Addendum 1 to Visual Impact Assessment Technical Report

North Houston Highway Improvement Project
From US 59/I-69 at Spur 527 to I-45 at Beltway 8 North
Harris County, Texas
CSJ 0912-00-146
August 2020

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 9, 2019, and executed by FHWA and TxDOT.

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1 INTRODUCTION

This addendum provides an update to the visual impact assessment (VIA) conducted for the April 2017 Draft Environmental Impact Statement (Draft EIS) for the North Houston Highway Improvement Project (NHHIP). The Visual Impact Assessment Technical Report (February 2017) is Appendix L of the Draft EIS. In response to comments received regarding the assessment of the proposed project's visual impact to several specific areas, as well as new design changes to the Preferred Alternative, some areas near the proposed project were reassessed for the Preferred Alternative. The methodology of the visual impacts assessment follows the same process as described in Section 2 of the February 2017 VIA Technical Report and follows Federal Highway Administration (FHWA) guidance (FHWA 2015) for a standard level VIA for assessing visual and aesthetic resources for vehicular highway projects.

Summary of Study Area Segments

As reported in the 2017 VIA Technical Report, the project study area was broken into three landscape units, which are geographical units used with similar visual characteristics for assessing visual impacts. The landscape units for the analysis are the three project segments. Segment 1 contains more retail and commercial properties facing the I-45 frontage roads. Residential homes are generally located behind the retail and commercial buildings. Segment 2 has more residential homes near I-45 and less retail and commercial properties adjacent to the interstate. Segment 3 contains the downtown central business district. While there may be unique characteristics differentiating parts of the downtown, as noted in the prior report and further evaluated in this report, the cultural order and natural harmony are similar enough to group into one segment.

Addition of Visual Simulations

At the time the Draft EIS was prepared, there were no simulations (renderings) of the project alternatives from the location of parks and bicycle/pedestrian trails adjacent to or intersecting the proposed project area. To address the public comments about visual impacts of the proposed project in the Segment 3 study area, Texas Department of Transportation (TxDOT) prepared four simulations from Key View Points (KVPs) within Landscape Unit 3. These simulations were assessed to provide an updated visual impact assessment for the Preferred Alternative in the area of Segment 3 of the NHHIP; locations of KVPs for the simulations are shown on an exhibit in Appendix A.

Summary of Local Plans

With this visual impact assessment update, local plans and studies that include actions or goals related to visual resources, views, or visual quality were reviewed. The following bullets summarize actions and goals related to visual resources in the project area.

Plan Houston is the City of Houston's first general plan, established in September 2015 (City of Houston 2015). The following bullets summarize actions and goals related to visual resources in the City of Houston.

- Strategic Goal: Grow responsibly. An action under this strategy commits incorporating context sensitive design principles for development of the transportation network, with attractive streetscapes and public spaces.
- Strategic Goal: Protect and conserve our resources. Actions and goals under this strategy include:

- Limit City's impact on the environment
- Preserve and enhance the public tree canopy
- Attractive streetscapes and public spaces

For geographic areas within the study area there are several H-GAC Livable Centers studies and other plans which identify projects and goals of the communities that border the project area. The following bullets summarize actions and goals related to visual resources.

- The *North Houston District/Greenspoint Livable Centers Study* (H-GAC 2020) includes a northern portion of the Greater Greenspoint super neighborhood and was completed in April 2020. Projects within the plan include pedestrian network improvements at the I-45 intersection and Green Bayou, helping to complete goals established in the Bayou Greenways 2020 plan.
- The *Independence Heights - Northline Livable Centers Study* (H-GAC 2012a) recommends developing a pedestrian crossing at the Crosstimbers Street and I-45 intersection. Projects would include lighting and bollards at the I-45 underpass, as well as landscaping improvements, sidewalk and bike lane construction, and vertical gateway signage located on either side of I-45.
- A portion of the southern half of the Near Northside super neighborhood is included in the study area of the *Northside Livable Centers Study* (Van Meter Williams Pollack 2010). This study recommended projects within the study area including neighborhood gateway signage near I-45 and bike routes along Little White Oak Bayou.
- An eastern portion of the Washington Avenue Coalition/Memorial Park super neighborhood is included in the *Washington Avenue Livable Centers Study* (H-GAC 2012b), the study area of which is defined as I-10 to the north, Memorial Parkway to the south, I-45 to the east, and Washington Avenue and Westcott Street to the west. Projects recommended in this study within the study area would include increasing density near I-45 and develop open space as an extension of Buffalo Bayou.
- A portion of the Downtown super neighborhood is included in the *Downtown/EaDo Livable Centers Study* (H-GAC 2011), the study area of which is defined by Pease Street, St. Charles Street, Commerce Street, and Austin Street. The plan recommended improving pedestrian crossings at major intersections under US 59.
- The *Near Northside Complete Communities Action Plan* (City of Houston 2018) recommends transforming vacant or leftover spaces into green spaces. The goal recommends working in partnership with projects to identify and develop opportunities for new green spaces.

1.1 Existing Facility

1.1.1 Segment 1: I-45 from Beltway 8 North to north of I-610 (North Loop)

I-45 within this segment consists of eight general purpose lanes (i.e., mainlanes; four lanes in each direction), four to six frontage road lanes (two to three lanes in each direction), and a reversible high occupancy vehicle (HOV) lane in the middle, all within a variable right-of-way (ROW) width of 250 to 300 feet. The existing posted speed limit along the general purpose lanes and reversible HOV lane is 60 miles per hour (mph). The existing posted speed limit for the frontage roads is 45 mph. The length of Segment 1 is approximately 8.8 miles, and the area of the existing ROW is approximately 349 acres.

1.1.2 Segment 2: I-45 from north of I-610 (North Loop) to I-10 (including the interchange with I-610)

I-45 within this segment primarily consists of eight at-grade general purpose lanes (four lanes in each direction), four to six frontage road lanes (two to three lanes in each direction), and a reversible HOV lane in the middle, all within a variable ROW width of 300 to 325 feet. Segment 2 also includes a depressed section that consists of eight general purpose lanes (four lanes in each direction) and a reversible HOV lane in the middle, all below grade, within a 245-foot ROW. The frontage road lanes associated with the depressed section are located at-grade. The existing posted speed limit is 60 mph along the general purpose lanes, 55 mph along the reversible HOV lane, and 40 mph along the frontage road lanes. The I-45 and I-610 frontage roads are discontinuous at the I-45/I-610 interchange. The length of Segment 2 is approximately 4.5 miles, and the area of the existing ROW is approximately 220 acres.

