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Houston-Galveston Area Council

2023 REGIONAL GOODS MOVEMENT PLAN

FINAL REPORT

Acknowledgements

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Harris County
Houston Airport System
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Port Freeport
Port Houston
Port of Galveston
Trans-Global Solutions, Inc.
TxDOT
Union Pacific
Waller County
Walmart

Stakeholders

Representatives from numerous groups were engaged during the entirety of the study's development. Refer to Chapter 4 and Appendix A for additional information.

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Acronym Reference List

μg/m3	micrograms per cubic meter
AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
ATCMTD	Advanced Transportation and Congestion Management Technologies Deployment
ATRI	American Transportation Research Institute
ATTAIN	Advanced Transportation Technologies and Innovation
ATTIMD	Advanced Transportation Technologies and Innovative Mobility Deployment
BIL	Bipartisan Infrastructure Bill
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Corporation
BRFG	Brazos River Floodgates
CAA	Clean Air Act
CAGR	Compound Annual Growth Rate
CBI	Coordinated Border Infrastructure
CDA	comprehensive development agreements
CFC	Critical Freight Corridor
CMAQ	Congestion Mitigation and Air Quality
CO2	carbon dioxide
CP	Canadian Pacific Railway Limited
CPKC	Canadian Pacific Kansas City
CPNID	Cedar Port Navigation and Improvement District
CRFC	Critical Rural Freight Corridors
CRISI	Consolidated Rail Infrastructure and Safety Improvement Program
CRP	Carbon Reduction Program
CSA	Census Statistical Area

CUFC	Critical Urban Freight Corridors
DERA	Diesel Emissions Reduction Act
DFW	Dallas-Fort Worth
DOT	Department of Transportation
EAA	Economic Adjustment Assistance
EFD	Ellington Airport
EPA	Environmental Protection Agency
FAF 5	Freight Analysis Framework, version 5
FCEV	fuel cell electric vehicle
FHWA	Federal Highway Administration
FLAP	Federal Land Access Program
FMCSA	Federal Motor Carrier Safety Administration
FNTOP	Freight Network Technology and Operations Plan
FWS	U.S. Fish and Wildlife Service
GHFC	Greater Houston Freight Committee
GIWW	Gulf Intracoastal Waterway
GVSR	Galveston Railroad
HART	Houston Area Rail Transformation
HAS	Houston Airport System
HB&T	Houston Belt & Terminal Railway Company
H-GAC	Houston-Galveston Area Council
HM	Hazardous Materials
HOU	William P Hobby Airport
HSIP	Highway Safety Improvement Plan
IAH	George Bush Intercontinental Airport
IIJA	Infrastructure Investment and Jobs Act
INFRA	National Significant Multimodal Freight and Highway Projects

ITS	Intelligent Transportation Systems
KCS	Kansas City Railway Company
KCSM	Kansas City Southern de Mexico
LNG	Liquid Natural Gas
LPG	Liquid Petroleum Gas
MCDA	multi-criteria decision analysis
mph	miles per hour
NHFN	National Highway Freight Network
MPO	Metropolitan Planning Organization
MPP	Metropolitan Planning Program
NAAQS	National Ambient Air Quality Standards
NAFTA	North American Free Trade Agreement
NHFP	National Highway Freight Program
NHMRR	National Hazardous Materials Route Registry
NHPP	National Highway Performance Program
NHS	National Highway System
NHTSA	National Highway Traffic Safety Administration
NOx	nitrogen oxides
NPS	National Park Service
NRHM	non-radioactive hazardous materials
OD	Origin-Destination
OSOW	oversize and overweight
PEL	Planning and Environmental Linkage
PHFS	Primary Highway Freight System
PIDP	Port Infrastructure Development Program
PM2.5	fine particles
PM NAAQS	National Ambient Air Quality Standards for Particulate Matter

PPP	Public-Private Partnerships
PROTECT	Promoting Resilient Operations for Transformative, Efficient and Cost Saving Transportation
PTI	Planning Time Index
PTRA	Port Terminal Railroad Association
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
RCE	Railroad Crossing Elimination Program
REAL	Regional Express Access Lanes
RGMP	Regional Goods Movement Plan
RITIS	Regional Integrated Transportation Information System
RRIF	Railroad Rehabilitation and Improvement Financing
RTP	Regional Transportation Plan
SH	State Highway
SMART	Strengthening Mobility and Revolutionizing Transportation
SP	Southern Pacific Railroad
STBG	Surface Transportation Block Grant Program
TAZ	Traffic Analysis Zones
TCEQ	Texas Commission on Environmental Quality
TCT	Texas City Terminal Railway
TEU	Twenty-foot Equivalent Unit
THFN	Texas Highway Freight Network
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TPWD	Texas Park and Wildlife Department
TSMO	Transportation System Management and Operations
TTI	Texas A&M Transportation Institute
TxDOT	Texas Department of Transportation

SHSP	strategic highway safety plan
UP	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USFS	USDA Forest Service
UTP	Unified Transportation Plan
VMT	vehicle-miles of travel
VOCs	volatile organic compounds
ZEV	Zero Emission Vehicles

Executive Summary

The Houston Region hosts the 1st, 16th, 20th and 46th ranked ports in the nation; the nation's 19th busiest air cargo airport; highways with over 20,000 trucks per day; 180 pipeline systems; and approximately 2,200 trains per week operating within the Houston Region rail network. This multimodal freight network is a key enabler for the regions' industries, businesses and residents that rely on the movement of goods and commodities, and the jobs and livelihoods supported by freight movement. However, this vast scale of freight activity has significant impacts upon the regional population including a disproportionate number of crashes involving large trucks (17.6 percent), delays and frustration associated with blocked rail crossings and congested highways, with 10 of the nation's Top 100 truck bottlenecks located within the region according to the American Transportation Research Institute (ATRI, 2021). Other impacts include emissions from freight transportation and freight facilities, with heavy trucks producing 54 percent of the region's nitrogen oxides (NOx) emissions associated with on-road transportation emission sources, contributing to the region's non-attainment status for ground level ozone.

The 2023 Regional Goods Movement Plan (RGMP) has analyzed commodity flow data to identify existing and future freight flows. Based on Transearch data, 882 million tons of freight were carried on the Houston-Galveston Area Council's (H-GAC) transportation network in 2019 with a value of $821 billion. The highest share of freight tonnage in the region was carried on the highway network with 401 million tons (45 percent share by weight), with water tonnage following with 340 million tons (39 percent share by weight). Rail accounted for 113 million tons (13 percent share by weight) with pipeline and air following. Domestic moves from and to the H-GAC Region represent the highest share of tons (476 million) in 2019 and are projected to grow annually at 2.3 percent by 2050. Exports totaled 290 million tons in 2019 and are projected to grow to 452 million tons in 2050; imports totaled 116 million tons in 2019 and are projected to grow to 238 million tons in 2050. Trucks will remain the dominant mode share, transporting 933 million tons in 2050. This equates to over 58 million truck trips in 2050, doubling from the 25 million truck trips in 2019. Addressing growth will be a key need for the region, requiring new and upgraded freight-related infrastructure, adopting new freight-related technologies and approaches to freight-related bottlenecks, as well as developing policies and programs to expand capacity across all freight modes and manage demand while addressing freight-related externalities.

The Regional Goods Movement Plan outcomes are as follows:

Designation of a H-GAC Highway Freight Network. Multiple freight-important highways in the region are already designated as part of the National Highway Freight Network (NHFN) (comprising 387 miles) and the Texas Highway Freight Network (THFN) (1,689 miles). However, these networks did not identify all the region's freight-important highways, especially the first and last mile connectors. Using stakeholder input, land use analysis, truck counts and truck delay data, a series of highways (517 miles) were identified and included in the definition of the H-GAC Freight Network. See **Figure ES-1**. This designation will assist in planning future projects and implement policies and programs to mitigate the impact of freight on neighboring communities.

Categorization of 2045 Regional Transportation Plan projects. Projects from the 2045 Regional Transportation Plan (RTP) located in the NHFN, Texas Department of Transportation (TxDOT) or H-GAC Freight Networks were categorized using a multi-criteria decision analysis (MCDA) approach based on quantitative measures to identify the type of regional freight network needs that each project is trying to address. The type of needs is identified based on the goals that represent the outcomes the RTP aspires to achieve. The identification of the criteria to be used relied on input from both the Steering Committee and the Stakeholder Forum for this project. Members of these groups were asked to rank the study's five goals: safety, move people and goods efficiently, economic competitiveness, state of good repair and protect natural resources. The ranking provided by these groups was used to assign weights for each of the five goals that serve as the criteria in the categorization process

Of the 346 projects evaluated, 116 projects are identified as addressing high needs, 115 projects address medium needs and 115 projects address low needs. Stakeholders have identified additional locations with high and medium needs that do not currently have projects to alleviate them. Due to the date in which the 2045 RTP was released, there could be projects that address high or medium needs, but were developed after the creation of the 2045 RTP. These projects were not considered as part of the quantitative categorization process presented here. The study suggests these projects be added to the next RTP.

Of the 116 projects in the high-needs category: 12 are located on I-10; 22 on I-45; 13 on I-610; and, 14 are on State Highway (SH) 99. See **Figure ES-2** and **Figure ES-3**.

Intelligent Transportation Systems for Freight Applications. H-GAC will play a significant role in the planning of corridors for successful accommodation of freight technology solutions, securing federal and state funding for dedicated technology projects, and ensuring technologies are included on all MPO projects through the systems engineering process. The Houston Region already has several technology deployments and projects under development that require continued support and expansion in addition to discovering new projects or programs. Intelligent Transportation Systems (ITS) recommendations include:

- Identify a Freight Technology Representative within the H-GAC TSMO Subcommittee
- Ensure Freight Technology Service Packages during the Regional ITS Architecture update reflect emerging needs of the private industry
- Develop plan to provide Freight Industry with real-time information from Houston Regional Traffic Signal Map
- Evaluate H-GAC Critical Regional Freight Corridors Map and prioritize locations for early-stage deployments of Smart Freight Connector strategies within the statewide Freight Network Technology and Operations Plan (FNTOP)
- Coordinate with Private Sector Autonomous Trucking Companies that have piloted hauls within the Greater Houston Region, and identify specific corridor needs to enhance operations
- Develop resource plan for Regional Operation, Management and Maintenance of Technologies for freight applications

Polices and Programs. Key recommendations associated with the private and public sectors that target a wide range of policies and programs could be adopted to address safety; congestion; emissions; and residential and community impacts from freight activity. These include:

- Safety Policies and Programs
    - Integrate truck safety initiatives into local and regional Vision Zero and Safety Plans
    - Establish a Regional Truck Safety Task Force, given the region accounts for 17.6 percent of all crashes in the state involving large trucks, 11.9 percent of the number of large trucks involved in fatal crashes in the state and 21 percent of the state's hazardous materials crashes involving large trucks
    - Increase the number of truck parking spaces in the region to ensure truck drivers have adequate rest facilities
    - Update the National Hazardous Materials Route Registry
    - Increase uptake of truck safety equipment not mandated by federal regulations, such as sideguards and hi-vision truck cabs
- Congestion-Related Policies and Programs
    - Encourage more off-peak truck activity
    - Implement a Port Transportation Optimization and Efficiency Task Force/Working Group to lead the implementation of strategies including off-hour acceptance of containers at import warehouses, better efficiency of container movements including street-turns/matchbacks, and other multi-modal solutions to reduce the number of trucks serving port facilities
- Railroad crossings with a high truck count and impact on truck journey times are identified and afforded some form of priority within the Houston Area Rail Transformation program
- Emission-Related Policies and Programs
    - Reduce emissions from equipment in freight facilities such as ports, rail yards and warehouses
    - Reduce emissions from older trucks, which are unlikely to have modern pollution abatement equipment such as particulate filters
    - Increase the number of zero-emission freight-related vehicles operating in the region and maximize Houston's expertise in hydrogen to support fuel cell electric vehicle (FCEV) adoption
- Mitigating Residential and Community Impacts
    - Develop a regional truck route map
    - Mitigate residential impacts focusing on LaPorte, Seabrook, Baytown, Mont Belvieu, Deer Park and Pasadena

The Key Deliverables on this project are listed in **Table ES -1** below.

Table ES-1:

Key Project Deliverables

DELIVERABLE	REFERENCE IN THE REPORT	MAP/TABLE REFERENCES
ArcGIS storyboards for regional freight data	Chapter 2	H-GAC website
Origin-Destination Tableau Dashboard	Chapter 3	H-GAC website
Freight Commodity Tableau Dashboard	Chapter 5	H-GAC website
H-GAC Freight Network	Chapter 6 - Section 6.1	Figure 6-38 and Appendix C
Critical Urban Freight Corridors	Chapter 6 - Section 6.2	Figure 6-39 and Appendix C
2045 RTP Project Categorization	Chapter 6 -Sections 6.3 and 6.4	Figures 6-43 to 6-48 and Appendix C
Future RTP Considerations	Chapter 6 -Section 6.4	Figures 6-49 to 6-50 and Appendix C
Intelligent Transportation System Considerations	Chapter 6 -Section 6.5	Table 6-13
Policy Considerations	Chapter 6 -Section 6.6	Not Applicable
Spreadsheet based reusable project categorization tool	Chapter 6 -Sections 6.3 and 6.4	Appendix D – User Guide

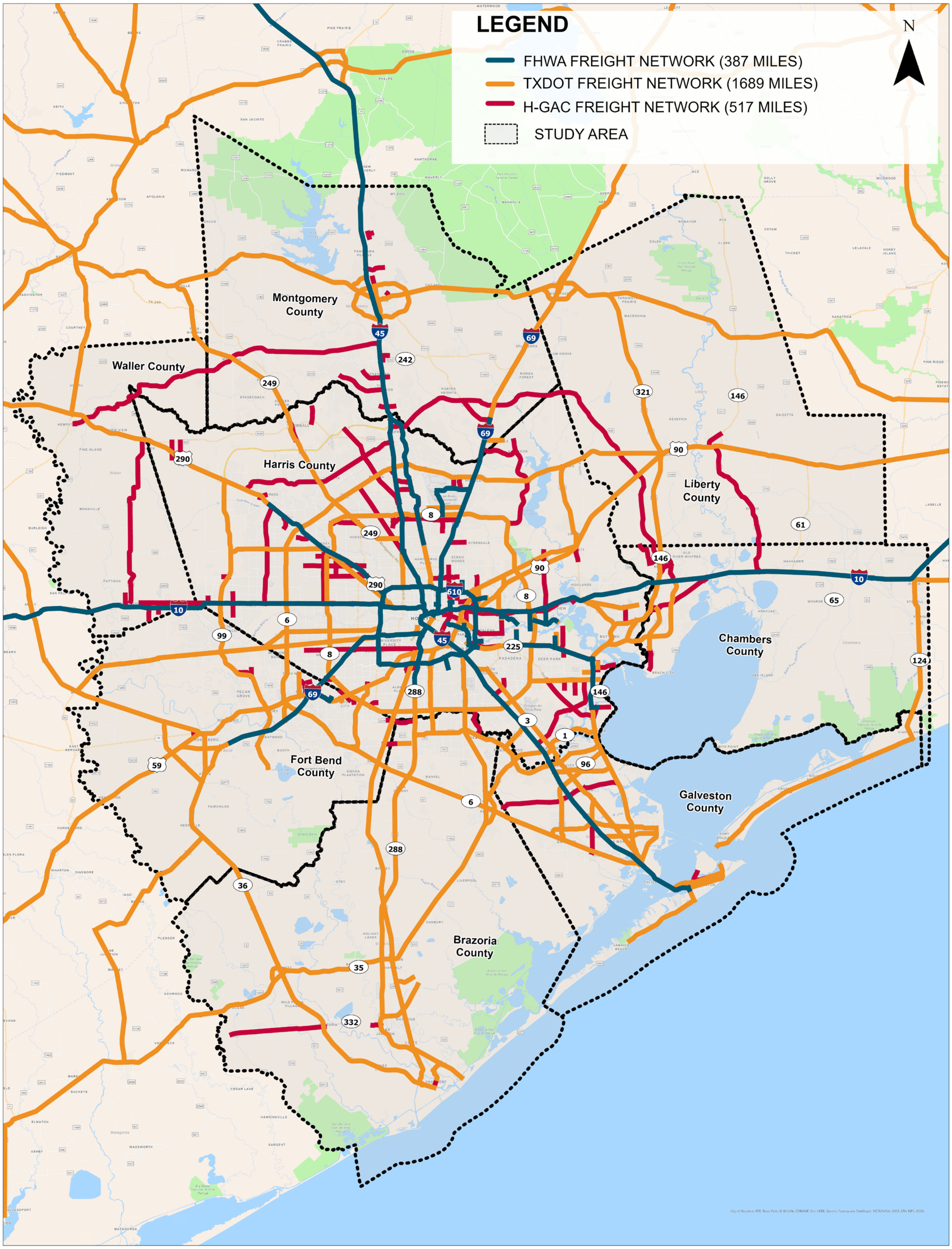
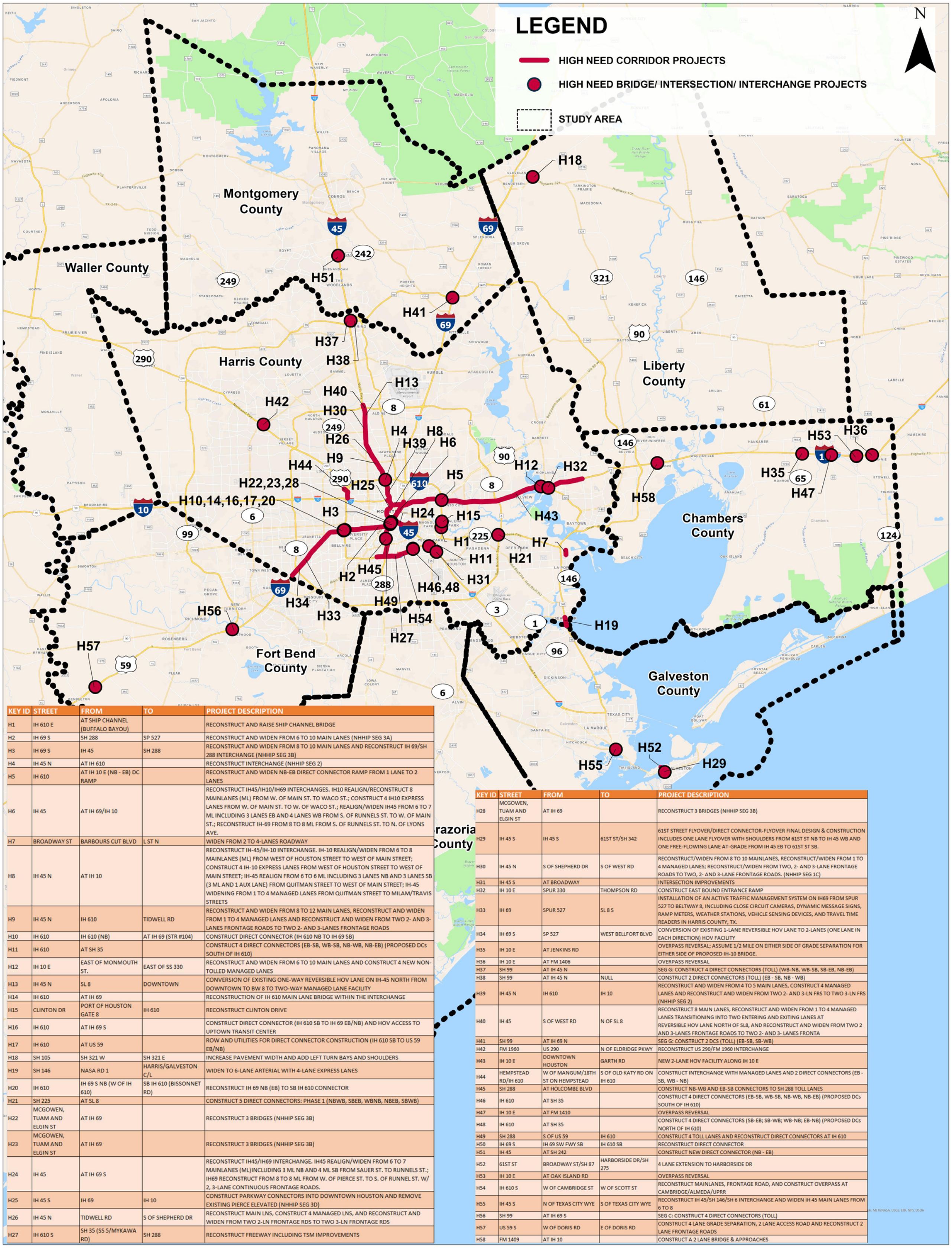


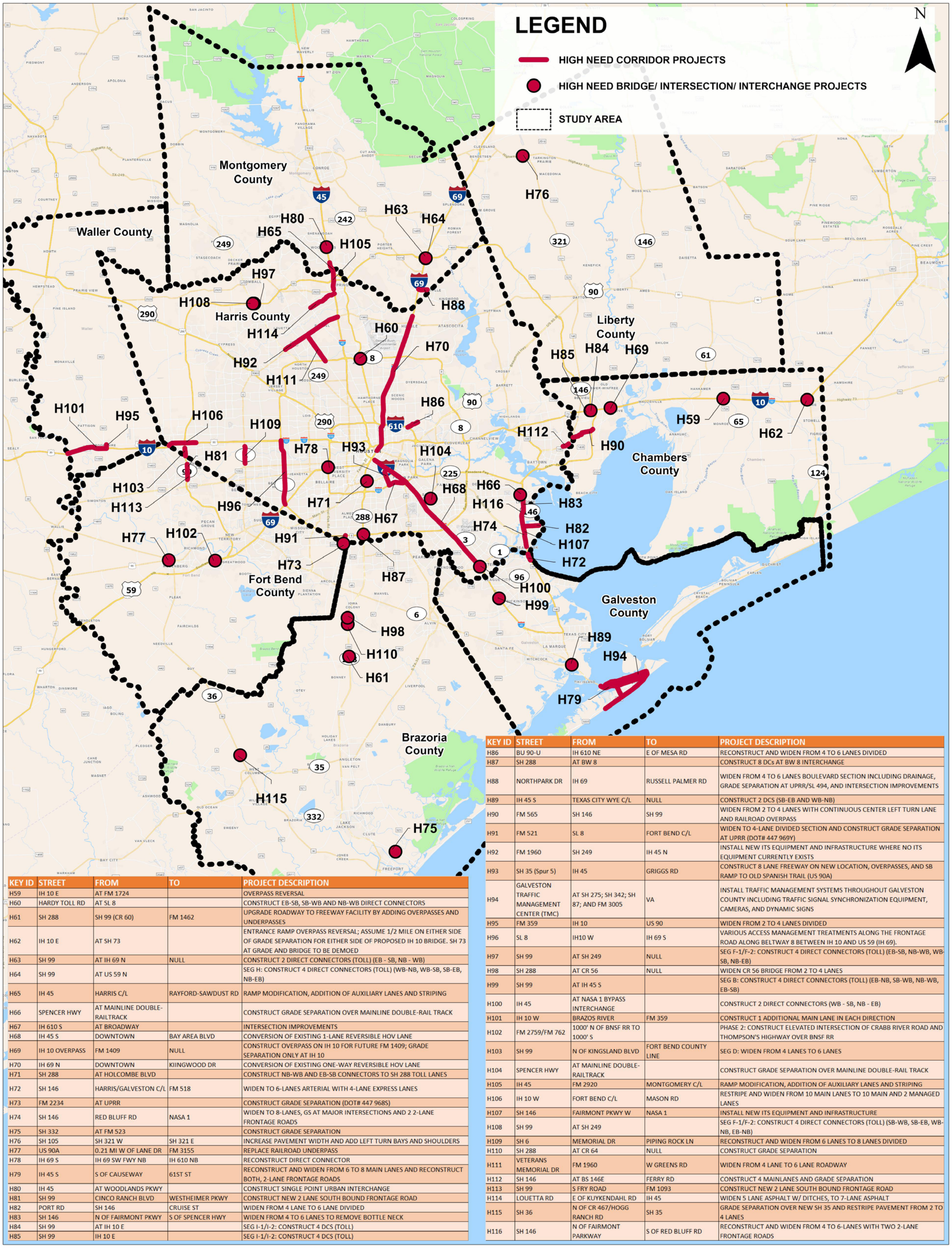
Figure ES-1: Combined Map of FHWA, TxDOT and H-GAC Freight Networks



