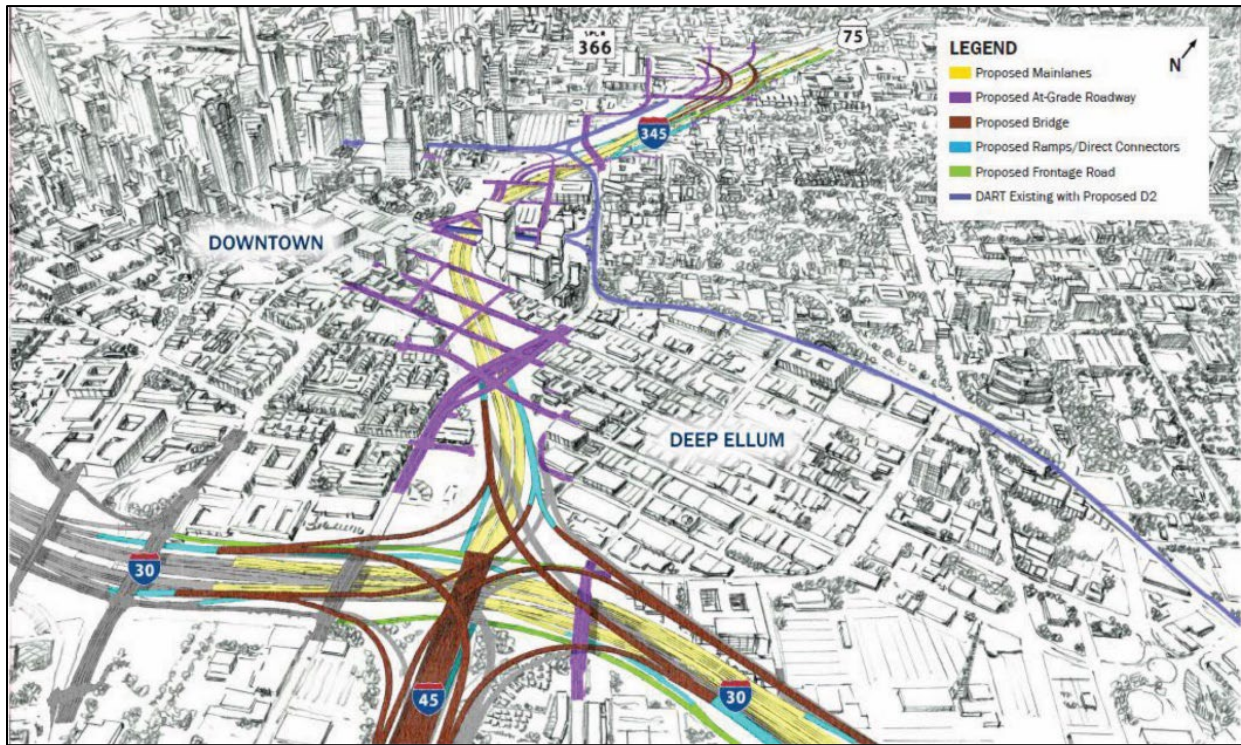


Figure 10 – Hybrid Alternative
Source: TxDOT

Traffic data was primarily evaluated using origin-destination data from fall 2017 through spring 2018. The data set focused on the regions in which drivers began and ended their trips and was limited to trips that included I-345 in their route. This data was then examined using a 2045 calibrated subarea model derived from the North Central Texas Council of Governments' 2045 regional traffic model to determine how each I-345 alternative concept would impact travel times by the year 2045 relative to the No Build/Leave As-Is option. The study determined that the Removal alternative would significantly increase travel times for all

commutes, in some cases more than 50%. The Depressed alternative produced minor increases on relatively few regional commutes, but it was otherwise concluded that the Depressed, Elevated, and Hybrid alternatives would all have negligible impacts on travel time (TxDOT 2022).

This traffic data was used alongside public feedback and an evaluation matrix of mobility, connectivity, sustainability, and economic criteria to determine which I-345 alternative design concept would be the ideal choice moving forward. TxDOT's final recommendation was a refined version of the Hybrid alternative (TxDOT 2022).

This recommended alternative has been updated from the original concept to accommodate planned expansion of Dallas's light rail system and minimize impacts to the recently renovated Carpenter Park. TxDOT additionally identified potential capping areas over the proposed highway to provide more space for amenity development (Figure 11) (TxDOT 2022).

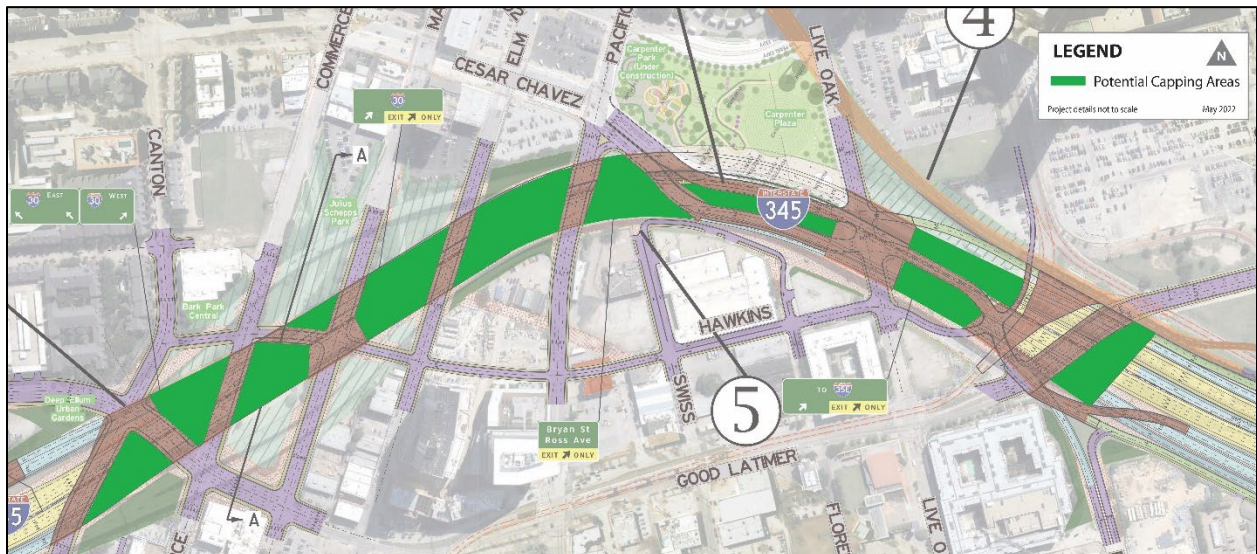


Figure 11 – Potential Capping Areas for I-345
Source: TxDOT

2.2 Urban Highways & Highway Teardowns

Futurama, a 1939 World's Fair exhibit by Norman Bel Geddes, captured imaginations with its futuristic model of a highway system connecting and mobilizing the country like never before (Weber 2015). The industrial machine of postwar America then rapidly constructed urban freeways connecting commuters to the hearts of cities across the country (Mohl 2004). As it became easier and cheaper to transport goods (Kerski 2015), and America adopted a "mass consumer economy" (Cohen 2004) resources were diverted from urban centers to inter-city mobility. However, this was only one aspect of the country's infrastructural focus on automobility at the expense of the pedestrian and community.

Highway construction efforts reached their height during the 50s and 60s and coincided with the civil rights movement. It became common practice to use highway construction as a pretense to demolish Black neighborhoods and displace their people (Savitzky & Cidell 2022). As a result, Black communities were cut off from the urban core and further deprived of social, political, and economic power. White decision-makers refused to put resources into amenities, like public transit, that benefitted urban communities of color, instead choosing to self-segregate by promoting automobility and suburban living (Gioielli 2021).

Henderson labelled this phenomenon "secessionist automobility" (2006), claiming automobility stems from the attempt to separate oneself from an "undesirable" setting. As Whites and their tax dollars fled urban centers, America's new interstate system became a weapon that increased the disparities of wealth and access between affluent White communities and poor communities of color (Savitzky & Cidell 2022). This has had lasting consequences for American neighborhoods and communities. Most of these highways still

stand and remain as barriers; they have been found to account for 7-10% of persisting segregation in schools (Heidt & Kasim 2020), contribute heavily to urban sprawl and the depopulation of city centers (Baum-Snow 2007), and lead to reduced health for adjacent communities (Brugge et al 2007). This development trend continued for decades, but the 1960s also saw the emergence of an organized movement against urban freeways (Mohl 2004).

These “Freeway Revolts” began in San Francisco, spearheaded by the likes of Joseph Alioto and L. Deming Tilton (Issel 1999). Proponents such as these fought to have municipal input in state highway planning, the consideration of aesthetic and community values, and the integration of transit and freeway development. In 1959, preservationists successfully persuaded the city council to rescind its approval of seven out of nine proposed state highways, and again in 1966, two more were rejected (Issel 1999). This period represented a shift in zeitgeist, and these early successes in San Francisco encouraged other cities, and even federal agencies, to fight their own battles against urban freeways (Muller 2014).

This fight was not one-sided; decades of engineering and planning policy stood in the way. Most opponents of the freeway revolts tended to prioritize automobility and efficiency, whereas the pro-teardown movement placed more value on community and aesthetics (Mohl 2011). Those cities which won their battles had several things in common among them; local involvement was key, from neighborhood residents to local politicians to local media, across socio-economic boundaries. Legal action was frequently inevitable, but in many cases was only used to buy time. Cities with an existing tradition of planning, of course, had an easier time of things as well (Mohl 2004).

Today, many cities have successfully removed urban highways with varying outcomes. Boulevards are a common replacement, and one of the more prevalent concerns with this solution is increased traffic congestion. However, evidence shows that traffic tends to redistribute itself without causing severe congestion. Some boulevards are designed to function as miniature freeways and are able to handle capacities similar to the highway they replaced, but in most cases the traffic volume is spread across other surface streets and highways (Billings et al 2012). There is also evidence that traffic congestion is mitigated by increased use of public transit (Billings et al 2012, Chung et al 2012).

Another popular strategy is to replace or cover urban highways with green space. Cap parks (or deck parks) are used to provide connectivity and green space in areas separated by urban highways without actually disturbing the highway itself. Freeway park in Seattle was the first of this kind in 1976, but more recently Dallas has seen much success with Klyde Warren Park which reconnects the Uptown and Downtown neighborhoods that were severed by Woodall Rodgers Freeway. In other instances, such as Boston's Rose Kennedy Greenway, parks are implemented alongside boulevards or tunnels that replace elevated highways (Brennan 2022). Such green space is frequently a much need amenity for areas where highways and automobility have dominated land use and fragmented communities (Rigolon & Németh 2018).

Unfortunately, the best intentions can sometimes have unintended consequences. Patterson and Harley (2019) found that while replacing an urban highway with a boulevard led to significant reduction of air pollutants, it also contributed to increased property values and a decreased Black population. This applies to green space as well; attempts to provide parks to

lacking areas often leads to “environmental gentrification,” harming the very communities they were intended to help (Checker 2011, Wolch et al 2014).

2.3 Disconnected Neighborhoods

The presence of the interstate highway system in American cities has fragmented the urban form and left many neighborhoods disconnected from one another. According to Salingaros (2003), a living city requires an infrastructure made up of a large number of connections with many alternative choices between nodes. Additionally, connections are necessary at all scales, but large-scale connections (automobiles) can easily overshadow or eliminate smaller-scale connections (pedestrians). Thus, small-scale connections should be prioritized and supplemented with relatively few large-scale connections (Salingaros 2003).

The prioritization of auto-centric infrastructure, however, has led to an erasure of pedestrian-scale connectivity, particularly in highway adjacent neighborhoods. This necessitation of a personal vehicle, along with the decentralization of employment, has severely limited job accessibility for residents of disconnected inner-city neighborhoods. Furthermore, these isolated communities received little economic stimulation because their members are forced to spend their income outside of their own neighborhoods. As result, they are left in a vicious cycle of poverty (Steiner 2019)

Contributing to this injustice is a separation of land uses fueled by excessive large-scale connectivity. A sustainable urban fabric requires a high density of diverse land uses with a variety of connections between them (Salingaros 2003). Neighborhoods with strong connectivity are not only more self-sufficient, but also provide more opportunities for social

engagement, which contributes the well-being of residents and resilience against crime and disaster (Pfeiffer & Cloutier 2016).

Connections to green space are also important at all scales. Of equal importance, is that said green space must be usable at each scale, not merely present (Salingaros 2003). Access to open green space has been shown to highly correlate with happiness and wellbeing (Pfeiffer & Cloutier 2016)

2.4 Precedent Studies

This section reviews five case studies of urban highway teardown projects as precedence for this design master thesis. They include the Embarcadero and Central freeways of San Francisco, Cheonggyecheon in Seoul, the Alaskan Way Viaduct in Seattle, and Boston's Big Dig.

2.4.1 Embarcadero Freeway & Central Freeway, San Francisco, CA

First, two highway removal projects in San Francisco are examined, Embarcadero Freeway and Central Freeway. Both were constructed in 1959 and damaged by the Loma Prieta earthquake in 1989; removal of Embarcadero was completed in 1991 while Central was closed in 1992 and torn down in phases which were completed in 2002 (Billings 2013, CNU 2019b, CNU 2019c). Data on each project is reported individually, followed by their combined impacts on the city of San Francisco.

Embarcadero Freeway (Figure 12) was a double-decked highway built over a surface street along San Francisco's northeastern waterfront. Its existence was highly contested from the beginning, as it cut off the city's downtown from the waterfront. The decision to remove it

came quickly once it became apparent damage from the earthquake would be too costly to repair (Billings 2013). The highway was eventually replaced with Embarcadero Boulevard in June of 2000 alongside a promenade with tree-lined sidewalks and a number of waterfront plazas (Cervero et al 2009). Between three lanes of traffic each way, the boulevard also included a streetcar line as an alternative to auto-centric travel for locals and tourists alike (CNU 2019c).



Figure 12 – Embarcadero Freeway 1960
Source: cnu.org

Central Freeway (Figure 13), also double-decked, primarily ran through poor minority residential neighborhoods. Removal of this highway was a bit more contentious due to its proponents mostly being the residents of the adjacent neighborhoods who lacked the political influence of the central business district that pushed for the demolition of Embarcadero (Billings 2013, Cervero et al 2009). Central Freeway did come down, however, and was also replaced with a surface boulevard (Figure 14). Octavia Blvd consists of four through-lanes with a raised median, a peripheral lane, also separated by a median, on each side for local and bike traffic as well as street parking (Cervero et al 2009), and Patricia’s Green,

a linear park/plaza that replaces the through-lanes at the northern end of the boulevard (CNU 2019b). For safety reasons, left turns are prohibited on Octavia Blvd, a feature that allows commuters to use the street in a similar manner to the freeway it replaced while protecting the interests of the local community (Billings 2013).



Figure 13 – Central Freeway
Source: sfgate.com



Figure 14 – Octavia Boulevard
Source: restreets.org

The removal of neither freeway resulted in increased traffic congestion despite an estimated 25% loss in capacity for both roads. In fact, traffic congestion decreased for Embarcadero,

with evidence showing that traffic redistributed itself fairly evenly to the local street grid. Additionally, public transit use in both areas increased significantly after removal of the highways (Billings 2013).

Jobs, housing, and land values all increased for both areas after the highway tear downs and boulevard replacements, but with different implications. With 15 acres newly available, housing increased by more than 50% near Embarcadero, with land values predictably rising relative to their proximity to the waterfront. On the other hand, given its history as a poor ethnically diverse community, the area surrounding Octavia Blvd experienced a greater struggle with gentrification. The new amenity saw mercantile retailers replaced with high-end boutiques and nightlife businesses. Land values rose. The White population increased, and the Black population decreased. However, this was expected, and preventative measures were implemented. Half of new residential development was reserved for low-income housing. Additionally, because private parking raises residential unit prices, off-street parking maximums were reduced as low as 0.25 spots per unit (Cervero et al 2009).

2.4.2 Cheonggyecheon, Seoul, South Korea

The Cheonggyecheon Freeway was an elevated highway in Seoul (Figure 15). It was constructed in 1968 and demolished in 2005. Motivations for its removal included reduction of traffic congestion, reduction of noise pollution, environmental restoration, and improved multimodal connectivity (CNU 2017, Ink 2017).

The highway had covered a historic creek, also named Cheonggyecheon, and repairing the environmental damage this did was one of the project's top priorities. This was accomplished

by constructing a 9-kilometer artificial creek along the path of the original and the removed highway (Figure 16). This was accompanied by a linear park that emphasizes the pedestrian experience in an area previously dominated by the automobile. Cheonggyecheon begins with a street level plaza, frequently used for special events, which leads down to the depressed promenade and Cheonggyecheon stream. This first section features modern and abstract design aesthetics before passing under a restored historic bridge and adopting a naturalistic aesthetic with more vegetation and a softer stream bank (Kim 2020).



Figure 15 – Cheonggyecheon Before
Source: globaldesigningcities.org



Figure 16 – Cheonggyecheon After
Source: globaldesigningcities.org

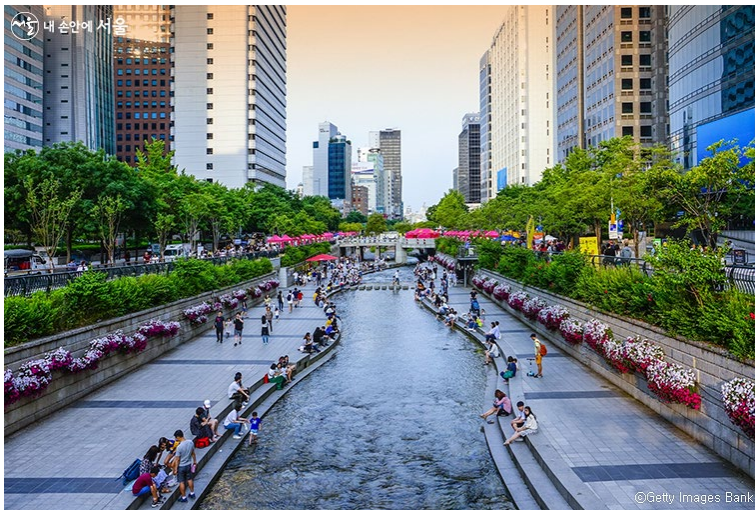


Figure 17 - Cheonggyecheon Today
Source: mediahub.seoul.go.kr

Homage is paid to the past in many ways including the Cheonggyecheon museum, a replica shanty house, and three highway columns that stand as modern ruins of history. The site also displays historic imagery from Korea's Joseon dynasty, as well as a series of photographs that tell the story of Cheonggyecheon's evolution over the course of the 20th century (Kim 2020).