1.1.3 Segment 3: Downtown Loop System (I-45, US 59/I-69, and I-10)

The Downtown Loop System consists of three interstate highways that create a loop around Downtown Houston. I-45 forms the western and southern boundaries of the loop and is known locally as the Pierce Elevated because it partially follows the alignment of Pierce Street. I-10 forms the northern boundary of the loop, and US 59/I-69 forms the eastern boundary of the loop. The loop includes three major interchanges: I-45 and I-10, I-10 and US 59/I-69, and US 59/I-69 and I-45. The interchange of US 59/I-69 and Spur 527 is located southwest of Downtown Houston.

I-45 along the western and southern sides of Downtown consists of six elevated general purpose lanes (three lanes in each direction) within a variable ROW that is typically 205 feet to 320 feet wide. I 10 north of Downtown, between I-45 and US 59/I-69, consists of six general purpose lanes (three lanes in each direction) within an existing ROW width of 420 feet. US 59/I-69 along the east side of Downtown consists of six general purpose lanes (three lanes in each direction) within an existing ROW width of 225 feet. US 59/I-69 south of Downtown from I-45 to Spur 527 has eight general purpose lanes (four in each direction). Generally, local streets serve as one-way frontage roads within Segment 3, except near the I-10 and US 59/I-69 interchange, where the frontage roads are discontinuous. The length of Segment 3, which includes the Downtown Loop System, is approximately 13.1 miles, and the existing ROW is approximately 638 acres.

1.2 Proposed Facility

The Preferred Alternative for the proposed project is described below, by study segment. The Preferred Alternative includes changes to the Recommended Alternative (for each segment) presented and evaluated in the Draft Environmental Impact Statement. Section 2.3.6 of the Final EIS discusses the design changes, including the proposed locations of storm water detention areas.

1.2.1 Segment 1: I-45 from Beltway 8 North to north of I-610 (North Loop)

The Preferred Alternative would widen the existing I-45 primarily on the west side of the roadway to accommodate four managed express (MaX) lanes. The proposed typical section would include eight to ten general purpose lanes (four to five lanes in each direction), four MaX lanes (two lanes in each direction), and four to six frontage road lanes (two to three lanes in each direction). The general purpose lanes and MaX lanes would be at-grade except at major cross streets, where they would be elevated over the intersecting streets. Approximately 200 to 225 feet of new ROW would be required for the roadway widening, mostly to the west of the existing I-45. New ROW would also be required on

the west side of I-45 for proposed storm water detention areas. New ROW would be required to the east of the existing I-45 ROW at intersections with major streets and between Crosstimbers Street and I-610. Approximately 246 acres of new ROW would be required in Segment 1.

1.2.2 Segment 2: I-45 from north of I-610 (North Loop) to I-10 (including the interchange with I-610)

The Preferred Alternative would widen the existing I-45 to accommodate four MaX lanes. The proposed typical section would include ten general purpose lanes (five lanes in each direction), four MaX lanes (two lanes in each direction), and four to six frontage road lanes (two to three lanes in each direction). From north of Cottage Street to Norma Street, the general purpose lanes and the Max lanes would be depressed, while the frontage road lanes would be at-grade. The proposed I-45 and I-610 frontage roads would be continuous through the I-45/I-610 interchange. New ROW would be required from both the east and west sides of the existing I-45. The new ROW would include proposed storm water detention areas on the east side of I-45, south of Patton Street. Approximately 44 acres of new ROW would be required in Segment 2.

The Preferred Alternative provides a structural "cap" over a portion of the depressed lanes of I-45 from north of Cottage Street to south of N. Main Street. Future use of the structural cap area for another purpose would require additional development and funding by entities other than TxDOT.

1.2.3 Segment 3: Downtown Loop System (I-45, US 59/I-69, and I-10)

The Preferred Alternative would reconstruct all the existing interchanges in the Downtown Loop System and reroute I-45 to be parallel to I-10 on the north side of Downtown and parallel to US 59/I-69 on the east side of Downtown. Access to the west side of Downtown would be provided via "Downtown Connectors" that would consist of entrance and exit ramps for various Downtown streets. A section of the Downtown Connectors would be below-grade (depressed) between approximately W. Dallas Street to Andrews Street. The existing elevated I-45 roadway along the west and south sides of Downtown would be removed. The portion of I-45 (Pierce Elevated) between Brazos Street and US 59/I-69 could be left in place for future use and redevelopment by others; however, an alternative use for the structure is not proposed by TxDOT and is not evaluated in the Final EIS.

To improve safety and traffic flow in the north and east portions of Segment 3, portions of both I-10 and US 59/I-69 would be realigned (straightened) to eliminate the current roadway curvature. I-45 and US 59/I-69 would be depressed along a portion of the alignment east of Downtown. South of the George R. Brown Convention Center, the rerouted I-45 would begin to elevate to tie to existing I-45 southeast of Downtown, while US 59/I-69 would remain depressed as it continues southwest toward Spur 527. US 59/I-69 would be widened from eight to twelve general purpose lanes between I-45 and SH 288, and would be reconstructed to ten general purpose lanes from SH 288 to Spur 527.

The four proposed I-45 MaX lanes in Segments 1 and 2 would terminate/begin in Segment 3 at Milam Street/Travis Street, respectively. I-10 express lanes (two lanes in each direction) would be located generally in the center of the general purpose lanes within the proposed parallel alignment of I-10 and I-45 on the north side of Downtown. The I-10 express lanes would vary between being elevated and at-grade.

New ROW to the east of the existing US 59/I-69 along the east side of Downtown would be required to accommodate the proposed realigned I-45. A new continuous southbound access road would be provided adjacent to US 59/I-69 and would tie to existing Hamilton Street on the south side of the

Convention Center. The existing St. Emanuel Street would serve as a northbound access road. The project ROW would include areas to be developed as storm water detention. Approximately 160 acres of new ROW would be required, the majority of which would be for the I-10 and US 59/I-69 realignments (straightening) and to construct the proposed I-45 lanes adjacent to US 59/I-69 along the east side of Downtown.

The Preferred Alternative provides a structural "cap" over the proposed depressed lanes of I-45 and US 59/I-69 from approximately Commerce Street to Lamar Street. There would also be a structural cap over the depressed lanes of US 59/I-69 between approximately Main Street and Fannin Street, and in the area of the Caroline Street/Wheeler Street intersection. Future use of the structural cap areas for another purpose would require additional development and funding by entities other than TxDOT.

2 VISUAL CHARACTER AND QUALITY

2.1 Segment 1

The physical geography of Segment 1 is generally characterized as flat terrain. This landscape unit is mostly developed and is primarily comprised of commercial and industrial development along the frontage roads of I-45 and residential areas generally located behind the commercial developments. A few residential areas face both sides of I-45 between Parker Road and I-610. Industrial and public/institutional land uses are also located along the frontage roads and throughout the entire Segment 1 study area. The I-45 corridor consists of eight lanes of general traffic, four lanes of frontage roads, and one reversible HOV lane. The interstate corridor is mostly at-grade and elevated over major intersecting roads.