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H1	IH 610 E	AT SHIP CHANNEL (BUFFALO BAYOU)		RECONSTRUCT AND RAISE SHIP CHANNEL BRIDGE
H2	IH 69 S	SH 288	SP 527	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES (NHHIP SEG 3A)
H3	IH 69 S	IH 45	SH 288	RECONSTRUCT AND WIDEN FROM 8 TO 10 MAIN LANES AND RECONSTRUCT IH 69/SH 288 INTERCHANGE (NHHIP SEG 3B)
H4	IH 45 N	AT IH 610		RECONSTRUCT INTERCHANGE (NHHIP SEG 2)
H5	IH 610	AT IH 10 E (NB - EB) DC RAMP		RECONSTRUCT AND WIDEN NB-EB DIRECT CONNECTOR RAMP FROM 1 LANE TO 2 LANES
H6	IH 45	AT IH 69/IH 10		RECONSTRUCT IH45/IH10/IH69 INTERCHANGES. IH10 REALIGN/RECONSTRUCT 8 MAINLANES (ML) FROM W. OF MAIN ST. TO WACO ST.; CONSTRUCT 4 IH10 EXPRESS LANES FROM W. OF MAIN ST. TO W. OF WACO ST.; REALIGN/WIDEN IH45 FROM 6 TO 7 ML INCLUDING 3 LANES EB AND 4 LANES WB FROM S. OF RUNNELS ST. TO W. OF MAIN ST.; RECONSTRUCT IH-69 FROM 8 TO 8 ML FROM S. OF RUNNELS ST. TO N. OF LYONS AVE.
H7	BROADWAY ST	BARBOURS CUT BLVD	L ST N	WIDEN FROM 2 TO 4-LANES ROADWAY
H8	IH 45 N	AT IH 10		RECONSTRUCT IH-45/IH-10 INTERCHANGE. IH-10 REALIGN/WIDEN FROM 6 TO 8 MAINLANES (ML) FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; CONSTRUCT 4 IH-10 EXPRESS LANES FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; IH-45 REALIGN FROM 6 TO 6 ML INCLUDING 3 LANES NB AND 3 LANES SB (3 ML AND 1 AUX LANE) FROM QUITMAN STREET TO WEST OF MAIN STREET; IH-45 WIDENING FROM 1 TO 4 MANAGED LANES FROM QUITMAN STREET TO MILAM/TRAVIS STREETS
H9	IH 45 N	IH 610	TIDWELL RD	RECONSTRUCT AND WIDEN FROM 8 TO 12 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3-LANES FRONTAGE ROADS
H10	IH 610	IH 610 (NB)	AT IH 69 (STR #104)	CONSTRUCT DIRECT CONNECTOR (IH 610 NB TO IH 69 SB)
H11	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)
H12	IH 10 E	EAST OF MONMOUTH ST.	EAST OF SS 330	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES AND CONSTRUCT 4 NEW NON-TOLLED MANAGED LANES
H13	IH 45 N	SL 8	DOWNTOWN	CONVERSION OF EXISTING ONE-WAY REVERSIBLE HOV LANE ON IH-45 NORTH FROM DOWNTOWN TO BW 8 TO TWO-WAY MANAGED LANE FACILITY
H14	IH 610	AT IH 69		RECONSTRUCTION OF IH 610 MAIN LANE BRIDGE WITHIN THE INTERCHANGE
H15	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE
H16	IH 610	AT IH 69 S		CONSTRUCT DIRECT CONNECTOR (IH 610 SB TO IH 69 EB/NB) AND HOV ACCESS TO UPTOWN TRANSIT CENTER
H17	IH 610	AT US 59		ROW AND UTILITIES FOR DIRECT CONNECTOR CONSTRUCTION (IH 610 SB TO US 59 EB/NB)
H18	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS
H19	SH 146	NASA RD 1	HARRIS/GALVESTON C/L	WIDEN TO 6-LANE ARTERIAL WITH 4-LANE EXPRESS LANES
H20	IH 610	IH 69 S NB (W OF IH 610)	SB IH 610 (BISSONNET RD)	RECONSTRUCT IH 69 NB (EB) TO SB IH 610 CONNECTOR
H21	SH 225	AT SL 8		CONSTRUCT 5 DIRECT CONNECTORS: PHASE 1 (NBWB, SBEB, WBNB, NBEB, SBWB)
H22	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H23	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H24	IH 45	AT IH 69 S		RECONSTRUCT IH45/IH69 INTERCHANGE. IH45 REALIGN/WIDEN FROM 6 TO 7 MAINLANES (ML)INCLUDING 3 ML NB AND 4 ML SB FROM SAUER ST. TO RUNNELS ST.; IH69 RECONSTRUCT FROM 8 TO 8 ML FROM W. OF PIERCE ST. TO S. OF RUNNEL ST. W/ 2, 3-LANE CONTINUOUS FRONTAGE ROADS.
H25	IH 45 S	IH 69	IH 10	CONSTRUCT PARKWAY CONNECTORS INTO DOWNTOWN HOUSTON AND REMOVE EXISTING PIERCE ELEVATED (NHHIP SEG 3D)
H26	IH 45 N	TIDWELL RD	S OF SHEPHERD DR	RECONSTRUCT MAIN LNS, CONSTRUCT 4 MANAGED LNS, AND RECONSTRUCT AND WIDEN FROM TWO 2-LN FRONTAGE RDS TO TWO 3-LN FRONTAGE RDS
H27	IH 610 S	SH 35 (SS 5/MYKAWA RD)	SH 288	RECONSTRUCT FREEWAY INCLUDING TSM IMPROVEMENTS

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H28	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H29	IH 45 S	IH 45 S	61ST ST/SH 342	61ST STREET FLYOVER/DIRECT CONNECTOR-FLYOVER FINAL DESIGN & CONSTRUCTION INCLUDES ONE LANE FLYOVER WITH SHOULDERS FROM 61ST ST NB TO IH 45 WB AND ONE FREE-FLOWING LANE AT-GRADE FROM IH 45 EB TO 61ST ST SB.
H30	IH 45 N	S OF SHEPHERD DR	S OF WEST RD	RECONSTRUCT/WIDEN FROM 8 TO 10 MAINLANES, RECONSTRUCT/WIDEN FROM 1 TO 4 MANAGED LANES; RECONSTRUCT/WIDEN FROM TWO, 2- AND 3-LANE FRONTAGE ROADS TO TWO, 2- AND 3-LANE FRONTAGE ROADS. (NHHIP SEG 1C)
H31	IH 45 S	AT BROADWAY		INTERSECTION IMPROVEMENTS
H32	IH 10 E	SPUR 330	THOMPSON RD	CONSTRUCT EAST BOUND ENTRANCE RAMP
H33	IH 69	SPUR 527	SL 8 S	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON IH69 FROM SPUR 527 TO BELTWAY 8, INCLUDING CLOSE CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, RAMP METERS, WEATHER STATIONS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN HARRIS COUNTY, TX.
H34	IH 69 S	SP 527	WEST BELLFORT BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE TO 2-LANES (ONE LANE IN EACH DIRECTION) HOV FACILITY
H35	IH 10 E	AT JENKINS RD		OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH-10 BRIDGE.
H36	IH 10 E	AT FM 1406		OVERPASS REVERSAL
H37	SH 99	AT IH 45 N		SEG G: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)
H38	SH 99	AT IH 45 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)
H39	IH 45 N	IH 610	IH 10	RECONSTRUCT AND WIDEN FROM 4 TO 5 MAIN LANES, CONSTRUCT 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LN FRS TO TWO 3-LN FRS (NHHIP SEG 2)
H40	IH 45	S OF WEST RD	N OF SL 8	RECONSTRUCT 8 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES TRANSITIONING INTO TWO ENTERING AND EXITING LANES AT REVERSIBLE HOV LANE NORTH OF SL8, AND RECONSTRUCT AND WIDEN FROM TWO 2 AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3- LANES FRONTA
H41	SH 99	AT IH 69 N		SEG G: CONSTRUCT 2 DCS (TOLL) (EB-SB, SB-WB)
H42	FM 1960	US 290	N OF ELDRIDGE PKWY	RECONSTRUCT US 290/FM 1960 INTERCHANGE
H43	IH 10 E	DOWNTOWN HOUSTON	GARTH RD	NEW 2-LANE HOV FACILITY ALONG IH 10 E
H44	HEMPSTEAD RD/IH 610	W OF MANGUM/18TH ST ON HEMPSTEAD	S OF OLD KATY RD ON IH 610	CONSTRUCT INTERCHANGE WITH MANAGED LANES AND 2 DIRECT CONNECTORS (EB - SB, WB - NB)
H45	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES
H46	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)
H47	IH 10 E	AT FM 1410		OVERPASS REVERSAL
H48	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (SB-EB; SB-WB; WB-NB; EB-NB) (PROPOSED DCs NORTH OF IH 610)
H49	SH 288	S OF US 59	IH 610	CONSTRUCT 4 TOLL LANES AND RECONSTRUCT DIRECT CONNECTORS AT IH 610
H50	IH 69 S	IH 69 SW FWY SB	IH 610 SB	RECONSTRUCT DIRECT CONNECTOR
H51	IH 45	AT SH 242		CONSTRUCT NEW DIRECT CONNECTOR (NB - EB)
H52	61ST ST	BROADWAY ST/SH 87	HARBORSIDE DR/SH 275	4 LANE EXTENSION TO HARBORSIDE DR
H53	IH 10 E	AT OAK ISLAND RD		OVERPASS REVERSAL
H54	IH 610 S	W OF CAMBRIDGE ST	W OF SCOTT ST	RECONSTRUCT MAINLANES, FRONTAGE ROAD, AND CONSTRUCT OVERPASS AT CAMBRIDGE/ALMEDA/UPRR
H55	IH 45 S	N OF TEXAS CITY WYE	S OF TEXAS CITY WYE	RECONSTRUCT IH 45/SH 146/SH 6 INTERCHANGE AND WIDEN IH 45 MAIN LANES FROM 6 TO 8
H56	SH 99	AT IH 69 S		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)
H57	US 59 S	W OF DORIS RD	E OF DORIS RD	CONSTRUCT 4 LANE GRADE SEPARATION, 2 LANE ACCESS ROAD AND RECONSTRUCT 2 LANE FRONTAGE ROADS
H58	FM 1409	AT IH 10		CONSTRUCT A 2 LANE BRIDGE & APPROACHES

Figure ES-2: RTP Projects Categorized as High Needs (Map 1 of 2)



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H59	IH 10 E	AT FM 1724		OVERPASS REVERSAL
H60	HARDY TOLL RD	AT SL 8		CONSTRUCT EB-SB, SB-WB AND NB-WB DIRECT CONNECTORS
H61	SH 288	SH 99 (CR 60)	FM 1462	UPGRADE ROADWAY TO FREEWAY FACILITY BY ADDING OVERPASSES AND UNDERPASSES
H62	IH 10 E	AT SH 73		ENTRANCE RAMP OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH 10 BRIDGE. SH 73 AT GRADE AND BRIDGE TO BE DEMOED
H63	SH 99	AT IH 69 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)
H64	SH 99	AT US 59 N		SEG H: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)
H65	IH 45	HARRIS C/L	RAYFORD-SAWDUST RD	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING
H66	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
H67	IH 610 S	AT BROADWAY		INTERSECTION IMPROVEMENTS
H68	IH 45 S	DOWNTOWN	BAY AREA BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE
H69	IH 10 OVERPASS	FM 1409	NULL	CONSTRUCT OVERPASS ON IH 10 FOR FUTURE FM 1409; GRADE SEPARATION ONLY AT IH 10
H70	IH 69 N	DOWNTOWN	KIINGWOOD DR	CONVERSION OF EXISTING ONE-WAY REVERSIBLE HOV LANE
H71	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES
H72	SH 146	HARRIS/GALVESTON C/L	FM 518	WIDEN TO 6-LANES ARTERIAL WITH 4-LANE EXPRESS LANES
H73	FM 2234	AT UPRR		CONSTRUCT GRADE SEPARATION (DOT# 447 968S)
H74	SH 146	RED BLUFF RD	NASA 1	WIDEN TO 8-LANES, GS AT MAJOR INTERSECTIONS AND 2 2-LANE FRONTAGE ROADS
H75	SH 332	AT FM 523		CONSTRUCT GRADE SEPARATION
H76	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS
H77	US 90A	0.21 MI W OF LANE DR	FM 3155	REPLACE RAILROAD UNDERPASS
H78	IH 69 S	IH 69 SW FWY NB	IH 610 NB	RECONSTRUCT DIRECT CONNECTOR
H79	IH 45 S	S OF CAUSEWAY	61ST ST	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT BOTH, 2-LANE FRONTAGE ROADS
H80	IH 45	AT WOODLANDS PKWY		CONSTRUCT SINGLE POINT URBAN INTERCHANGE
H81	SH 99	CINCO RANCH BLVD	WESTHEIMER PKWY	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
H82	PORT RD	SH 146	CRUISE ST	WIDEN FROM 4 LANE TO 6 LANE DIVIDED
H83	SH 146	N OF FAIRMONT PKWY	S OF SPENCER HWY	WIDEN FROM 4 TO 6 LANES TO REMOVE BOTTLE NECK
H84	SH 99	AT IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)
H85	SH 99	IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H86	BU 90-U	IH 610 NE	E OF MESA RD	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES DIVIDED
H87	SH 288	AT BW 8		CONSTRUCT 8 DCs AT BW 8 INTERCHANGE
H88	NORTHPARK DR	IH 69	RUSSELL PALMER RD	WIDEN FROM 4 TO 6 LANES BOULEVARD SECTION INCLUDING DRAINAGE, GRADE SEPARATION AT UPRR/SL 494, AND INTERSECTION IMPROVEMENTS
H89	IH 45 S	TEXAS CITY WYE C/L	NULL	CONSTRUCT 2 DCS (SB-EB AND WB-NB)
H90	FM 565	SH 146	SH 99	WIDEN FROM 2 TO 4 LANES WITH CONTINUOUS CENTER LEFT TURN LANE AND RAILROAD OVERPASS
H91	FM 521	SL 8	FORT BEND C/L	WIDEN TO 4-LANE DIVIDED SECTION AND CONSTRUCT GRADE SEPARATION AT UPRR (DOT# 447 969Y)
H92	FM 1960	SH 249	IH 45 N	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE WHERE NO ITS EQUIPMENT CURRENTLY EXISTS
H93	SH 35 (Spur 5)	IH 45	GRIGGS RD	CONSTRUCT 8 LANE FREEWAY ON NEW LOCATION, OVERPASSES, AND SB RAMP TO OLD SPANISH TRAIL (US 90A)
H94	GALVESTON TRAFFIC MANAGEMENT CENTER (TMC)	AT SH 275; SH 342; SH 87; AND FM 3005	VA	INSTALL TRAFFIC MANAGEMENT SYSTEMS THROUGHOUT GALVESTON COUNTY INCLUDING TRAFFIC SIGNAL SYNCHRONIZATION EQUIPMENT, CAMERAS, AND DYNAMIC SIGNS
H95	FM 359	IH 10	US 90	WIDEN FROM 2 TO 4 LANES DIVIDED
H96	SL 8	IH10 W	IH 69 S	VARIOUS ACCESS MANAGEMENT TREATMENTS ALONG THE FRONTAGE ROAD ALONG BELTWAY 8 BETWEEN IH 10 AND US 59 (IH 69).
H97	SH 99	AT SH 249	NULL	SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-SB, NB-WB, WB-SB, NB-EB)
H98	SH 288	AT CR 56	NULL	WIDEN CR 56 BRIDGE FROM 2 TO 4 LANES
H99	SH 99	AT IH 45 S		SEG B: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-NB, SB-WB, NB-WB, EB-SB)
H100	IH 45	AT NASA 1 BYPASS INTERCHANGE		CONSTRUCT 2 DIRECT CONNECTORS (WB - SB, NB - EB)
H101	IH 10 W	BRAZOS RIVER	FM 359	CONSTRUCT 1 ADDITIONAL MAIN LANE IN EACH DIRECTION
H102	FM 2759/FM 762	1000' N OF BNSF RR TO 1000' S		PHASE 2: CONSTRUCT ELEVATED INTERSECTION OF CRABB RIVER ROAD AND THOMPSON'S HIGHWAY OVER BNSF RR
H103	SH 99	N OF KINGSLAND BLVD	FORT BEND COUNTY LINE	SEG D: WIDEN FROM 4 LANES TO 6 LANES
H104	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
H105	IH 45	FM 2920	MONTGOMERY C/L	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING
H106	IH 10 W	FORT BEND C/L	MASON RD	RESTRIPE AND WIDEN FROM 10 MAIN LANES TO 10 MAIN AND 2 MANAGED LANES
H107	SH 146	FAIRMONT PKWY W	NASA 1	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
H108	SH 99	AT SH 249		SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB, SB-EB, WB-NB, EB-NB)
H109	SH 6	MEMORIAL DR	PIPING ROCK LN	RECONSTRUCT AND WIDEN FROM 6 LANES TO 8 LANES DIVIDED
H110	SH 288	AT CR 64	NULL	CONSTRUCT GRADE SEPARATION
H111	VETERANS MEMORIAL DR	FM 1960	W GREENS RD	WIDEN FROM 4 LANE TO 6 LANE ROADWAY
H112	SH 146	AT BS 146E	FERRY RD	CONSTRUCT 4 MAINLANES AND GRADE SEPARATION
H113	SH 99	S FRY ROAD	FM 1093	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
H114	LOUETTA RD	E OF KUYKENDAHL RD	IH 45	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT
H115	SH 36	N OF CR 467/HOGG RANCH RD	SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4 LANES
H116	SH 146	N OF FAIRMONT PARKWAY	S OF RED BLUFF RD	RECONSTRUCT AND WIDEN FROM 4 TO 6-LANES WITH TWO 2-LANE FRONTAGE ROADS

Figure ES-3: RTP Projects Categorized as High Needs (Map 2 of 2)

1. Chapter 1 – Introduction and Overview of the Houston Region Multi-Modal Freight Network

H-GAC is the regional organization through which local governments consider issues and cooperate in solving area-wide problems. Agency programs emphasize local government concerns, such as transportation, air and water quality, criminal justice, demographic analysis, mapping programs, and intergovernmental purchasing. H-GAC also serves its citizens through workforce development programs, services to the aging and elderly, and small business finance programs.

The Houston Galveston Area eight county region has one of the fastest growing economic sectors in the United States. Moving forward, freight tonnage is expected to grow at 2.1 percent annually until 2050 to a total of 1.7 billion tons. For the region to maintain its economic competitiveness, it must support a growing demand for goods moving from, to and thorough the region. Goods movement includes a wide array of activities to ensure raw materials and parts can efficiently get to producers and products from producers to consumers. Goods movement in the region is multimodal, with goods traveling by water, air, highways, rail and in pipelines. However, freight movement does produce externalities including emissions, crashes and wear and tear on infrastructure.

This Regional Goods Movement Plan serves as a framework that supports the region's economic activity through efficient, safe, connected freight movement, at the same time addressing the externalities associated with freight transportation. It builds upon and complements previous freight studies and plans, including the 2013 Regional Goods Movement Plan and the Ports Area Mobility Study. This plan identifies actionable, operational, logistical and technological policies, programs and projects that improve goods movement, leverage private and public investment, and furthers the goals outlined in the Regional Transportation Plan.

The Houston Region's freight network is made up of multiple modes of freight transport that often interface with each other to move goods, cargoes, and commodities to, from, within and through the region. This chapter identifies the main components of the region's multi-modal freight network.

1.1 Air Cargo

The region hosts three airports accommodating air cargo movement. These airports are:

- George Bush Intercontinental Airport (IAH)
- William P Hobby Airport (HOU)
- Ellington Airport (EFD)

These three airports are managed by the Houston Airport System (HAS). In 2021, the region's airports handled just over 1.2 billion pounds of mail and cargo. IAH accommodated 98 percent of the region's tonnage and HOU accommodated 2 percent. EFD handled minimal cargoes.

Air cargo can be transported using several methods. These include:

- Belly cargo on passenger aircraft – A wide-body passenger aircraft such as a Boeing 777 may carry 33,000 pounds of cargo, whereas a smaller Boeing 737 carries 5,500 pounds. Many passenger airlines serving the region's airports carry cargo, forming an important revenue stream for these carriers.
- Freighter aircraft, such as those operated by carriers FedEx and UPS – Some freighter aircraft can carry 300,000 pounds of cargo and are designed especially for the movement of outsize and heavy-item cargo, which is important for the region's industrial sector.
- Trucking between airports – where trucks carry cargo instead of aircraft. This is typically used for domestic movements when cargo capacity is limited due to aircraft size.

IAH facilitates the movement of air cargo with all the above methods. In October 2022, cargo carried by freighter aircraft amounted to 63 percent of the airport's volume, mostly carried by freighter operators FedEx, UPS and DHL. Domestic cargo accounted for 63 percent of freight and mail at the airport. United Airlines, the largest airline at IAH carried 20 percent of the airport's cargo.[1] In 2020, the airport was ranked 19th in the nation and 2nd in Texas in terms of all cargo landed weight.[2] Air cargo facilities at the airport include two air cargo centers – the original Central Cargo Facility accommodating FedEx and United Airlines, and a 120-acre facility located on the east side of the airport with multiple air cargo centers and aprons capable of accommodating parking for 20 wide-body aircraft.

HOU is focused on passenger aircraft cargo, predominantly cargo carried by Southwest Airlines. Cargo tonnage is evenly split with arriving cargo accounting for 51 percent of tonnage and departing cargo 49 percent.[3] EFD handles very small volumes of air cargo and does not have any frequent or regular air cargo services, despite it having a 9,000-foot-long runway that can accommodate most freighter aircraft. Other airports and airfields in the region may also handle small volume, ad hoc and infrequent air cargo movements.