Additional objectives of Cheonggyecheon focused on incentivizing public transit and improved connectivity. The street was downsized to only two lanes on either side of the promenade; 21 new bridges were constructed crossing the stream, 12 of which are dedicated to pedestrian use (LAF 2020), and six subway stations and 18 bus routes link to Cheonggyecheon (Chung et al 2012). This led to an increase in pedestrian activity of 76%, and bus and subway ridership increased by 15% and 3.3% respectively. Contrary to the expectations of many, traffic congestion never manifested. Traffic speed and volume both decreased as construction began, but speeds eventually leveled out (Chung et al 2012), and volume continued to fall as much as 45% (Ink 2017).

Another major goal of the Cheonggyecheon restoration project was environmental and ecological improvement. The new riparian corridor has seen more than a 600% increase in biodiversity (LAF 2020), particularly near the convergence with the Jungnangcheon stream (Kim 2020). The city has also experienced a reduced urban heat island effect with temperatures dropping as much as 5.9°C in the vicinity of Cheonggyecheon (LAF 2020), a decrease in air pollution of at least 10% (Ink 2017) and upwards of 35%(LAF 2020), and improved water quality in Jungnangcheon (Lee & Anderson 2013).

Lastly, there have also been significant impacts on Seoul's economy. On average 64,000 people visit Cheonggyecheon daily, 2% of them are foreign tourists who contribute over two billion won to the city's economy. Land values in the area have increased by 30-50%, which leads some to fear that Cheonggyecheon is contributing to gentrification (Lee & Anderson 2013).

2.4.3 Alaskan Way Viaduct, Seattle, WA

Alaskan Way Viaduct (Figure 17) was an elevated double-decked section of the State Route 99 highway in Seattle that was demolished and replaced with the SR 99 Tunnel. The original highway was constructed in 1953 and ran along the city's waterfront cutting it off from downtown Seattle. After decades of deterioration from use and elemental exposure, damage from an earthquake in 2001 made it clear that the freeway needed to come down (WSDOT 2022). What to do next was not so clear.



Figure 18 – Alaskan Way Viaduct
Source: cnu.org

Citizens and stakeholders had long considered the highway to be problematic, and there was no shortage of opinions on how to handle its removal and replacement. After nearly a decade of controversy, the city approved a plan featuring a tunnel in 2009 (Mohl 2011). As the details of how to accomplish this were worked out, the southern mile of Alaskan Way Viaduct between Holgate and King Streets was torn down first and replaced with an improved elevated version that overpassed the railroad. The SR 99 Tunnel was not itself completed until February 2019, after which the remaining portion of the highway was demolished in November 2019 (WSDOT 2022).

Traffic data for the SR 99 Tunnel has been difficult to measure due to the Covid-19 pandemic, but WSDOT has nevertheless conducted a thorough analysis. Traffic volumes were initially comparable to the Alaskan Way Viaduct but decreased significantly with the implementation of tolling the summer after the tunnel's completion and have slowly trended back toward baseline levels. Surface street traffic volumes, on the other hand, have consistently trended downward while public transit numbers held consistent until dropping during the pandemic (WSDOT 2021).

In the absence of such a large obstacle, the city of Seattle is now focusing its resources on restoring surface connections and developing the waterfront. A new boulevard named Alaskan Way is under construction. In addition to connecting existing surface streets to the new waterfront, it will improve multimodal circulation with features such as protected bike lanes, a lane dedicated to public transit, raised crosswalks, and tree-lined sidewalks (SDOT 2022). Development of the waterfront consists of several projects intended to function as a cohesive walkable neighborhood. The pedestrian experience is being prioritized through dedicated pedestrian circulation and plazas including a park promenade, Railroad Way, Outlook Walk, and pedestrian bridges. Along with the park promenade, three piers are also being converted into park space (Waterfront Seattle 2022).

Because Seattle's waterfront and new Alaskan Way are still under construction, there is no data on their success. However, some knowledge can still be inferred from peripheral data. By restoring local access to blue space, the Waterfront Seattle initiative has the opportunity to achieve social, cultural, economic, and environmental justice (Wessels 2014). New walkable and bikable infrastructure provides easier access for locals and tourists alike, and new parks

provide affordable activities that reduce the area's dependency on seasonal tourism revenue. Removal of the Alaskan Way Viaduct has restored views of the waterfront to local residents; however, it remains to be seen how potential increases in land value might affect the existing population (Wessels 2014, Waterfront Seattle 2022).

Pioneer Square is a historic preservation district adjacent to the Seattle waterfront similar to Deep Ellum in that it is primarily composed of brick buildings from the late 19th and early 20th centuries and has had to battle with incompatible infill. Fortunately, its status as a historic district and the presence of the Pioneer Square Preservation Board have prevented undue harm to the district, allowing it to evolve with new development over the decades without compromising its historic character (Ochsner2017). On the other hand, the neighborhoods of Belltown and South Lake Union at the northern end of Alaskan Way have not been so lucky. Both are now being dominated by outsized modern development and gentrification (Anderson et al 2022, Pearson 2002). The lesson is that neighborhood preservation and new development are not mutually exclusive, but the intention of coexistence must be clear and backed by public policy.

2.4.4 The Big Dig, Boston, MA

Constructed in 1959, the Central Artery was a six-lane elevated segment of Interstate 93 that ran through the heart of Boston (Figure 18). Apprehensions about the highway began as early as the late 1960s, and by 1982 the decision was officially made to replace it with a tunnel (Palazzo 2014). "The Big Dig," formally known as the Central Artery and Tunnel (CA/T) Project, was the largest highway project in U.S. history, encompassing the removal of Central Artery, construction of the underground replacement expressway, a second tunnel under Boston

Harbor, two bridges, four highway interchanges, and dozens of new parks and plazas.

Construction efforts began in 1991 and lasted through 2006 (MassDOT 2018).

The primary motives behind the demolition of the Central Artery highway were extreme traffic congestion and restoring the urban fabric. The highway carried up to 200,000 cars per day by the early 1990s and was expected to experience traffic jams for 16 hours daily by 2010. Following the national trend of prioritizing automobility over livability, the construction of the Central Artery displaced 20,000 residents and cutoff Boston's downtown from adjacent neighborhoods and the waterfront (MassDOT 2018).

In terms of traffic congestion, the project produced mixed results. The downtown area saw a 62% reduction in congestion between 1995 and 2003 (MassDOT 2018), but it can be argued that that traffic was just relocated to other parts of the city's highway system (Flint 2015).

Although it was not one of the project's objectives, it should be noted that this did nothing to reduce Boston's dependence on the automobile (McKeag 2021).

While there may be more cars than ever travelling through the city, the CA/T Project is widely considered a success from a restoration of the urban fabric standpoint (Palazzo 2014, Rembeza 2017). The Rose Kennedy Greenway (Figure 19) is a 17-acre series of parks and plazas that follows the path of the removed Central Artery (McKeag 2021). Not only does it reconnect districts to each other and the waterfront, it also replaces what was a completely auto-centric space with one focused on the pedestrian experience (Rembeza 2017).

Guidelines were developed by the *Greenway District Planning Study* to provide standards for aspects such as density, form, building height, and building orientation that allowed for future growth and urban infill while ensuring a cohesive district character (Palazzo 2014).



Figure 19 – Central Artery
Source boston.com



Figure 20 – Rose Kennedy Greenway
Source: bostonglobe.com

The Rose Kennedy Greenway is both socially and economically sustainable and an invaluable amenity to the city of Boston. Nondiscriminatory access is widely available through vehicular, pedestrian, public transit, and marine connections. As a destination, it provides diverse programming and activities that include shopping, dining, education, and recreation (Öztürk Kurtaslan 2014). Emphasis on public art, both permanent and seasonal installations, has also been an important feature for engaging the community and enhancing the identity of the

district (Rembeza 2017). New development prompted by the greenway has provided more than 7,500 housing units – 15% of which should be dedicated to low/middle income households according to the *Greenway District Planning Study* (Palazzo 2014) – and approximately 43,000 new jobs (McKeag 2021). In the 5 years after its construction, real estate values increased by 47% and the central business district gained 36% in economic value (Öztürk Kurtaslan 2014).

2.5 Chapter Summary

This chapter discussed the history of highways, particularly their use as a means of removing and separating communities of color in postwar America, which spawned a nationwide epidemic of auto-centric design. This trend was opposed early on, and eventually cities began to remove highways from their urban centers. The histories of Downtown and Deep Ellum were then studied to provide context for how the city of Dallas has been affected by the development of the interstate system, specifically I-345. An examination of TxDOT's I-345 feasibility study followed in order to understand how this project is being approached by governmental entities.

Five specific examples of urban highway teardowns were reviewed in the precedent study section. Central Fwy, Embarcadero Fwy, and Cheonggyecheon Fwy were all removed and replaced with surface boulevards, while Alaskan Way Viaduct and Central Artery were both replaced with tunnels. In all cases, green space and pedestrian amenities were expanded, if not made the primary focus of the project, and the urban grid was successfully restored.

CHAPTER 3 - METHODOLOGY

This design master thesis uses qualitative methods to research potential best uses for the I-345 corridor in Downtown Dallas, TX. Using the literature reviewed in chapter two as context, data is gathered from interviews, precedent studies, and passive site observation to inform design of a replacement for I-345. This chapter covers research design, study location, study population, data collection methods, data analysis methods, the design process, bias, limitations, and errors. This research protocol has been approved by Institutional Review Board (IRB), documentation of which can be found in the appendix (Appendix 1).

3.1 Research Design

A four-step process following qualitative methods (Creswell 2008) is adopted to assess needs and propose a redesign of the I-345 corridor in Downtown Dallas, TX for its best use (Figure 20). First, the histories of urban highway removal, as well as Deep Ellum and Downtown, are reviewed and documented. Next, five case studies of similarly affected cities will be likewise reviewed. In-depth interviews will then be conducted with experts who live or work in the community. Finally, the spatial qualities of the area are documented using passive site observation, photography, and GIS mapping techniques. The findings are then synthesized and used to produce a design vision for the segment of I-345 corridor between Deep Ellum and Downtown, Dallas.

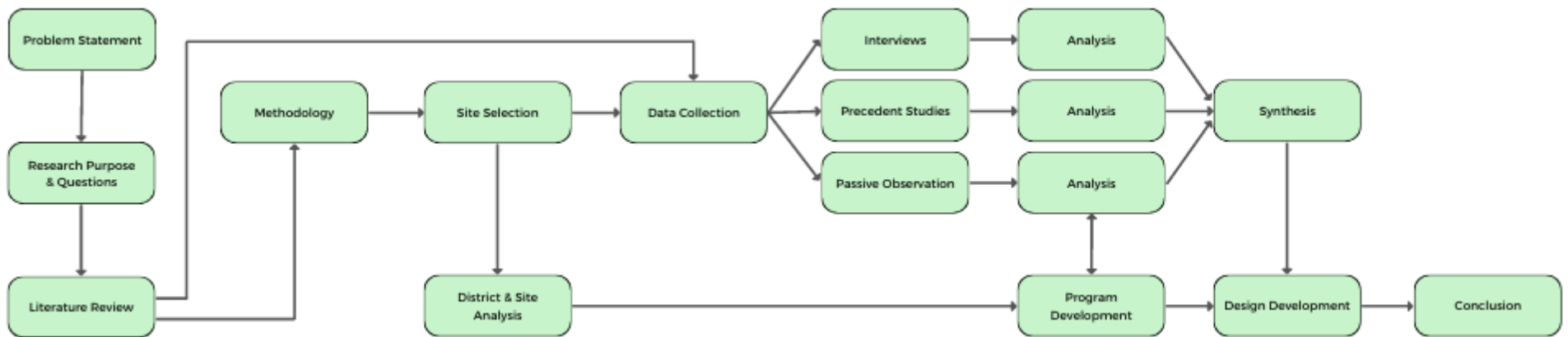


Figure 21 – Research Design

3.2 Study Location

The purpose of this thesis, to design an appropriate replacement for I-345 in Dallas, TX, is inherently tied to a specific location – the land currently under and occupied by Interstate 345. This study is additionally concerned with preserving the culture and history of the Deep Ellum neighborhood and improving connections between it and Downtown Dallas.

Therefore, while conceptual suggestions are made for the full I-345 corridor between I-30 and U.S.-75, the design portion of this thesis will be limited to the area directly adjacent to Deep Ellum. The boundaries for this area are Good Latimer Expy, Cesar Chavez Blvd, Pacific Ave, and Canton St and will include the portion of Good Latimer Expy between Elm St. and Commerce St. (Figure 21)

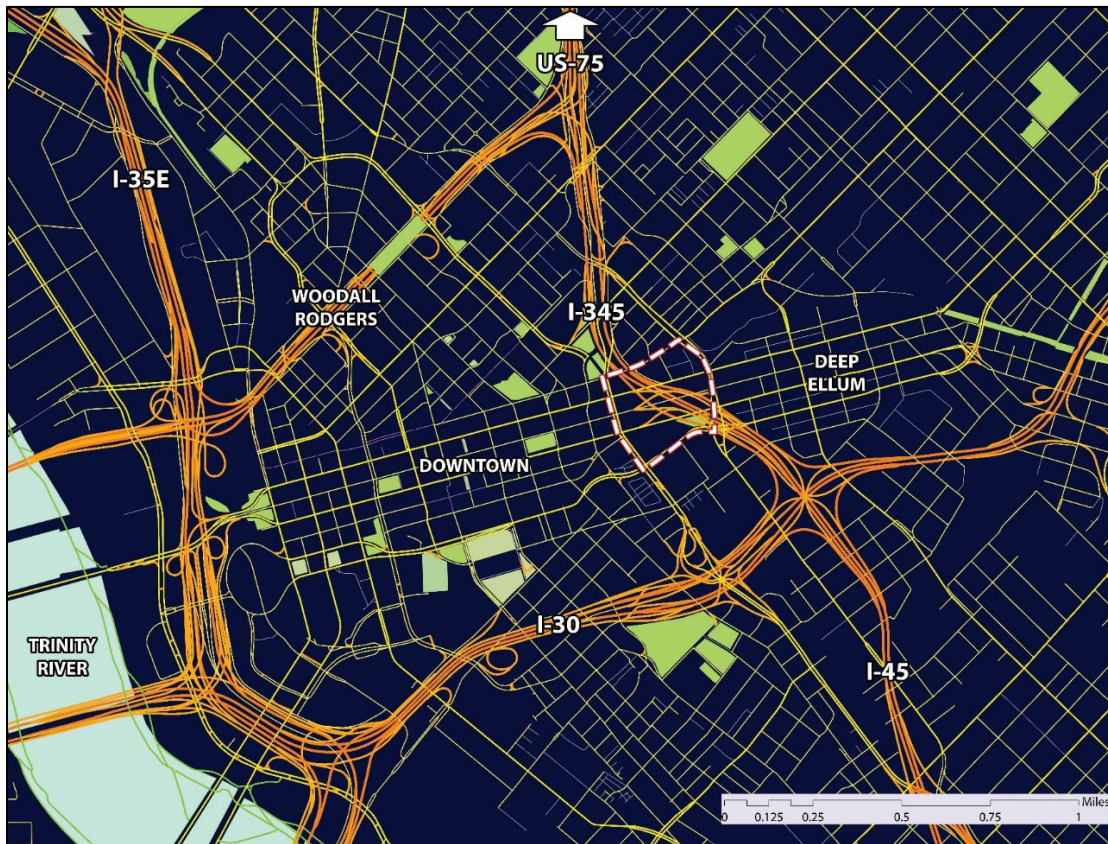


Figure 22 – Highway System Around Downtown Dallas, TX with Site Location Outlined

3.3 Study Population

The intent of this study is to interview a population of stakeholders comprised of three subgroups: residents of Deep Ellum and Downtown, people employed in Deep Ellum and Downtown, and experts on Deep Ellum, Downtown, and/or I-345.

While criteria for residents and employees is straightforward – location of residence and/or employment – criteria for experts is more nuanced. Education or professional experience in the design and/or planning industries is preferred but not required. Professional interest and/or extensive knowledge of the study location is required. Topics deemed acceptable as “knowledge of the study location” include the history of Deep Ellum and/or Downtown, professional involvement in the Deep Ellum and/or Downtown communities, and/or the state of I-345.

The study population of this thesis also includes any people in the study location during the passive site observation process. Unless approached as a potential interviewee, these people will not be contacted, but their behavior may be documented.

3.4 Data Collection Methods

A combination of descriptive and interpretive strategies (Deming & Swaffield, 2011) are used to collect data for this thesis from three different sources: one-on-one in-depth interviews, precedent studies, and passive site observation. This study also benefits from the use of archival and secondary data for setting the historic timeline and context, area studies and reports, and documenting socioeconomic factors affecting Downtown.

3.4.1 Interviews

This study primarily relies on in-depth interview data (Sommer & Sommer 2002). Interview participants are first asked five profile questions, followed by eight in-depth core questions with nine supplemental questions that may or may not be asked depending on the answers received for the core questions. Questions are set to understand stakeholders' perspectives on issues highlighted in the research questions regarding I-345 and its impacts on Downtown and Deep Ellum, particularly user experience, land use, and neighborhood character.

The profile and core questions are listed below, and the supplemental questions can be found in the appendix (Appendix 2).

Profile Questions:

1. Do you live in Deep Ellum or Downtown Dallas within walking distance from the I-345 corridor (less than 15 minutes)?
 - a. If so, how long have you lived in the area?
2. Do you work in Deep Ellum or Downtown Dallas within walking distance from the I-345 corridor (less than 15 minutes)?
 - a. How long have you worked in the area?
3. Do you have any experience or education in the design and planning industries?
4. What is your current profession?
5. What is your age?

Core Questions :

1. How do you most often interact with the I-345 corridor?
2. How does I-345 affect daily life in Deep Ellum/Downtown in your view? Please elaborate.
3. What are some of the strengths and weaknesses of the I-345 corridor for the Deep Ellum/ Downtown Communities? Please elaborate .
4. What type of buildings (low-up to 2 floor, medium 3-5 floors, high density 6 or more floors) and public spaces (parks, pocket parks, plazas, sport fields, open space etc.) are suitable for the area in your view? Please elaborate.
5. Should I-345 between Deep Ellum and Downtown be kept as is with renovations, downsized, demolished and/or replaced by the regular city grid? Please elaborate.
6. How would you like to see the culture and history of Deep Ellum emphasized/displayed in this area?
7. How could the land currently occupied by I-345 be utilized to improve the relationship between Deep Ellum and Downtown? Please elaborate.
8. What design features and elements could be implemented in this area that would benefit both the local community and the City of Dallas as a whole?