The natural environment of Segment 1 is flat grassland mixed with pockets of dense forested areas. Two creeks, Halls Bayou and White Oak Bayou, are located in this landscape unit. The areas around these creeks have moderate to moderately low natural harmony for recreational and residential viewer groups. Residential areas include many trees which provide a higher sense of natural harmony for residential and recreational users by restricting views of the I-45 corridor and adjacent developments.

This segment is homogeneous from a vividness, natural harmony and cultural order perspective. The area is bisected by a multilane interstate and commercial and industrial land uses buffer most residential areas from the interstate. No specific places were identified as landmarks, scenic viewpoints, or key resources. Therefore, no key viewpoints were established for the analysis.

Based on site visits and desktop analysis, the natural harmony of this area is moderate and the cultural order of this landscape unit ranges from low to moderate. Areas with a lower sense of cultural order are mostly located closer to I-45 and adjacent to a combination of many land uses which appear to have little organization. Some of the residential and recreational areas in this landscape unit are well-maintained and have a sense of cultural order. The vividness of this landscape unit is low. There are few memorable, dramatic or distinctive visual resources. Table 2-1 describes the visual quality of this landscape unit.

Table 2-1. Visual Quality Assessment Landscape Unit #1

Landscape Unit	Vividness	Natural Harmony	Cultural Order	Visual Quality
1	Low	Moderate	Moderately Low	Moderately low

2.2 Segment 2

Similar to Segment 1, the physical geography of Segment 2 is generally characterized as flat terrain. This landscape unit is mostly developed and is primarily comprised of residential development. A small amount of commercial and industrial development is concentrated along the frontage roads of I-45. Little White Oak Bayou runs generally parallel to the I-45 corridor and crosses under I-45 in several locations. The bayou has historically limited development adjacent to I-45 in these areas.

Montie Beach Park and Woodland Park are located on west side of I-45, and Moody Park is located on the east side of I-45. The Historic Hollywood and Holy Cross Catholic cemeteries are located between I-45 and the Little White Oak Bayou. The I-45 corridor consists of eight lanes of general traffic, six lanes of frontage roads, and one reversible HOV lane. The interstate corridor is mostly at-grade and elevated over major intersecting roads. There is also a 0.5-mile section of the corridor where the general lanes of traffic are below grade near Moody Park and the cemeteries.

The natural environment of this landscape unit is flat grassland mixed with dense forested areas. In the residential areas, there are many trees which provide interest for residential and recreational users. Little White Oak Bayou has limited development and is organized in an aesthetically pleasing composition with low levels of disruptive visual detractors.

This segment is homogeneous from a vividness, natural harmony and cultural order perspective. The area is bisected by a multilane interstate and bayou, while some commercial and industrial land uses buffer residential areas from the interstate. No specific places were identified as landmarks, scenic viewpoints, or key resources. Therefore, no key viewpoints were established for the analysis.

Based on site visits and desktop analysis, natural harmony is moderate and the cultural order of this landscape unit ranges from low to moderate. Areas with a lower sense of cultural order are mostly located closer to I-45 and adjacent to a combination of many land uses that appear to have little organization. However, the cemeteries, recreational areas, and parts of the residential neighborhoods in this landscape unit are well-maintained and have a moderate sense of cultural order. The vividness of this landscape unit is moderately low, although the areas containing Moody Park, Little White Oak Bayou, and the historic cemeteries provide a distinct viewshed within this landscape unit. Table 2-2 describes the visual quality of this landscape unit.

Table 2-2. Visual Quality Assessment Landscape Unit #2

Landscape Unit	Vividness	Natural Harmony	Cultural Order	Visual Quality
2	Moderately Low	Moderate	Moderately low	Moderate

2.3 Segment 3

Similar to the other segments, the physical geography of Segment 3 is generally characterized flat terrain; however, this segment includes Downtown Houston which is the central business district with several tall buildings. This landscape unit is densely developed and is comprised of commercial and multiple purpose land uses concentrated in the Downtown area with residential areas located primarily outside of the Downtown loop (three interstate highways that create a loop around Downtown Houston). More undevelopable land, including storm water detention areas, drainage channels, bayous, and waterbodies, occur in this landscape unit in comparison to the other segments.

The natural environment of this landscape unit is flat urban land with several urban park areas and bayous running east and west through the north part of Downtown. Within the residential areas outside of the Downtown loop, there are many trees which provide interest for residential and recreational users. The natural harmony of Segment 3 is moderate due to the presence of large transportation infrastructure from the viewpoints of many natural areas and urban parks such as Buffalo Bayou, and White Oak Parkway, Freed Art and Nature Park, Hogg Park, and Stude Park located north of I-10 along White Oak Bayou.

The cultural order of this landscape unit ranges from moderately low to moderately high. Areas with a lower sense of cultural order, mostly located east of Downtown, are adjacent to a combination of a variety of land uses which appear to have little organization or fallen into disrepair. This area is typically comprised of industrial uses or vacant properties. These areas are experiencing some revitalization as new developments continue to appear. Most of the residential neighborhoods outside of the Downtown loop to the north and west in this landscape unit are well-maintained and have a moderate to moderately high sense of cultural order. These neighborhoods are among some of the original and most historic communities in Houston, dating back to the mid-1800s. As a result of the variety of cultural order, this landscape unit has a moderate score for cultural order.

The vividness of this landscape unit is moderately high. Downtown Houston has a distinct viewshed and strong sense of place. Historic neighborhoods and most recreational areas are well-maintained. Additionally, southbound travelers on I-45 have a view of The American Statesmanship Park, which contains four large busts of important political figures including Stephen F. Austin, Sam Houston, Abraham Lincoln, and George Washington. Based on site visits and desktop analysis, the visual quality assessment of this landscape unit is described in Table 2-3.

Table 2-3. Visual Quality Assessment Landscape Unit #3

Landscape Unit	Vividness	Natural Harmony	Cultural Order	Visual Quality
3	Moderately high	Moderate	Moderate	Moderate

3 VIEWER SENSITIVITY

The combination of exposure and awareness of each viewer group within each landscape unit determines the viewers' sensitivity to the proposed changes as a result of the project. Exposure is a measure of the proximity (distance), extent (number of people viewing), and duration (length of viewing time) a viewer may perceive a visual attribute, resource, or the project. Awareness is the measure of a viewer's attention (level of observation based on routine and familiarity), focus (level of concentration), and protection (legal and social constraints on the use of visual resources).