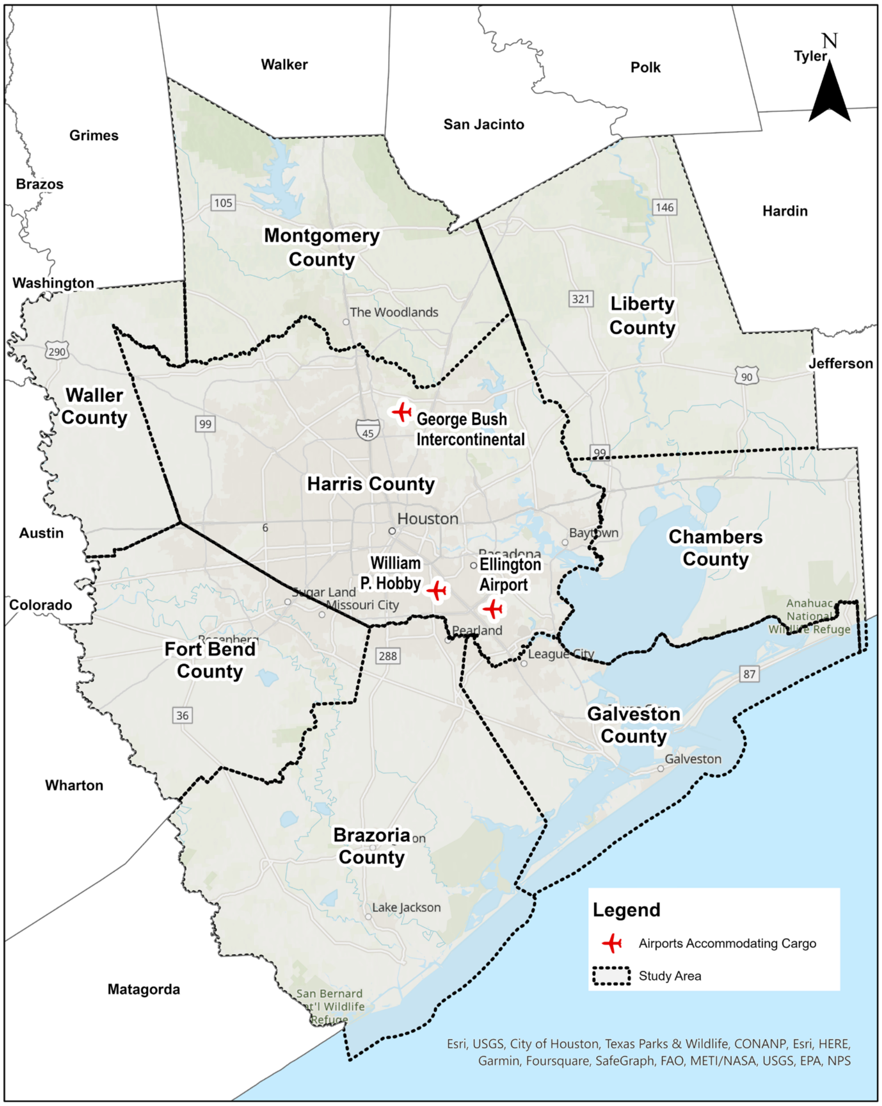


Figure 1-1: Houston Region Air Cargo Airports

1 Houston Airports System Statistics Dashboard

2 FAA CY 2020 All-Cargo Landed Weight Table

3 Houston Airports System Statistics Dashboard

1.2 Maritime

The region's maritime freight network consists of the following:

- Port of Freeport
- Port of Galveston
- Port Houston
- Houston Ship Channel
- Port of Texas City
- Gulf Intracoastal Waterway (GIWW)
- Small Draft Navigable Waterways
- Private maritime freight terminals

In 2020, the region's four principal ports collectively accounted for 14 percent of all cargo handled through the nation's top 150 ports. The four ports handled 19 percent of the nation's foreign cargoes, 12 percent of imports, 23 percent of exports and 9 percent of domestic cargoes.[4] The following **Table 1-1** details the 2020 tonnage and national ranking of the four ports.

Table 1-1:
2020 Tonnage and Ranking of Houston Region Ports

PORT	RANK	TONS
Port Houston	1st	275,940,289
Port of Freeport	16th	38,748,662
Port of Texas City	20th	33,721,312
Port of Galveston	46th	11,945,182

1.2.1 Port of Freeport

Port of Freeport is a deep-water port located in Brazoria County, TX, about 40 nautical miles southwest of Galveston and about 65 miles south of downtown Houston. The port has direct access to the GIWW and the Freeport Harbor Channel Improvement Project is deepening the channel from 46 feet to 51-56 feet. This will make Port of Freeport the deepest port in Texas. Commodities handled by the port include:

- vehicles (the port can accommodate 10,000 vehicles),
- fruit and vegetables (in 2022, the port handled 10.5 million boxes of bananas), and
- aggregates, crude oil, and Liquid Natural Gas (LNG).

The port accounts for 17 percent of U.S. export LNG capacity,[5] Liquid Petroleum Gas (LPG), metal and project cargoes.

The port is served by the Freeport subdivision of the Union Pacific Railroad (UP) and highway connections including SH 288, SH 36 with connections to I-10, I-45 and Beltway 8.

1.2.2 Port of Galveston

The Port of Galveston is located at the mouth of Galveston Bay along the Upper Texas Coast in Galveston County. It occupies the north side of Galveston Island as well as the south shore of Pelican Island. The Port of Galveston is about 9.3 miles from the open gulf and about 50 miles south of Houston. The port is municipally owned by the City of Galveston and is managed by the Board of Trustees of the Galveston Wharves.

The Port of Galveston has a channel width of 1,000 feet and channel depth of 45 feet. The port is ranked the 4th busiest cruise terminal in the U.S. and handles cargo commodities including liquid bulks, grains, fertilizer, vehicles, fruit and project cargoes. The Port of Galveston is served by the port-based Galveston Railroad, LP, which serves the port facilities on Galveston Island. The Galveston Railroad provides rail connections to two Class I railroads, UP and Burlington Northern Santa Fe Corporation Railroad (BNSF). The port owns 22.75 miles of track inside the port.

1.2.3 Port of Texas City

The Port of Texas City is located on the southwest shore of Galveston Bay with access to the GIWW, Gulf of Mexico and the Houston Ship Channel. Port Houston lies approximately 42 nautical miles to the north and the Port of Galveston about 6.5 nautical miles to the southeast. The port has a channel depth of 45 feet, channel width of 400 feet and a 1,200-foot turning basin. The Port of Texas City is jointly owned by UP and BNSF. The Port of Texas City owns most of the property within the Port of Texas City harbor complex and it is Texas' only privately owned port. The Port of Texas City almost exclusively handles large volumes of liquid bulk cargoes. Subsequently, the port contains just one dry cargo dock and 34 liquid bulk docks. There are eight primary port users that utilize the port's 1,000 acres. The Texas City Terminal Railroad serves the port and interchanges with BNSF and UP.

Key commodities passing through the Port of Texas City include the import of crude petroleum oil and the export of refined petroleum products, including gasoline, diesel, jet fuel and intermediate chemicals. Oxbow is the only bulk facility at the

4 US Army Corps of Engineers, Waterborne Commerce Statistics Center

5 https://www.eia.gov/todayinenergy/detail.php?id=52859

port providing the receipt, storage and vessel loading of coal and petroleum coke sold for export and domestic consumption.

1.2.4 Port Houston

Port Houston is a river port on the Gulf of Mexico in Harris County. It is accessed via the GIWW and the Houston Ship Channel, connecting through Galveston Bay. Geographically, the port consists of three districts. The upper third handles break-bulk project cargo and Ro-Ro cargo, the middle third handles petroleum and the lower third handles container ships. There are 270 port facilities on the Houston Ship Channel and 190 manufacturing companies in the port district. Port Houston hosts eight public terminals which are owned, operated, managed or leased by the Port Houston Authority, and include the general cargo terminals at the Turning Basin, Care, Jacintoport, Woodhouse, and the Barbours Cut and Bayport container terminals. The remainder of the facilities in the port are private, with the majority handling bulk liquid commodities. Other bulk and break-bulk commodities handled by the port include aggregates, scrap metal, metal products and fertilizer. Vehicles and project equipment are also handled through the port.

In 2022, Port Houston handled 3.9 million Twenty-foot Equivalent Unit (TEU) containers, making it the 5th busiest container port in the U.S.[6] Houston is the nation's largest port of export for domestically produced plastic resins. Containerized imports include food and drink, retail consumer goods, furniture and clothing. Significant volumes of import containers are associated with importers including Walmart, Home Depot, and Ikea establishing their import receiving warehouses in the region.

The Port Terminal Railroad Association (PTRA) and Class I railroads; including BNSF, CPKC and UP; serve the port. In June 2023, BNSF and UP commenced intermodal rail services from the Barbours Cut container terminal. BNSF serves Dallas and Denver, and UP operates services to Denver, Salt Lake City, Oakland, Los Angeles and El Paso.

Port Houston is accessed by multiple major highways including four interstates: I-10, I-45, I-69 and the I-610 Loop. SH 225 and SH 146 are key highways supporting the container terminals.

1.2.5 Houston Ship Channel

The Houston Ship Channel is 52 miles in length from the Galveston Sea Buoy to Turning Basin and requires an eight-hour transit to navigate from the sea buoy to the channel end. Each year, more than 8,300 ships and 223,000 barges carry cargo through the Houston Ship Channel. In comparison, New York handles 4,600 ships, Los Angeles-Long Beach handles 4,300 ships and the Port of New Orleans handles 6,700 ships. The Houston Ship Channel area comprises the largest tonnage port in the U.S., over double the volume of the fourth tonnage port and 18 percent larger than the second port.

1.2.6 Gulf Intracoastal Waterway

The Gulf Intracoastal Waterway (GIWW) is a 1,100–mile shallow-draft, man-made, protected waterway that connects ports along the Gulf of Mexico from St. Marks, Florida to Brownsville, Texas. It includes the Marine Highway designation of M-10 and M-69. The GIWW is now dually designated, making it eligible for federal funding for both M-69 specific projects, as well as M-10 projects that address overarching challenges along the entire GIWW. The Texas portion extends for approximately 423 miles from Sabine River to Port Isabel, TX, and serves as a critical link between the deep draft and shallow draft ports while providing an interstate link for commodities transported in and out of the state. The GIWW is a vitally important waterway for the region enabling the region's industry to access the domestic waterway network and dispatching products to other states including Tennessee and Florida. Approximately half the vessels that move on the GIWW between Sabine River and Galveston originate from or terminate their trips in the Houston region, which based on 2016 U.S. Army Corps of Engineers (USACE) statistics is approximately 15,000 vessel trips each way per annum.

1.2.7 Small Draft Navigable Waterways

Small Draft Navigable Waterways in the region include the San Bernard River, Dow Barge Canal, Chocolate Bayou, Dickinson Bayou, Green Bayou, Buffalo Bayou, Cedar Bayou and San Jacinto River. These waterways are predominately used by barge traffic to access industrial, petrochemical and trans-shipment facilities. Cedar Bayou is one example and is also designated as the M-146 Marine Highway Route. It supports barge movement to the following facilities:

- Covestro manufacturing facility, Baytown
- Cedar Port Navigation and Improvement District (CPNID), a public barge facility available to all qualified operators and stevedores

6 Bureau of Transportation Statistics, Container Port Activity Dashboard

- Richardson Companies, operating the Green Transport Barge Terminal north of CPNID
- Aggregates facility serving Baytown Concrete
- Combined barge, rail and road terminal that serves the JSW Steel Works
- Cedar Marine Terminals, a truck-to-barge petroleum and biofuel facility located at the mouth of Cedar Bayou

The San Jacinto River also supports the largest single barge fleeting area[7] in Texas.

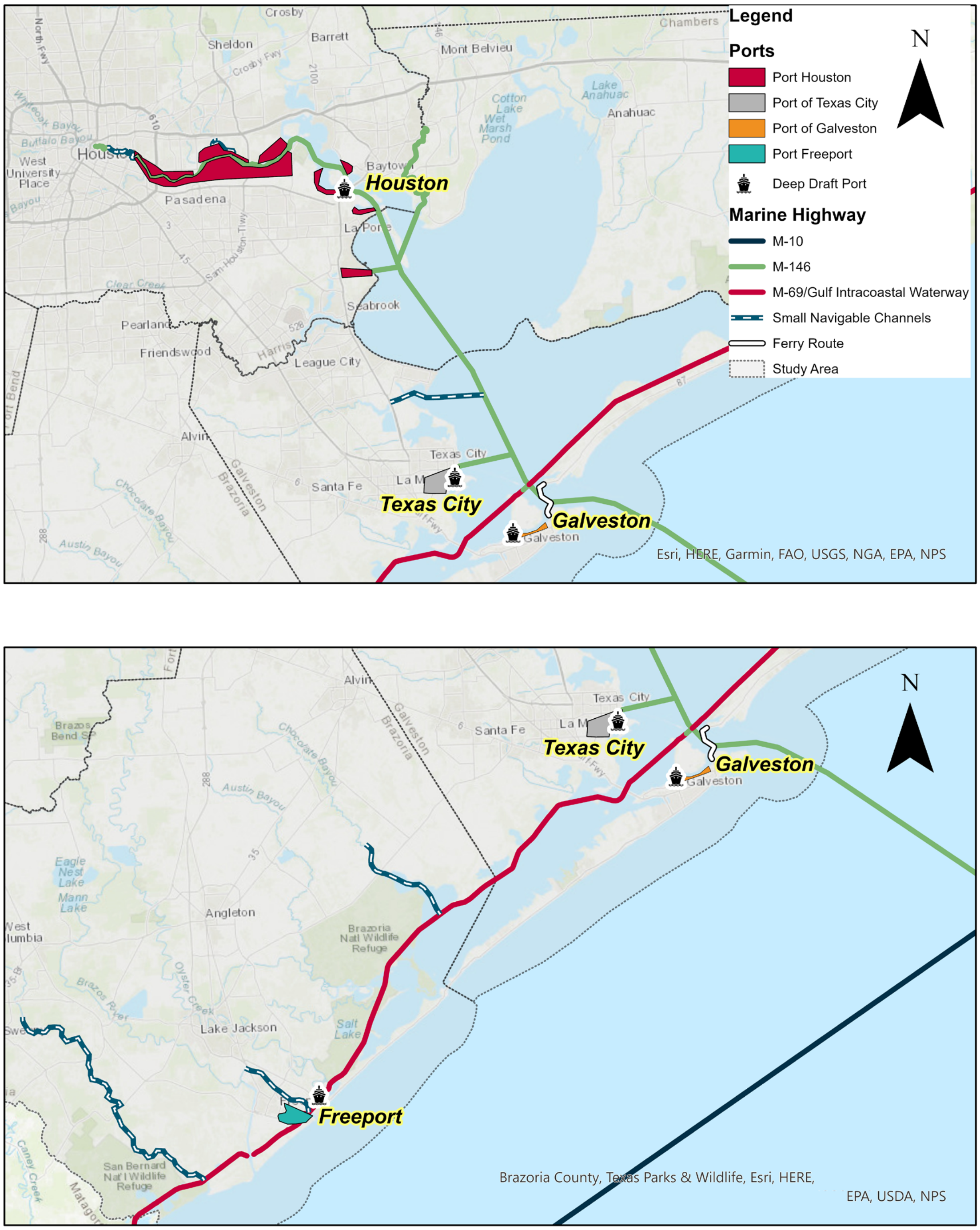


Figure 1-2: H-GAC Region Ports and Waterways

7 An area established for the making up, breaking down, staging and storage of barge tows.

1.3 Pipelines

The Houston Region is an epicenter for pipelines with more than 180 pipeline systems.[8] Pipelines are the most cost-effective method for moving large volumes of liquids and gases. The region's extensive pipeline network links areas of energy resource extraction; such as the gas and crude oil fields in West Texas and as far afield as Alberta, Canada; with the region's refineries, storage facilities and chemical processing plants. They also bring natural gas to many residents and commercial buildings for heating and cooking purposes. Other pipeline networks transport products between processing facilities in the region and send refined petroleum products such as jet fuel, as far away as JFK Airport in New York. The pipelines are a key component of the region's multi-modal freight system, linking ports with import and export markets. These pipeline networks have responded to changes in global markets and product flows. Some pipelines were originally established to transport imported crude oil from the Gulf Coast to inland refineries in the mid-west. Following the growth of domestically produced crude oil and the relaxing of controls limiting export of domestically produced crude oil, pipeline flows were reversed to bring this domestically produced crude oil to the Gulf Coast ports for export. Natural gas pipelines have also been extended to bring domestically produced natural gas to the Port of Freeport for export as LNG.

1.4 Rail

The network of railroad lines within and surrounding the Houston Region was formed from historic predecessor railroads originally built to connect Houston with other regional and national industrial and manufacturing centers. Fourteen different railroad corridors link Houston with other cities. Over time, most of the predecessor railroads have been merged with, or acquired by, other Class I railroads. Today, most of the main lines in the Houston Region are owned and operated by two railroad companies: UP and BNSF. Other railroads, including Canadian Pacific Kansas City (CPKC) Railway Company and Amtrak, serve the area by operating on trackage rights as tenants of UP and/or BNSF. In addition to the Class I railroads mentioned above, several terminal switching railroads such as PTRA exist in the Houston Region. These switch carriers serve the various ports and adjoining industrial customers, interchanging rail volume with the connecting Class I railroads.

Railroad operations are firmly integrated into the local manufacturing, shipping and logistics supply chains, with approximately 2,200 trains per week operating within the Houston Region rail network.

8 Houston.org

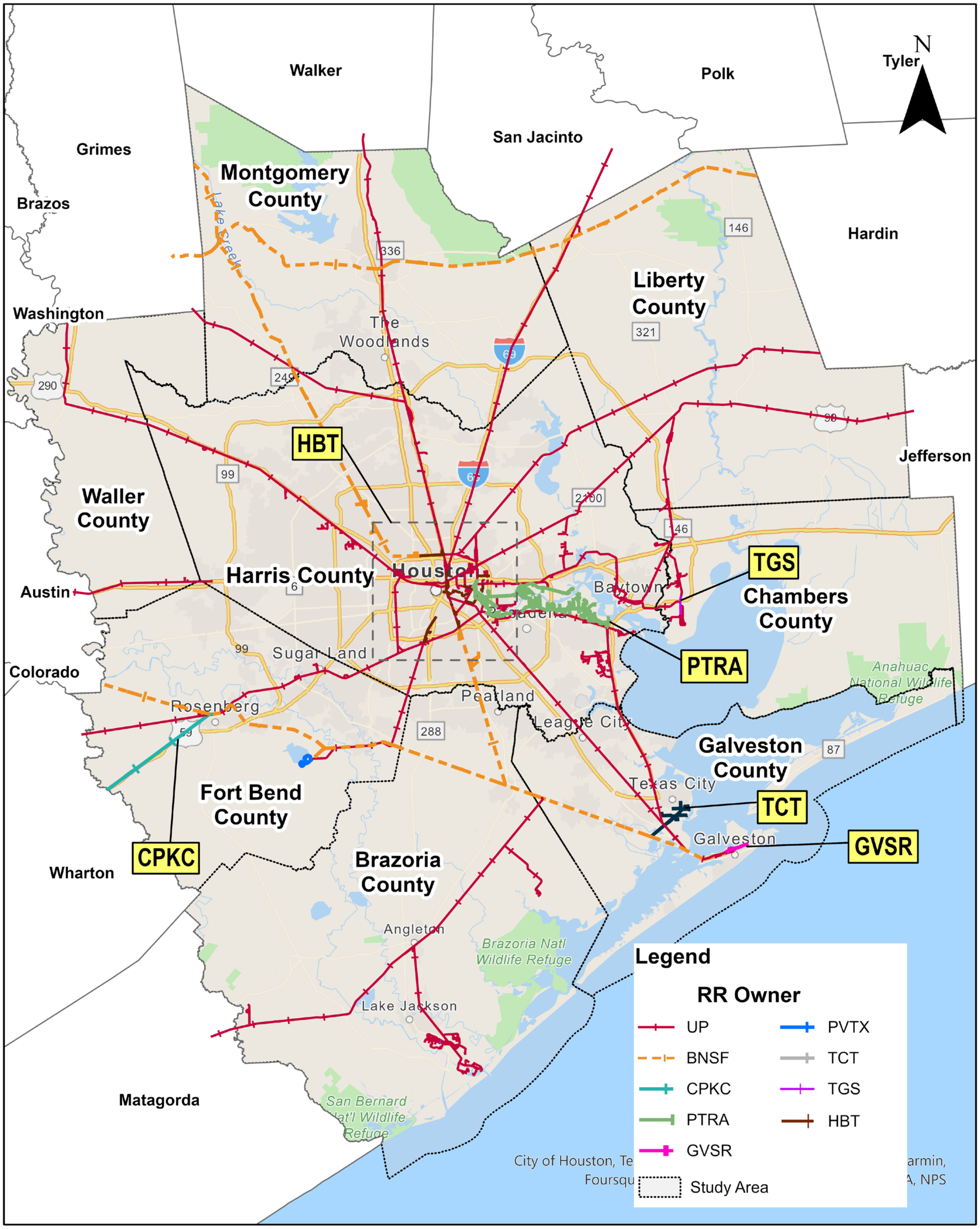


Figure 1-3: Railroad Network in Houston Region

1.4.1 UP

UP has the largest presence of all the Class I railroads operating within the region. The Houston area is a hub for UP lines radiating from the Texas Gulf Coast, linking the region by rail to the West Coast, Midwest, Louisiana Gulf Coast and Mexico. UP's network of rail lines in the region is made up of many predecessor railroads that UP has acquired or merged with, the most recent being the Southern Pacific Railroad (SP), which merged with UP in 1996. Although Houston generates a significant amount of rail volume of all kinds for UP, the railroad also operates trains that pass-through Houston while moving to and from other regions of the continent.

UP serves three intermodal terminals in the region, two in northeast Houston and one serving Port Houston. UP's Houston (Settegast) intermodal terminal is located on Kirkpatrick Boulevard off I-610 and handles both truck trailers and containers, while the Englewood intermodal terminal is located on Wallisville Road north of I-10 and handles only containers. UP previously served the Barbours Cut intermodal ramp at Port Houston but ceased the service to the Dallas Intermodal Terminal in 2019. In addition to operating numerous local freight yards that serve as the base for local freight trains to switch area manufacturers and other shippers, UP also operates a large freight car classification yard in Houston. This yard receives and originates manifest freight trains with a mix of commodities destined to and from cities across the western U.S., sorting freight cars that originate and terminate in Houston as well as cars passing through, to and from more distant locations.

As a result of the many mergers and acquisitions over the years, UP now has many different rail yards and industrial spurs across the Houston Region. Because UP controls the majority of the rail routes through the City of Houston, many other railroads operate over UP's lines on trackage rights including BNSF, KCS, the PTRA and Amtrak.

1.4.2 BNSF

BNSF has a significant presence in the region, operating primarily on trackage rights over UP through the City of Houston, although it owns lines that extend north to Dallas-Fort Worth (DFW), northwest to Amarillo and south to Galveston. Most of BNSF's trackage rights were gained during the 1996 UP-SP merger. Trackage rights on the PTRA also provide BNSF access to various customers and industrial railways in the Houston Region. The BNSF network and connections tie together its Texas Gulf Coast trackage with the Louisiana Gulf Coast, Midwest, northern states, West Coast and Mexico.

Houston is a significant traffic generating hub for BNSF. Trains moving between the West Coast and Gulf Coast and trains moving between the central U.S. and south Texas or Mexico pass through the Houston Region. BNSF operates the Pearland intermodal facility and adjacent automotive ramp on Brisbane Road by HOU.