Profile questions are used to determine which group participants fall into and roughly gauge population diversity. The core questions are intended to provoke in-depth discussions and

provide the majority of data gathered from interviews. Supplemental questions may be used to elicit more focused responses based on the direction of individual discussions.

The interviews are conducted in-person, over the phone, or virtually via video call according to the interviewees' preferences. In-person and phone interviews will be recorded and transcribed with a phone app and video calls with the virtual platform being used.

Expert participants are identified and recruited based on the author's personal knowledge, referral by the author's thesis chair, or referral by other participants via the snowball sampling technique detailed below. Resident and worker participants are primarily sought out through walk-up solicitation or through the snowball sampling. Snowball sampling relies on referrals from current participants to find subsequent participants who meet the study's criteria (Simkus 2022).

3.4.2 Precedent Studies

Five urban highway removal projects from four cities are analyzed as precedence for this design thesis using processes adapted from those laid out by Francis (2001). These cases are selected via convenience sampling based their unique and impactful approaches and solutions acknowledged in design and planning literature. Data on these projects is collected from literature and from studies conducted by organizations such as Congress for the New Urbanism. Targeted information includes motivations for highway teardown, replacement strategies, intended outcomes, programmatic elements, and positive and negative consequences.

3.4.3 Passive Site Observations

Further observations are documented by the author following descriptive strategies laid out by Deming and Swaffield (2011) during a thorough walkthrough of the study location.

Additionally, the author currently resides in Downtown Dallas and will record observations made on daily commutes through the area. Targeted information includes pedestrian behavior, driver behavior, spatial conditions, aesthetic conditions, land use, and programmatic elements.

3.4.4 Archival and Secondary Data

Archival and secondary data from the literature review process will be treated as miscellaneous data that informs the design process. This includes GIS data files, historical data and photographs, and maps, plans, and traffic data from the City of Dallas and TxDOT.

3.5 Data Analysis Methods

3.5.0 Introduction

The data collected using the above methods are then analyzed by applying grounded theory (Walsh, Holton et al 2015) to identify themes which will be entered into matrices and used to formulate design considerations. Grounded theory is the detection of patterns in data, specifically through coding in this study. Collected data is coded according to topic, and as relationships and patterns emerge, themes are developed to better understand, describe, and apply the findings (Walsh, Holton et al 2015). Although these are qualitative methods, they will include frequency as the single form of quantitative data.

3.5.1 Interview Analysis

Data collected from interviews is analyzed using grounded theory. The transcriptions are coded (Sommer & Sommer, 2002) and responses categorized by subject matter. This method is expected to identify a set of common themes across all interviews. These themes are used to create a matrix (Figure 22) that will serve as a tool to produce a set of design goals, programs, and design elements.

Transcriptions are then reexamined through the lens of these themes in order to generate design goals and objectives for each theme. Programming is then derived from the goals and objectives, and design elements and features then derived from the programming.

Items in each category are prioritized based on the number of respondents who supported or promoted them. This frequency will be labeled as “#” in the column title. Another column is used to note which participants addressed each item.

3.5.2 Precedent Study Analysis

To analyze the precedent studies, the characteristics detailed in chapter two are also categorized into themes through the application of grounded theory (Walsh, Holton et al 2015). The same matrix method used for interview data is then used to reexamine the precedent study data and generate supplemental objectives, programming, and design elements.

THEMES:	THEME 1	#		THEME 2	#		THEME 3	#	
DESIGN GOALS & OBJECTIVES:									
PROGRAMMING:									
DESIGN ELEMENTS & FEATURES:									

Figure 23 – Interview and Precedent Study Matrix Template

3.5.3 Passive Site Observation Analysis

Unintrusive (passive) site observations are similarly analyzed through grounded theory (Walsh, Holton et al 2015) using a slightly altered matrix (Figure 23). A new section is inserted before “Design Goals & Objectives” to document which observations generated each theme. Additionally, because there is only one observer, frequency is not used to prioritize items. Instead, data is prioritized based on the author’s discretion as informed by literature and typical landscape architecture standards.

THEMES:	THEME 1	THEME 2	THEME 3
OBSERVATIONS:			
DESIGN GOALS & OBJECTIVES:			
PROGRAMMING:			
DESIGN ELEMENTS & FEATURES:			

Figure 24 – Observation Matrix Template

3.5.4 Synthesis

After analysis of all three data sources is complete, the resulting matrices are consolidated into one table (Figure 24). The themes from each data collection method are reviewed and combined to produce three overarching themes which are used to code the resulting table. This is then refined by removing any redundant items, leaving comprehensive lists of design goals & objectives, programming, and design elements & features as the final product.

The three sources of data will be used as a means to mitigate bias of any one source. Further data triangulation will be achieved by interviewing three distinct groups of participants.

DESIGN GOALS & OBJECTIVES	PROGRAMMING	DESIGN ELEMENTS & FEATURES

Figure 25 – Synthesis Table

3.6 Design Process

The design process in this thesis consists of collecting relevant knowledge and evidence, deciding on an alternative scenario for I-345, specific site selection, design program development and conceptualization, design development, and vision details.

As previously stated, this study is inherently tied to a specific location, therefore the site selection process consists mainly of understanding the entirety of I-345, suggesting a scenario (demolish, alter, leave as-is), considering where such an intervention could take place, and narrowing the scope from the full I-345 corridor to a more focused and manageable area.

Evidence from the data collection portion of this research is analyzed to generate design goals and objectives which are then translated into a design program. This is supplemented by conducting inventory and analysis at region, city, district, and site level to provide additional site-related context and inform the design following standard landscape architecture practices. After which research findings will be applied to progress objectives and programming into concepts. Then through design development a schematic site plan is produced.

3.7 Bias, Limitations, & Errors

The purpose of this study is to design for a more appropriate use of the land currently occupied by I-345; thus, a bias against the presence of this highway must be acknowledged. Based on the author's previous knowledge and experience, this research is not expected to contradict that objective.

Additionally, because this thesis is inherently concerned with a specific location, application to other areas is limited. While the knowledge gained may be useful for other urban highway removal studies, a significant portion of data collected from literature and interviews will focus specifically on the Downtown and Deep Ellum neighborhoods of Dallas, TX.

While the intent of this study is to interview three distinct people groups, reliance on the snowball technique may not produce the desired results. Should an imbalance between these groups manifest, it is compensated for by reducing emphasis on the distinction between groups and by expanding the precedent study portion of this research.

Furthermore, data collected through passive site observation is limited by the perceptions and interpretation of a single observer.

Although parallel activity (TxDOT feasibility study) was able to provide a significant amount of data, only a portion of this was available to the author at the time of research. As such, this particular thesis is mainly informed by a small sample size.

3.8 Chapter Summary

This chapter covered the methodology adhered to in this research. Following qualitative methods, this thesis researches the best use for the I-345 corridor in Dallas, TX. This study is exclusively interested in a specific location, so site selection is therefore a straightforward process of narrowing the scope to a more manageable area. The study population includes those interviewed as well as people witnessed interacting with the site during the observation process.

In-depth interviews are conducted with local experts, residents, and workers of the Deep Ellum and Downtown area. Responses from these interviews are analyzed by dividing them into themes. Those themes are then used to create a matrix in order to generate design goals, programming, and design elements for each theme.

Five projects are reviewed as precedent studies to determine how four other cities have approached scenarios similar to the one Dallas faces. Data collected from the precedent studies is analyzed using the same process of identifying themes and creating a matrix as used in the interview portion of the study.

Additional observations of the site are made by author by walking the area and monitoring user behavior. These observations are similarly divided into themes and used to generate a matrix of potential programming and design elements.

The matrices from each data collection method are synthesized and refined to produce a single comprehensive table with lists of objectives, programs, and design features. These findings are used alongside standard landscape architecture practices and data from the literature review to inform a new design for the I-345 corridor between Deep Ellum and Downtown Dallas.

CHAPTER 4 – FINDINGS & ANALYSIS

This chapter covers the implementation of the data collection and analysis methods explained in Chapter 3. The findings from interviews, precedent studies, and observations are detailed and analyzed to produce design goals, objectives, and programming. The results from each method are then synthesized into a comprehensive table of design goals and objectives, programs, and design elements which is used to inform the design process.

4.1 Interview Findings & Analysis

25 individuals were contacted as potential interview subjects for this research, but only seven agreed to participate. In-depth interviews were conducted with the seven respondents, six experts (E1-6) and one resident worker (R1). A matrix was then created to categorize the interviewees' answers and used to generate themes and design goals. Interview participants were first asked five profile questions, followed by eight core questions with nine supplemental questions that may or may not have been asked depending on the answers received for the core questions.

4.1.1 Profile Questions

First, respondents were asked whether or not they lived in the Deep Ellum or Downtown neighborhoods within walking distance of I-345, and secondly if they worked in this area. Subjects E1, E6, and R1 answered "yes" to both questions, E3, E4, and E5 answered "no" to both, while E2 worked Downtown but did not live in the area.

Next, participants were asked if they had any education or experience in the design and/or planning industries, to which all respondents, except for R1, answered "yes." To follow up,

everyone was asked for their current profession. Subjects E1, E2, E3, & E4 all replied that they work as Urban Designers, Landscape Architects and/or Planners. E6 works as an executive for a non-profit, and R1 in marketing.

Lastly, the respondents were asked their age. R1 was 27. E5 and E1 were 33 and 34, respectively. E6 and E4 were 42 and 43, and both E2 and E3 were 59.

4.1.2 In-Depth Questions

The core of the interviews consisted of eight focused questions. The first question asked was: "How do you most often interact with the I-345 corridor?" E1 said they drove under I-345 on a daily basis and drove *on* it occasionally. E2 said they drive on or under it approximately every other day. E3 drives on or under I-345 daily in their work commute and frequently on weekends. E4 responded that they try to avoid it and are working professionally and politically to have it removed. E5 said they drive under it on a regular but infrequent basis. In addition to driving on I-345 and walking, biking, and running under it, E6 also mentioned the impact it had on their senses of sight, smell, and hearing. R1 also answered that they frequently drive on I-345 and walk and bike under it.

The second question posed to the interview participants was: "How does I-345 affect daily life in Deep Ellum/Downtown in your view?" E1 replied that it provides high connectivity for commuters, but that it is unpleasant and unsafe to walk under. E2 noted that I-345 was designed with connections to Downtown in mind, but not Deep Ellum, and also mentioned the spatial constraints inherent in building ramps from an elevated highway down to surface streets. E3 called it a "double-edged sword," saying it's convenient for commuters, but an

“eyesore” and a barrier between neighborhoods. E4 also emphasized the *disconnect* I-345 creates between Downtown and Deep Ellum, and even shared an anecdote about Urban Designers who were dedicated walkers in town for a conference being unwilling to make the walk between neighborhoods. E5 likewise labeled the highway as a barrier and discussed how new development is having to design and build around it, further hindering the conjunction of the two neighborhoods. E6 took things a bit further by claiming that I-345 cuts Downtown off from the eastern side of Dallas (rather than just Deep Ellum), and that it constitutes a “lack of design and lack of intention by the city.” Furthermore, they said it leads to increased traffic and reduced pedestrian safety. R1 touched on I-345 being convenient for commuters, but their primary concern was the lack of safety it causes for pedestrians.

The next question asked was: “What are some of the strengths and weaknesses of the I-345 corridor for the Deep Ellum/ Downtown Communities?” E1 expanded on their previous answer by adding an absence of bike infrastructure to their list of weaknesses, and further emphasized the connectivity I-345 provides, particularly from south to north, as a strength. E2 also mentioned the north/south connection provided as a strength, and the main weaknesses they pointed out were again the spatial constraints and focus toward Downtown. E3 likewise acknowledged the north/south connection but declared that was the highway’s only strength. As for weaknesses, in addition to being “ugly,” they said it’s both a physical and visual barrier between neighborhoods and that it occupies real estate which could be put to better use. E4 similarly discussed issues of land use, safety, spatial constraints, and disruption of the street grid, and while they acknowledged connectivity and parking under the highway as strengths, they also claimed that these were not as beneficial as other alternatives. E5, like

the rest, said connectivity was the primary strength of I-345, and the barrier it creates as a weakness. They also talked about the surrounding and surrounded land as being barren and that the space under the highway could be turned into an amenity as other cities have done. E6 confidently stated that there are no strengths for the communities around I-345, and listed hostility to pedestrians, barrier, land use, traffic, and pollution as weaknesses. While R1 did discuss connectivity as a strength, they focused on the access it provides to Deep Ellum's nightlife for residents in other parts of the city and the suburbs, and as a weakness they concentrated on spatial constraints in the context of new development going up around the highway.

The fourth question of the interview had two parts, the first of which was "What types of buildings and public spaces are suitable for the area in your view?" E1 answered that high density was necessary for the area and that any public space needs to accommodate the variety of people in the area, mentioning parks specifically. E2 also suggested more parks and green open space for the area and was primarily concerned that any new buildings not undermine the existing character of Deep Ellum. E3 expanded on the park idea by also mentioning sport fields and public pools, and believed mid-rise buildings would be best to handle the areas density and transition between Deep Ellum and Downtown. They also spoke on the need for affordable housing and small business retailers in the area. E4 also noted the need for affordable housing and suggested mid to high-rise buildings, but stressed the urban form is more important than building typology or land use, and discussed walkable streets and parks appropriate to the neighborhood as examples of public space. E5 recommended mid-rise buildings to bridge the gap between neighborhoods while respecting the character

of Deep Ellum and bringing more parks to the Deep Ellum side of development. E6 listed parks, walkable space, mixed-use areas, multimodal transit hubs, and community and history-focused areas as examples of public space for the area, and mid to low-rise buildings focused on higher density. R1 answered that high density mid to high-rise buildings would be best, as well as a plaza that primarily serviced Deep Ellum.

This was followed with the question: "Should I-345 between Deep Ellum and Downtown be kept as is with renovations, downsized, demolished and/or replaced by the regular city grid?" E1 was strongly in favor of a hybrid approach that reconnected east/west circulation and reduced I-345's footprint while maintaining the north/south connection for commuters, and specifically mentioned a depressed alternative. E2 was similarly in favor of keeping the connectivity provided by I-345 and reducing its impact. They further noted that I-345 plays an important role in completing the triangle of interstate highways that connect Dallas, Houston, and San Antonio. E3 was somewhat torn between a below-grade solution and demolishing it, they acknowledged the need for north/south connectivity, but were adamant that the city grid needs to be restored and that drivers using the highway just to pass through Dallas without stopping should not be a priority. E4 firmly believed that I-345 should be demolished and replaced with the city grid, stating that it only brings congestion and pollution to an area where people should be living, working, and playing, that traffic eventually needs to reach the street grid anyway, so we might as well be more intentional about it, and also that the primary reason it was built in this location was as a tool to remove African American neighborhoods. E5 said the highway should be removed and be replaced with development that brings programming like jobs to the area to compensate for the removal of the

north/south connection. E6 said I-345 should be downsized at the very least, if not demolished, and was also in favor a below-grade alternative. R1 would ideally like to see it demolished but did not think that idea was practical. Their primary concern was creating a safe, walkable, seamless transition between Downtown and Deep Ellum.

The sixth question participants were asked was: "How would you like to see the culture and history of Deep Ellum emphasized/displayed in this area?" E1 did not feel qualified to answer and said this should be left up to the local community. In addition to the relevance of Deep Ellum's music history, E2 mostly discussed preserving the neighborhood's entrepreneurial and industrial spirit. E3 discussed music and racial history, and proposed a museum. E4 called history and culture "fundamental" to Deep Ellum, mostly focusing on music, but also said the intentional racial injustice that occurred in the area needs to be acknowledged. E5 praised the adaptive reuse of the Knights of Pythias building as the Pittman Hotel and would like to see the character of Deep Ellum preserved through the continued repurposing of existing structures. Additionally, they would like to see more small theaters return to the area and said black artists in particular should be celebrated. E6 was emphatic that there should be a Deep Ellum history museum and also stressed a need for monuments to the neighborhood's racial history as well as music memorials and institutions. R1 recommended this be approached from a branding standpoint to make the area's history visible, using art to keep people engaged and aware of it, thereby increasing motivation to preserve what remains.

The next question asked was: "How could the land currently occupied by I-345 be utilized to improve the relationship between Deep Ellum and Downtown?" E1 focused on pedestrian safety and making alternate modes of transportation equally valid options to cars.

Specifically, they suggested “complete streets” as a solution. E2 was more concerned with reducing the highway’s footprint and filling in the gaps in development and advocated for a depressed alternative. E3 said much of the land dominated by I-345 could be turned into park space or other community-focused developments. E4 would like for there to be a safe, walkable, seamless transition between neighborhoods, as well as increased multimodal transportation options. E5 thought the area would benefit most from the addition of housing, parks, and mixed-use development to help unify the populations and activities of Downtown and Deep Ellum. E6 prioritized community restoration and acknowledgement of the area’s racial history. R1 emphasized that removing I-345 would allow for new development without disturbing existing structures and for increased safety and walkability.

The eighth and final core question of the interview was: “What design features and elements could be implemented in this area that would benefit both the local community and the City of Dallas as a whole?” E1 spoke on multimodality and the pedestrian experience, specifically mentioning design elements such as shade, enhanced paving, using cohesive design language between neighborhoods, and public art, and alluding to complete streets. E2 said it is necessary to have a framework for development that supports walkability, restoration of the city grid, and future development, but did not discuss any distinct design elements. E3 suggested a destination for people to walk to and large-scale public art and proposed incorporating the area’s railroad history. E4 said bringing housing, jobs, and amenities to a centralized location would help strengthen the city’s tax base while reducing the distance needed to travel to access these things. E5 largely focused on the benefits of complete streets and also mentioned introducing more trees and green space. E6 focused on cultural tourism

including programs like walking tours and monuments to local jazz and blues musicians.

Although they lacked the specific vocabulary, R1 referenced complete streets as a means to improve safety and circulation.

From here respondents were asked a variety of supplemental questions. E2, E3, and E6 were asked, "What would incentivize you to travel between the two neighborhoods?" E2 said to use the area's historical framework to inform future development by understanding why the roads were built this way in the first place. In particular, they noted Commerce Street's past as a two-way highway as well as the former existence of a railroad. E3 proposed increasing walkability and bikability via a trail similar to the Katy Trail which connects the Dallas neighborhoods Victory Park, Uptown, and Knox/Henderson. E6 began by suggesting a history tour then focused on improving multimodality, especially walkability and pedestrian safety, and referenced elements such as shade trees and pedestrian bridges.