3.1 Segment 1: I-45 from Beltway 8 to I-610

The primary viewers in this landscape unit are residents and travelers along I-45. A smaller group of viewers consists of workers in commercial or industrial areas and recreational viewers located in neighborhoods, parks, trails, or open spaces located within the landscape unit. Travelers along I-45 comprise a large number of viewers in this landscape unit; however, their exposure to the proposed project area is typically short due to the speed of their travel. Additionally, the attention and focus of travelers is not on the transportation corridor, but rather on the vehicles ahead and around the traveler. Therefore, because exposure and awareness are low, the sensitivity of travelers is low.

Exposure and awareness of the proposed project changes on residents and recreational viewers is dependent on their location. Those closest to the I-45 corridor will have more exposure and likely be more attentive to visual changes; however, the viewshed for many residents does not expose the viewer to the I-45 corridor as views of the infrastructure may be restricted by commercial developments, trees, billboards along the interstate right-of-way, and the roofs of neighboring houses. Additionally, most viewers may not pay full attention to the I-45 corridor because the presence of the transportation infrastructure has become integrated into their routine. Therefore, because exposure and awareness are generally low, the sensitivity of the residential viewer ranges from low to moderate depending on the location of the viewer.

While most of the employment areas are located adjacent to the I-45 corridor and are directly exposed to the project, most workers' awareness is likely focused inside their buildings and not on the I-45 corridor. Workers in the landscape unit have moderately low viewer sensitivity. Similar to workers, recreational or institutional viewers (those attending schools near I-45) would have low sensitivity to the project. Some recreational users nearest to the I-45 corridor may have moderate sensitivity, but several industrial land uses are adjacent to the I-45 corridor which help reduce exposure and sensitivity to visual changes.

Therefore, because the viewer exposure is typically low and most viewers have low awareness, the sensitivity rating for this landscape unit is typically low.

3.2 Segment 2: I-45 from I-610 to I-10

Travelers along I-45 comprise a large number of viewers in this landscape unit; however, their exposure to the proposed project area is typically short due to the speed of their travel. Additionally, the awareness of travelers is not on the transportation corridor, but rather on the vehicles ahead and around the traveler. Therefore, because exposure and awareness are low, the sensitivity of travelers is low.

Residents and recreational users closest to the I-45 corridor will have the most exposure; however, the viewshed for many residents does not include the I-45 corridor as views of the infrastructure may be restricted by trees, billboards along the interstate right-of-way, and the roofs of houses. Additionally, most viewers do not pay full attention to the I-45 corridor because the presence of the transportation infrastructure has become integrated into their routine. Therefore, because exposure and awareness are generally low, the sensitivity of the residential viewer ranges from low to moderately high depending on the location of the viewer.

While most of the employment opportunities are located adjacent to the I-45 corridor, workers' attention is likely focused inside their buildings and not on the I-45 corridor. Therefore, workers in the landscape unit have moderately low awareness. Recreational users along Little White Oak Bayou would have moderate to moderately high exposure and awareness as the viewer gets closer to the I-45 corridor; however, recreational facilities farther from the project, such as Moody Community Center or parts of Little White Oak Bayou, would have reduced exposure and awareness because views of the project are restricted by trees and natural vegetation.

Therefore, because the viewer exposure is typically low and most viewers have low awareness, the sensitivity rating for this landscape unit is typically low.

3.3 Segment 3: Downtown Loop System

A large number of viewers come from the thousands of travelers along I-45, I-10, and US-59/I-69; however, their exposure to the proposed project area is typically short due to the speed of their travel. Additionally, the awareness of travelers is not on the transportation corridor, but rather on the vehicles ahead and around the traveler. Although some parts of the interstate corridors in this landscape unit are elevated and offer more expansive viewsheds, the sensitivity of travelers is low.

Some viewer groups, especially workers, in Downtown are typically not focused on one particular location if they have a view of the surrounding environment from their office or home. Workers, residents, and recreational viewers turn their attention to particular activities within their surroundings and most focus is not outside their windows or away from their particular activity. In addition, many buildings in Downtown are very tall and would likely block the views of the proposed project unless the viewer was on the edges of Downtown. Therefore, the exposure and awareness of the view of the project for most downtown workers and residents would be low to moderately low, and the sensitivity is generally moderately low.

The viewshed for many residents outside of the downtown loop does include interstate corridors; however, most views of the infrastructure may be restricted by other buildings, vegetation and/or trees, and other transportation infrastructure unless the viewer was adjacent to the project. Additionally, most residential viewers do not pay full attention to the infrastructure corridors because the presence of the transportation infrastructure has become integrated into their routine and their focus on their own property or immediate adjacent properties. Therefore, the sensitivity of the residential viewer outside of the downtown loop ranges from low to moderately high depending on the location of the viewer.

The viewshed for recreational users varies depending on the location of the viewer. Except for a majority of the downtown area along the bayous, and near Moody Park, viewers would have views of the Downtown skyline. Some of these views in Downtown along the bayous would include elevated transportation structures, or concrete drainage ditches which may not be well-maintained. Therefore, recreational users in this area have become accustomed to viewing elevated transportation structures; however, the sensitivity of recreational viewers is moderate to moderately high because recreational users typically spend longer periods of time viewing surroundings.

The viewer awareness in this landscape unit ranges from low to moderately high, but is typically moderate due to the high number of people viewing the proposed project area; however, most viewers would have low exposure to the project. Additionally, the presence of elevated transportation infrastructure and drainage ditches has remained in this area for several years, and the awareness of the infrastructure for some viewers may not be a focus of attention. Therefore, because the viewer exposure is typically low and most viewers have moderate viewer awareness, the sensitivity rating for this landscape unit is typically moderate.

4 IMPACTS OF THE BUILD ALTERNATIVE

This section describes a review of the impacts to visual quality for the Preferred Alternatives for the three study segments. Impacts were assessed using the same methodology as described in the Draft EIS.

4.1 Segment 1

Design changes were proposed to Alternative 4 after the release of the Draft EIS. These design changes were primarily related to acquisition of minor amounts of ROW (corner clips) at intersections to ensure that roadway lanes correctly lined up and transitioned smoothly to existing lanes or to accommodate radius returns. Other clips included property that was considered unusable that remained as part of an originally impacted parcel. Three additional design changes include:

1) I-45 at Blue Bell Road (south of West Road) – an overpass was added at this location per the City of Houston's request. Even though ROW clips are only needed on Blue Bell Road to accommodate the radius returns, the overpass at Blue Bell Road is a new design since the Draft EIS.
2) I-45 at Bizerte Street (south of Tidwell Road) – ROW would be acquired on the east side of Marable Drive north of Bizerte Street to accommodate a cul-de-sac since Marable Drive will be cut off by the project.
3) I-45 at Foyce Street (south of Crosstimbers Street) – ROW would be acquired on the south side of Foyce Street to accommodate a cul-de-sac since the tie-in to Riggs Road cannot be maintained.