1.4.3 CPKC

In March 2023, the Surface Transport Board approved the acquisition of KCS by Canadian Pacific Railway Limited (CP), forming CPKC. KCS's main line between the Midwest/south central regions of the U.S. and Mexico passes through Houston. KCS owns no trackage in the city itself, instead operating on UP trackage rights, from as far east as Beaumont (where a connection exists with KCS's main U.S. north-south artery) through Houston and west to Rosenberg, TX, where KCS-owned trackage begins again headed south to Victoria, TX. Through additional trackage rights, plus connecting trackage it acquired with its purchase of the Texas Mexican Railway, the KCS system extends south from Houston to the Mexican border at Laredo, where it connects to its Mexican affiliate, Kansas City Southern de Mexico (KCSM). As a result, KCS operations in Houston consist mostly of run-through trains moving between the U.S. and Mexico that do not serve local customers, except in some cases for Houston-area traffic destined to and from Mexico. However, in Kendleton, KCS operates an intermodal terminal and automotive ramp that serves the Houston region.

1.4.4 Other Railroads

The region also includes several other railroads, such as:

- PTRA. Operating on both sides of the Ship Channel, the PTRA has a total yard capacity of 5,000 railcars and pulls an average of 2,500 cars per day. The PTRA services 226 local customers from seven serving yards and maintains 154 miles of track and 20 bridges as shown in **Figure 1-4.**
- Texas City Terminal Railway (TCT) is jointly owned by UP and BNSF. Handling over 25,000 carloads per year, the terminal switch carrier operates over 32 miles of yard and industrial track including connections to both of its Class I owners[9] and the Port of Texas City.
- Galveston Railroad (GVSR). The City of Galveston owns the railroad and leases it to Genesee & Wyoming, the largest

9 Tcttrr.com

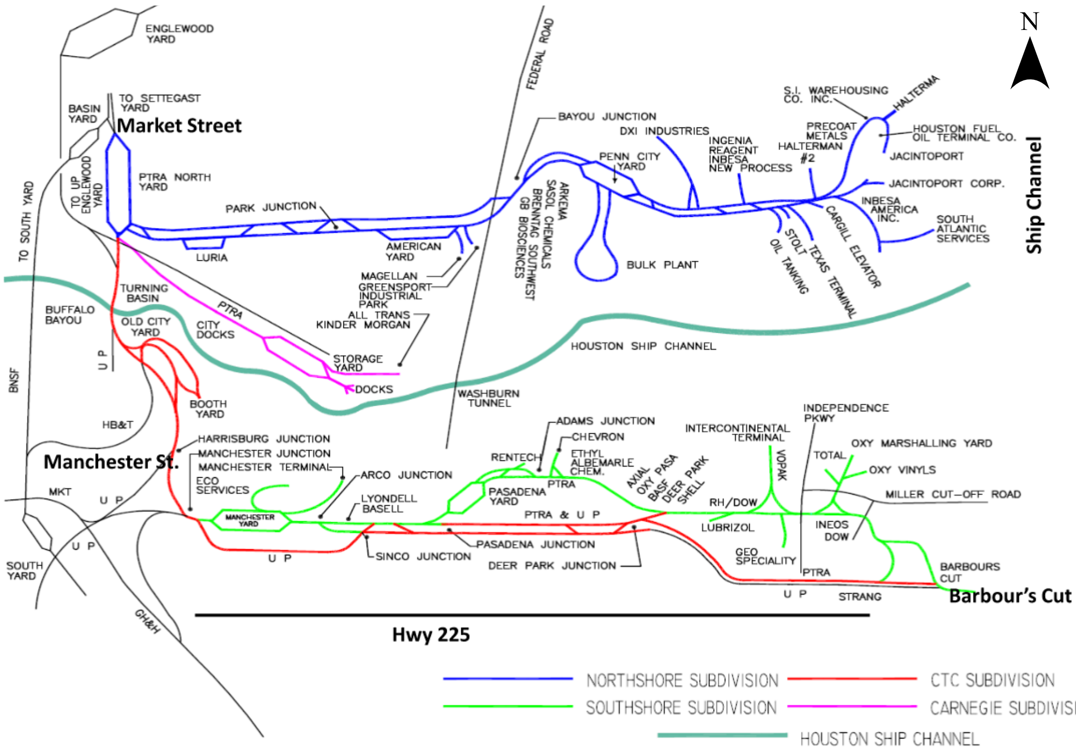


Figure 1-4: Port Terminal Railroad Association Rail Network

Source: *https://www.swrailshippers.com/wp-content/uploads/sites/5/2019/03/Jeff-Norwood-Transportation-Sustainability.pdf*

short line and regional railroad holding company in North America. The terminal switch carrier operates more than 39 miles of yard and industrial track, and interchanges with both UP and BNSF in Galveston.

- Rail Logix. Provides switching services in the 1,200-acre Ameriport in Baytown with a storage capacity of 3,000 railcars and the 300-acre, 1,105-railcar storage Port Crossing Commerce Center in La Porte.[10]
- TGS Cedar Port Railroad. A Class III railroad serving the Cedar Port Industrial Park and connecting to BNSF and UP.
- Houston Belt and Terminal Railway Company (HB&T). HB&T was chartered in 1905 to provide both passenger and freight terminal rail service in the City of Houston. Today, HB&T is primarily a land holdings company and its rail assets are jointly owned and operated by BNSF and UP. HB&T controls 15.3 miles of main line track, 15.7 miles of branch line track and 90 miles of side track in the city of Houston. HB&T's West Belt main line transitions north and south through the city and HB&T's East Belt is the main rail access point to Port Houston and PTRA.

1.5 Highways

The region's highways, comprising over 27,000 miles of local and arterial roads and freeways, support the movement of goods to, from, within and through the region and serve as first and last mile connectors for distribution and industrial sites, ports, airports and rail yards. Some sections of the highway network experience significant volumes of trucks. Some notable examples are I-10, which experiences a daily influx of around 40,000 trucks on certain sections. Similarly, I-45 towards Dallas sees up to 22,000 trucks daily, while SH 225 encounters approximately 22,000 trucks daily. I-610 and SH 146 are also significant freight routes, accommodating up to 18,000 trucks daily. The region's highways are categorized and classified within different network designations as identified in the following sections.

10 Rail-logix.com

1.5.1 National Highway Freight Network

The National Highway Freight Network (NHFN) includes the following subsystems of roadways:

Primary Highway Freight System (PHFS): This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system.

Other interstate portions not in the PHFS (non-PHFS): These highways consist of the remaining portion of interstate roads not included in the PHFS. These routes provide important continuity and access to freight transportation facilities.

Critical Rural Freight Corridors (CRFCs): These are public roads not in an urbanized area that provide access and connection to the PHFS and the interstate with other important ports, public transportation facilities or other intermodal freight facilities.

Critical Urban Freight Corridors (CUFCs): These are public roads in urbanized areas that provide access and connection to the PHFS and the interstate with other ports, public transportation facilities or other intermodal transportation facilities.

1.5.2 Texas Highway Freight Network

The Texas Highway Freight Network (THFN) is designated by the Texas Department of Transportation (TxDOT) and comprised of a Primary Freight Network and a Secondary Freight Network/Emerging Freight Corridors. It includes interstates, the National Highway System, and the Texas Trunk System.

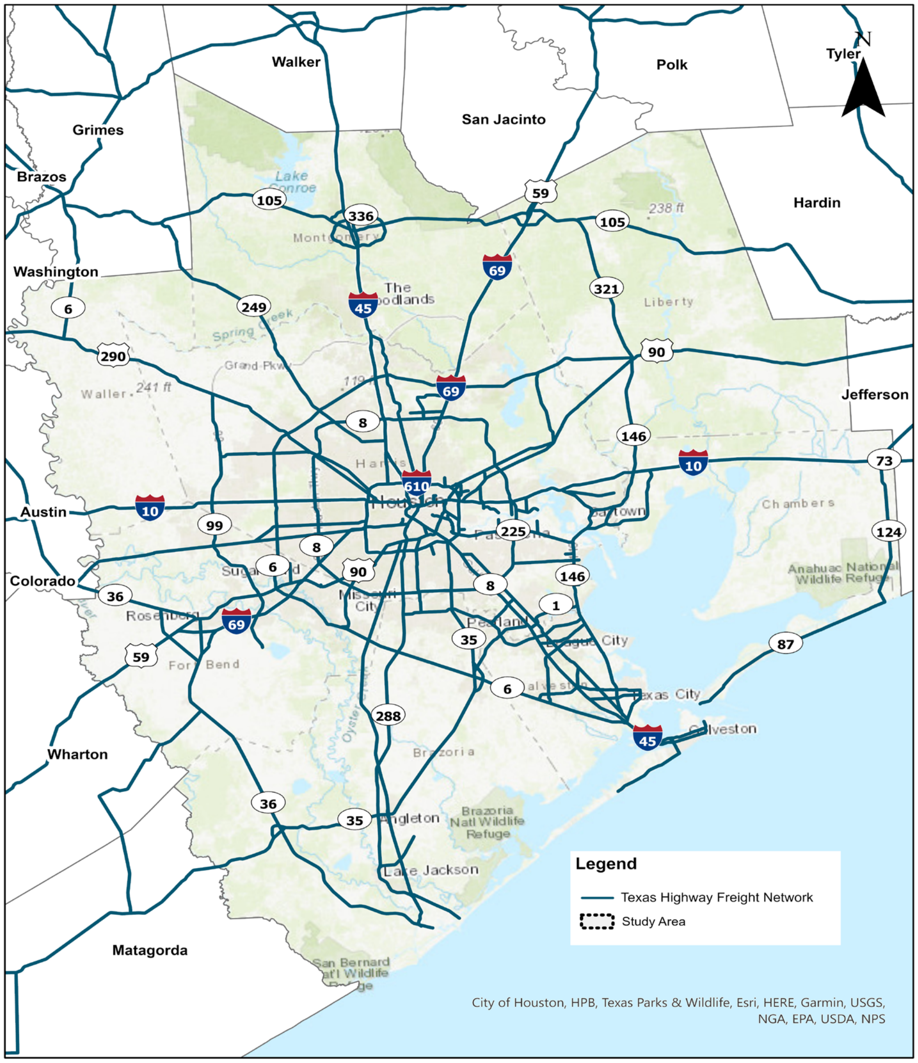


Figure 1-5: Texas Highway Freight Network

1.5.3 National Hazardous Materials Routes

The definition of Hazardous Materials includes those materials designated by the Secretary of the Department of Transportation as posing an unreasonable threat to the public and the environment. The term "Hazardous Materials (HM)" includes the following:

- Hazardous Substances,
- Hazardous Wastes,
- Marine Pollutants,
- Elevated Temperature Material,
- materials identified in 49 Code of Federal Regulations (CFR) Part 172.101, and
- materials meeting the definitions contained in 49 CFR Part 173.

The National Hazardous Materials Route Registry (NHMRR) provides publicly accessible information concerning designated routes, which are mandatory assigned routes for transporting HM shipments and restricted routes over which such shipments may not be transported. State and Tribal Governments may designate routes for transporting these HM. The States and Tribal Governments may also establish limitations for the use of routes by using required procedures. National Hazardous Material Routes in the region are identified in **Figure 1-6**.

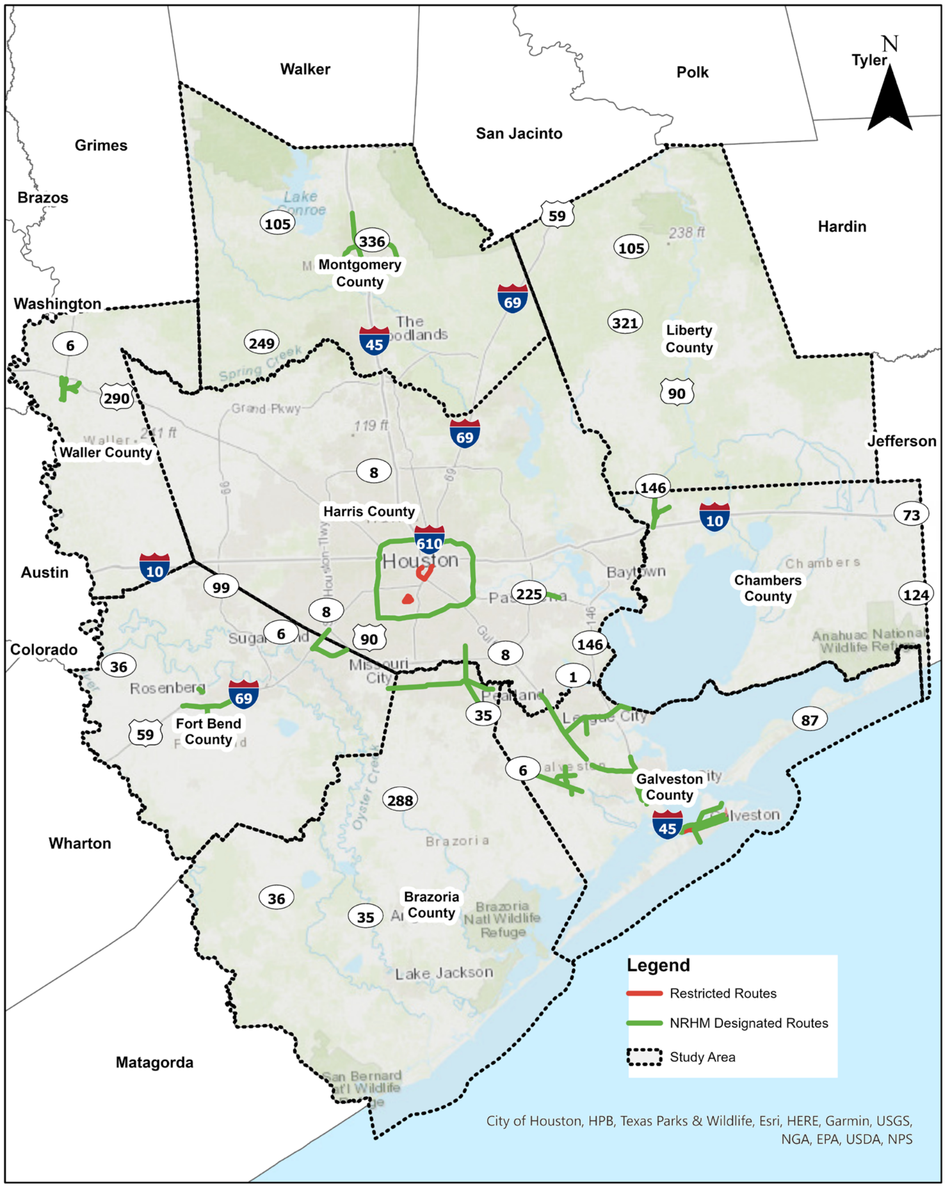


Figure 1-6: National Hazardous Material Routes

1.5.4 Local Municipal Truck Designated Routes

Several municipalities including Katy, Pasadena, Seabrook and Conroe restrict trucks on certain parts of their local highway network. These ordinances are typically used to restrict trucks in residential areas, but still facilitate deliveries. The City of Houston Planning and Development Department is currently developing a citywide Truck Route Plan to proactively manage freight movement throughout the city and designate certain roadways as "Through Truck Routes," which will allow trucks to move goods through the city. An example of a municipal truck route in Pasadena is illustrated in **Figure 1-7**.

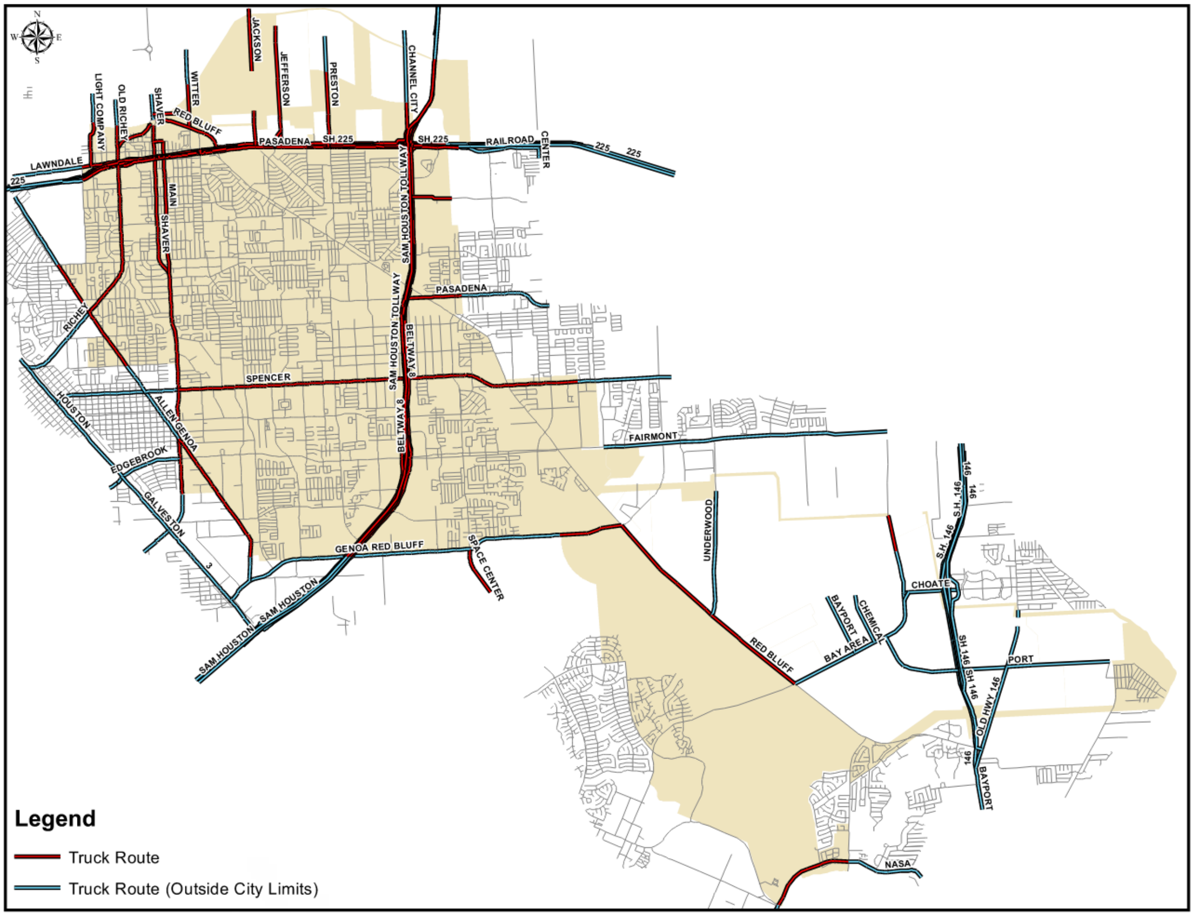


Figure 1-7: City of Pasadena Truck Route Map

2. Chapter 2 – Key Infrastructure Needs and Issues

This chapter provides an overview of the current state of infrastructure used for freight movement within the H-GAC Region. Some of the key issues and needs associated with the various modes of transport including highway, maritime, rail and air, along with freight externalities such as safety and emissions issues are discussed below.

2.1 Highway Infrastructure Needs

2.1.1 Bridge and Culvert Conditions

There are 2,586 bridges in the H-GAC Region along the THFN. These bridges have high volumes of oversize and overweight (OSOW) truck movements. Data relevant to four aspects of regional bridges is discussed here – clearance under the bridges where another road passes underneath, clearance above the bridge, their structural condition and weight restrictions.

2.1.1.1 CLEARANCES

Bridge strikes occur when vehicles crash into bridges. They usually take place when an oversized vehicle passes under a bridge with inadequate vertical/lateral clearance. Thus, increasing the clearance under a bridge is important for avoiding crashes and improving freight movement efficiency. The existing TxDOT requirement for a bridge vertical clearance is 18.5 feet for freeways and highways located along the freight network. However, this standard is relatively new, and many bridges are built to an earlier requirement (16.5 feet). **Figure 2-8** shows the location of bridges that do not meet this requirement. The bridges below the current requirement are typically along the old segments of interstates such as I-10, I-45 and I-610. Six percent of all bridges have a clearance of less than 14.5 feet; 42 percent have clearance between 14.5 feet and 16.5 feet; and 33 percent have clearance between 16.5 feet and 18.5 feet.

Only 19 percent of the bridges in the H-GAC Region meet the current requirement. The median vertical clearance under the bridge is 16.5 feet, i.e., 50 percent of the bridges have a clearance of less than 16.5 feet under them.

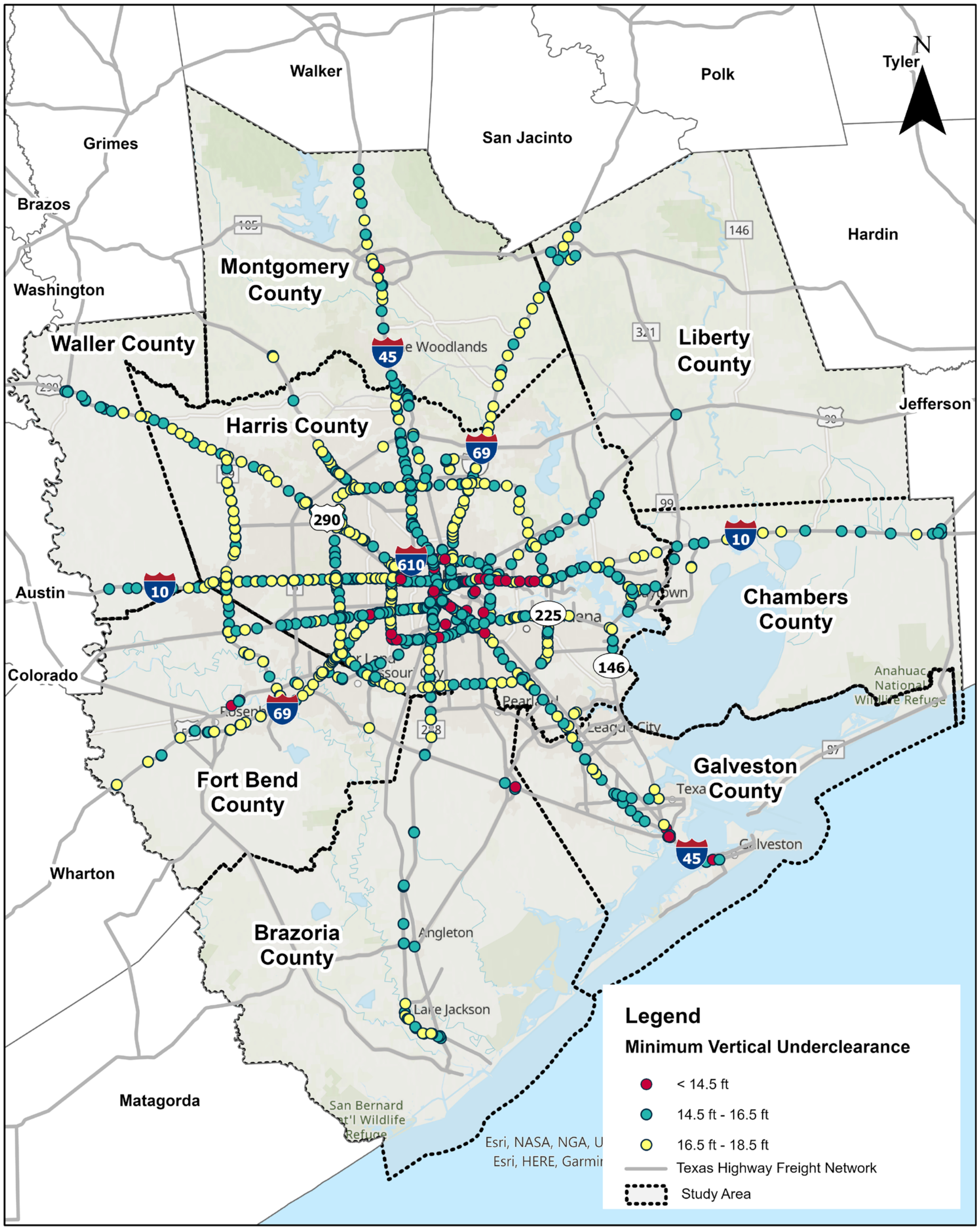


Figure 2-8: Bridges in the H-GAC Region – by Clearance Under Bridges

Where there is a stacked interchange, (a highway bridge is crossed by another bridge, such as at the I-10/I-45 interchange), the requirement for clearance above the bridge being crossed) is also 18.5 feet. **Figure 2-9** shows the distribution of bridges that do not meet this requirement. The bridges with the highest numbers below the current requirement are typically along the old segments of interstates I-69 and I-610. Only two percent of the bridges have more than the 18.5 feet clearance above them. However, 92 percent have no height restrictions since no roadbed is passing above them.