E3 and R1 were both asked, "Should the relationship between Deep Ellum and new development change?" E3 did not think the relationship between neighborhoods should change, but that development should be intentional and collaborative moving forward, and advocated making Deep Ellum a historic conservation district to ensure the preservation of its character. R1 addressed Deep Ellum's tendency to cycle through periods of prosperity and decline. They thought continued development was necessary to break this cycle but expressed concern over the threat this posed to Deep Ellum's historic character.

Each expert was asked, "Are there any additional issues concerning this research that haven't been addressed?" E1 discussed the history and displacement of black communities and promoted restoration efforts on this front but maintained that completely removing I-345

was not practical because so many people rely on it now. E2 mentioned increasing walkability and reducing traffic speeds. Then they digressed into a historical explanation of why I-345 was built the way it was, the implication being that the highway's footprint needs to be reduced. E3 pointed out the impact the highway has had on South Dallas, stating that it's worse off than Deep Ellum or Downtown. E4 said this topic touches on most issues that cities face and specifically spoke on environment and air quality, and equity and the need for mixed-income housing. E5 did not express any additional concerns. Finally, E6 listed several Black communities, in addition to Deep Ellum, that were displaced by I-345, and the importance of preserving *their* history as well.

Data from all respondents was first categorized into four main themes (Table 1): Equitable & Multimodal Mobility, Green & Open Space, Appropriate Land Use & Urban Form, Visible Celebration of History & Culture. Design goals and objectives were then generated for each theme and prioritized based on the number of interviewees who addressed each subject. From there, programming was derived from these goals and objectives and similarly prioritized. Finally, from this programming, a list of design elements and features was derived to fulfill the goals and objectives of each theme.

THEMES:	EQUITABLE & MULTIMODAL MOBILITY	#		COMMUNAL OPEN/GREEN SPACE	#		VISIBLE CULTURE & HISTORY	#		APPROPRIATE LAND USE & URBAN FORM	#	
Design Goals & Objectives	Acknowledge Vehicular Traffic	6	E1, E2, E3, E4, E5, R1	Create Urban Oasis	6	E1, E2, E3, E4, E5, E6	Increase Awareness of Local History	7	E1, E2, E3, E4, E5, E6, R1	Preserve Neighborhood Character*	5	E2, E3, E4, E5, R1
	Increase Walkability	6	E1, E2, E3, E4, E6, R1	Reduce Local Pollution	2	E4, E6	Celebrate Musical Heritage	5	E2, E3, E4, E5, E6	Increase Density	4	E1, E3, E4, E6
	Increase Safety	4	E1, E4, E6, R1				Acknowledge Historical Presence of Railroad	3	E1, E2, E3	Provide Affordable Housing	4	E3, E4, E5, E6
	Provide Multimodality	4	E1, E4, E5, E6				Presence of Street Art	3	E1, E3, R1	Strengthen Local Workforce	4	E3, E4, E5, E6
	Improved Bikability	3	E1, E3, E6				Preserve Neighborhood Character*	1	E5	Emphasize Mixed-Use Development	4	E3, E4, E5, E6
										Create Seamless Transition Between Neighborhoods	4	E1, E3, E5, R1
										Reduce Surface Parking	2	E3, E4
PROGRAMMING:	Restore E/W Connection/Urban Grid	6	E1, E2, E3, E4, E5, R1	Parks	6	E1, E2, E3, E4, E5, E6	History Education	4	E3, E4, E6, R1	Mid/High Population Density	5	E1, E3, E4, E6, R1
	Maintain N/S Connection, but Reduce Footprint	5	E1, E2, E3, E6, R1	Open Public Space	6	E1, E2, E3, E4, E5, R1	Music/Event Venue	4	E3, E5, E6, R1	Neighborhood Preservation*	5	E2, E3, E4, E5, R1
	Walkability			Decrease Sources of Pollution	2	E4, E6	Public Art	3	E1, E3, R1	Mid-Rise Bldgs.	5	E3, E4, E5, E6, R1
	Safety			Rest Areas	2	E1, R1	Monumentation	1	E6	Increase Jobs	3	E3, E4, E5
	Multimodal Transit						Cultural Tourism	1	E6	Mixed-Income Housing	2	E3, E4
	Bikability						Neighborhood Preservation*	1	E5	Small Businesses/Retail	2	E3, E6
										Eliminate Surface Parking	2	E3, E4
DESIGN ELEMENTS & FEATURES:	Depressed Hwy w/ no Exits	3	E1, E2, E6	Pocket Parks	6	E1, E2, E3, E4, E5, E6	Outdoor Event Space	3	E3, E6, R1	Mid/High Density Housing	5	E1, E3, E4, E6, R1
	Complete Streets	2	E1, E5	Pedestrian Parkway*	3	E1, E3, E5	Historical Murals/Street Art	2	E3, R1	Mid-Rise Mixed-Use Neighborhood	3	E3, E4, E5
	Pedestrian Parkway*	1	E3	Shade Trees	3	E1, E5, E6	Museum	2	E3, E6	Mixed-Income Housing	2	E3, E4
	Reduced Traffic Speed	1	E4	Seating	2	E1, R1	Historical Monuments	1	E6	Locally Owned Businesses	2	E3, E6
	Enhanced/Varied Paving	1	E1	Noise Barriers?	2	E3, E6	History/Culture Walking Trail*	1	E6	Cohesive Design Language	1	E1
	Short Tunnel Below New Neighborhood	1	E3	Dog Park	1	E4	Community Center	1	E6	Mixed-Use Parking Structures		
	Lighting	1	E1	Depressed Hwy + Restored St Grid	1	E4	Art Crosswalks					
	Ride-Share Loading Zone			Community Garden			Misc. Public Art					
	Dedicated Bus Stop						Retain/Relocate Existing Street Art					

Table 1 – Interview Analysis Matrix

4.1.2.1 Equitable & Multimodal Mobility

Unsurprisingly, mobility came up quite often while interviewing subjects about a prominent urban highway. Five design goals were identified for this theme: Acknowledge Vehicular Traffic, Increased Walkability, Increased Safety, Provide Multimodality, and Improved Bikability. Acknowledge Vehicular Traffic and Increased Walkability were clearly the most pressing concerns within this theme, each being addressed by six out of seven interviewees. From these were derived essential programs including Restore the East/West Connection/Urban Grid, Maintain the North/South Connection but Reduce its Footprint, and Walkability, all supported by at least five interviewees.

Increased Safety and Provide Multimodality were both addressed by four out of seven interviewees, and Improved Bikability by three. While safety is generally a broad topic, in this research, interviewees only brought it up in the context of Equitable & Multimodal Mobility. Bikability was mentioned by most interviewees in the context of multimodality, but three interviewees discussed issues regarding bicycle riders specifically. Safety, Multimodal Transit, and Bikability programming was derived from these objectives.

The defining design element drawn from these programs is to convert I-345 into a depressed freeway with no exits between I-30 and US-75. Three out of seven interview participants proposed this, with one more going so far as to suggest taking I-345 underground completely as a tunnel. This idea is supported by case studies and is adopted for a segment of the freeway between the Downtown and Deep Ellum neighborhoods. To complement this intervention, Complete Streets will be implemented on the surface of this underground section.

Complete Streets help fulfill the Walkability, Safety, Bikability, and Multimodal Transit programming, and also help establish better connections from east to west. Additionally, Complete Streets provide a foundation for other Walkability and Safety features, such as reduced traffic speed and enhanced paving. Further design elements to expand the Multimodal Transit programming include a ride-share loading zone and dedicated DART bus stop.

The heavy focus of interviewees on walkability and bridging the gap between Downtown and Deep Ellum has produced one of the defining elements of this design: a pedestrian parkway. Not only does this create a more walkable neighborhood, but it provides much needed public green space to the area. This new open space is perfect for implementing several other design elements derived from other themes generated by this research.

4.1.2.2 Communal Open/Green Space

While Communal Open Green Space was one of the most prevalent themes to emerge from the interviews, it only generated two design goals, predominantly Create an Urban Oasis and to a much lesser extent Reduce Local Pollution. The former was discussed by all six experts and the latter by only two.

From the first of these themes two programs came up repeatedly, both supported by six of the seven respondents: Open Public Space and Parks. Two interviewees specifically called attention to the need for Rest Areas as programming. Lastly, Decreasing Sources of Pollution will be implemented as a means to Reduce Local Pollution.

As previously mentioned, a Pedestrian Parkway featured prominently in this thesis design provides access to green park space in addition to accommodating design elements, such as Seating and Shade Trees, which address the demand for Rest Areas and enhance the pedestrian experience. Pocket Parks will also be utilized to add green open space throughout the redesigned area. Although it was only mentioned by one interview respondent, an existing dog park will be modified and improved but kept. Similarly, an existing community garden – currently positioned under the highway within a street median – will be kept but relocated to a more suitable site.

Sources of Pollution will primarily be decreased by the alterations made to I-345. Eliminating exits between I-30 and US-75 and restoring the urban grid on surface streets should significantly reduce traffic congestion and by extension local carbon emissions. Interviewees also voiced concern about noise pollution. It is assumed that putting the highway below grade and partially burying it will help mitigate this, but Noise Barriers have also been considered as an appropriate design solution.

4.1.2.3 Visible Culture & History

Analysis of discussions central to the theme of Visible Culture & History produced five design goals and objectives: Increase Awareness of Local History, Celebrate Musical Heritage, Acknowledge Historical Presence of Railroad, Presence of Street Art, and Preserve Neighborhood Character. Increase Awareness of Local History was the most pressing concern, being advocated by all seven participants, followed by Celebrate Musical Heritage which was supported by five participants. Three interviewees felt it was important to Acknowledge the

Historical Presence of Railroad in the area, and three also advocated for the continued Presence of Street Art in and around Deep Ellum.

With Increase Awareness of Local History being the most prominent of these objectives, the majority of programming and design elements in this category focused on this objective. The most encompassing program is History Education, which was promoted by four respondents and from which features like Historical Murals, a Museum, Historical Monuments, and a History/Culture Walking Trail were derived. This would also fulfill the Monumentation program. Although only one person specifically used the term Cultural Tourism, it was alluded to by most respondents. Cultural Tourism would capitalize on the previously listed design elements – as well as those to follow – but is distinguished from History Education by its agendas to reach beyond Dallas and generate revenue and reputation for the city.

The second most prevalent design goal in this category was Celebrate Musical Heritage with the support of five interviewees. The main program generated for this objective was the inclusion of a Music/Event Venue, which was brought up by four interviewees and would manifest as a featured Outdoor Event Space.

Several design features discussed under Increase Awareness of Local History also contribute crossover support for the Celebrate Musical Heritage and Presence of Street Art design objectives. Presence of Street Art produced one unique program, Public Art, both of which were suggested by three participants. Additional Public Art features include Art Crosswalks, Miscellaneous Public Art, and the Retention and/or Relocation of Existing Street Art wherever possible. Similarly, Acknowledging the Historical Presence of the Railroad was significant to three respondents and will be integrated into the previously explored programs and features.

More so than those of other themes, the design elements and features of Visible Culture & History unify the programs and design goals from which they were derived. The identity of Deep Ellum is inseparable from its history of art and music, Black artists in particular, and the participants of this interview clearly feel that any redesign of this area should reflect that.

4.1.2.4 Appropriate Land Use & Urban Form

In addition to mobility, Appropriate Land Use & Urban Form was one of the most discussed themes during interviews. This produced seven design goals and objectives, the most popular of which was Preserve Neighborhood Character with the support of five respondents. Increase Density, Provide Affordable Housing, Strengthen Local Workforce, Emphasize Mixed-Use Development, and Create Seamless Transition Between Neighborhoods were each promoted by four respondents. Two respondents also identified a need to Reduce Surface Parking.

Many programs and features derived from Visible Culture & History also contribute to Preserving Neighborhood Character. These are expanded upon with the addition of Mid-Rise Buildings as a program, which in turn helps to Increase Density by allowing Medium to High Density Housing. Such housing would also include Mixed Income Housing policies in order to Provide Affordable Housing in the area.

Strengthening the Local Workforce by Increasing Jobs and introducing more Small Businesses, particularly Locally Owned retailers and restaurants, would reduce the need to travel, and thereby traffic, and contribute to population density.

By including housing and businesses while focusing on higher density, Emphasizing Mixed-Use Development becomes a straightforward exercise. To further this goal, Mixed-Used Parking Structures will be added which would also fulfill the objective to Reduce Surface Parking, even eliminate it altogether.

Lastly, the combination of all programs and elements discussed thus far, unified by a Cohesive Design Language, means the goal to Create a Seamless Transition Between Neighborhoods has already been achieved. Mid-rise buildings provide a smooth progression from the high-rises of Downtown to the low-rise buildings of Deep Ellum, and replacing surface parking and vacant lots with active spaces makes for a coherent urban experience.

4.2 Precedent Study Findings & Analysis

Five urban highway removal projects, previously discussed in chapter two, were analyzed using the same matrix method detailed in the Interview section above (Table 2). This produced new themes, goals, and design elements in addition to reinforcing several of those generated from the interview process. The Embarcadero Freeway and Central Freeway, both located in San Francisco, were treated as one project for the purposes of this analysis and abbreviated as "SF" on the table below. Central Artery/I-93, better known as "The Big Dig," located in Boston, is abbreviated as "BD," the Alaskan Way Viaduct in Seattle is abbreviated as "AW," and Cheonggyecheon in Seoul as "Ch."

Three themes were identified in these precedent studies: Equitable & Multimodal Mobility, Communal Open/Green Space, and Social Equity Via Urban Design. Design goals and objectives were then generated for each theme and prioritized based on the number of

studies that addressed each subject. From there, programming was derived from these goals and objectives and similarly prioritized. Finally, from this programming, a list of design elements and features was derived to fulfill the goals and objectives of each theme.

THEMES:	EQUITABLE & MULTIMODAL MOBILITY	#		COMMUNAL OPEN/GREEN SPACE	#		SOCIAL EQUITY VIA URBAN DESIGN	#	
Design Goals & Objectives	Emphasize Pedestrian Experience	4	AW, BD, SF, Ch	Create Urban Oasis	4	AW, BD, SF, Ch	Strengthen Local Workforce	2	BD, SF
	Restore Urban Grid	4	AW, BD, SF, Ch	Environmental Restoration	1	Ch	Emphasize Mixed-Use Development	2	BD, SF
	Provide Multimodality	3	AW, SF, Ch				Increase Available Housing	1	SF
PROGRAMMING:	Walkability	4	AW, BD, SF, Ch	Parks	4	AW, BD, SF, Ch	Mixed-Use Infill	2	BD, SF
	Restore E/W Connection/Urban Grid	4	AW, BD, SF, Ch	Open Public Space	4	AW, BD, SF, Ch	Increase Jobs	1	SF
	Multimodal Transit	3	AW, SF, Ch	Decrease Sources of Pollution-	1	Ch	Mixed-Income Housing	1	SF
DESIGN ELEMENTS & FEATURES:	Pedestrian Parkway*	4	AW, BD, SF, Ch	Pedestrian Parkway*	4	AW, BD, SF, Ch	Mixed-Use Neighborhood	2	BD, SF
	Depressed Hwy/Tunnel	2	AW, BD	Pocket Parks	3	AW, BD, SF	Mixed-Income Housing	1	SF
	Complete Streets	2	AW, SF	Shade Trees	2	BD, SF	Locally Owned Businesses		
	Lighting	2	AW, SF	Depressed Highway + Restore Grid-	2	AW, BD			
	Enhanced/Varied Paving	1	SF						

Table 2 – Precedent Study Analysis Matrix

4.2.1 Equitable & Multimodal Mobility

Equitable & Multimodal Mobility is the first of two themes shared with the interview findings but uses a broader, large-scale perspective. Two of the three resulting design goals were likewise overlapped with the interview theme: Restore Urban Grid, which was an objective of all four projects, and Provide Multimodality, which appeared in the San Francisco, Seattle, and Cheonggyecheon studies. Emphasize Pedestrian Experience was a priority for every project examined and covers many of the remaining objectives explored in the interviews, but to varying degrees between projects.

Central to the Emphasis on Pedestrian Experience is walkable programming. While this was not necessarily the motivation behind each of these highway teardowns, replacements for every one of them included walkable development of some kind. This further reinforces the incorporation of design elements such as lighting, enhanced paving, a pedestrian parkway, and complete streets. Complete streets, of course, are a key feature derived from the objective to Provide Multimodality.

For these design goals to be realized, it is important to first Restore the Urban Grid. Each precedent study focused on expanding access to amenities for all denizens, pedestrians in particular. By removing the obstacles created by these urban highways, space and resources were then able to be reallocated to improving surface circulation. Two projects, Boston and Seattle, both elected to bury the highway underground, rather than remove it completely. Because interview findings supported a hybrid solution that keeps I-345 in some form, this design thesis has also adopted the tunnel solution.

4.2.2 Communal Open/Green Space

The second theme shared with those produced by the interview process is Communal Open & Green Space, which maintained the objective to Create an Urban Oasis but broadened Reduce Local Pollution to Environmental Restoration. This change was primarily due to Cheonggyecheon's focus on rebuilding a stream that had been covered by the highway. Whereas the other cities made moves to reduce the environmental impacts of otherwise motivated projects, environmental restoration was highly prioritized by Seoul. However, the programs and design elements derived from this objective remained much the same as those generated by interviews to reduce pollution.

Creating an Urban Oasis was supported by all four projects. Both Cheonggyecheon and Boston's Big Dig included linear parks in their replacement strategies, and both San Francisco and Seattle packed their waterfronts full of parks, plazas, and pedestrian promenades. These served as the main source of inspiration for this thesis's proposal for a pedestrian parkway connecting Downtown to Deep Ellum.

4.2.3 Social Equity via Urban Design

The final theme identified by examining precedent studies, Social Equity via Urban Design, had a significant overlap with the interview theme Appropriate Land Use & Urban Form. However, it was far less prominent, with contributions from only two of the four projects. The San Francisco and Boston projects each supported Emphasizing Mixed-Use Development as well as Strengthening the Local Workforce as design goals. San Francisco alone was concerned with Increasing Available Housing. Again, these objectives reinforce programs and

features derived from interviews such as Mixed-Use Infill, Mixed-Income Housing, and Increase Jobs.

4.3 Passive Site Observation Findings & Analysis

Observations were made by the author during a thorough walkthrough of the study area. Additionally, the author currently resides in Downtown and has recorded observations made on daily commutes through the area. As before, these observations were categorized into a matrix and then analyzed to produce design goals, programs, and features (Table 3). From these observations, three themes were identified: Pedestrian Safety, Contested Land Use, and Distinctive Aesthetics. Unlike previous matrices, there was only one observer, or data source, in this case, so no prioritization took place.