The new overpass at Blue Bell Road would not adversely impact visual quality for this landscape unit because adjacent viewers would have low sensitivity. These viewers are mostly workers on either side of the interstate where the new overpass would be visible. Residential viewers would have limited views restricted by mature trees, commercial or industrial land uses, or neighboring roofs. The additional new ROW for cul-de-sacs at Marable Drive and Foyce Street would not adversely impact visual quality for this landscape unit. Viewers at this area would have low sensitivity to views of the new cul-de-sacs because the existing views contain existing streets and nearby buildings and the cul-de-sacs would introduce familiar infrastructure.

Part of the additional new ROW includes construction of storm water detention basins. Segment 1 would have 10 detention basins ranging in size from 0.6 acre to 11.5 acres (see Section 2 of the Final EIS for additional details). The location of the detention basins determines the level of visual impact. Recreational and residential viewers closest to the detention basins would be the most sensitive; however, the visual quality of the detention basins could become a benefit for all viewers. TxDOT would construct the detention basins with a wet bottom, if a partner agrees to maintain it and any other amenities that may be added; however, for the purposes of this analysis, wet bottom ponds were not assumed.

Overall, the visual impacts of the Segment 1 Preferred Alternative are still expected to be neutral.

Table 4-1. Visual Impact Summary Segment 1 Alternative 4

LU #	Visual Quality - No Build	Visual Quality - Build Alternative	Existing Viewer Sensitivity	Project Compatibility
1	Moderately low	Moderately low	Low	Yes

4.2 Segment 2

Design changes were proposed to Alternative 10 after the release of the Draft EIS. These include:

1) Increase the curve radius for a southbound I-45 direct connector to westbound I-610.
2) Replace an entrance ramp from Irvington Boulevard to westbound I-610 to elevate the ramp over the METRO light rail line along Fulton Street.
3) Reconfigure an existing bicycle trail to connect to the proposed sidewalk/trail south of Link Road.
4) Shift a northbound frontage road east to accommodate the transition from a depressed roadway section south of Cottage Street to an elevated overpass at Patton Street.

These proposed design changes would not adversely impact the visual quality for this landscape unit. The additional new ROW includes construction of two storm water detention basins. The detention basin sizes would be 2.3 acres and 19.5 acres.

The viewers most impacted by changes to the proposed project would be recreational and residential viewers closest to the new detention basins. The visual quality of the detention basins could become a benefit for all viewers. TxDOT would construct the detention basins with a wet bottom if a partner agrees to maintain it and any other amenities that may be added; however, for the purposes of this analysis, wet bottom ponds were not assumed.

Overall, the visual impacts of the Segment 2 Preferred Alternative are still expected to be neutral.

Table 4-2. Visual Impact Summary Segment 2 Alternative 10

LU #	Visual Quality - No Build	Visual Quality - Build Alternative	Existing Viewer Sensitivity	Project Compatibility
2	Moderately low	Moderately low	Low	Yes

4.3 Segment 3

This section includes a reassessment of the visual impact analysis for Alternative 11 presented in the Draft EIS. With respect to several comments received regarding impacts to recreational and open space areas within this segment, TxDOT prepared four simulations from four different areas. Existing views and the simulations are included as Figures 3-11. This alternative would realign I-45 along I-10 to the north of downtown and then turn south along US-59/I-69 to the east of Downtown. The land requirements for this alternative are greater than the other two alternatives. The new ROW required would be primarily north and east of Downtown in order to realign these highways and to construct the I-45 corridor and MaX lanes.

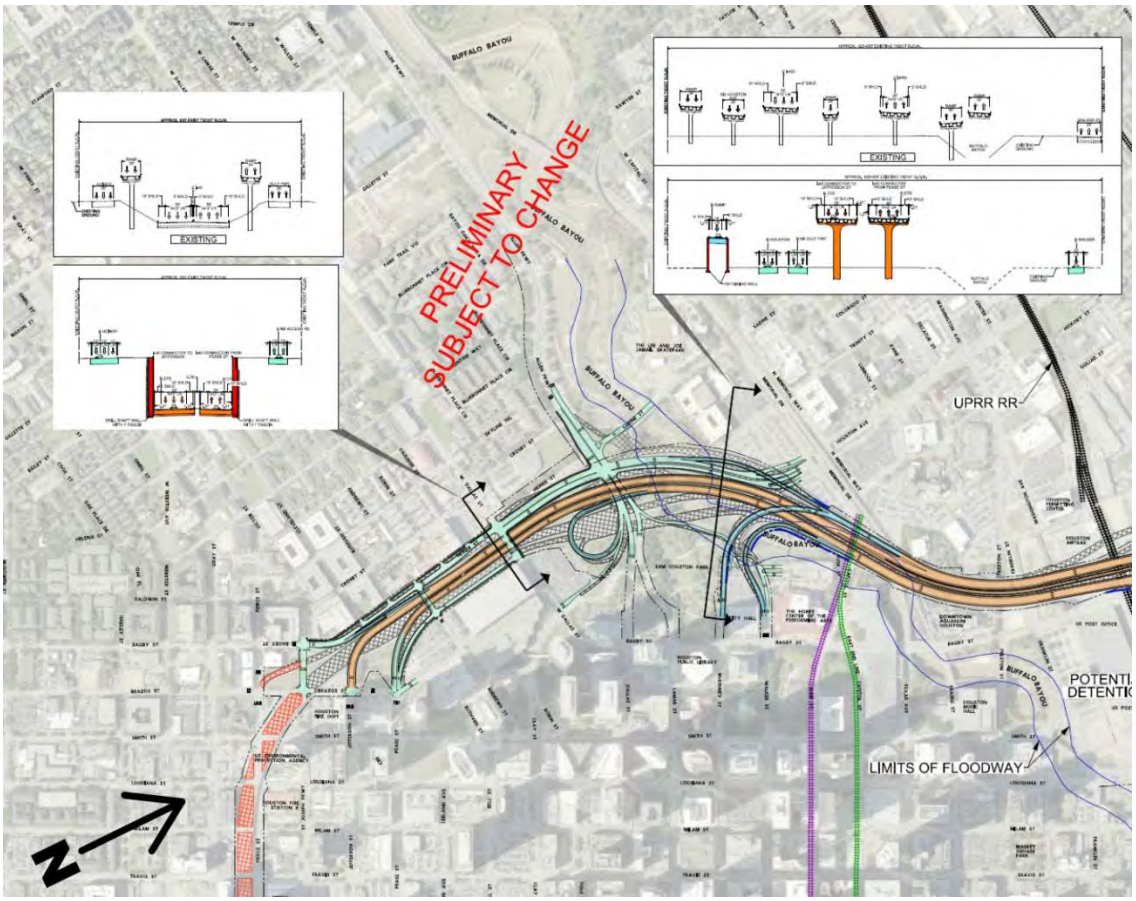
Under this Alternative, the Pierce Elevated segment of I-45 along a portion of the west and south side of Downtown would be removed and replaced with “Downtown Connectors.” The Pierce Elevated on the side south of Downtown would be removed, eliminating the visual barrier between Downtown and communities on the west and south side, including the Midtown neighborhood.