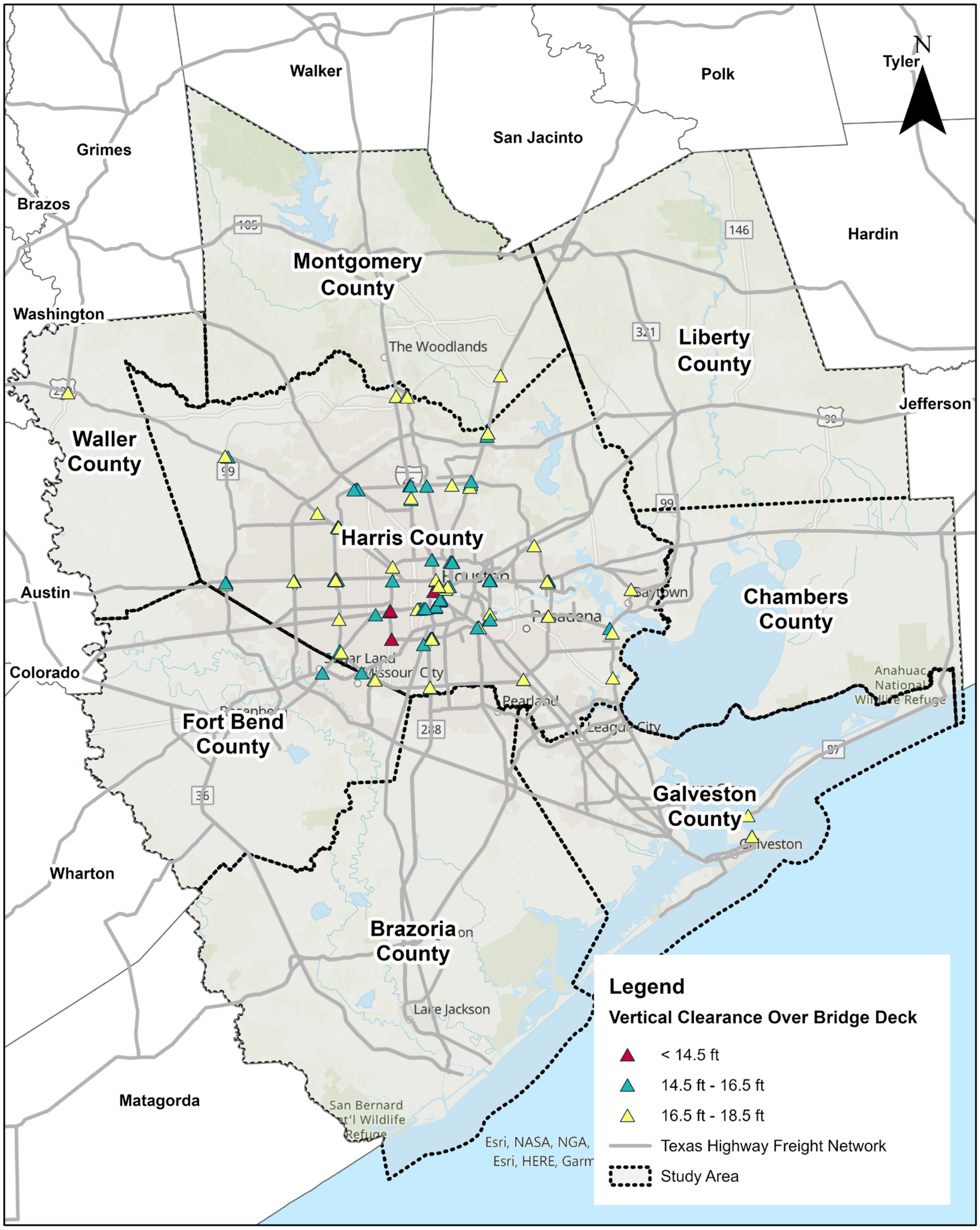


Figure 2-9: Bridges in the H-GAC Region – by Clearance Over Bridge Deck

2.1.1.2 STRUCTURAL CONDITIONS

Structural integrity is a key indicator of the quality of a bridge and its load bearing capacity. As bridges age, their structural condition deteriorates. **Figure 2-10** demonstrates the structural condition of bridges in the H-GAC area relative to their age. Bridges are usually designed to last 50 to 100 years. As such, 98 percent of bridges in the study area were rated 'Fair' or 'Good' for structural conditions. Of the 61 bridges rated 'Poor' or 'Unsatisfactory', 14 were 'Poor' (23 percent). None of the 428 bridges built after 2010 were rated 'Poor' or 'Unsatisfactory'.

About 75 percent of the bridges built before 1990 are either 'Fair' or worse. Overall, nearly half of all existing bridges are rated 'Fair' or worse.

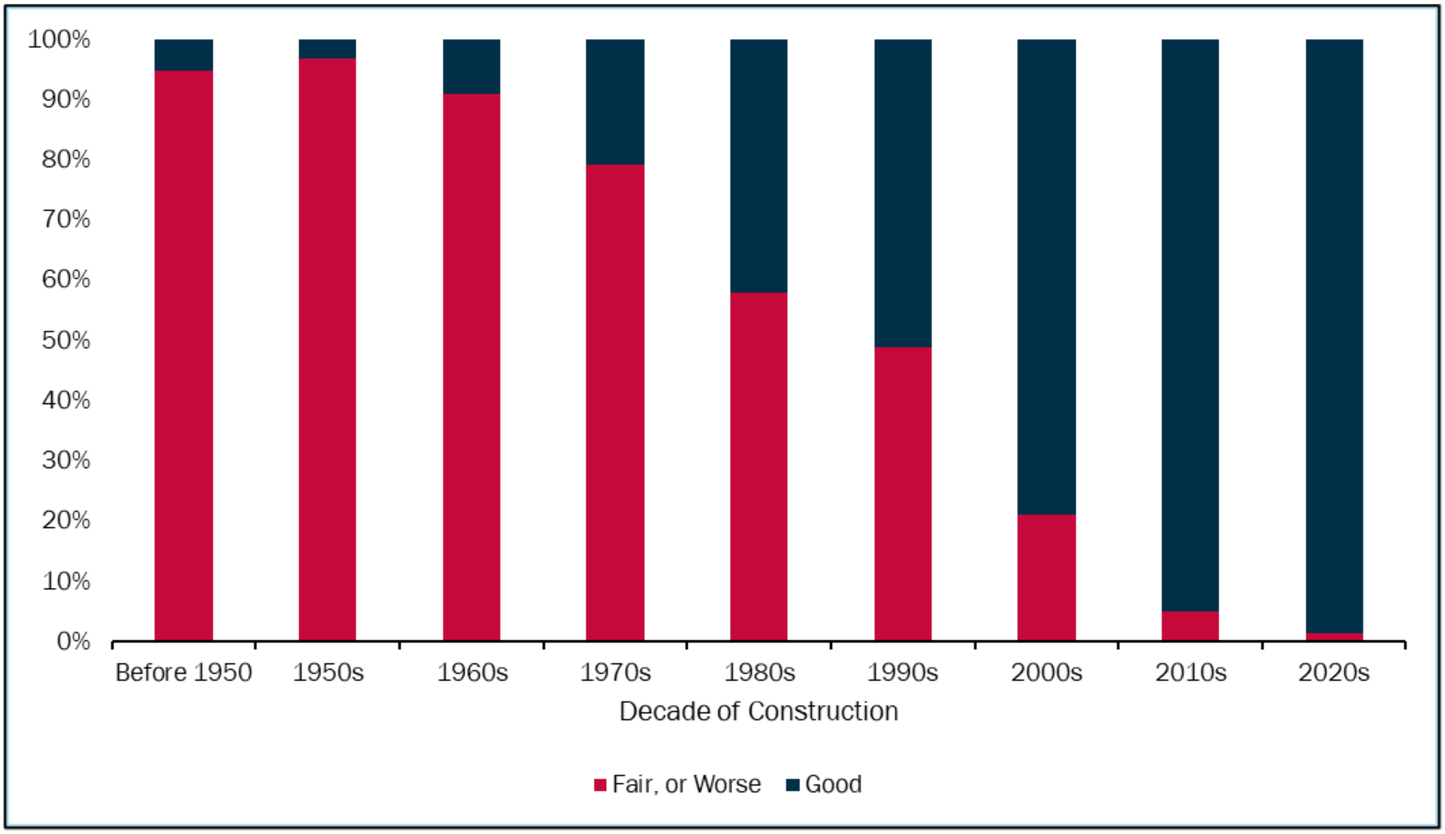


Figure 2-10: Bridge Structural Condition by Decade of Construction

Figure 2-11 shows the location of bridges rated 'Poor' and 'Unsatisfactory'. There is also one culvert that is rated 'Poor' in Montgomery County. There is a concentration of poor and unsatisfactory bridges along I-610 on the east side of the loop.

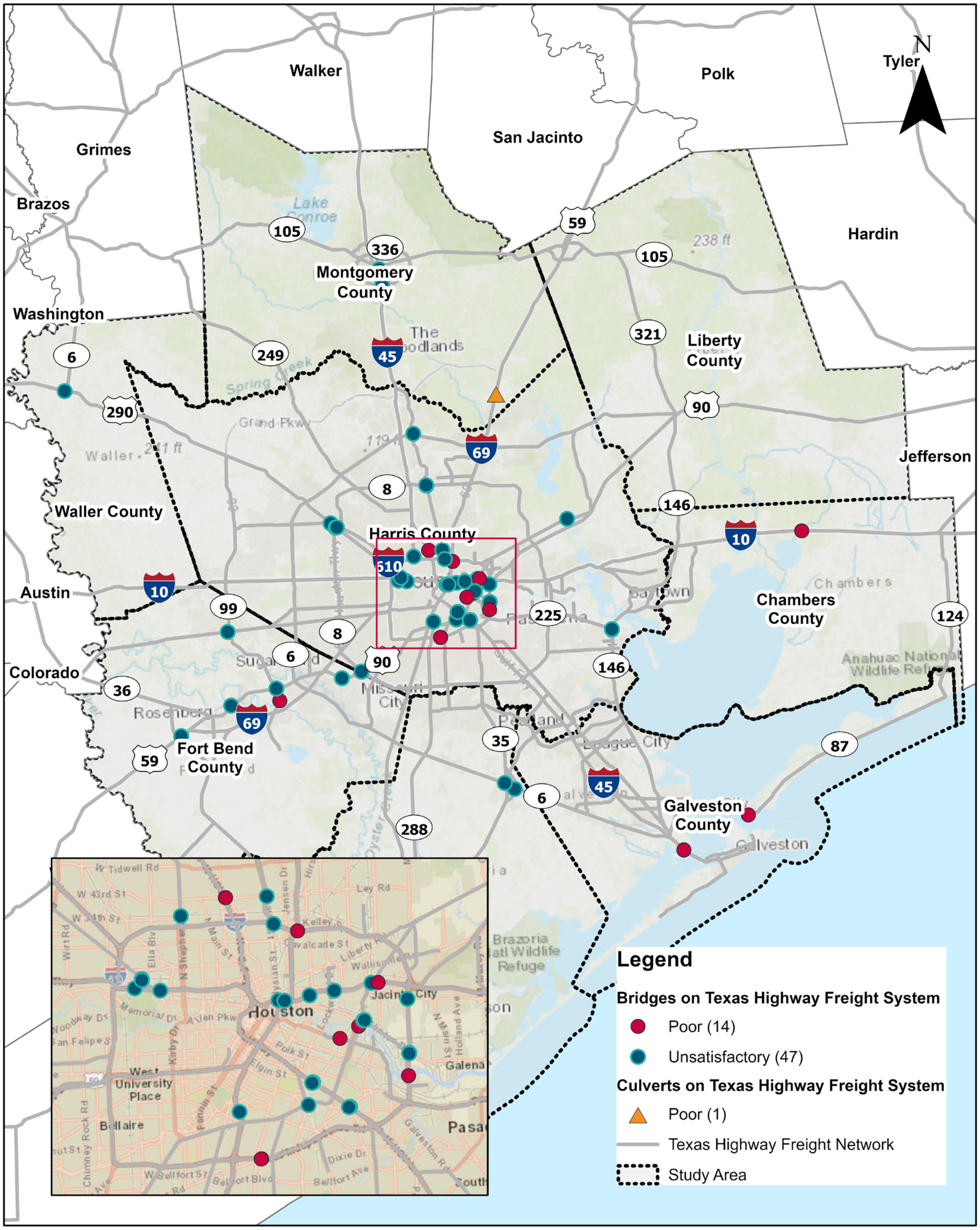


Figure 2-11: Bridges in the H-GAC Region – by Structural Condition (Unsatisfactory and Poor)

2.1.1.3 WEIGHT RESTRICTIONS

There are two bridges in the H-GAC Region on which the maximum loading allowed is 80,000 pounds. Both are in the City of Houston – one at the intersection of Lockwood Drive and Wallisville Road, and the other on Navigation Boulevard just east of McFarland Street.

2.2 Highway Infrastructure Issues

2.2.1 Congestion

The American Transportation Research Institute (ATRI) ranks locations that experience the most congestion by trucks. **Figure 2-12** shows 10 locations that are within the H-GAC Region and among the top 100 congested intersections nationwide for freight movement. Most of these locations are interchanges formed by major interstates I-10, I-45, I-69 and I-610 within the region. Six out of these ten interchanges are located along the I-610 Loop.

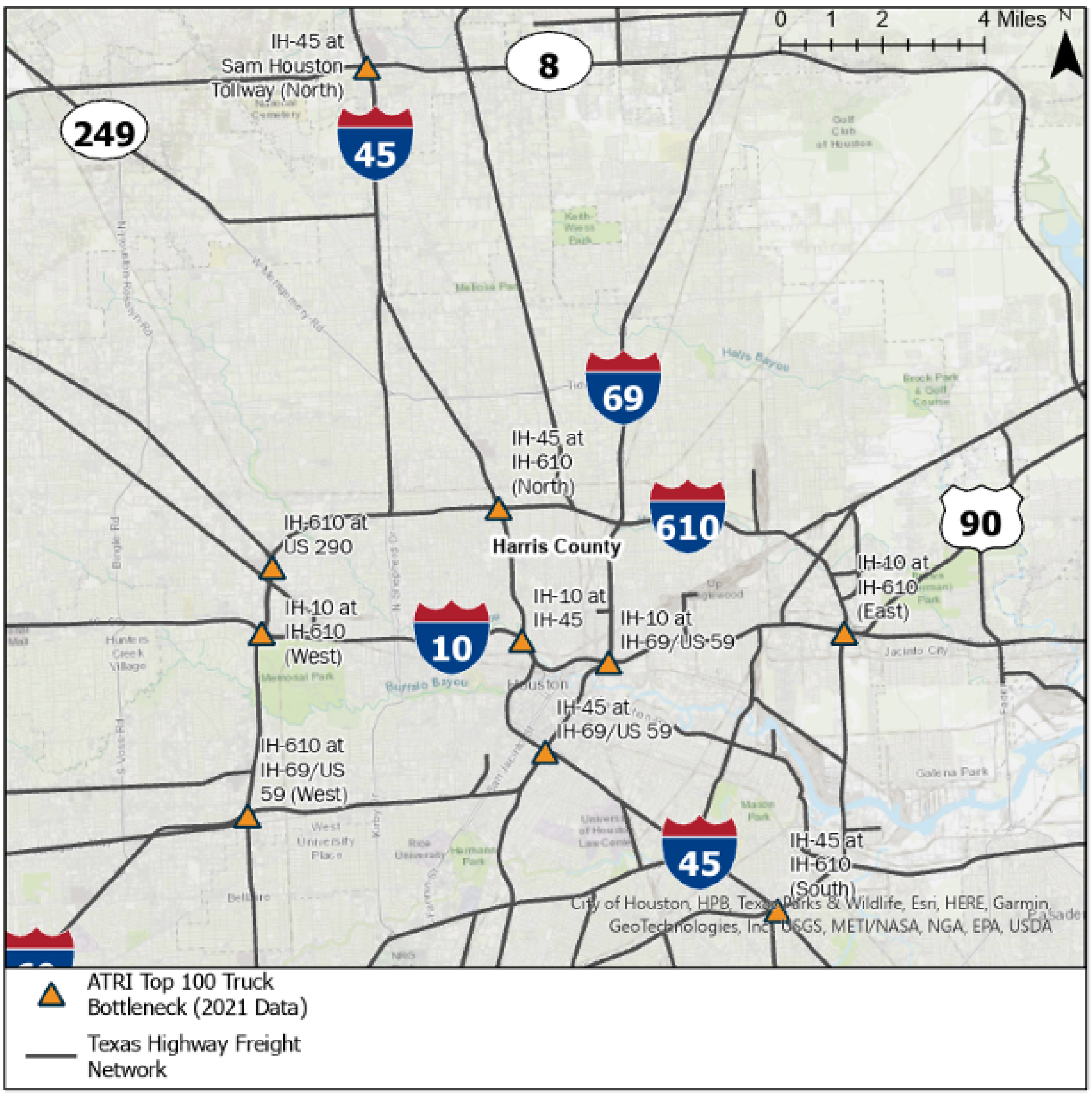


Figure 2-12: ATRI Top 100 Truck Bottleneck Locations

TxDOT, in association with the Texas Transportation Institute, publishes a report on roadway congestion annually. **Figure 2-13** shows TxDOT's top 100 congested corridors that are within the H-GAC Region.

As shown in **Figure 2-13**, 213 of the 1,693 miles (12.6 percent) of the THFN in the H-GAC Region is part of TxDOT's top 100 congested roadways. One hundred eighty miles (18 percent) of all urban THFN roads are congested, while only 33 miles (4.5 percent) of rural THFN roads are congested. A majority of the interstates serving Houston; I-10, I-69, I-45, I-610 and parts of Beltway 8 and Westpark Tollway; are part of the top 100 congested roadways.

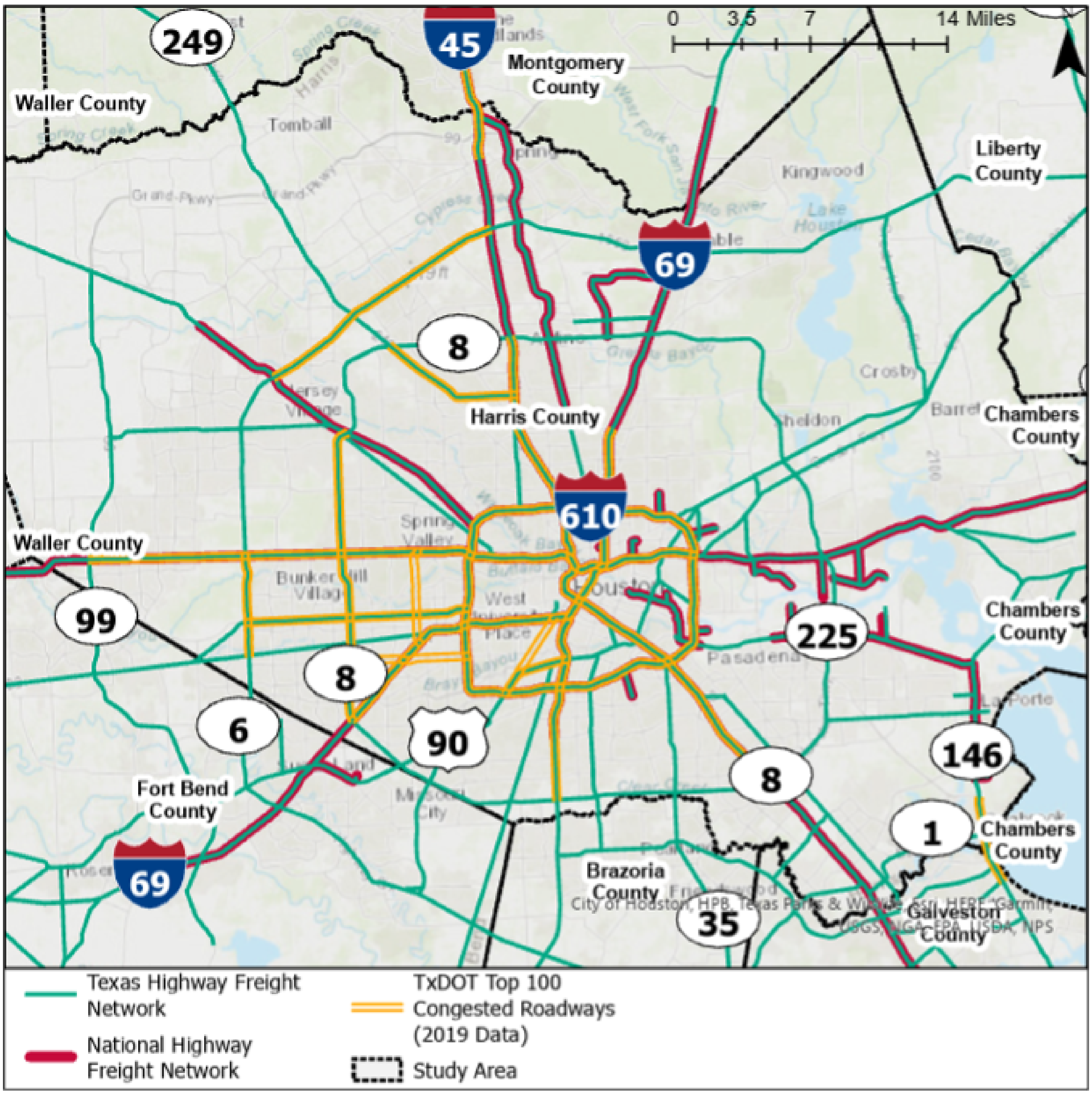


Figure 2-13: TxDOT Top 100 Congested Roadways

2.2.2 Truck Delay and Truck Travel Time Reliability

The most effective measure of congestion along a roadway is the total annual delay experienced, measured in person-hours. This measure combines two essential elements: the additional travel time incurred during a trip (indicating the intensity of congestion) and the magnitude of people affected by that congestion. By considering both factors, a comprehensive assessment of the congestion problem in the area can be obtained. For instance, let's consider a scenario where a four-lane freeway operates at the same speed and has the same additional travel time as a 10-lane freeway. Despite having similar travel time impacts, the 10-lane freeway would experience greater overall delay due to its higher volume of traffic. Consequently, it becomes a more significant problem for the region, as it affects a larger number of people. Specifically, the measure of truck delay refers to the portion of the total annual delay that can be attributed to trucks. By analyzing and quantifying this component, it is possible to isolate the impact of truck-related congestion within the overall congestion problem.