THEMES:	PEDESTRIAN SAFETY	CONTESTED LAND USE	DISTINCTIVE AESTHETICS
OBSERVATIONS:	Missing Crosswalks	Acres of Vacant or Unused Land under I-345	I-345 is Eyesore and Visual Block
	Sidewalks End Abruptly	Excess of Surface Parking	Trash/Litter Accumulated under/near I-345
	Narrow Sidewalks w/ No Separation from Street	Little to No Vegetation under I-345	Serial Vacant Lots
	Dark Under I-345	Discontinuous Roads	Loud/Noisy under and near I-345
	Poor Visibility	Unnecessarily Wide Roads	Discontinuous Urban Form
	Traffic Speed/Congestion	Limited Space for New Development	Abundance of Street Art
	General Disrepair		No Historical Presence
	Very Auto-Centric/Hostile to other Transit Modes		New Development Mismatched w/ Deep Ellum
DESIGN GOALS & OBJECTIVES:	Increase Safety	Restore E/W Connections/Urban Grid	Create Seamless Transition Between Neighborhoods
	Increase Walkability	Enable Appropriate Future Development	Preserve Existing Neighborhood Character
	Provide Multimodality	Increase Green Space	Presence of Street Art
	Repair/Replace Neglected Infrastructure	Provide Usable/Active Spaces	Increase Awareness of Local History
		Eliminate Surface Parking	Reduce Material and Noise Pollution
PROGRAMMING:	Walkability		
	Safety	Parks	Neighborhood Preservation
	Multimodal Transit	Active Public Space	Public Art
	Improved Infrastructure	Reduce Highway Footprint	History Education
		Eliminate Surface Parking	Decrease Potential for Pollution
DESIGN ELEMENTS & FEATURES:	Pedestrian Parkway*	Pedestrian Parkway*	Low to Mid-Rise Mixed Use Buildings
	Complete Streets	Depressed/Tunnel Highway w/ No Exits	Retain/Relocate Art from Plaza under I-345
	Ride-Share Loading Zone	Pocket Parks	New Public Art Installations Including Historical Murals
	Dedicated Bus Stop	Dog Park	Monumentation
	Lighting	Community Garden	Open Air Museum/History Walking Trail
	Enhanced Paving	Mid-Rise Mixed-Use Buildings	Cohesive Design Language
	Reduced Traffic Speed	Mixed-Use Parking Garage	Noise Barriers
	Signage	Outdoor Event Space	Trash Cans

Table 3 – Observation Analysis Matrix

4.3.1 Pedestrian Safety

Safety concerns were some of the more obvious observations, many stemming from the area's auto-centric design which is hostile to other forms of transportation. The area is dominated by I-345 and its entrance and exit ramps, which cultivate scenarios of poor visibility, high-speed traffic, and traffic congestion.

The danger posed by vehicles is exacerbated by a lack of crosswalks. Multiple sidewalks lead to a street curb and continue on the other side but have no crosswalks or signs to signal drivers that pedestrians are present (Figure 25). In one case, a sign directs pedestrians to use a crosswalk that doesn't exist. In other cases, sidewalks end abruptly with no indication to cross, continue, or turn back. Additionally, sidewalks are frequently narrow with no separation from the street and vehicular traffic. In one instance, the sidewalk is actually between the street and bollards meant to stop oncoming traffic (Figure 26).

The absence of lighting along and under I-345 is most noticeable near its northern end at the intersection of Central Expy and Ross Ave. At this location, Ross Ave is overpassed by 12 lanes of highway and ramps that essentially create a short tunnel. The overpass is quite low here, making the space very dark. Not only does this make it difficult for drivers to spot pedestrians, but it also makes it difficult for pedestrians to be aware of their surroundings in an intimidating and uninviting space (Figures 27 & 28).

Furthermore, much of the area is in a state of general disrepair. Many of the sidewalks are cracked and broken, safety fences under the highway are broken and/or falling down, and I-345 itself is showing signs of deterioration (Figures 29 & 30).

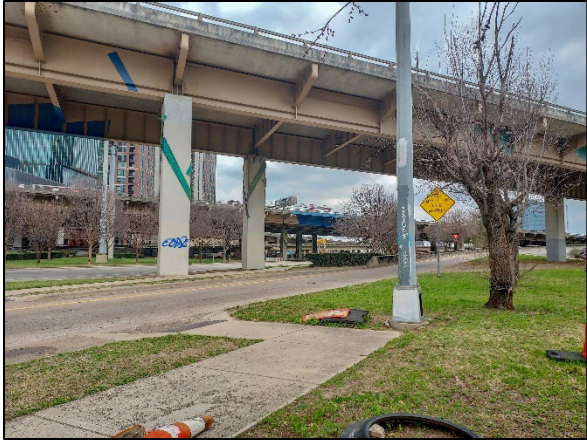


Figure 26 – Sidewalk Leads to Highway Ramp w/o Crosswalk



Figure 29 – Unsafe Conditions Under I-345 at Ross Ave



Figure 27 – Sidewalk Dead Ends Abruptly Under I-345

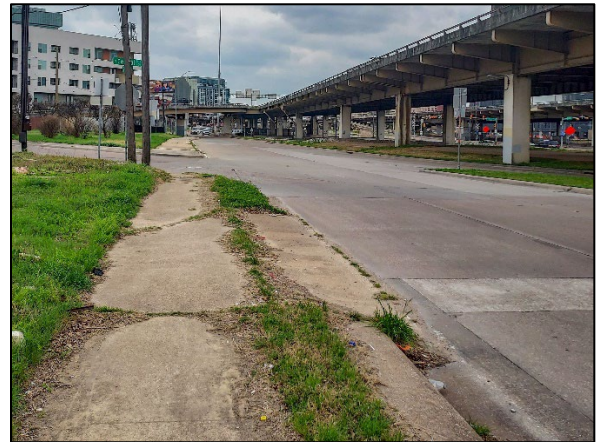


Figure 30 – Broken Sidewalk



Figure 28 – Lack of Lighting Under I-345 at Ross Ave



Figure 31 – Damaged Railing on I-345

These observations generated the design goals to Increase Safety, Increase Walkability, Provide Multimodality, and Repair/Replace Neglected Infrastructure. Most of the focus here is on safety and walkability which further reinforced previously mentioned programs and elements, but also emphasized the need to include features like lighting and signage.

4.3.2 Contested Land Use

Further observation revealed a number of ways in which the land occupied by and surrounding I-345 is being put to contentious use. Perhaps the most noticeable of which are the acres of vacant and/or unused space beneath the highway (Figure 31). Additionally, these empty areas tend to support little or no vegetation growth, which contributes to their unappealing nature and limits alternative use options.



Figure 32 – Vacant Land Under I-345

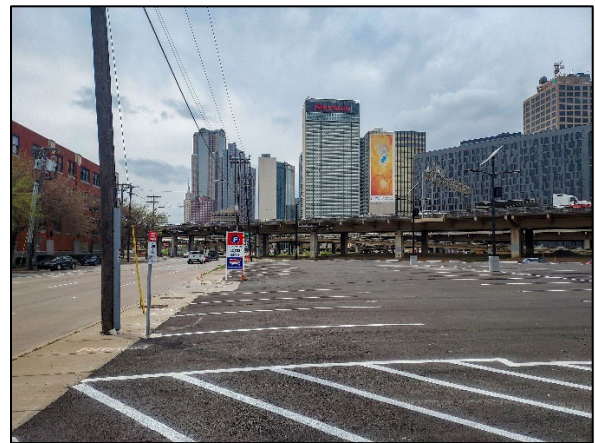


Figure 33 – Underused Parking Lot Adjacent to I-345



Figure 34 – The Epic at Good Latimer and Elm St



Figure 35 – Deep Ellum at Good Latimer and Elm St

There is also an excess of surface parking in the area. Some parking lots are located underneath the highway and provide parking for Deep Ellum, others serve stand-alone buildings, but some seem to be perpetually vacant (Figure 32).

The surface streets themselves are using land inefficiently. Elm St, Main St, and Commerce St each have four lanes that are heavily trafficked between I-345 and Downtown; however, once past the entrance and exits ramps, closer to Deep Ellum, traffic dies down considerably, but the surplus lanes remain. Many other streets are cut off completely, bisected either by the highway or by the DART railroad track which itself had to be planned around I-345.

With so much land occupied by I-345, infill, or pre-existing buildings, little space remains for new development and growth. As a result, developers have had to encroach upon adjacent neighborhoods or tear down or repurpose existing structures. The Epic, a recent three-building mixed-use development, is an interesting example of this. On one hand, the designers were able preserve the historic Knights of Pythias building by expanding it into the Pittman Hotel, but the office tower and residential high-rise are counter to the low-rise Deep Ellum neighborhood which they loom over (Figures 33 & 34). Without space to build farther

west or preservation policies in place, future development threatens to overwhelm Deep Ellum.

This set of observations led to the design goals to Restore East/West Connections and the Urban Grid, Increase Green Space, Provide Usable/Active Spaces, Eliminate Surface Parking, and Enable Appropriate Future Development. Programs and elements derived from these objectives include the addition of parks, reducing I-345's footprint, mixed-use development that includes parking structures, and outdoor event space.

4.3.3 Distinctive Aesthetics

Lastly, the Distinctive Aesthetics of Deep Ellum and the surrounding area are impossible to overlook, which makes them the last theme. One of the defining characteristics is the abundance of street art. Many buildings in Deep Ellum are covered in large murals, a feature which bleeds into the I-345 corridor. Many of the highway's support columns along Good Latimer Expy are painted with bright colors, and a largely unused plaza filled with painted sculptures has been built in a wide median directly underneath I-345 (Figures 35 & 36). These art pieces certainly emphasize the neighborhood's character but fail in the attempt to make space below the highway appealing to pedestrians.

The highway itself is an eyesore and acts as a visual block between Downtown and Deep Ellum. This not only prevents people from enjoying the city's skyline but imposes a perceived barrier between the neighborhoods. Rather than draw people from one to the other, it confines them to separate areas.

Additional observed deterrents to inter-neighborhood travel include the discontinuous urban form, serial vacant lots, trash and litter accumulated under I-345, and noise pollution (Figure 37). The area between Cesar Chavez Blvd and Good Latimer Expy is incohesive with no destinations of its own. Surrounded by concrete and bombarded by loud traffic noise, walking past vacant lot after vacant lot filled with sand and trash can feel like an extended trek through a hostile wasteland.

As mentioned previously, parts of this area are starting to be filled with new development, some of which are at odds with the existing neighborhood character. As much as Deep Ellum's character and age are apparent, its rich history is not. Without increasing awareness and appreciation for this unique piece of Dallas history, it is likely to be covered up or demolished and forgotten.

From these observations were derived the following design goals: Create a Seamless Transition Between Neighborhoods, Preserve Existing Neighborhood Character, Presence of Street Art, Increase Awareness of Local History, and Reduce Material and Noise Pollution. As with the other themes, these objectives further reinforce programs and design elements already explored, particularly those concerning the development of a cohesive mixed-use neighborhood that complements the existing character of both neighborhoods, promoting art and history, and incentivizing travel between Downtown and Deep Ellum.



Figure 36 – Art Plaza Under I-345 in Deep Ellum



Figure 38 – Neglected Sidewalk Under I-345 on Elm St



Figure 37 – Mural Under I-345 at Ross Ave

4.4 Synthesis

Findings from all data collection methods were synthesized by combining the individual matrices to create comprehensive lists for design goals & objectives, programming, and design elements & features (Table 4). After reviewing all data collection methods, the four themes developed in Interview findings were found to sufficiently cover the major issues. However, other data collection methods produced four additional themes that provided more nuance and enriched the goals and objectives of the design intervention under consideration. The different themes from each method were then evaluated and consolidated

into three overarching themes. The resulting themes are *Equitable & Multimodal Mobility*, *Livable Community-Focused Land Use*, and *Visible Culture & History*, and are each represented by a different color on the table below: blue, green, and orange, respectively. Next, items that were similar but differed due to context and data source were also consolidated to reduce redundancy. For example, “Increase Green Space” was deemed to already be encompassed by “Create Urban Oasis,” while “Emphasize Pedestrian Experience” was considered too general and discarded in favor of numerous more focused objectives.

DESIGN GOALS & OBJECTIVES	#	PROGRAMMING	#	DESIGN ELEMENTS & FEATURES	#
Increase Walkability	11	Walkability	11	Pocket Parks	10
Create Urban Oasis	10	Parks	11	Pedestrian Parkway	8
Provide Multimodality	8	Open/Active Public Space	11	Depressed/Tunneled Highway w/ No Exits	7
Increase Awareness of Local History	8	Restore East/West Connections	10	Low to Mid-Rise Mixed-Use Buildings	6
Acknowledge Vehicular Traffic	6	Multimodal Transit	8	Complete Streets	5
Emphasize Mixed-Use Development	6	Mid-Rise Mixed-Use Neighborhood	7	Mid/High Density Housing	5
Strengthen Local Workforce	6	Reduce Highway Footprint	6	Shade Trees	5
Preserve Neighborhood Character	6	Mid/High Population Density	6	Lighting	5
Create Seamless Transition Between Neighborhoods	5	Neighborhood Preservation	6	Mixed-Income Housing	4
Restore Urban Grid	5	Maintain North/South Connection	5	Misc. Public Art	4
Increase Safety	5	Safety	5	Outdoor Event Space	4
Celebrate Musical Heritage	5	History Education	5	Locally Owned Businesses	3
Increase Density	4	Mixed-Income Housing	4	Historical Murals/Street Art	3
Provide Affordable Housing	4	Increase Jobs	4	Enhanced/Varied Paving	3
Presence of Street Art	4	Music/Event Venue	4	Noise Barriers	3
Improve Local Environment	4	Public Art	4	Cohesive Design Language	2
Improve Bikability	3	Decrease Sources of Pollution	4	Retain/Relocate Existing Street Art	2
Eliminate Surface Parking	3	Bikability	3	Historical Monuments	2
Acknowledge Historical Presence of Railroad	3	Eliminate Surface Parking	3	History/Culture Walking Trail	2
Enable Appropriate Future Development	1	Rest Areas	2	Open-Air Museum	2
		Small Businesses	2	Dog Park	2
		Monumentation	1	Seating	2
		Cultural Tourism	1	Art Crosswalks	2
				Reduced Traffic Speed	2
				Mixed-Use Parking Structures	1
				Community Center	1
				Community Garden	1
				Signage	1
				Trash Cans	1
				Ride-Share Loading Zone	1
				Dedicated Bus Stop	1

Table 4 – Synthesized Findings

Items are color coded by theme. Blue = Equitable & Multimodal Mobility. Green = Livable Community-Focused Land Use. Orange = Visible Culture & History.

This final table demonstrates a necessity for development that focuses on the needs of people and their community. While the findings respect the demand for transportation infrastructure, they also recognize that personal vehicles should not be prioritized over

neighborhood connectivity, safety, or multimodal transit. Interventions that restore the urban fabric, provide open green space, and support walkability are highly promoted. Additionally, features that highlight the area's history and culture are considered important for strengthening the identity of both neighborhood and city.

4.5 Chapter Summary

This process began by reviewing archival and secondary data then collecting additional data from three different sources: interviews, precedent studies, and personal observation.

Interview participants were asked a series of in-depth questions regarding the status of I-345 and its impacts on adjacent communities. Four major themes emerged from their responses.

The first, Equitable & Multimodal Mobility, focused on issues of walkability, safety, multimodality, and circulation. Communal Open/Green Space primarily concentrated on providing respite by creating an urban oasis, and also touched on reducing local pollution. Visible Culture & History was concerned with maintaining Deep Ellum's artistic and musical identity, as well as educating the public about the area's rich but contentious history. Lastly, Appropriate Land Use & Urban Form focused on density, mixed-use development, affordable housing, and creating a seamless transition between Downtown and Deep Ellum.

Analysis of precedent studies produced one unique theme in addition to sharing two others with the interview findings, Equitable & Multimodal Mobility and Communal Open/Green Space. The newly generated theme, Social Equity via Urban Design, covered mixed-use development, housing, and strengthening the local workforce. It differed from interview findings in that it emphasized social equity rather than land use. It was also a far less

prominent concern than the other themes, especially when compared to interview discussions.

Personal observation led to three new themes: Pedestrian Safety, Contested Land Use, and Distinctive Aesthetics. Again, there was quite a bit of overlap with findings from the other data sources. Pedestrian Safety focused on safety, walkability, and multimodality, but from an exclusively pedestrian perspective. Contested Land Use concentrated on the surplus of parking and unused space surrounding I-345, as well as the highway's impact on surface streets. Responses gathered from the interview process certainly touched on the area's Distinctive Aesthetics but failed to convey just how prolific these characteristics are. This theme not only emphasized visual aesthetics like street art and I-345's dominating presence, but also noted the incoherent experience of traversing the desolate blocks between Downtown and Deep Ellum.

A matrix was created for each data source, deriving from these themes design goals and objectives which in turn generated programming that then produced design elements and features. Those matrices were then synthesized into one table with comprehensive lists of design goals, programs, and design elements to be used as a framework for a new design of the I-345 corridor.

CHAPTER 5 – URBAN DESIGN

This chapter applies the synthesized findings from chapter four to suggest a replacement strategy for I-345 and to design a connective neighborhood between Deep Ellum and Downtown Dallas. Context is provided at regional, city, and district scales, followed by inventory of the site. Programming developed from the research is then reviewed leading to the design concept. Lastly, the final schematic plan (urban design vision) is presented followed by design details.

5.1 Site Selection

As previously stated, the site for this design master thesis was narrowed down from the full I-345 corridor and chosen for its situation directly between Downtown and Deep Ellum. It should also be noted that the presence of Cesar Chavez Blvd represents a unique opportunity. The street was renamed in 2010 after a drawn-out battle to have the Mexican American leader represented in the Dallas landscape (Sebesta 2020). Unlike other streets in Dallas named for civil rights activists, Cesar Chavez Blvd is prominently located in the city center. Dallas has the opportunity to demonstrate that it embraces its diverse population by valuing the land that bears Chavez's name through equitable urban design. Instead of I-345 acting as a barrier between Downtown and Deep Ellum, Cesar Chavez Blvd could be the link between the two communities.

Malcolm X Blvd, which runs through the heart of Deep Ellum, was renamed in 1998 after multiple failed attempts (Sebesta 2020), and presents a similar opportunity. The name is further reason to preserve and emphasize Deep Ellum's character and history as a primarily

Black neighborhood. Together the two streets represent what minorities in Dallas have endured to see their presence reflected in the municipal landscape, making the land between them the perfect place for urban design that focuses on unification and visible history.