Proposed roadway design changes in Segment 3 since the publication of the Draft EIS include:

1) Realign the eastbound I-10 frontage road between Gregg Street and Buck Street and realign the westbound I-10 frontage road between Meadow Street and Gregg Street due to the addition of a lane to the director connector.
2) Realign the eastbound I-10 frontage road and modify the frontage road vertical profile to be depressed under both the UPRR and BNSF rail lines in the southwest quadrant of the US 59/I-69/I-10 interchange.
3) Realign a portion of St. Emanuel St. to the west to accommodate the City of Houston's proposed Navigation Boulevard/Commerce Street underpass project.
4) Depress the proposed Downtown Connectors from south of Allen Parkway to south of Andrews Street, including reconnecting Andrews Street to Downtown.
5) Revise design of interchange of I-45/US 59/I-69: modify the direct connectors from northbound I-45 to northbound and southbound US 59/I-69, add exit ramp from the northbound US 59/I-69 direct connector to southbound I-45, and reconfigure the northbound I-45 exit and connection to St. Joseph Parkway
6) Realign the Gray Street exit from northbound US 59/I-69.
7) Relocate proposed SH 288 managed lanes ramps from Chenevert Street to Hamilton Street.
8) Redesign the entrance ramp to northbound US 59/I-69 from San Jacinto Street.
9) Revise design to avoid ROW acquisition at a historic property on Wrightwood Street in the northern portion of Segment 3.
10) Revise design to avoid ROW acquisition at Freed Art and Nature Park.
11) Revise design to avoid ROW acquisition at Linear Park.

Although the proposed design changes would not substantially change the visual quality of the proposed project as compared to the previous assessment, the proposed revised design of the Downtown Connectors, as shown in Figure 1, will eliminate a portion of elevated roadway, improving views on both sides of the corridor. Near Buffalo Bayou, there would only be three elevated structures for the Direct Connectors. The project would remove three elevated structures in this area, which would enhance visual quality for all viewers in this area.

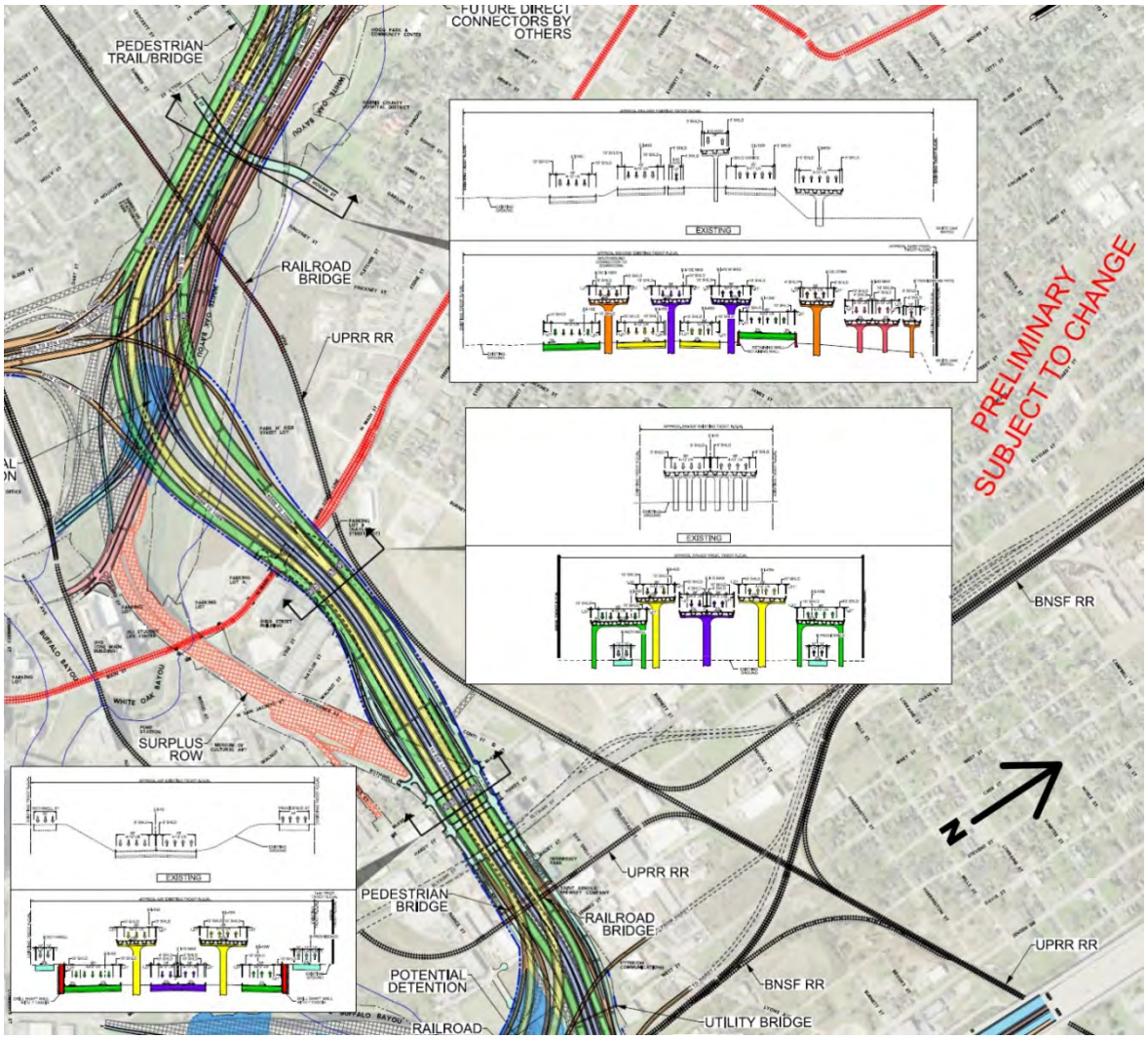
Figure 1: West Downtown Schematic



Source: http://ih45northandmore.com/docs9/20180521_NHHIP_Seg3_Overview_Layout_PH_1-1.pdf

To the north of Downtown, the proposed elevated lanes along the realignment of I-10 would increase the visual barrier between Near Northside and Downtown neighborhoods (shown in Figure 2), visually disconnecting Near Northside and the future Hardy Yards development from Houston's central business district. Efforts have been made to maintain existing open spaces. There are opportunities for aesthetic enhancements under elevated sections of the highways.