In general, corridor travel times and delays are typically reported based on annual averages. However, it is important to note that travel times on a corridor can vary from day to day, even during the same time of day. Travelers tend to remember the worst travel times they have experienced on a particular corridor. To capture the variability and unpredictability of delays, the concept of travel time reliability comes into play. Travel time reliability refers to the consistency or dependability of travel times, taking into account variations observed from day to day and/or across different times of the day. It provides a formal measure of how reliable and consistent travel times are along a corridor. In other words, travel time reliability assesses the extent to which unexpected delays occur, allowing commuters to understand the level of consistency they can expect when traveling on a particular corridor.

To assess travel time reliability, various measures are employed, and one commonly used measure is the 95th Percentile Planning Time Index (PTI). The PTI serves as an indicator of travel time reliability by estimating the total travel time that should be allocated for a trip. It is derived by dividing the 95th percentile travel time by the free flow travel time. The PTI value represents the "worst trip of the month" or the travel time that should be planned to avoid being late on just one day of the month. It serves as a practical guideline for travelers, indicating the amount of additional time they should allocate to their trips to avoid being late on only one day in a month. For example, if the PTI is 3.00 for a 20-minute trip under light traffic conditions, it implies that 60 minutes should be planned for the journey.

In the context of truck traffic, the truck 95th Percentile PTI is specifically calculated to assess travel time reliability for trucks. This measure acknowledges the unique needs and considerations of truck drivers who are delivering goods. It allows them to plan by allocating additional time for time sensitive trips.

The Texas A&M Transportation Institute (TTI) conducts annual congestion analysis on Texas roadways, assessing the person hours of delay and PTI along corridor segments. TTI relies on data from INRIX to evaluate congestion parameters specifically for the segments identified in the TxDOT roadway inventory.

Below are the figures displaying the Truck Delay and Truck PTI within the H-GAC Region for interstates, major highways and principal arterials. These figures provide insights into the extent of truck-related delays and the PTI, indicating the level of reliability and additional time required for truck travel on these roadways.

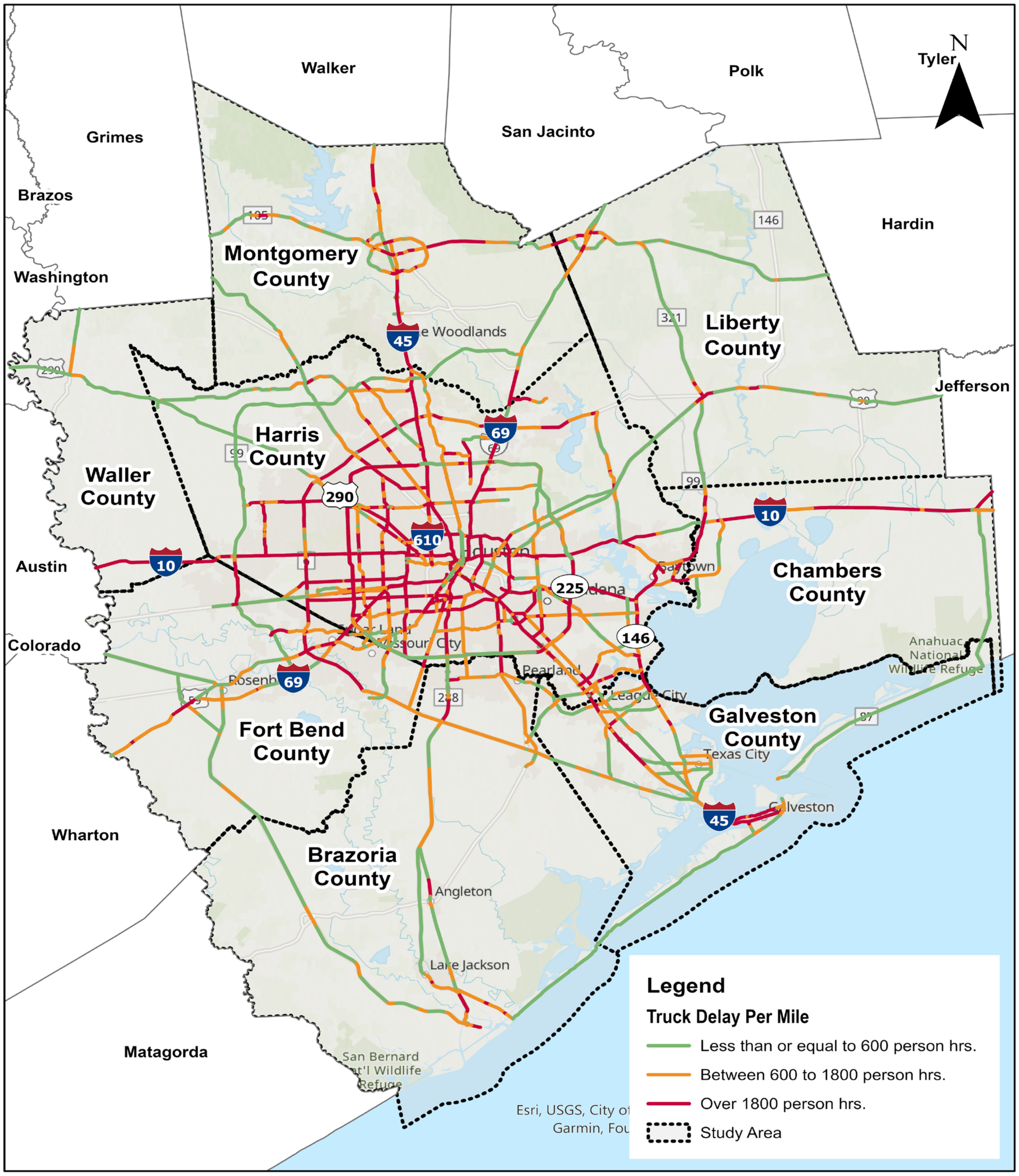


Figure 2-14: Truck Delay Per Mile for Major Corridors in the H-GAC Region

The analysis reveals that the most heavily congested segments for trucks within the H-GAC Region are predominantly located in Harris County. Specifically, I-10 and I-610 experience congestion along their entire length within the region. Additionally, Beltway 8 is congested for trucks between I-45 North and I-69 South. Furthermore, there is congestion on I-45 North, particularly when traveling from the core of Houston towards Dallas. SH 225, which serves as a critical freight corridor, exhibits notably high levels of delays in the area. Moreover, major arterials running parallel to the interstates in the core of Houston also face congestion.

Outside the Houston core, congestion tends to be concentrated in areas near ports such as the Port of Freeport and the Port of Galveston, as well as at major interchanges.

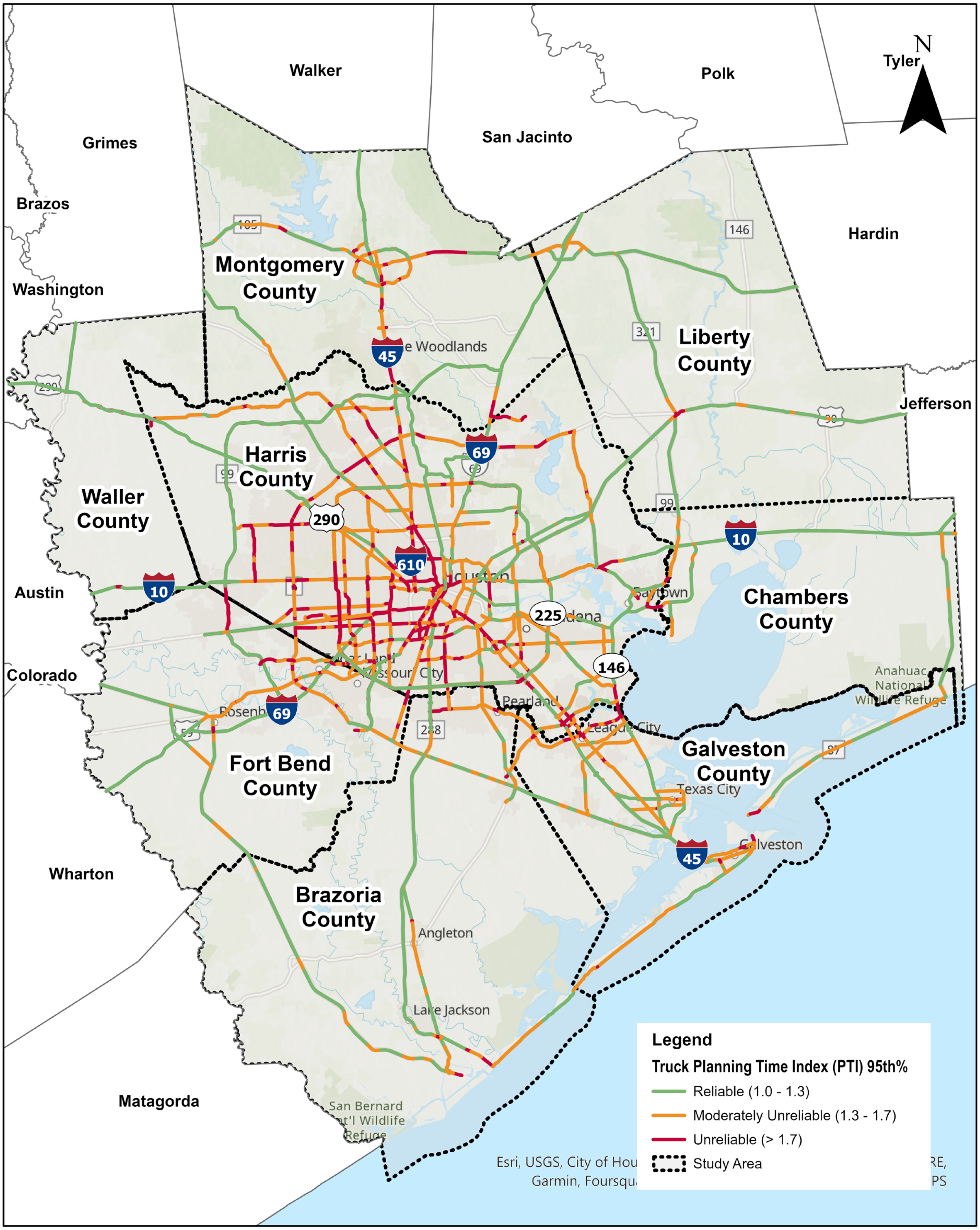


Figure 2-15: Truck 95th Percentile Planning Time Index for Major Corridors in the H-GAC Region

It is important to highlight that although certain major interstates within the H-GAC Region experience high delays, there are segments where travel times are relatively reliable with minimal variation. For instance, when heading towards Louisiana, I-10 demonstrates a PTI range of 1.0 to 1.3, indicating a consistent and reliable travel experience.

Similarly, within SH 225, there are segments characterized by reliable or moderately unreliable travel times. However, it is noteworthy that unreliable segments are primarily found on I-610, the western section of Beltway 8 and the western section of SH 6.

These observations emphasize that while congestion may exist on major roadways, some specific segments still provide a level of reliability in terms of travel times, offering more predictable commuting experiences. However, it is crucial to address the segments that demonstrate higher variability and work towards improving the reliability of travel times.

2.3 Maritime Needs and Issues

2.3.1 Port Capacity

The region's ports will need to consider terminal expansion to accommodate growing volumes and demands of their respective port customers. The need for port terminals to grow and expand to accommodate growth and changes in volume is vital in maintaining the competitiveness of the region's businesses and supply chains that rely on port infrastructure. All Houston area ports have plans to expand their terminals, except for Texas City. For example, the Galveston Wharves Strategic Master Plan identifies the port growing its cargo land from 218.6 acres in 2018 to 368 acres in 2040, and Port Houston's 2040 plan identifies a series of conceptual alternatives to accommodate growth.

2.3.2 Houston Ship Channel

As vessels have increased in size, especially container ships calling at the port, the narrowness of the channel has resulted in restrictions and constraints. The system has constrained vessel sizes, draft restricted areas in the upper channel and inadequate channel configurations for vessels currently using the channel, including the width and size of channel bends and turns; these inefficiencies are contributing to congestion along the waterway, especially with the high volume of barge and deep-draft vessel traffic on the channel. In 2021, the Port Commission of Port Houston awarded $593 million in contracts for Project 11, and the first 11.7 miles was completed and open for navigation in March 2023. Project 11 will widen the channel by 170 feet along its Galveston Bay reach, from 530 feet to 700 feet. It will also deepen some upstream segments to 46.5 feet, make other safety and efficiency improvements and craft new environmental features.

2.3.3 Gulf Intracoastal Waterway

Maintaining the condition of the GIWW to its authorized 12-foot depth and 125-foot width is an ongoing task. Sediment is deposited from the rivers that intersect with the GIWW due to wind and wave action from the Gulf of Mexico. Past studies have shown certain segments of the channel are periodically shoaled to depths of less than 10 feet, which makes the waterway impassable to fully laden barges. Shoaling often results in light loading of vessels, where vessel operators do not fully load the vessel to leave additional draft. This increases shipping costs and reduces the efficiency of freight movement.

The Brazos River Floodgates (BRFG) were designed to help reduce shoaling along the waterway. However, this structure acts as a bottleneck for barge movement along the waterway and has multiple constraints including:

- The 75-foot opening of the structure results in barge tows having to be broken down, if the tows are two barges wide.
- The narrow gate opening and crossing geometry create hazardous cross currents and eddies, which, when coupled with winds and other issues, are the cause for many vessel impacts on the structure.

The combination of the above create delays to navigation, averaging 12 hours per barge. Addressing the condition and capacity of this bottleneck is a key need for the barge transportation industry.

2.4 Rail Needs and Issues

Central Houston is surrounded by a railroad inner belt line (formed by the HB&T Railway) and an outer belt line (UP's Strang Subdivision), from which railroad main lines of both BNSF and UP diverge in all directions. There are numerous junctions throughout the city where intersecting routes converge or cross each other at-grade. Unlike a highway interchange where dedicated lanes separate the merging traffic from through-traffic without interference or interruption from vehicles traveling the opposite direction, the railroad junctions of Houston are at ground level and are designed more like three-way or four-way street intersections. Trains merging to or from the belt lines may have to stop and wait for other trains continuing around the belt lines to pass.

In addition, many of the railroad lines merging into the belt lines, and portions of the Terminal Subdivision, have only one main line track, like a one-lane road. Trains cannot move in two directions simultaneously on a single-track railroad. Instead, trains moving one direction must pull into passing sidings to stop and wait for opposing traffic on the single-track main line to pass before resuming their journey. In Houston, trains may also stop and wait on the double-track segments of the belt lines for oncoming trains to move off the single-track main lines.

Rail operations in the Houston area are further challenged by the need for through-trains to be re-crewed at some point during their transit through the city. Because Houston has multiple rail yards in different locations around the city, the boundaries of the terminal area used to designate where crew changes are planned to take place is expanded to include all possible routings between adjoining subdivisions via the inner and/or outer belt lines and connectors. As a result, trains may come to a stop for extended periods of time both within yards and at points in between yards while they await a new crew to board the train and take it to the next terminal.

The average length of freight trains in the U.S. has increased by as much as 25 percent from 2008 to 2017.[11] This trend poses a challenge for railroad operations where yards and terminals are undersized to efficiently accommodate trains beyond a certain length. Additional investment is required to extend yard tracks or to establish suitable locations outside of yards for longer trains to hold as they await clearance to enter a yard or to await a new crew to board the train to take it to the next terminal without occupying highway-rail grade crossings or railroad at-grade junctions.

As per the Federal Railroad Administration database, there are approximately 1,400 public railroad crossings in the H-GAC Region on tracks owned or used by seven companies. About 86 percent of the railroad crossings in the region are at-grade crossings (approximately 1,200). At-grade crossings are where the railroad intersects with a roadway at the same level. This necessitates the use of gates that stop the movement of vehicles to let trains pass. Frequent gate closures can cause long back-ups resulting in severe congestion on high-traffic roadways and emergency vehicle inaccessibility. Frequency and timing of railroad crossing closures is dependent on a timetable of train movement. By one estimate, using 30 miles per hour (mph) as train speed, an average freight train that is 6,600 feet long would take about 150 seconds (2.5 minutes) to pass each crossing. Additionally, at-grade crossings pose safety risks since there is potential interaction of the trains with vehicular and pedestrian traffic. **Figure 2-16** shows the railroad crossings in the H-GAC Region based on the crossing position.

At some locations across the H-GAC Region, trains carrying goods halt for extended periods of time and block access across the roadway, forcing traffic to seek alternative routes. The blockages not only increase congestion but impact emergency and first responder services. There are 39 locations in the City of Houston where trains consistently block crossings. **Figure 2-17** shows the frequently blocked railroad crossings in the City of Houston. The presence of 28 blocked crossings along the I-610 Loop is significant given that several areas of high population and traffic concentration are found in the same locations.

11 United States Government Accountability Office, Freight Trains Are Getting Longer, and Additional Information Is Needed to Assess Their Impact, May 2019. Retrieved from: https://www.gao.gov/assets/gao-19-443.pdf

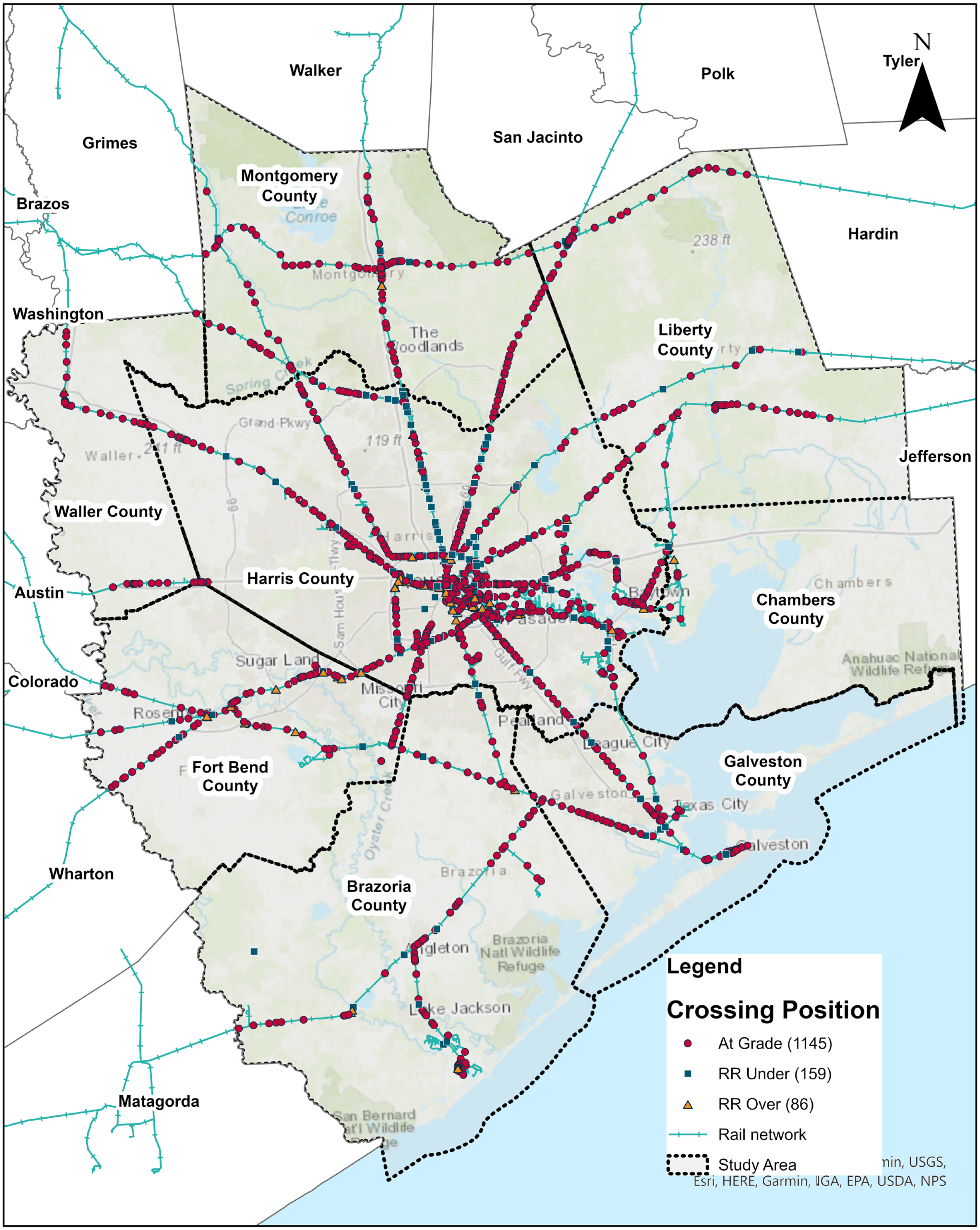


Figure 2-16: Railroad Crossings in the H-GAC Region – Based on Crossing Position

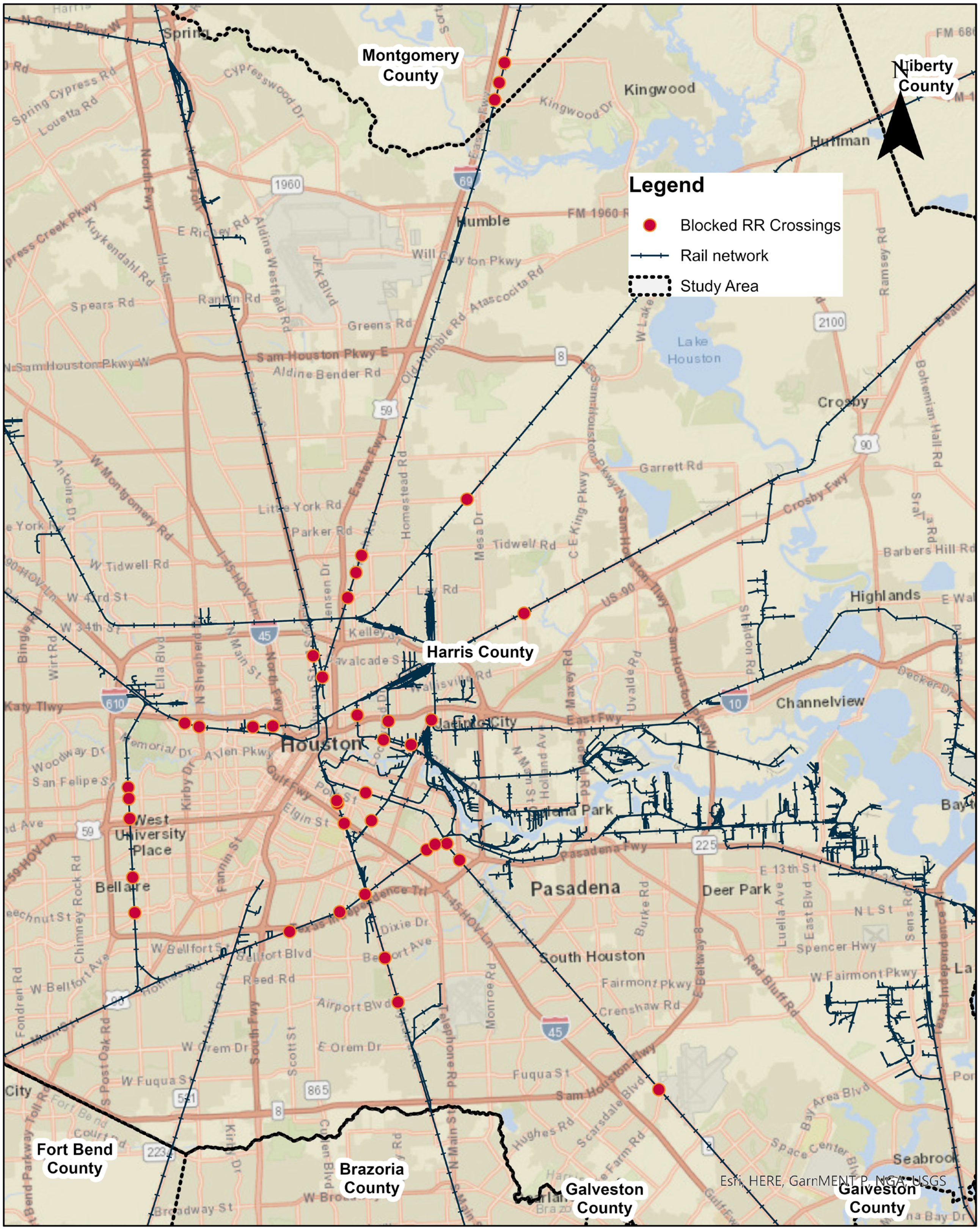


Figure 2-17: Frequently Blocked Railroad Crossings in the City of Houston

2.5 Airport Needs and Issues

The current air cargo ecosystem must expand to accommodate forecasted cargo demand. The expansion should include stands or aprons for freighter aircraft and facilities for handling and processing air cargo, including customs and security checks and loading/unloading air cargo to and from trucks. Most other airport components such as the runways, taxiways and fueling infrastructure are shared between cargo and passenger operations.