5.2 Inventory & Analysis

Strengths and weaknesses of the study area were documented and assessed primarily through the use of GIS mapping and passive site observation. The author began at regional scale and gradually zoomed-in to city, district, then site scale. While large scale maps were informative about region and city level dynamics that need to be considered, district and site level focus allowed for detailed assessment of the built-environment context of the intervention site.

5.2.1 Regional, City, & District Context

The regional map (Figure 38) shows the four main cities that comprise the Dallas-Fort Worth Metroplex and focuses on the interstate system and other major circulation in the North Central Texas region. Here, it can be seen that the three most prominent urban centers – Dallas, Fort Worth, and Denton – are connected by a triangle of interstate highways. The city scale map (Figure 39) also focuses on circulation, most notably the concentric rings of highways that center on Downtown.

Multiple maps were created at district scale. The first (Figure 40) shows more detailed circulation in addition to park space and Downtown's proximity to the Trinity River. This shows an urban core dominated by highway connections and isolated from the rest of the city. The parks of downtown are likewise isolated from each other by an auto-centric street

network, and there no parks to speak of in Deep Ellum. The second map (Figure 41) shows the distribution of land uses in the Downtown/Deep Ellum area, and the third (Figure 42) shows building footprints as well as impervious and pervious surfaces. Land-uses in the area are primarily retail and commercial with most of the residential development relegated to the periphery and adjacent neighborhoods. Additionally, the prevalence of impervious surfaces is significant, especially the amount of land devoted to surface parking.

The last map (Figure 43) displays median household incomes from 2019 by US 2010 census block groups (City-Data 2020). Although Downtown contains a relatively diverse income range, there is clear disparity both east to west and north to south. This is accentuated by the interstate overlay which shows how highways form borders between high and low income areas, with disparities as large as \$60K on opposite sides of I-345.

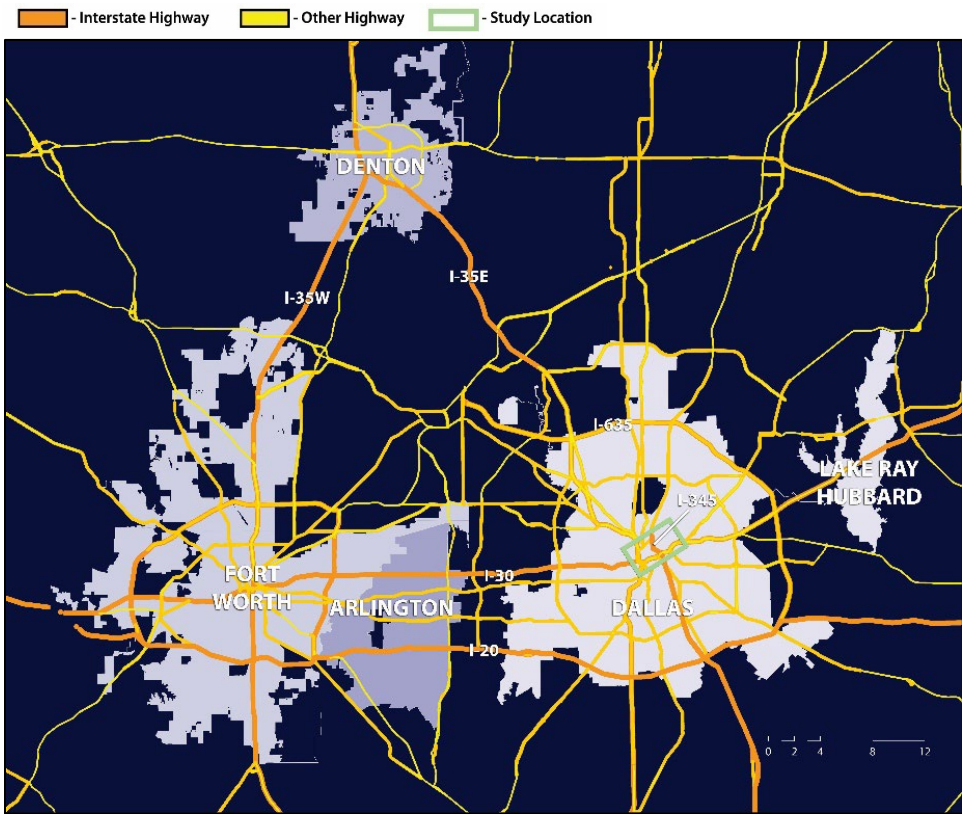


Figure 39 – Regional Circulation

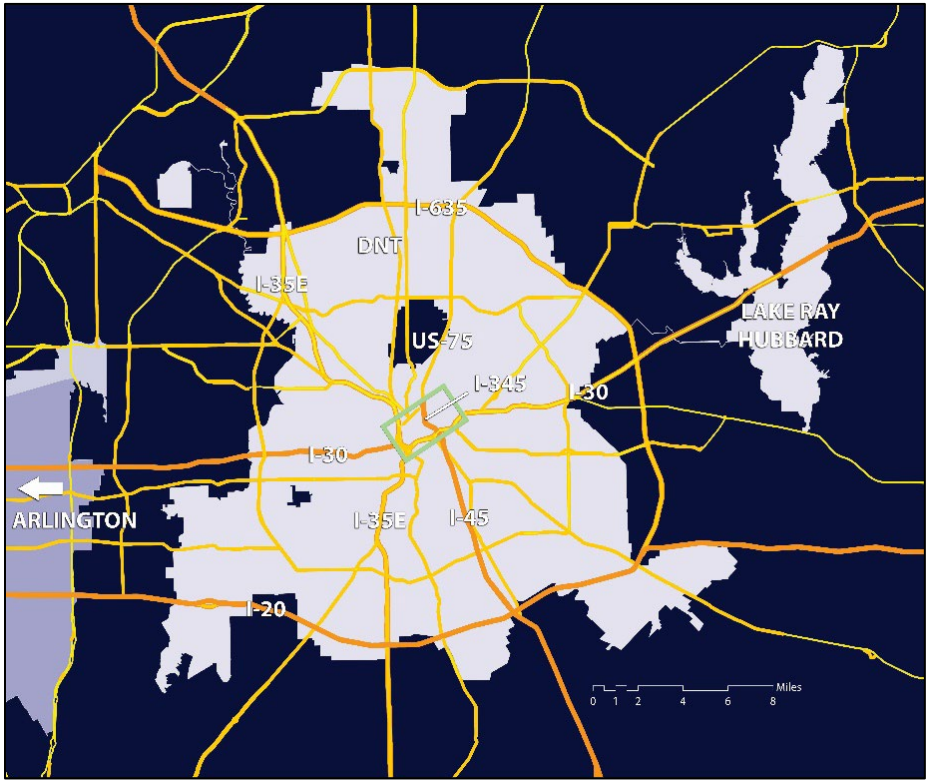


Figure 40 – City Circulation

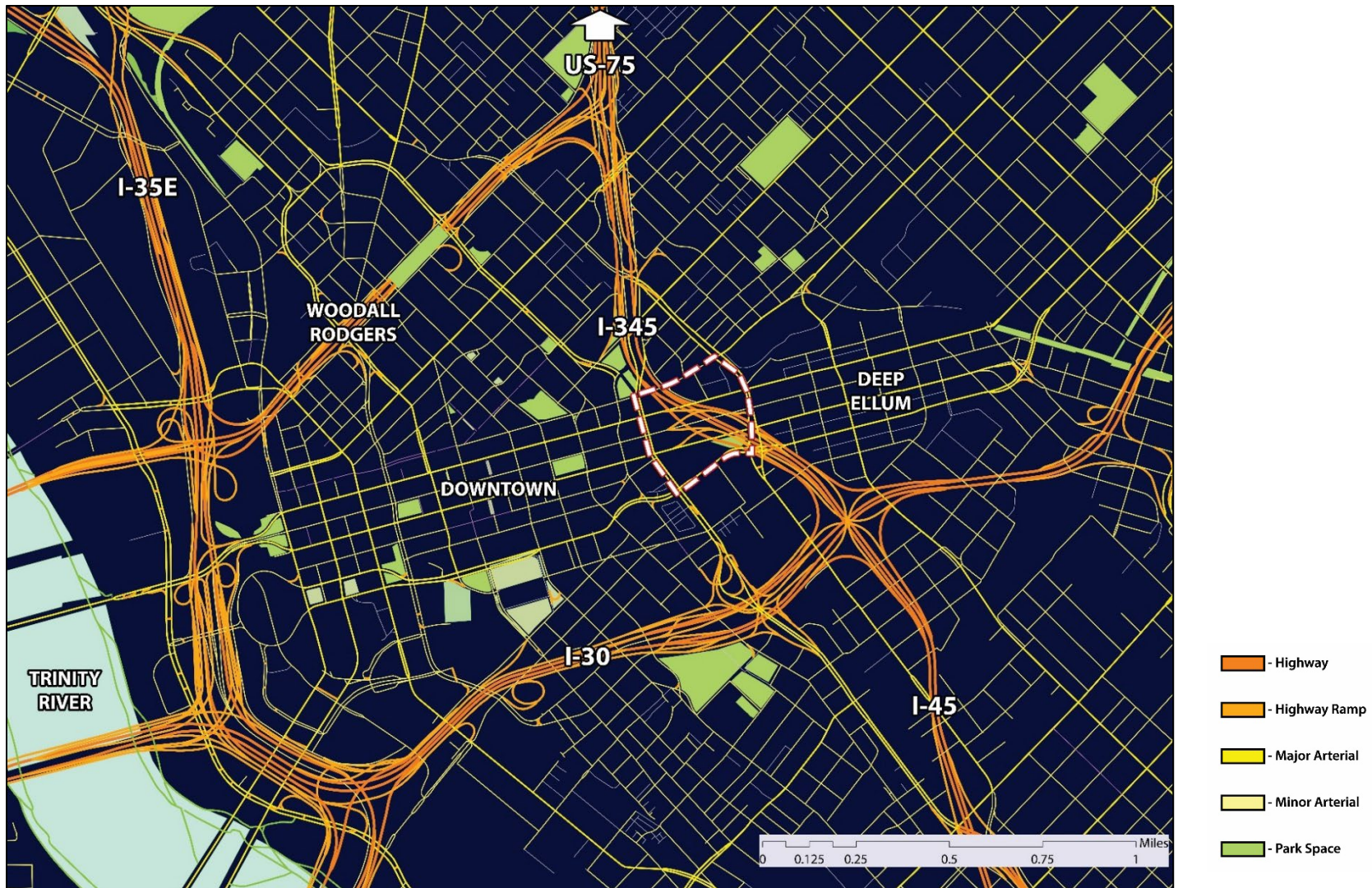


Figure 41 – District Circulation and Park



Figure 42 – District Land Use
 Data Source: gis.dallascityhall.com

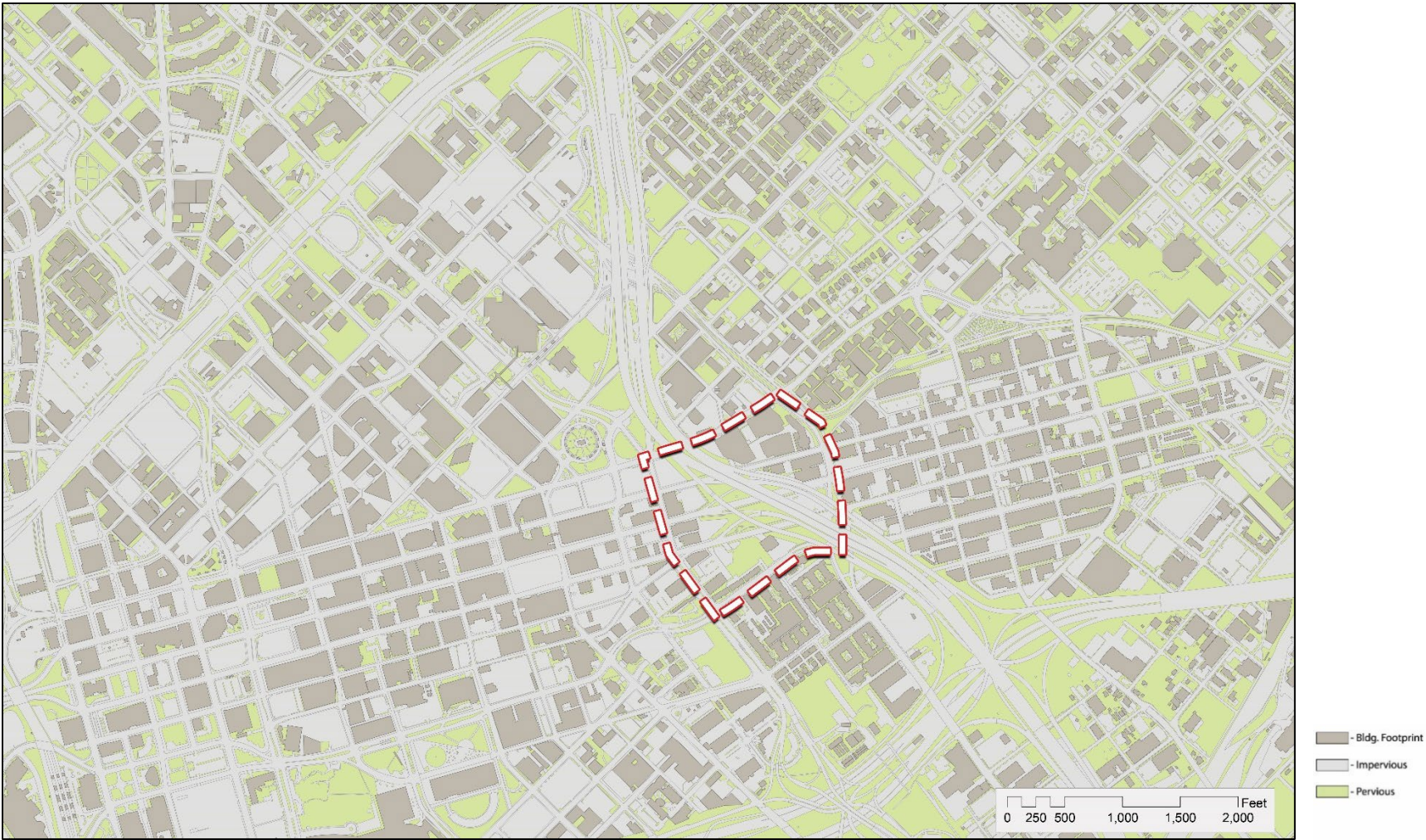


Figure 43 – District Impervious Surfaces
Data Source: gis.dallascityhall.com



Figure 44 - Median Household Income
Data Source: City Data 2020

5.2.2 Site Inventory & Analysis

The site scale map (Figure 44) identifies existing development that is to be kept or removed. It also documents the current land uses of open space, major circulation paths, and existing landmarks. Photographs documenting existing site conditions are provided in chapter four (Figures 25-37). The presence of I-345 has led to an excess of surface parking and vacant land and limits any built development. With the exception of a large storage facility, none of the existing buildings are considered problematic, in fact, the Epic is considered a successful mixed-use development.

On the other hand, the streetscapes are highly problematic. Streets are unnecessarily wide and focus on serving personal vehicles with little to no consideration for pedestrians or other mode of transportation. Sidewalks are poorly maintained, unsafe, and frequently end abruptly. There is also a noticeable absence of crosswalks, particularly at highway ramps.

The large dog park, Bark Park Central, is popular, but its location under I-345 makes the entrance dark and uninviting and makes it difficult for grass to grow, leaving parts of the park perpetually muddy. Adjacent to the dog park is another beloved amenity, Deep Ellum Urban Gardens, a community garden managed by Deep Ellum Community Association with a less than desirable location in a road median on Good Latimer Expy.

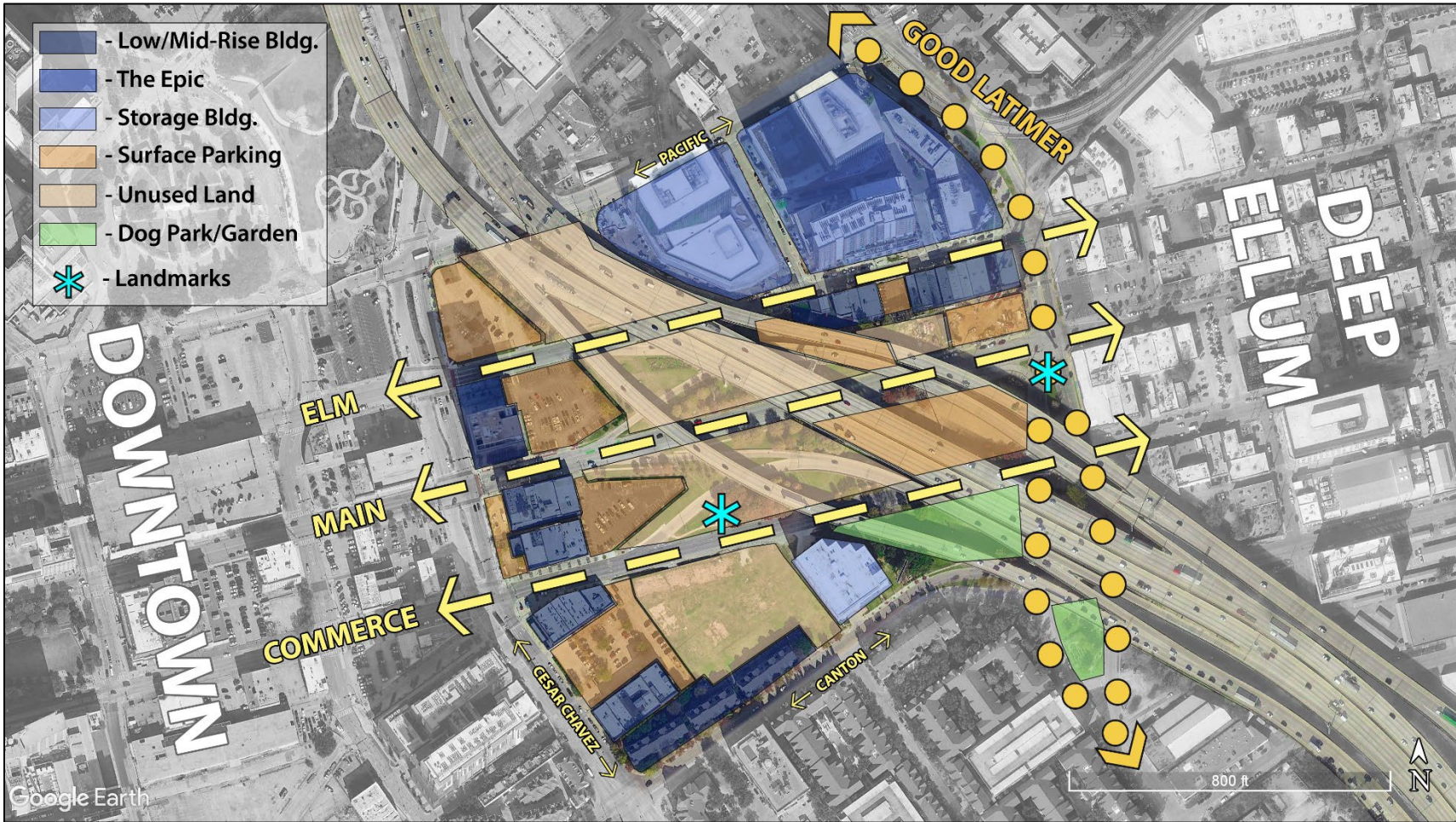


Figure 45 - Site Inventory

5.3 Design Program

Programming for this design is derived from the synthesized findings documented in chapter 4 (Table 4). The design addresses all three consolidated themes produced from the synthesized findings discussed in chapter four. Equitable & Multimodal Mobility is addressed by restoring east/west connections while maintaining the north/south connection provided by I-345 and reducing footprint, and by improving walkability, bikability, and multimodal transit. The two primary ways in which Livable Community-Focused Land Use is addressed are by increasing park space and the creation of a mid-rise mixed-use transitional neighborhood. These will be supplemented with additional open and active public spaces, high population density, mixed-income housing, and the elimination of surface parking. Visible Culture & History will be addressed through neighborhood preservation, history education, public art, monumentation, and the inclusion of a music/event venue.