Figure 2: North Downtown Schematic



Source: http://ih45northandmore.com/docs9/20180521_NHHIP_Seg3_Overview_Layout_PH_1-1.pdf

In addition to the design changes listed above, four storm water detention areas are proposed for Segment 3, all within the project ROW evaluated in the Draft EIS. The visual quality of the detention basins could become a benefit for all viewers. TxDOT would construct the detention basins with a wet bottom, if a partner agrees to maintain it and any other amenities that may be added; however, for the purposes of this analysis, wet bottom ponds were not assumed.

Miscellaneous aesthetic improvements along Heights Bike Trail between Taylor Street and Main Street will be provided (coordinated by TxDOT with City of Houston, Houston Parks Board and other entities). There are opportunities for aesthetic enhancements under elevated sections of the highways.

TxDOT will consider options for "signature" bridges to distinguish the Near Northside neighborhood and improve the visual quality of the proposed project area. The design of the bridges will be conducted as a collaboration between the Greater Northside Management District and TxDOT. TxDOT will consider options for a "signature bridge" over Sam Houston Park and Buffalo Bayou and will collaborate during

design with the management districts or neighborhood groups. Funding for “signature” bridges would be determined in a later phase of project development.

With the exception of elevated direct connectors at an interchange on the southeast side of Downtown, and at the Spur 527 interchange, the US 59/I-69 corridor would be depressed on the east and south sides of Downtown beginning at Commerce Street. The I-45 corridor on the east side of Downtown would be depressed from Commerce Street until the facility becomes the Gulf Freeway. The depressed section from Commerce Street to Lamar Street could potentially be capped, creating opportunities to enhance the visual quality of the landscape unit. The open space options shown on the schematics are conceptual; however, the proposed project will include the infrastructure to support a future open space option. Future development and use of the highway cap for another purpose would require additional development and funding by entities other than TxDOT.

The University of Houston Downtown would have improved views because the existing elevated highways (shown in Figure 3) would be realigned north of the campus. The proposed project would improve views for users along the Heights Bike Trail and along Buffalo Bayou, illustrated by the simulation in Figure 4; however, some residential viewers closest to the proposed project, along I-10 north of Downtown, would experience a degradation in visual quality due to the new elevated structures.

There would be some negative impacts to some recreational views on the north and northwest side of Segment 3., The alternative would temporarily impact hike and bike trails along White Oak Bayou and Buffalo Bayou during construction. The existing visual quality on the Heights Bike Trail at White Oak Bayou is moderate, as no large elevated transportation facilities obstruct the view of Downtown (Figure 5); however, the bayou has moderate to moderately low quality visual appeal because there are no improvements to the bayou or concrete drainage system to enhance the quality of landscaping in the area. The simulated image that includes the proposed project, as shown in Figure 6, shows several large elevated structures which would reduce the visual quality to moderately low for some viewers in this area. The height of the elevated structures would block the view of many of the buildings in Downtown for viewers along the trail.

An image from White Oak Drive east of Freed Art and Nature Park shows an existing viewshed with moderate visual quality. The presence of several elevated structures breaks up the view of the Downtown skyline and the park has an average landscaping quality (Figure 7). A simulated image of the proposed project (Figure 8) from this location shows the presence of additional elevated structures which would block more of the Downtown skyline view. An additional elevated roadway planned by Metropolitan Transit Authority of Harris County (METRO), but not proposed by TxDOT as part of this project, would appear taller than the tallest building in the skyline. Due to the elevated structures, the visual quality would be reduced to moderately low because more of the skyline would be blocked from view.

Another simulation includes Hogg Park at White Oak Bayou Greenway Trail. The existing image, as shown in Figure 9, shows the view facing south towards the Downtown skyline. The view is moderate to moderately high. The appearance of the landscaping enhances the view, but elevated transportation structures block from some of the views of Downtown. There are two simulated images for this location, differentiated by the average length of the bridge spans. Figure 10 shows average bridge spans that are 130 feet apart, and Figure 11 illustrates 300 foot average bridge spans. Both simulations illustrate there would be negative impacts to visual quality, due to height of the elevated

structures. The wider bridge spans block less views, but still would result in reducing visual quality to moderately low to moderate; however, once young trees mature, the height of the trees may block more of the elevated structures and the impact would be minimized.

Although this alternative would degrade the visual quality for viewer groups north of Downtown, and for some residential and other viewers outside of Downtown with views of the skyline, the majority of viewsheds in the Segment 3 area would have improved views or no impacts to views as a result of the Proposed Facility, and visual quality would remain moderate. Specific areas where adverse impacts could occur (North Downtown) could be mitigated to reduce the impact (see Section 5). Additionally, the form and materials of the Proposed Facility would remain compatible with the existing environment. Therefore, the overall visual quality impact would be neutral for Segment 3 as a result of this alternative.

Table 4-3. Visual Impact Summary Segment 3 Alternative 11

LU #	Visual Quality - No Build	Visual Quality - Build Alternative	Existing Viewer Sensitivity	Project Compatibility
3	Moderate	Moderate	Moderate	Yes

4.4 Impact Summary

This section summarizes the visual impact assessment. While there may be specific areas close to the Proposed Facility which may be negatively impacted by a reduction in visual quality, the majority of viewers would have no impacts. Some viewers may have improved views where elevated structures have been removed, or where mitigation measures have reduced visual impacts. Areas where adverse impacts could occur could be mitigated to minimize the visual impact (see Section 5). Table 4-4 summarizes the visual impact to the landscape unit, as a whole, represented by the individual segments of the Proposed Facility.