The Houston Airport System is commencing updates to the airport master plans for IAH, HOU, and EFD. Within these efforts HAS will conduct new and revised analysis of existing conditions, facility requirements, alternatives and develop updated plans for the development of cargo facilities.

In the 2015 IAH Master Plan the East Cargo Area was identified for expandable growth. The 2014 HOU Master Plan identified the need to demolish the existing air cargo facility and construct a new cargo building on a site in the east quadrant of the airport.

2.6 Freight Externalities

In addition to the needs and issues associated with each mode of freight movement discussed above, several externalities exist that impact the quality of life of residents. A brief discussion of some of the key issues caused by freight movement is provided below.

2.6.1 Safety

A particular issue associated with trucks in the region is the number and impact of trucks involved in crashes. Commercial trucks are involved in 8 percent of the region's fatal crashes and 4 percent of seriously injured crashes. In 2020, there were 63 commercial vehicle fatalities in the region. The H-GAC Region also has a disproportionate number of truck-involved crashes compared to other regions in the state, with the H-GAC accounting for:

- 17.6 percent of all crashes in the state involving large trucks
- 11.9 percent of the number of large truck-involved crashes resulting in a fatality
- 21 percent of the state total of large truck crashes involving hazardous materials[12]

Harris County is the highest ranked county in the state for all three categories. Commercial vehicle crashes at railroad crossings are also an issue. Seven percent of the region's highway crashes between 2017 and 2021 involving a train at a railroad crossing, involved commercial trucks. The H-GAC 2020 State of Safety report noted that semi-tractor trailer and large buses account for nearly 60 percent of the commercial vehicles involved in crashes throughout the region; 51 percent of commercial vehicle crashes by road class between 2016 and 2020 occurred on highways and toll roads.

Figure 2-18 shows the distribution of crashes along the THFN in the region. Crashes were concentrated around the Houston Downtown region and distributed along the main highways. Few isolated cases were also found near Lake Jackson and in outlying areas of Liberty County. Almost the entire length of I-45 in the H-GAC Region experiences high crash density compared to other interstates.

12 HDR Analysis of https://ai.fmcsa.dot.gov/gis/tools/safetyevent/

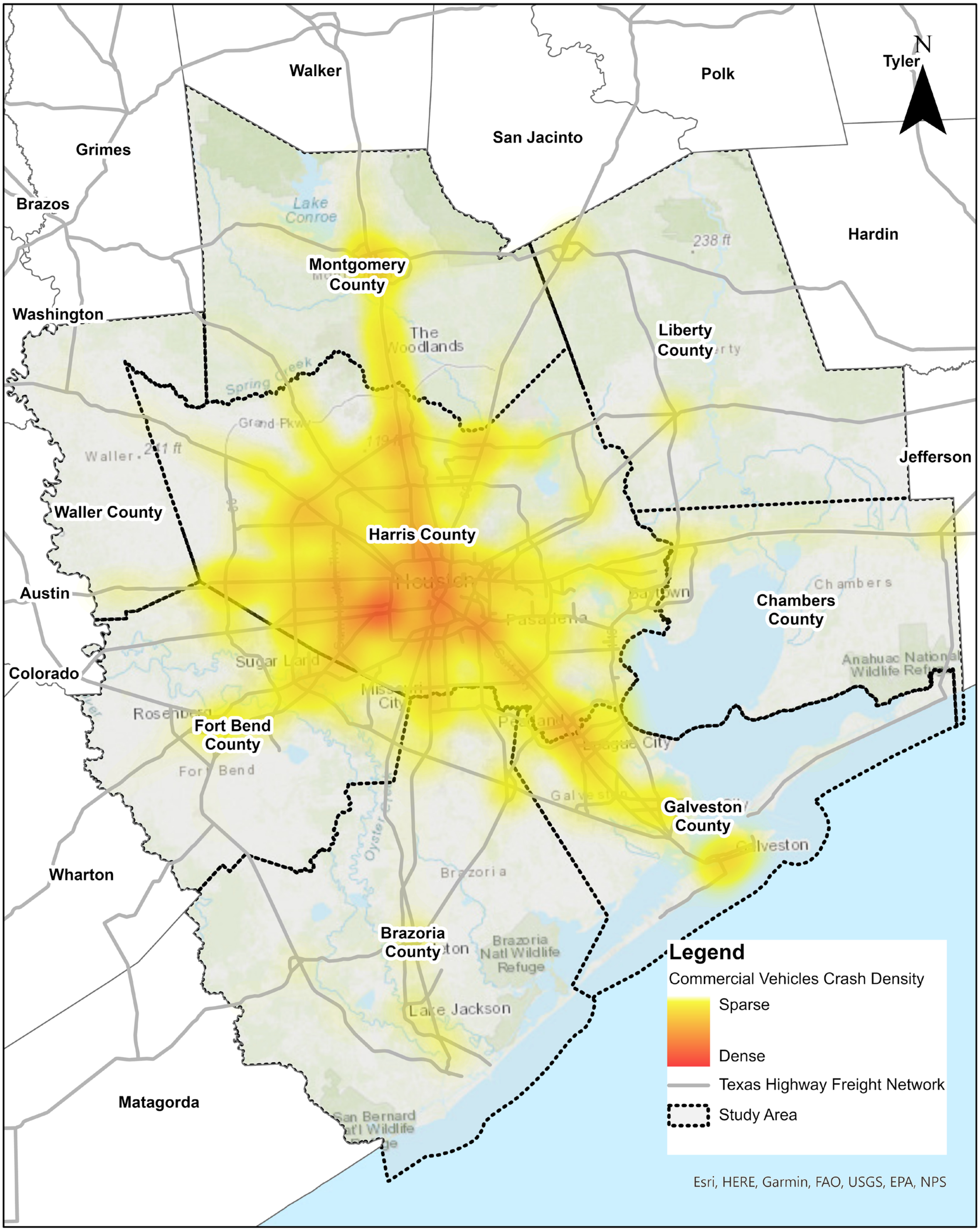


Figure 2-18: Commercial Crash Hotspots along Texas Highway Freight Network

2.6.2 Truck Parking

The region's truck parking availability is critical to ensure truck drivers have a safe and convenient place to park while they adhere to the federal rules associated with truck drivers' hours of service. These rules are aimed at ensuring drivers are rested and stay awake and alert.

In the H-GAC area, there are two kinds of parking areas based on ownership of land: Publicly Held Parking and Privately Held Parking.

2.6.2.1 PUBLICLY HELD PARKING

Few truck parking slots in the H-GAC area are on public lands. As shown in **Table 2-2**, there are 52 parking slots available outside the Grand Parkway and none inside. Similarly, peak demand information is only available outside Grand Parkway and the information is not available within the Grand Parkway loop.

Table 2-2: Publicly Held Truck Parking Slots by Area

INSIDE...	PEAK DEMAND	SUPPLY
Downtown Loop	Not Available	0
I-610 Loop	Not Available	0
BW 8/Sam Houston Tollway Loop	Not Available	0
Grand Pkwy/SH 99 Loop	Not Available	0
Outside Grand Pkwy/SH 99 Loop	44	52

Source: *2020 TxDOT Truck Parking Study*

Figure 2-19 shows the distribution of locations of public parking. However, peak demand can only be found in Chambers County.

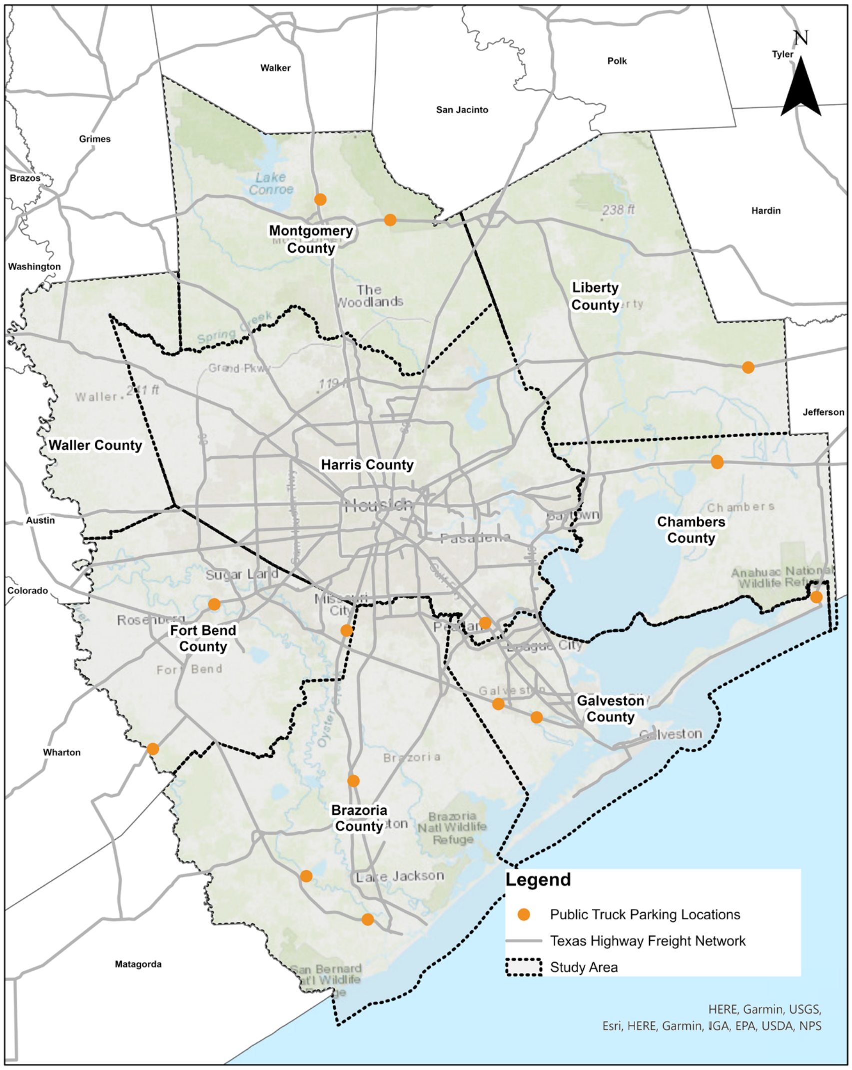


Figure 2-19: Publicly Held Truck Parking Spots in the H-GAC Region

2.6.2.2 PRIVATELY-HELD PARKING

There are more privately held parking slots within the H-GAC area than publicly held. They are distributed across the region outside of the Downtown Houston Loop. **Table 2-3** shows parking supply and demand by the number of slots and their distribution.

Figure 2-20 shows the distribution of private parking locations by the number of slots.

Table 2-3: Privately Held Truck Parking Slots by Area

INSIDE...	PEAK DEMAND	SUPPLY
Downtown Loop	Not Available	Not Available
I-610 Loop	180	317
BW 8/SHT Loop	561	531
Grand Pkwy/SH 99 Loop	1372	1308
Outside Grand Pkwy/SH 99 Loop	1180	1423

Source: *2020 TxDOT Truck Parking Study*

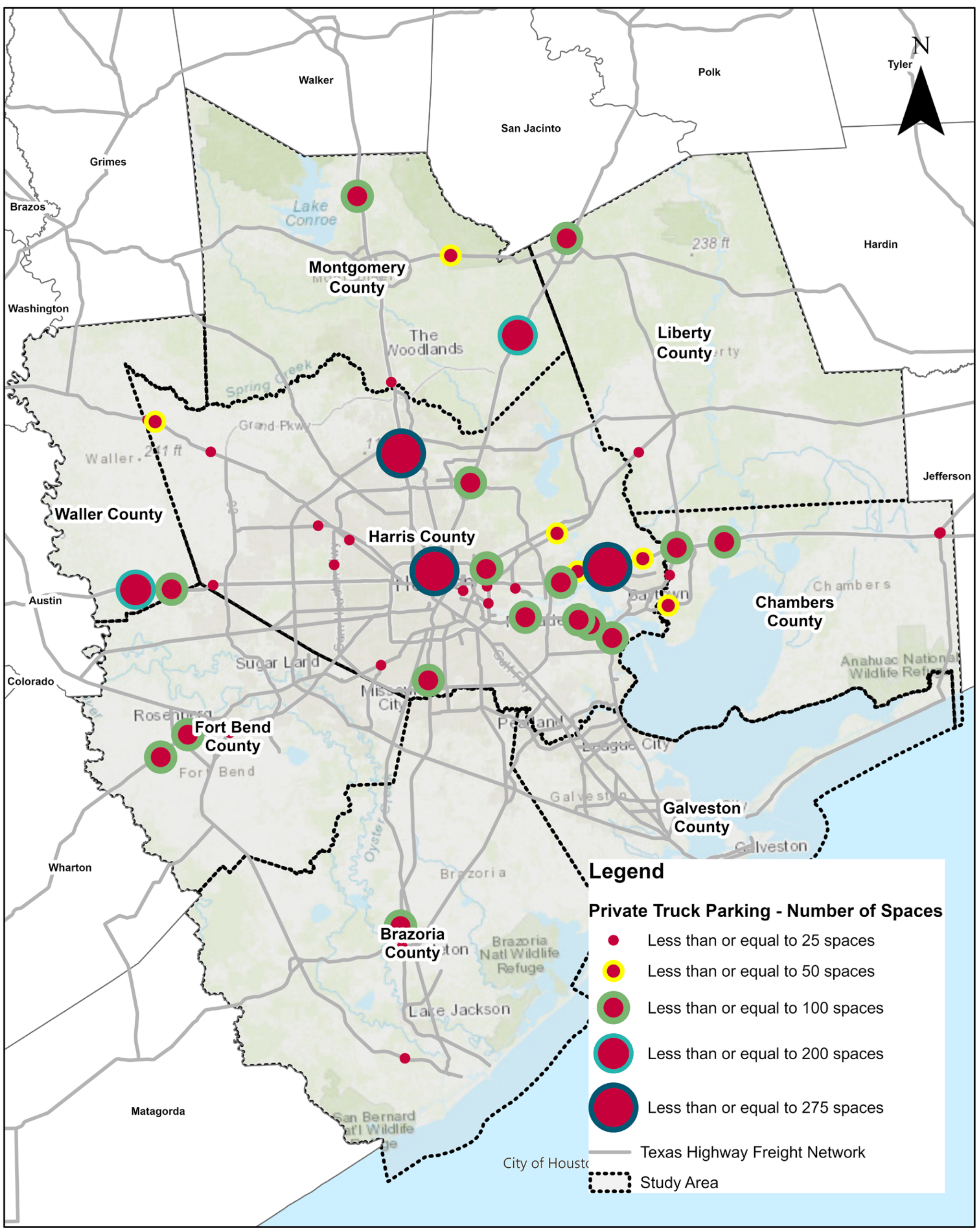


Figure 2-20: Privately Held Truck Parking Spots in the H-GAC Region

2.6.2.3 DEMAND VERSUS CAPACITY

Peak demand for truck parking outpaces supply for both privately and publicly held truck parking facilities. However, demand is not distributed evenly across the day. **Table 2-4** shows the total excess parking demand hours. This is calculated by multiplying the difference between peak parking demand and available parking supply by the number of hours demand outpaces supply in a day.

Figure 2-21 shows a distribution of truck parking demand and supply within each highway loop of the H-GAC area, along with the peak demand curve representing the number of hours when demand is in excess of supply.

Table 2-4: Total Vehicle Demand Hours

INSIDE...	PRIVATE PARKING	PUBLIC PARKING
Downtown Loop	Not Available	Not Available
I-610 Loop	Not Available	Not Available
BW 8/SHT Loop	1877 vehicle-hours	Not Available
Grand Pkwy/SH 99 Loop	3803 vehicle-hours	Not Available
Outside Grand Pkwy/ SH 99 Loop	2417 vehicle-hours	6 vehicle-hours

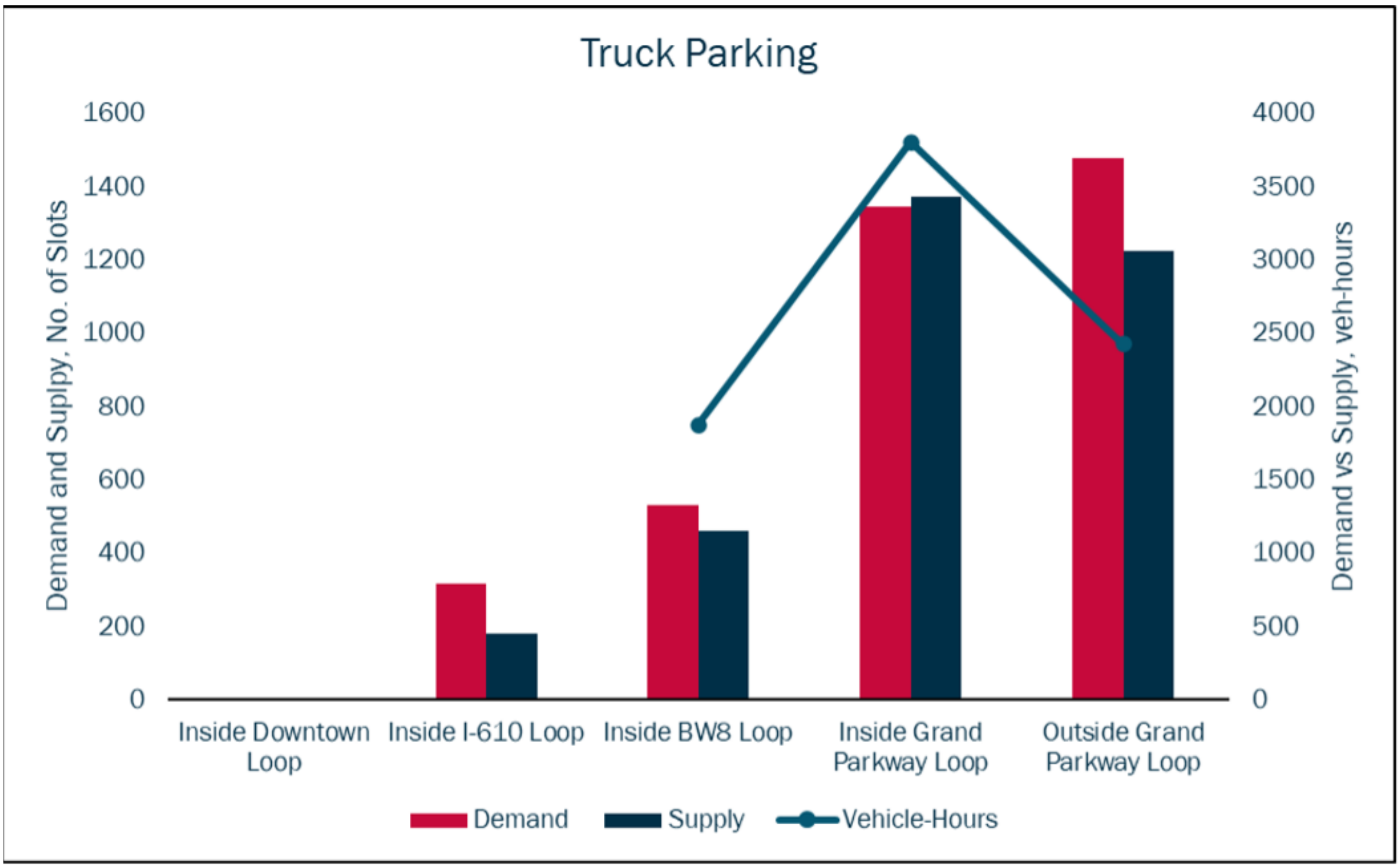


Figure 2-21: Truck Parking Supply and Demand Distribution

2.6.3 Emissions

Transportation activities generate multiple air pollutants including ozone, particulate matter and carbon monoxide. The Houston Region is designated as a non-attainment area for ground-level ozone. The H-GAC Region, along with the DFW Region, contain the two largest and longest standing ozone non-attainment areas in Texas. Ground-level ozone is not emitted directly, but rather is the product of photochemical reactions between NOx and volatile organic compounds (VOCs).

In the Houston Region, 25 percent of all ozone-forming NOx pollution is associated with the on-road transportation sector. As shown in **Table 2-5**, heavy duty trucks comprise seven percent of vehicle miles travelled in the region but produce 54 percent of NOx emissions associated with on-road transportation emission sources. NOx also reacts in the atmosphere to produce particulate matter.

In January 2023, the Environmental Protection Agency (EPA) proposed to strengthen the National Ambient Air Quality Standards for Particulate Matter (PM NAAQS). The EPA is proposing to revise the level of the primary (health-based) annual standard for fine particles (PM2.5) from its current level of 12 micrograms per cubic meter (µg/m3) to within the range of 9 – 10 µg/m3. According to the I-45 Corridor Zero Emission Vehicles (ZEV) Plan, of the nine regulatory PM2.5 monitors within the region, three monitors' regional design values are above 10 µg/m3, another two monitors are above 9 µg/m3, and finally another two are above 8 µg/m3. It is, therefore, possible the region could receive another non-attainment designation. The EPA projects that Harris County would also not meet the annual fine standard for particulate matter in 2032.[13] Nationally, highway vehicles account for 6.2 percent, and non-road mobile sources are associated with 7.9 percent of fine particulate emissions. Non-road mobile sources include warehouses, distribution center yard tractors, intermodal and port facility cargo handling equipment, marine vessels and locomotives.

2.6.4 Addressing Growth

The freight forecasts identified in Chapter 5 indicate the region's freight tonnage will grow from 882 million tons in 2019 to 1,667 million tons in 2050. Trucks will remain the dominant mode share transporting 993 million tons in 2050. Trucks are the region's dominant freight mode carrying 401 million tons in 2019 and are expected to move 993 million tons in 2050,[14] equating to 25 and 62 million truck trips respectively.