5.4 Concept & Vision

The table of objects, programs, and design elements (Table 4) from chapter four was used alongside findings from the literature review to inform and develop a concept for this thesis design (Figure 45). In addition, the hybrid alternative, including the potential capping areas, recommended by TxDOT (Figures 10 & 11) was adapted to form a base starting point for this design. To better suit the goals and findings of this thesis, the proposed extension of Hawkins St has been removed from TxDOT's recommendation, and the number of lanes on I-345 has been decreased from ten to four to further reduce the highway's footprint.

Aside from the reconstruction of I-345 as a depressed covered highway, the park system and mixed-use neighborhood are the most important aspects of this design master thesis. As such, more focused concept diagrams have been made to detail the programming within the park and the distribution of specific uses throughout the site (Figures 46 & 47).

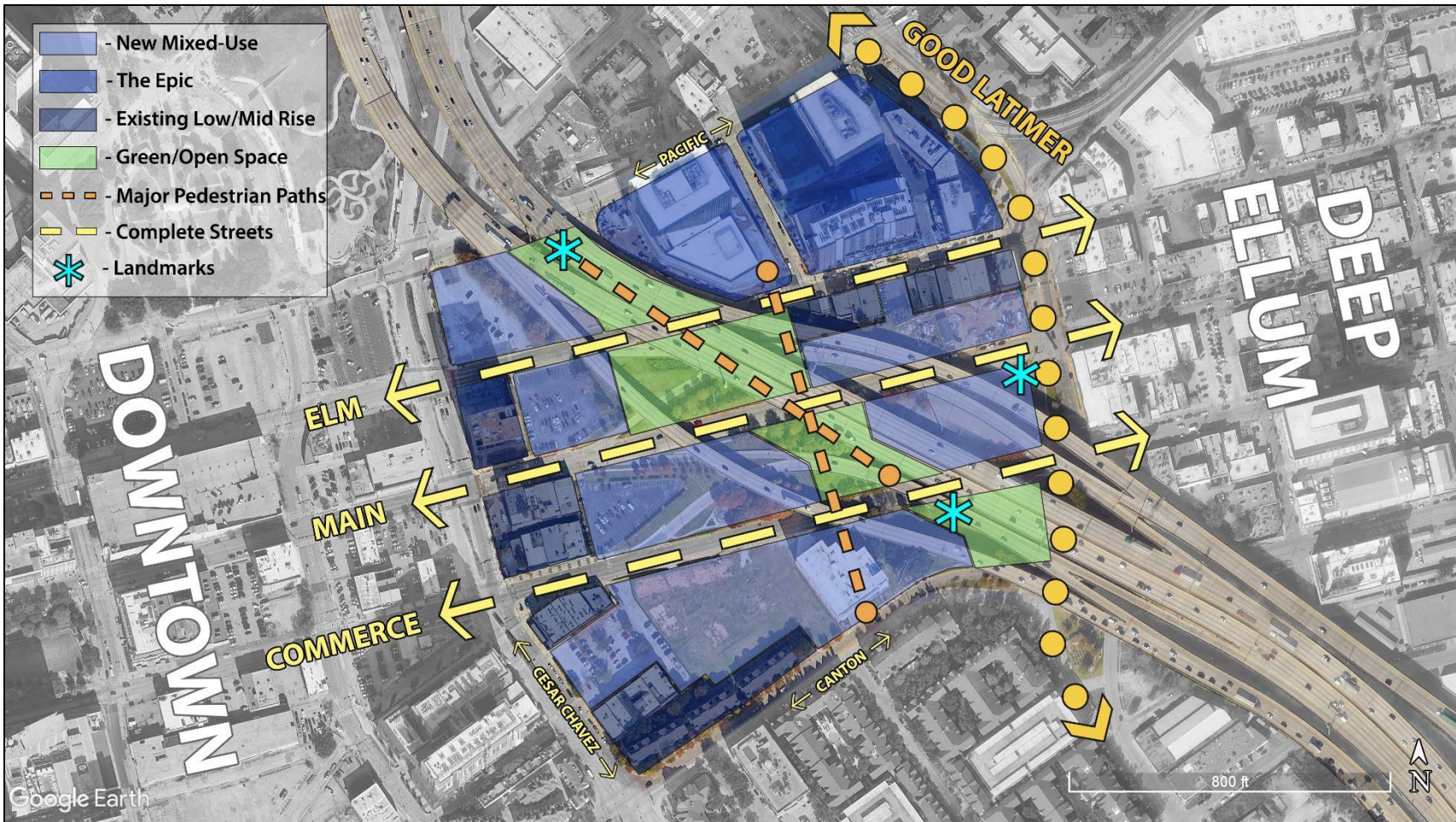


Figure 46 – Site Concept

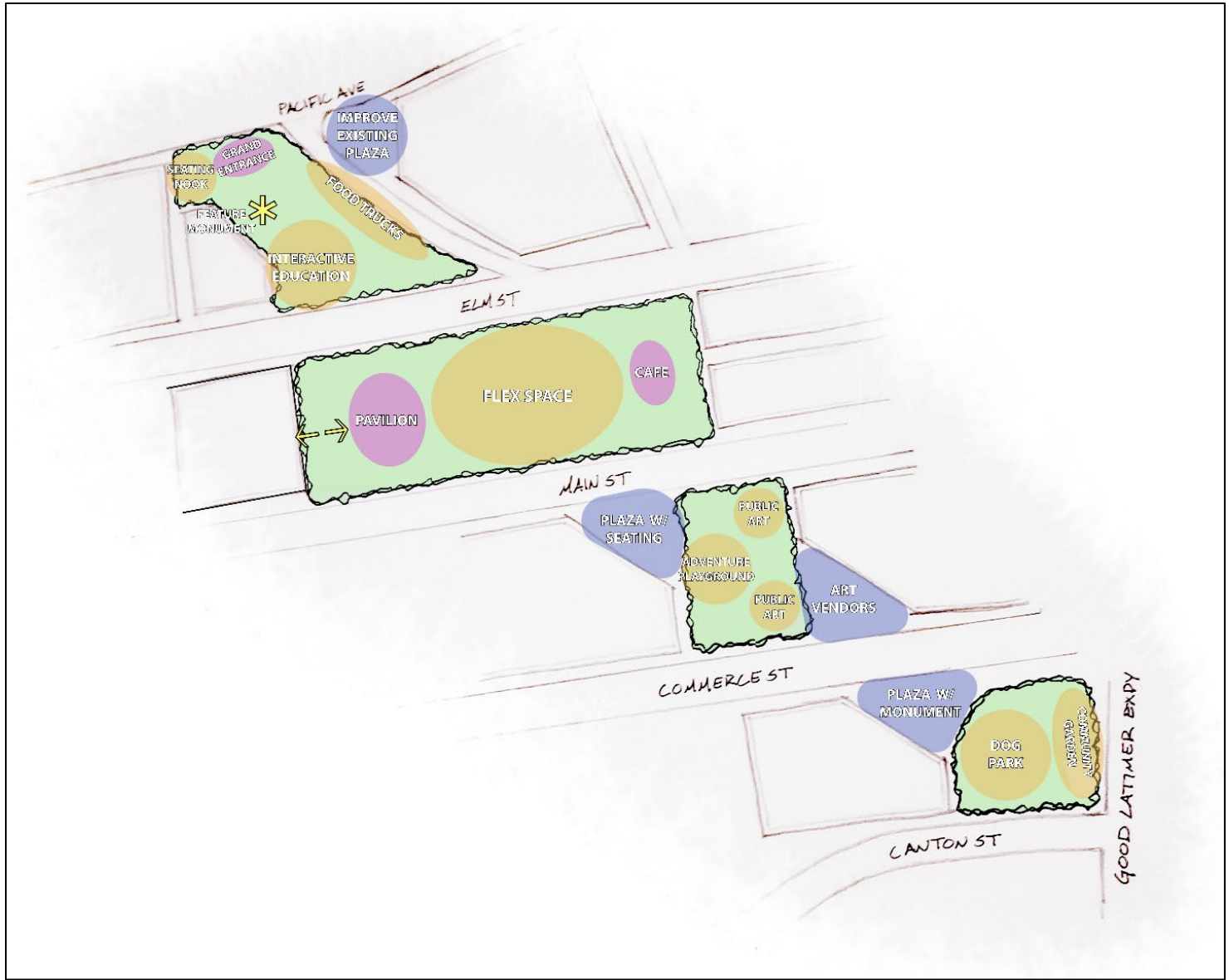


Figure 47 – Park Concept

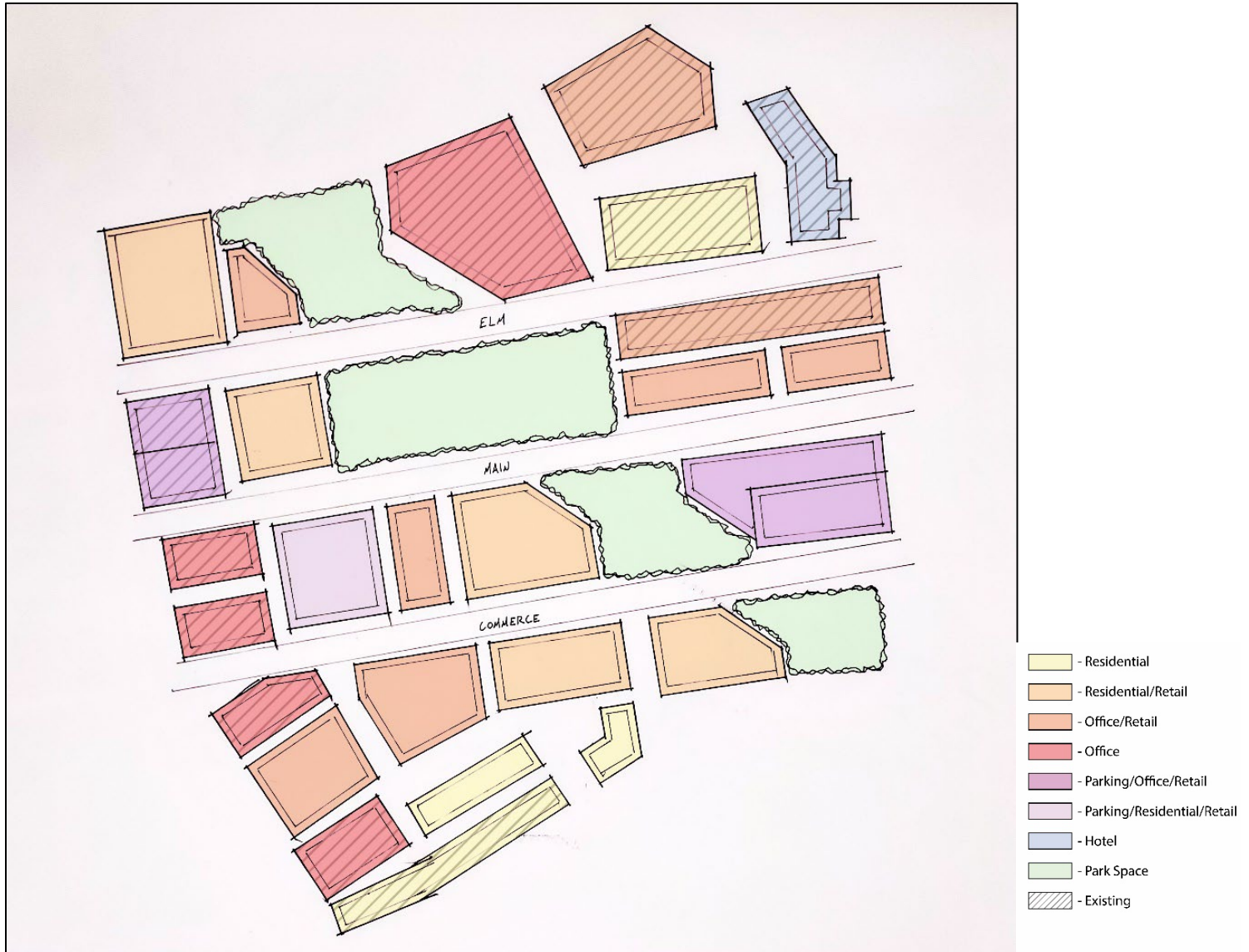


Figure 48 – Mixed-Used Distribution Concept

5.5 Schematic Plan

A schematic plan (Figures 48-50) was developed from the above concept using design elements from the findings in chapter four (Table 4). First and foremost, I-345 has been reconstructed as a depressed highway and capped according to TxDOT's recommendation (Figure 11). The plan focuses on the capped area and surrounding blocks. This, along with converting Elm, Main, and Commerce Streets into complete streets, significantly reduce the site's auto-centricity and greatly improve multimodal connections between Downtown and Deep Ellum.

Multimodality and connectivity are also increased through the inclusion of a large park that links Downtown and Deep Ellum. The park begins in the northwest corner with an artistic grand entrance and history focused programming that establish the identity of the neighborhood. This identity is reinforced throughout the design with the inclusion of public art and historical monuments.

The next section of the park is the largest and primarily consists of a large flex-space anchored by a pavilion and café at either end. A large building to the west of this park has a throughway on the first floor that provides access to facilities, shopping, and dining for park goers.

The park section between Main and Commerce features the most public art, including existing street art relocated from beneath I-345, as it is the closest of the three general-use parks to Deep Ellum and has a plaza dedicated to providing artists a space to sell their creations. This section is also closest to more domestic-use spaces – a dog park and community garden – so an adventure play area has also been added. The dog park is pre-

existing in the southeast corner of the site and has been kept but downsized. The community garden is also pre-existing but currently resides in a median on Good Latimer Expy which is to be removed. Rather than lose this amenity, which is sponsored by Deep Ellum Community Association, it has been relocated next to the dog park. Both of these are anchored to the rest of the park system by a plaza which features a large monument that serves as the complementary terminus to the grand entrance.

The first floor of all buildings adjacent to the parks has been reserved for retail space to provide pedestrians easy access to shopping, dining, and entertainment. The upper floors of larger buildings are dedicated to residential use in order to maximize population density. The upper floors of smaller buildings contain office and studio space. Surface parking has been replaced by mixed-use parking structures, and limited to the periphery of the site.

Lastly, building heights transition from mid-rise to low-rise moving from west to east to create a more seamless transition between the Downtown and Deep Ellum neighborhoods. This, along with diverse land uses, helps maintain the historic framework of Deep Ellum.

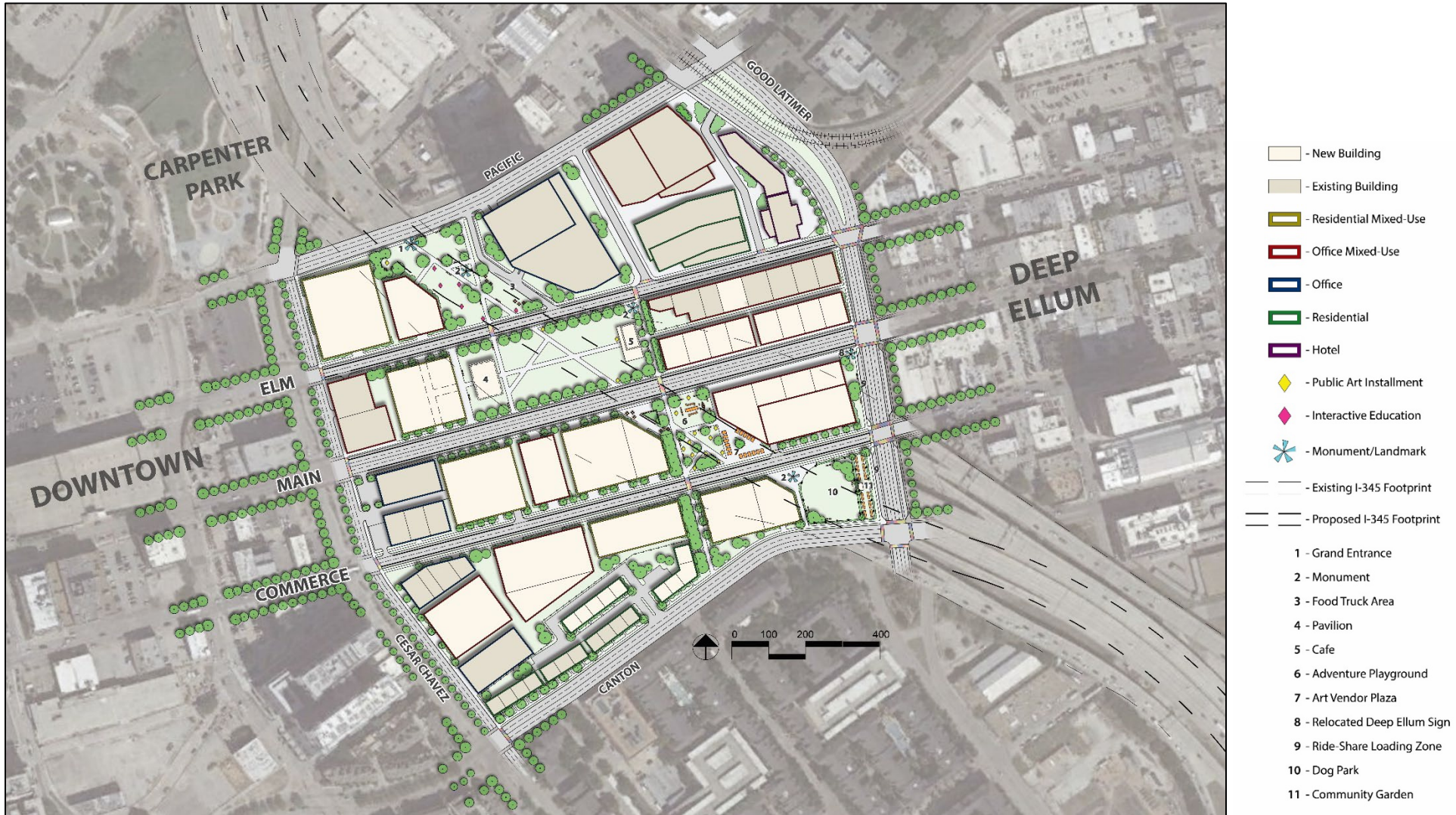


Figure 49 – Urban Design Vision



Figure 50 - Schematic Plan: Enlargement of Entrance and Main Parks



Figure 51 - Schematic Plan: Enlargement of Art Park, Dog Park, and Community Garden

5.6 Design Details

Figures 51-58 show renderings of various design details to provide a better understanding of the design vision for the I-345 corridor as well as public realm connectivity of Downtown and Deep Ellum.