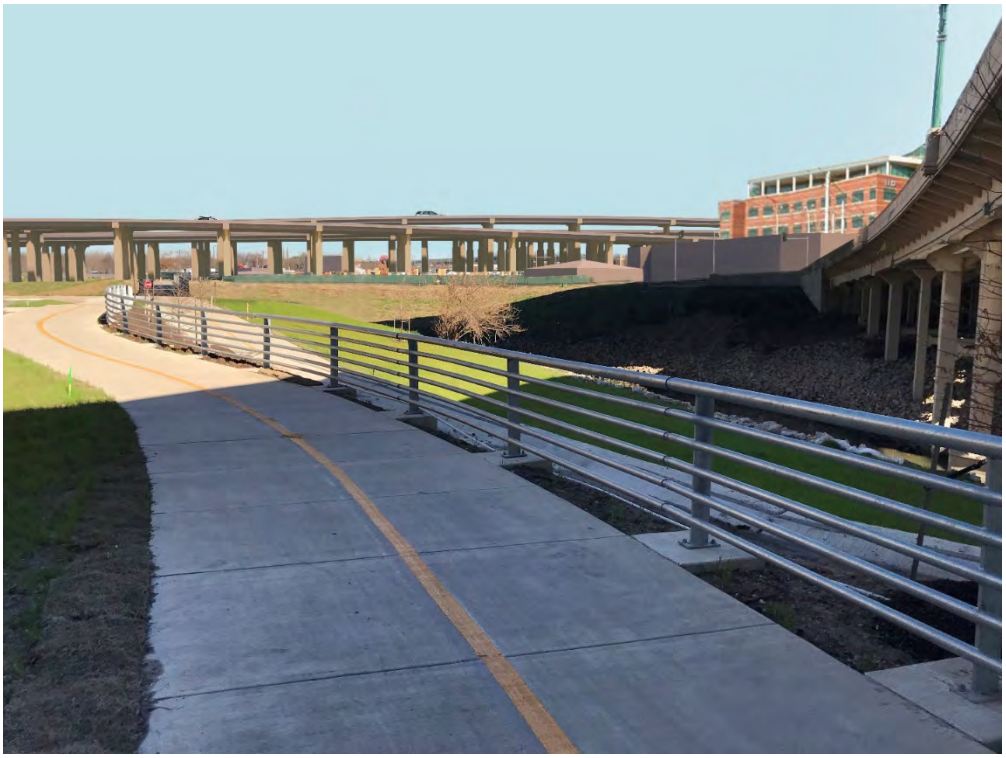
Table 4-4. Visual Impact Summary

LU #	Visual Impact	Existing Viewer Sensitivity	Project Compatibility
1	Neutral	Low	Yes
2	Neutral	Low	Yes
3	Neutral	Moderate	Yes

Figure 3: University of Houston Downtown at Heights Bike Trail – Existing

Source: TxDOT 2018.

Figure 4: University of Houston Downtown at Heights Bike Trail – Proposed NHHIP



Source: TxDOT 2018.
Note: The rendered image above was developed to show the proposed transportation improvements. Landscaping and aesthetic improvements would be determined during detailed design.

Figure 5: White Oak Bayou at Heights Bike Trail – Existing

Source: TxDOT 2018.

Figure 6: White Oak Bayou at Heights Bike Trail – Proposed NHHIP

Source: TxDOT 2018.
Note: The rendered image above was developed to show the proposed transportation improvements. Landscaping and aesthetic improvements would be determined during detailed design.

Figure 7: White Oak Drive east of Freed Art and Nature Park – Existing

Source: TxDOT 2018.

Figure 8: White Oak Drive east of Freed Art and Nature Park – Proposed NHHIP

Source: TxDOT 2018.
Note: The rendered image above was developed to show the proposed transportation improvements. Landscaping and aesthetic improvements would be determined during detailed design.

Figure 9: Hogg Park at White Oak Bayou Greenway Trail – Existing

Source: TxDOT 2018.

Figure 10: Hogg Park at White Oak Bayou Greenway Trail – Proposed NHHIP (130 foot average bridge spans)

Source: TxDOT 2018.

Figure 11: Hogg Park at White Oak Bayou Greenway Trail – Proposed NHHIP (300 foot average bridge spans)

Source: TxDOT 2018.
Note: The rendered images in Figures 10 and 11 were developed to show the proposed transportation improvements. Landscaping and aesthetic improvements would be determined during detailed design.

5 MITIGATION VISUAL AND AESTHETIC QUALITIES

As indicated by FHWA's Guidelines for the Visual Impact Assessment of Highway projects (January 2015), design-related mitigation considerations often occur during the design process rather than during NEPA, but may result from input received on the project during the public involvement process. Additionally, FHWA's regulations prohibit final design activities until the NEPA process is complete. 23 CFR 771.113(a). Some types of specific design elements and specific details regarding design elements cannot be determined until the project enters the final design phase, after completion of the NEPA process. However, certain elements intended to mitigate the visual impacts of the project were considered during the NEPA process, as discussed below.

In developing the Build Alternatives, opportunities to locate transportation and utility corridors together were identified to maximize compatibility with existing aesthetic views. During the Alternatives Analysis, displacements were documented and evaluated to determine the degree of impact to all land uses. Roadway and structural design was developed to be compatible with the surrounding natural and cultural environment in order to minimize visual impacts. TxDOT anticipates continued refinements and improvements to the proposed project and mitigation measures during detailed project design.

Where practicable, mitigation to improve the visual and aesthetic qualities of the project area would include the following features:

- Landscape plantings and re-vegetation per TxDOT's Green Ribbon Landscape Improvement Program, which allocates funds for trees and plants within roadway ROW.
- Promoting roadside native wildflower planting programs.
- Noise barriers which are integrated into the context of the surrounding environment.
- Providing adequate signage and easy access to roadway facilities.
- Treatment of the side surfaces and columns of the project using façade materials of varying texture, color, etc.
- Installing landscaping and maintenance for the detention basins.
- Coordinating with local groups and agencies to accommodate enhancements to standard landscaping and recreation use of open space in and around storm water detention areas, where feasible. Wet bottom storm water detention basins will be considered if a partner entity agrees to maintain them. The detention areas will not be designated as parks as their primary use is for drainage and flood mitigation.
- Miscellaneous aesthetic improvements along Heights Bike Trail between Taylor Street and Main Street will be provided (coordinated by TxDOT with City of Houston, Houston Parks Board and other entities).
- Conducting the design of bridges in the area of the Near Northside neighborhood as a collaboration between the Greater Northside Management District and TxDOT.
- Conducting the design of bridges over Sam Houston Park and Buffalo Bayou as a collaboration between the management districts or neighborhood groups and TxDOT.

The project will be developed under TxDOT's Green Ribbon Program, which allocates funds for trees and plants within roadway ROW. TxDOT will apply the Green Ribbon themes to the proposed project, including landscaping and hardscaping elements. A detailed landscaping plan will be developed as part of the final design process. Landscaping would include regionally native plants for landscaping and implementing design and construction practices that minimize adverse effects on the natural habitat. To the extent possible, the proposed project would be designed to create an aesthetically and visually pleasing experience for both roadway users and roadway viewers.

There are opportunities for aesthetic enhancements under elevated sections of the highways. The Mayor of Houston has appointed a committee to oversee the potential designs and funding options for uses for the open space areas in Segment 3 and TxDOT will consider its recommendations.

All lighting would be in accordance with the Texas Health and Safety Code Title 5 §425.002 regarding light pollution. To the extent possible, outdoor lighting fixtures would only be installed and operated if the purpose of the lighting cannot be achieved by the installation of reflective road markers, lines, warning, or informational signs, or other effective passive methods.

Additionally, full consideration would be given to energy conservation, reduction of glare, minimizing light pollution, and preserving the natural light environment. An example of commonly used lighting meeting these considerations is the use of high-pressure sodium lamps equipped with glare shields.

6 REFERENCES

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Appendix A

Locations of Renderings