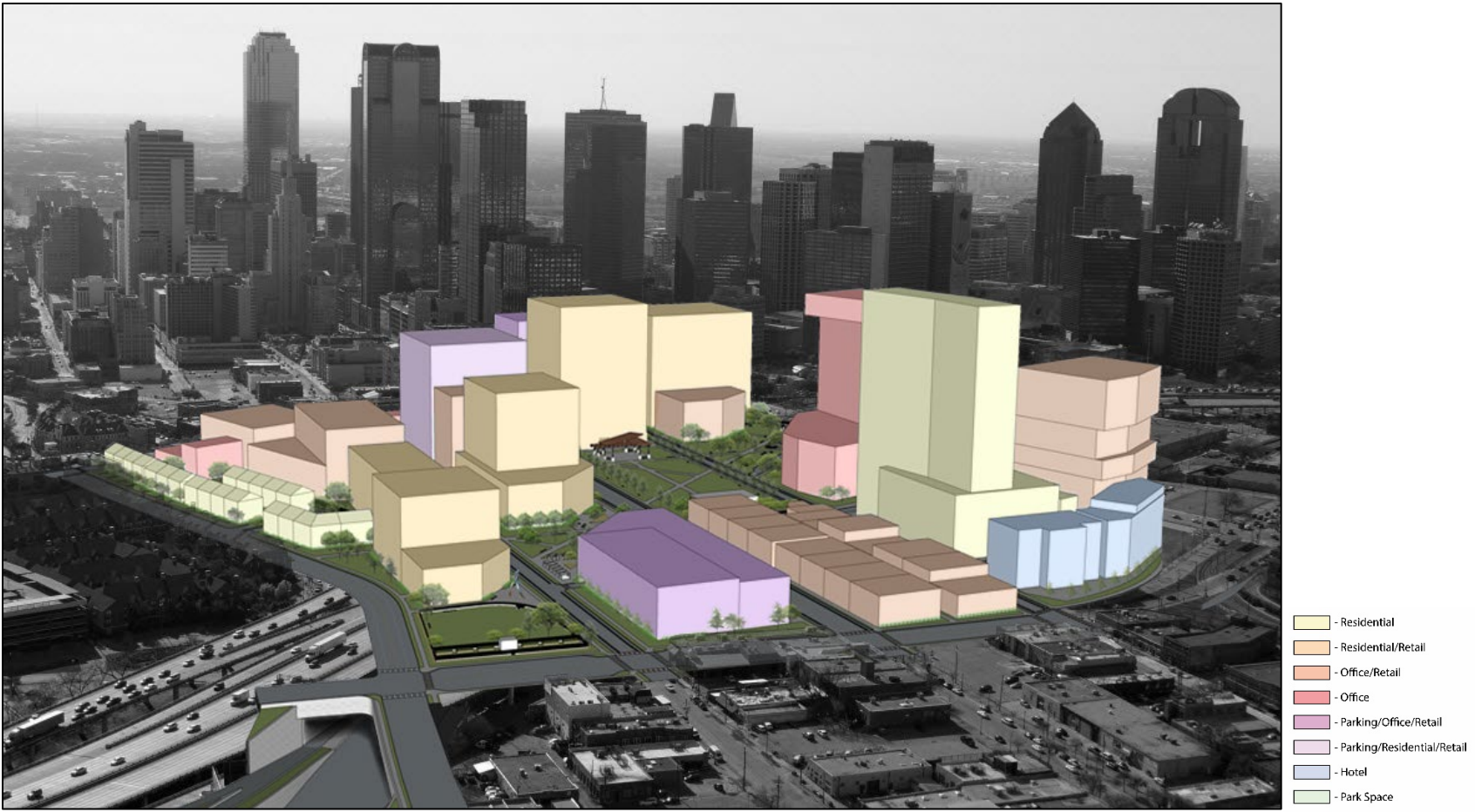


Figure 52 - Bird's eye View facing Downtown



Figure 53 – Proposed Park Entrance Facing Southeast



Figure 54 - Center Park Space with Pavilion, Facing West



Figure 55 - Park Space with Public Art, Adventure Play, and Vendor Stalls

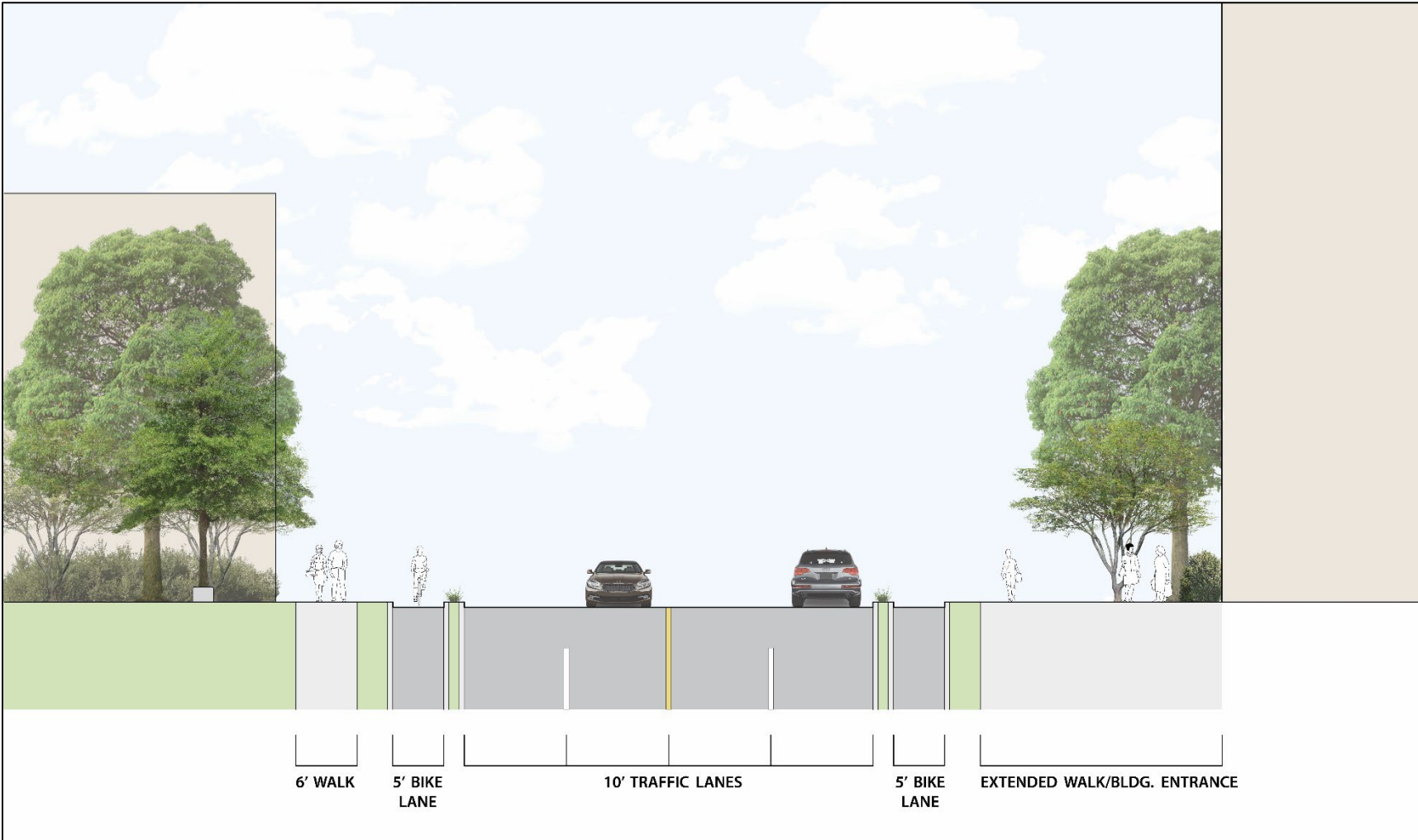


Figure 56 - Elevation View of Main St Streetscape



Figure 57 - Elevation View of Full Site Showing Transition in Building Size from Downtown (Tall) to Deep Ellum (Low)



Figure 58 - Section/Elevation View of First Park Section, Facing Pacific Ave.



Figure 59 - Section/Elevation View of Park and Art Vendor Plaza, Facing North.

5.7 Chapter Summary

This chapter covered the design process beginning with inventory and analysis of the site and surrounding region. GIS maps were used to convey the prevalence of highways in Dallas, particularly the complete enclosure of Downtown by highways. These maps also displayed the excess of impervious surfaces and lack of green space in the Downtown and Deep Ellum neighborhoods. Additional maps were also developed based on observation to document existing site conditions and land use.

These were used in concordance with the findings from chapter four and TxDOT's recommended hybrid alternative for I-345 (Ch.2) to develop programming and concepts for a mixed-use transitional neighborhood and park system over a capped portion of the depressed highway. From these concepts, a schematic plan (urban design vision) was developed implementing design elements synthesized in chapter four. This was supplemented with detailed renderings of the design to demonstrate the author's intent to connect these neighborhoods using the evidence produced by this research.

CHAPTER 6 - CONCLUSION

This section reviews the conclusion of this thesis by first answering the research questions that guided this design master thesis. Next, it examines this research's relevance to landscape architecture, and then briefly discuss some implications and limitations. Lastly, the author makes recommendations for future research based on the take-aways from this study.

6.1 Study Findings & Response to Research Questions

6.1.1 Summary of Findings

This research identified four major themes which encapsulate the issues and needs of I-345 discussed during the interview process: Equitable & Multimodal Mobility, Communal Open Green Space, Visible Culture & History, and Appropriate Land Use & Urban Form. These were combined with additional themes that emerged from precedent studies and observations into three guiding themes for the design goals and objectives and design program. Those themes are: Equitable & Multimodal Mobility, Livable Community-Focused Land Use, and Visible Culture & History. As a solution, this thesis proposes that the I-345 corridor would benefit from a design intervention that puts I-345 below grade, which would enable the development of a mixed-use neighborhood with affordable housing and a deck park over the highway. Such urban design interventions would reconnect the Downtown and Deep Ellum neighborhoods physically and socioeconomically, significantly improve safety and walkability in the area, and emphasize Deep Ellum's distinctive aesthetic born from its rich cultural history.

6.1.2 Response to Research Questions

How can the land currently occupied by I-345 best be used to unite/connect the Downtown and Deep Ellum neighborhoods?

Based on findings from in-depth interviews with local experts, precedent studies, passive site observation, and literature review, this study has concluded that the best way to reunite Downtown and Deep Ellum using the land currently occupied by I-345 is to put a major section of the highway below grade, thereby allowing for the restoration of the urban grid and socioeconomic disparity, and the creation of a walkable, multimodal connected urban neighborhood.

What is the best use (or design strategy) for the land currently occupied by the I-345 corridor in Dallas, TX according to local denizens and experts?

While this study was limited in its collection of adequate data from denizens of Downtown and Deep Ellum, expert opinions indicate that the best use for the land currently occupied by I-345 would be a walkable, multimodal, community-focused, mixed-use neighborhood with ample park space. Reviewing the history of the two neighborhoods illustrated that design can also play a tangible role in connecting communities once separated by major infrastructure.

What design features would protect and emphasize the history, culture, and character of Deep Ellum, TX?

This study has concluded that design features such as street art, historical murals and monuments, educational programming, communal open space, and musical performance

space would contribute the preservation of Deep Ellum's character and culture by engaging the public and increasing their awareness of the neighborhood's history.

6.2 Relevance to Landscape Architecture

This research can help landscape architects better understand how to connect and strengthen communities through urban design strategies and projects that catalyze the urban landscape as cities try to correct the design and planning mistakes of the past. Landscape architects can improve cities by prioritizing livability and walkability over highways and other auto-centric design. Dallas is not the only U.S. city with communities that have been segregated by the interstate highway system, and this thesis has demonstrated that landscape architecture can be employed to stitch these communities back together (environmentally, socially, or economically).

6.3 Discussion

This thesis offers a solution to the problems created by I-345 based on its findings; however, this solution continues to facilitate car-dependency in Dallas. To move away from this and toward a more equitable future, complete removal of I-345 should be considered further. This would incentivize urban design interventions that reduce, even eliminate, the need for people to travel long distances to access jobs and basic amenities.

While part of this study's purpose was to preserve the character and highlight the culture of Deep Ellum through an urban design framework, the neighborhood faces threats beyond the scope of this research. Deep Ellum is currently experiencing accelerated gentrification. Although the development proposed by this thesis would reconnect two critical Dallas

neighborhoods, it has the potential to exacerbate that issue by establishing new opportunities for development and connections. On the bright side, such urban design intervention, with proper zoning and urban design guidelines, also has the potential to protect and act as a catalyst that benefits all users of the city.

6.4 Future Research

This thesis primarily focused on findings from archival data, passive site observations, and experts. More data and feedback from the denizens of Deep Ellum and Downtown is needed to fully understand how best to serve their communities. While TxDOT's feasibility study heavily involved the public, it only focused on transportation and does not address urban design framework, neighborhood preservation, diversity, or what type of development would benefit the communities adjacent to I-345. Likewise, demographic, and socioeconomic studies of these neighborhoods would be beneficial in determining what types of public policy and urban design would best serve them. Furthermore, as illustrated by the precedent studies, these issues are not distinct to I-345 in Dallas. Many other communities across the nation, including Black neighborhoods such as of Oak Cliff in Dallas, have been similarly affected by other highways, and each deserves dedicated research. Following are some potential questions for future research:

- What overarching urban design intervention would best benefit the Downtown Dallas and Deep Ellum communities according to their residents?
- What role can landscape architects play in shaping public policy that best serves the diverse communities of Downtown Dallas and Deep Ellum?

- How can urban design best be employed in Dallas, TX at both district/neighborhood or city scales to remedy the disconnection of communities by construction of the interstate highway system?

APPENDIX

Appendix 1

See attached PDF

3/30/2022

IRB Approval of Minimal Risk (MR) Protocol

PI: Matthew Thornton

Faculty Advisor: Taner Ozdil

Department: Planning and Architecture

IRB Protocol #: 2022-0251

Study Title: *Designing for Best Use of the Downtown I-345 Corridor in Dallas, TX: User Perspectives*

Effective Approval: 3/28/2022

The IRB has approved the above referenced submission in accordance with applicable regulations and/or UTA's IRB Standard Operating Procedures.

Principal Investigator and Faculty Advisor Responsibilities

All personnel conducting human subject research must comply with UTA's [IRB Standard Operating Procedures](#) and [RA-PO4, Statement of Principles and Policies Regarding Human Subjects in Research](#). Important items for PIs and Faculty Advisors are as follows:

- **Notify [Regulatory Services](#) of proposed, new, or changing funding source**
- Fulfill research oversight responsibilities, [IV.F and IV.G](#).
- Obtain approval prior to initiating changes in research or personnel, [IX.B](#).
- Report Serious Adverse Events (SAEs) and Unanticipated Problems (UPs), [IX.C](#).
- Fulfill Continuing Review requirements, if applicable, [IX.A](#).
- Protect human subject data ([XV.](#)) and maintain records ([XXI.C.](#)).
- Maintain [HSP](#) (3 years), [GCP](#) (3 years), and [RCR](#) (4 years) training as applicable.

Appendix 2

Profile Questions:

1. Do you live in Deep Ellum or Downtown Dallas within walking distance from the I-345 corridor (less than 15 minutes)?
 - a. If so, how long have you lived in the area?
2. Do you work in Deep Ellum or Downtown Dallas within walking distance from the I-345 corridor (less than 15 minutes)?
 - a. How long have you worked in the area?
3. Do you have any experience or education in the design and planning industries?
4. What is your current profession?
5. What is your age?

Core Questions :

1. How do you most often interact with the I-345 corridor?
2. How does I-345 affect daily life in Deep Ellum/Downtown in your view? Please elaborate.
3. What are some of the strengths and weaknesses of the I-345 corridor for the Deep Ellum/ Downtown Communities? Please elaborate .

4. What type of buildings (low-up to 2 floor, medium 3-5 floors, high density 6 or more floors) and public spaces (parks, pocket parks, plazas, sport fields, open space etc.) are suitable for the area in your view? Please elaborate.
5. Should I-345 between Deep Ellum and Downtown be kept as is with renovations, downsized, demolished and/or replaced by the regular city grid? Please elaborate.
6. How would you like to see the culture and history of Deep Ellum emphasized/displayed in this area?
7. How could the land currently occupied by I-345 be utilized to improve the relationship between Deep Ellum and Downtown? Please elaborate.
8. What design features and elements could be implemented in this area that would benefit both the local community and the City of Dallas as a whole?

Supplemental Interview Questions:

1. What would incentivize you to travel between the two neighborhoods?
2. How does I-345 impact your travel between Downtown and Deep Ellum?
3. Have you witnessed any long-term consequences caused by I-345?
4. Should the relationship between Deep Ellum and new development change?
5. Is there any programming Deep Ellum is missing?

6. Is there any existing programming that should be removed from Deep Ellum?
7. Are there any additional issues concerning this research that haven't been addressed?
8. Is there anyone you could recommend I speak with to further my research?
9. Are there any online or physical resources you feel would be helpful with my research?

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