With this projected growth, addressing needs and issues discussed above will be critical for the region. This requires new and upgraded freight-related infrastructure across all modes, exploring new freight-related technologies and approaches to bottlenecks such as Freight Shuttle and a Cross-Harbor Float Rail Service (similar to the cross-harbor operation in New York), as well as wide ranging policies and programs (discussed in Chapter 6) while addressing freight-related externalities.

Table 2-5: Houston-Galveston Area On-Road NOx Sources by Vehicle Type[15]

HGB 8-County Region	Light-Duty Gas	Light-Duty Diesel	Medium-Duty Gas	Medium-Duty Diesel	Heavy-Duty Gas	Heavy-Duty Diesel
Vehicle Miles Traveled (miles)	178,212,297	1,990,747	9,040,392	602,910	2,277,645	11,868,359
Vehicle Miles Traveled (percentages)	87%	1%	4%	0%	1%	6%
NOx (tons/day)	32.81	1.10	3.81	0.94	1.49	42.88
NOx Percentages	40%	1%	5%	1%	2%	52%

Source: *Texas Commission on Environmental Quality Texas State Implementation Plan HGB Region (March 2020)*

13 https://www.epa.gov/system/files/documents/2023-01/PM%20NAAQS%20Reconsideration%20Proposal%20-%20Overview%20Presentation_0.pdf

14 Based on a 16-ton truck payload

15 Vehicles classified as per FHWA: Light Duty Vehicles FHWA Classes 1-2 (<10,000 lbs), Medium Duty Classes 3-6 (10,001 – 26,000 lbs), Heavy Duty Classes 7-8 (>26,000 lbs)

3. Chapter 3 – Truck Origin-Destination Patterns

Understanding Origin-Destination (OD) patterns is essential for comprehending regional freight movement. It provides decision-makers with valuable insights, allowing them to:

- **Identify Key Freight Corridors:** By analyzing OD patterns, decision-makers can identify the major routes and corridors where freight flows are concentrated. This information helps to understand the primary arteries of goods movement within the region.
- **Optimize Infrastructure Investments:** OD analysis assists decision-makers in determining the areas that experience heavy freight traffic. This knowledge enables them to prioritize infrastructure investments, such as building or expanding highways, improving intermodal facilities, or implementing dedicated freight lanes to accommodate the demand and enhance freight mobility.
- **Plan Freight Operations:** Understanding OD patterns helps decision-makers plan and optimize freight operations. It enables them to strategically align distribution centers, warehouses, and intermodal facilities to meet demand and efficiently reduce transportation costs. It also allows agencies to provide supporting infrastructure such as truck parking, information and service centers, weigh-in-motion facilities, etc.
- **Develop Freight Policies and Regulations:** OD analysis provides decision-makers with evidence-based insights to develop effective freight policies and regulations. It helps formulate strategies addressing specific freight challenges, such as congestion mitigation, emission reduction and safety improvements.
- **Support Economic Development:** OD patterns contribute to economic development efforts by providing valuable information about the movement of goods and the connectivity of supply chains. Decision-makers can leverage this knowledge to attract businesses, promote trade and foster a favorable environment for regional economic growth.

By leveraging OD analysis, decision-makers can make informed choices and develop targeted strategies to improve freight movement, optimize infrastructure, enhance supply chain efficiency and support economic development within their regions.

3.1 Data Analysis

The Regional Integrated Transportation Information System (RITIS) platform data was utilized to perform OD analysis for this plan. The data sets used for the analysis are generated by INRIX and are compiled from live and historical GPS data streams. The sources of this data include GPS dispatch feeds from truck fleets, the reporting capabilities of newer "connected vehicles," and smartphone apps used by vehicle occupants.

The data set used for performing the OD analysis is described below:

- **Origins and Destinations** – The analysis focused on trips between Texas, Louisiana, New Mexico, Oklahoma, Arkansas, Mississippi and Alabama. These locations served as the origins and destinations for the analysis.
- **Time Range** – All available data for 2019 and 2020 was utilized in the analysis, which includes spring and fall months of the two years.
- **Vehicle Classes** – The analysis specifically considered Medium and Heavy vehicle classes. These classes broadly correspond to single-unit trucks and tractor-trailers, respectively.

The data was summarized for H-GAC's Traffic Analysis Zones (TAZ), and trip origins and destinations within each zone were aggregated and analyzed for estimating the level of truck activity. This allowed identification of zones with heavier truck activity based on the number of trips originating from or ending in those zones.

Utilizing H-GAC TAZ helps to organize the data spatially and provides a framework for understanding the distribution and concentration of truck activity within the region. This information can be valuable for transportation planners, policy makers, and analysts in identifying areas that may require targeted infrastructure improvements or policy interventions to address truck-related issues effectively.

An interactive dashboard tool was used to visualize the analyzed data using Tableau, a data visualization software. This dashboard provides a user-friendly interface to explore, query and interpret the results of the OD spatial analysis. The dashboard is published on H-GAC's freight data website to allow users, including other agencies or the public, to learn about the truck patterns in the region and download data for further analysis. The background data supporting this tool will be updated periodically to track changes in truck travel patterns.

In the dashboard tool, the user has the following selection options in dropdown form:

- **Aerial or Street Map** – Background can be chosen to display an aerial or a regular street map
- **Area** – Analysis could be done for H-GAC region only, outside H-GAC region only, or combined for both inside and outside H-GAC
- **Direction of Traffic Flow** – Trip direction can be selected as Inflow (trips entering the selected TAZ(s)), Outflow (trips leaving the selected TAZ(s)), Within TAZ(s), and All
- **TAZ ID** – One or multiple TAZs of interest can be selected by checking the box next to TAZ IDs

Users can also select TAZ(s) of interest by directly clicking in the Map #1 on the left side of the dashboard (hold Ctrl+ button on the keyboard for multiple TAZ selections). **Figure 3-22** shows a screenshot of the Tableau tool for selecting parameters.

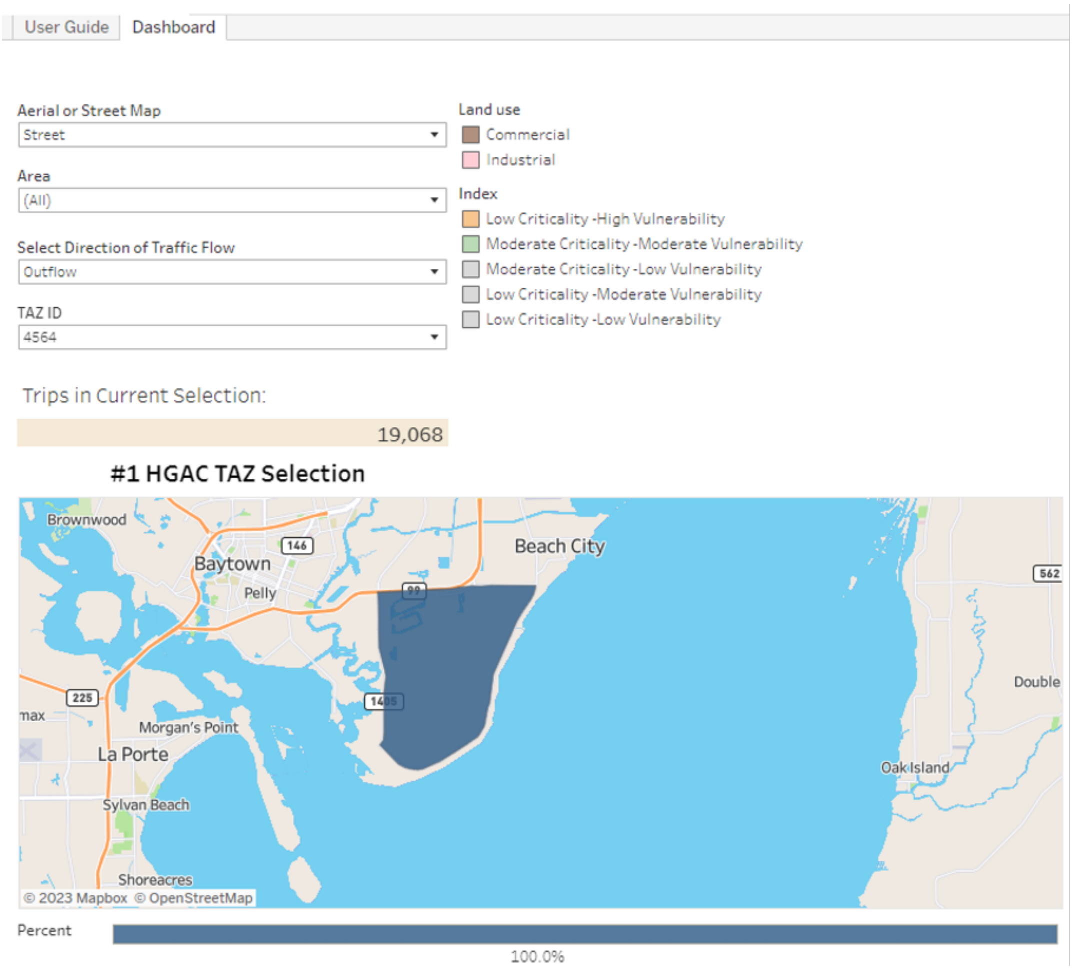


Figure 3-22: Origin-Destination Tool Selection Window

Based on the selected criteria, the distribution of trips for selected TAZ(s) is shown in Map #2 (Trip Origins and Destinations window) to the right of the dashboard. It must be noted that this is a dynamic window, and the size of the dots is dynamically adjusted based on the selected criteria and the relative number of trips based on selected criteria. By hovering a computer mouse over the dots, the number of trips generated, and the TAZ ID is displayed. This data is available to download for further analysis using the Download button in the upper right corner. **Figure 3-23** shows a screenshot of the output window in the Tableau tool.

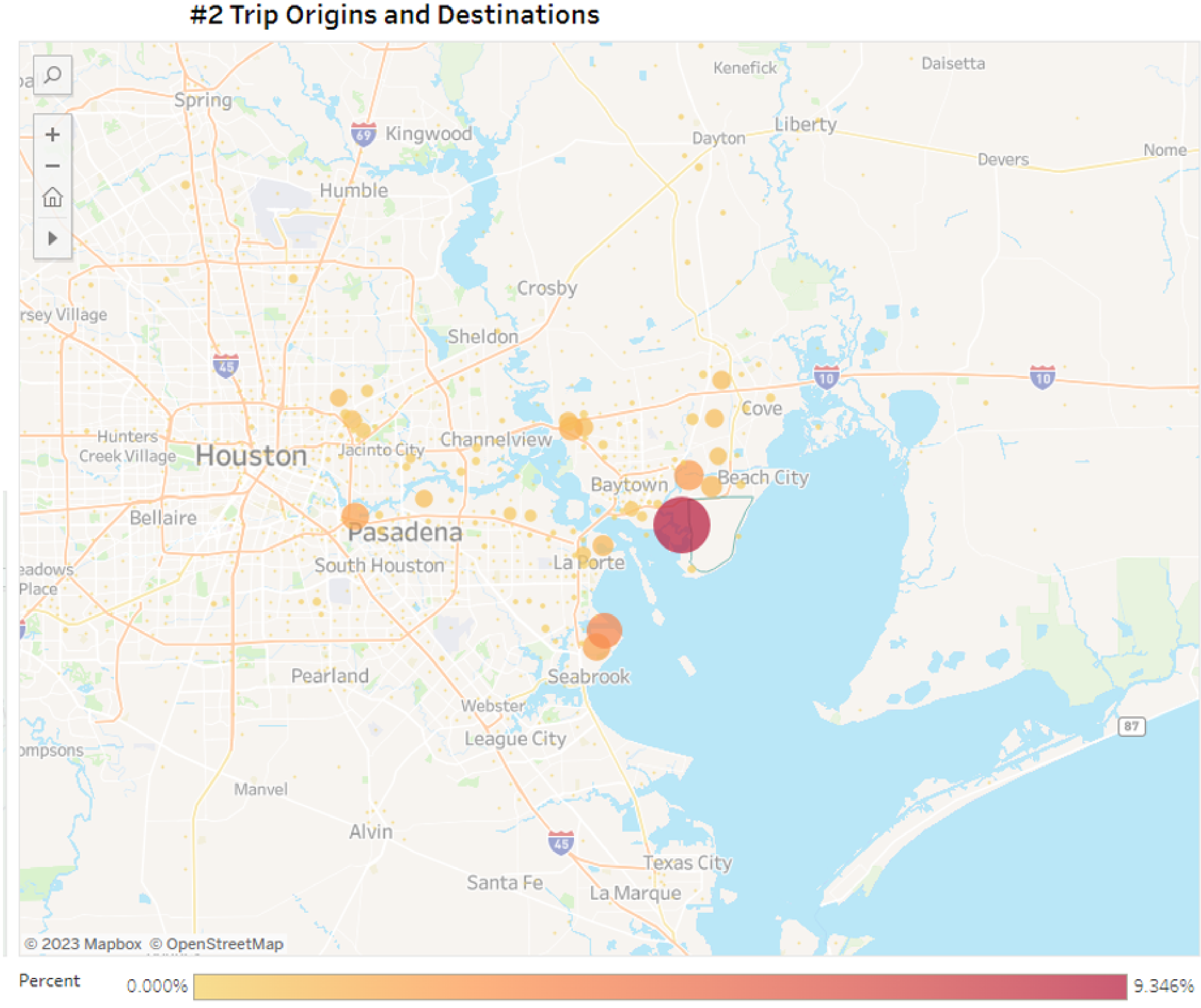


Figure 3-23: Origin-Destination Tool Output Window

3.2 Current Truck Travel Trends for Port Houston Terminals

The OD analysis tool was used to identify truck travel patterns for the region's key freight generator, Port Houston terminals, and the results are provided in **Figure 3-24**.

The analysis revealed a significant portion of trips to and from the port terminals primarily occur between the terminals and the surrounding areas. Several key freight generators were identified in this analysis including Cedar Port Industrial Park, AmeriPort Industrial Park, Chevron Phillips and various industries located in Deer Park and LaPorte. These areas contribute significantly to the freight traffic flowing to and from Port Houston terminals.

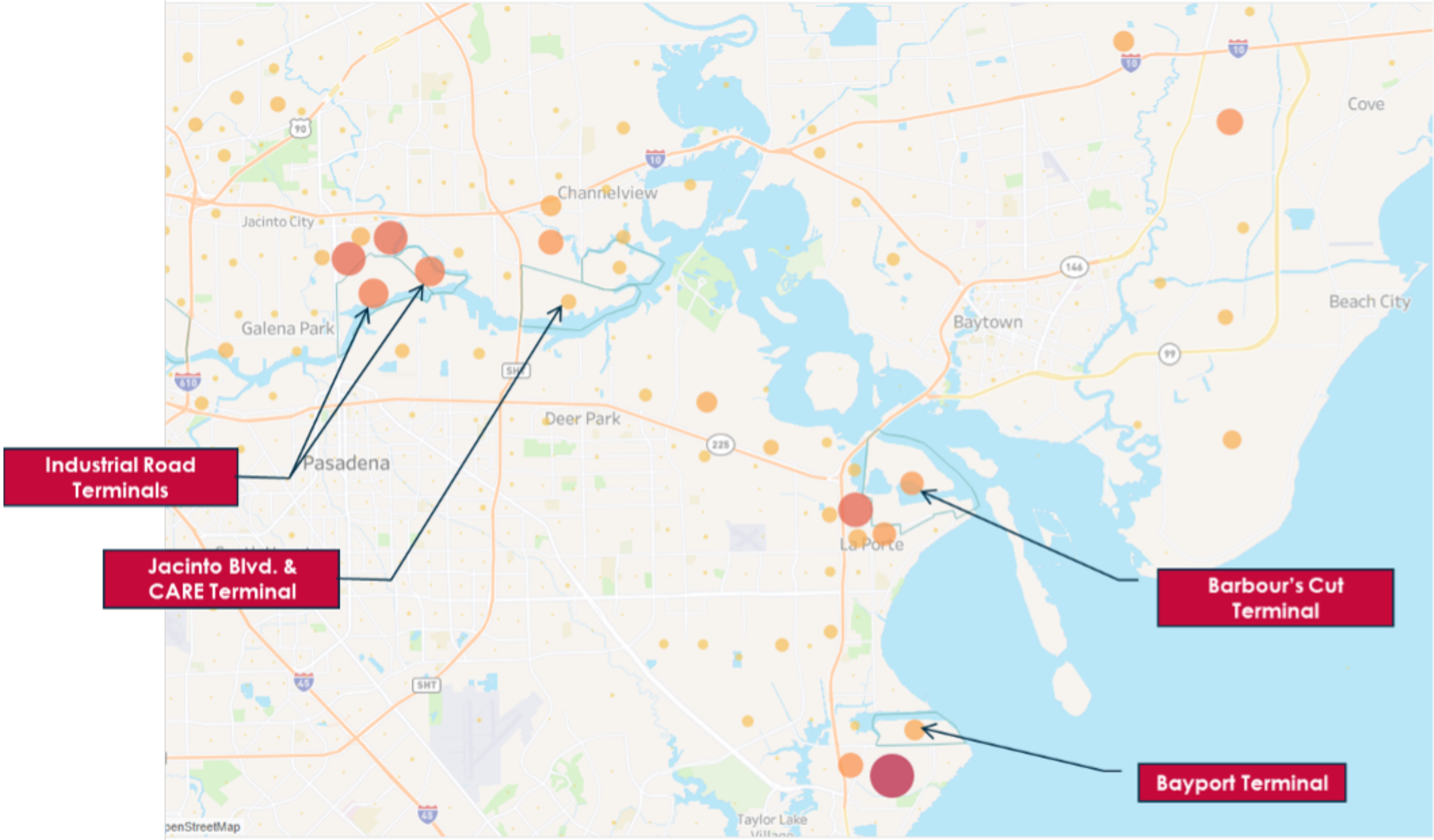


Figure 3-24: Major Freight Generators (TAZs) for the Port of Houston

3.3 Current Truck Travel Trends for Other Areas

A comparable analysis was conducted to identify the TAZs within the H-GAC Region that contribute significantly to freight generation. The resulting analysis identified the top 25 TAZs with the highest freight activity levels. **Figure 3-25** below visually represents these TAZs, highlighting the locations that serve as major freight generators within the H-GAC Region.

The analysis revealed several notable freight generators within the region. Port Houston significantly contributes to freight activity in the entire region. Additionally, industries in Pasadena, Deer Park, La Porte, Baytown and Mont Belvieu play a crucial role as major freight generators. The northeast Houston and Pleasantville areas are prominent freight generators within the urban core. A major H-E-B distribution center is one of the key freight generators, located in close proximity to the intersection of Clay Road and Gessner Drive. A cluster of distribution and warehousing facilities can be found at the intersection of I-45 North and Beltway 8. Multiple small industries generate freight along Beltway 8, north of I-10. The Dow Chemical Plant, located near the Port of Freeport, is another significant freight generator in the region.

A comprehensive list of major and minor freight generators and their locations is available as an online GIS map on the H-GAC website. This interactive map provides a visual representation of the freight generators within the region, allowing users to better understand the distribution and concentration of freight generators in the area.

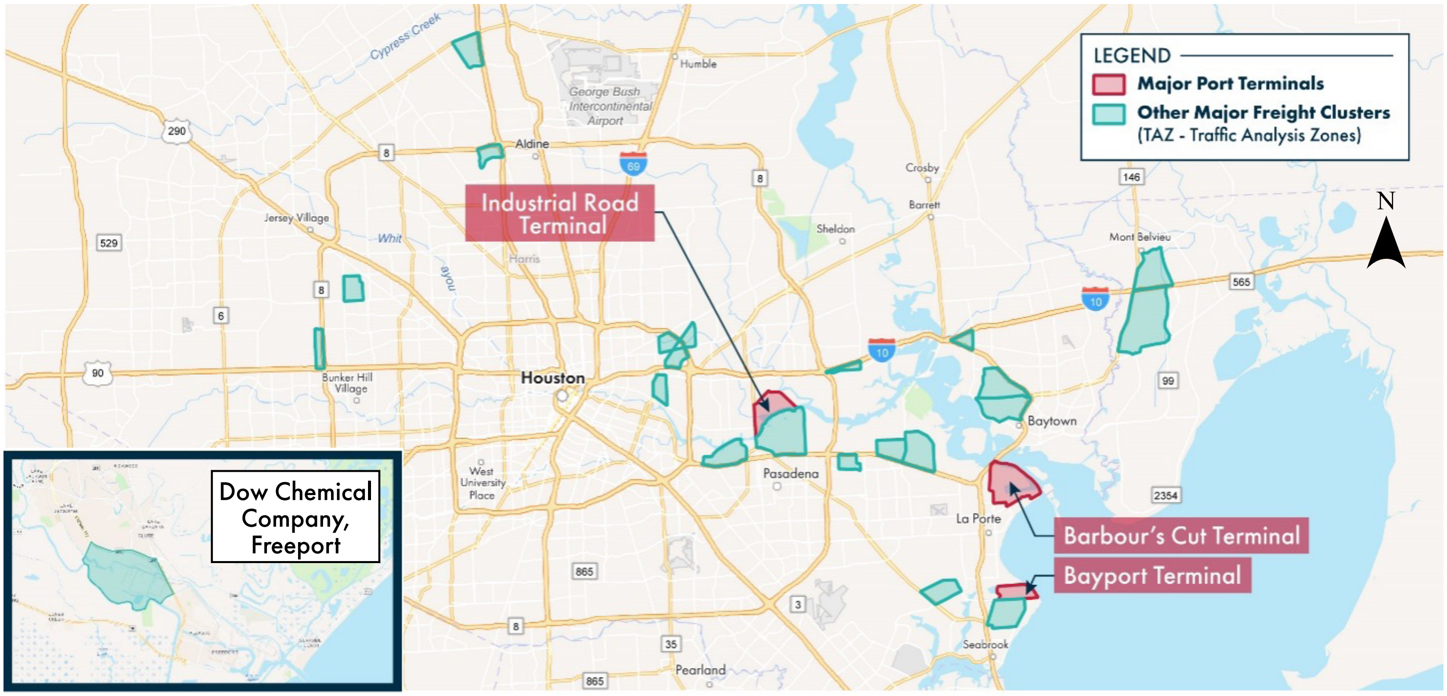


Figure 3-25: Top 25 Freight-Generating TAZs in the H-GAC Region

3.4 Secondary Truck Trip Analysis

Through data analysis, it became evident the first leg, or the primary freight movement, associated with Port Houston terminals and other freight generators begins or ends within the H-GAC Region. However, the secondary leg, or the ultimate freight origin or destination beyond the H-GAC Region, can be estimated using the OD tool developed as part of this plan.

For example, the Cedar Port Industrial Park, which houses large distribution centers such as Walmart and Home Depot, is a key freight generator. A sample analysis of trips arriving or leaving this zone is discussed below.

3.4.1 Second Leg Inflow Trips – From Outside H-GAC to Cedar Port Industrial Park

It can be seen in **Figure 3-26** below that most trips arriving at Cedar Port Industrial Park from outside the H-GAC area originate from Louisiana and Beaumont along I-10 East (about 37 percent of the trips), followed by San Antonio along I-10 West (about 24 percent of the trips), and from Dallas along I-45 (about 16 percent of the trips).

#2 Trip Origins and Destinations

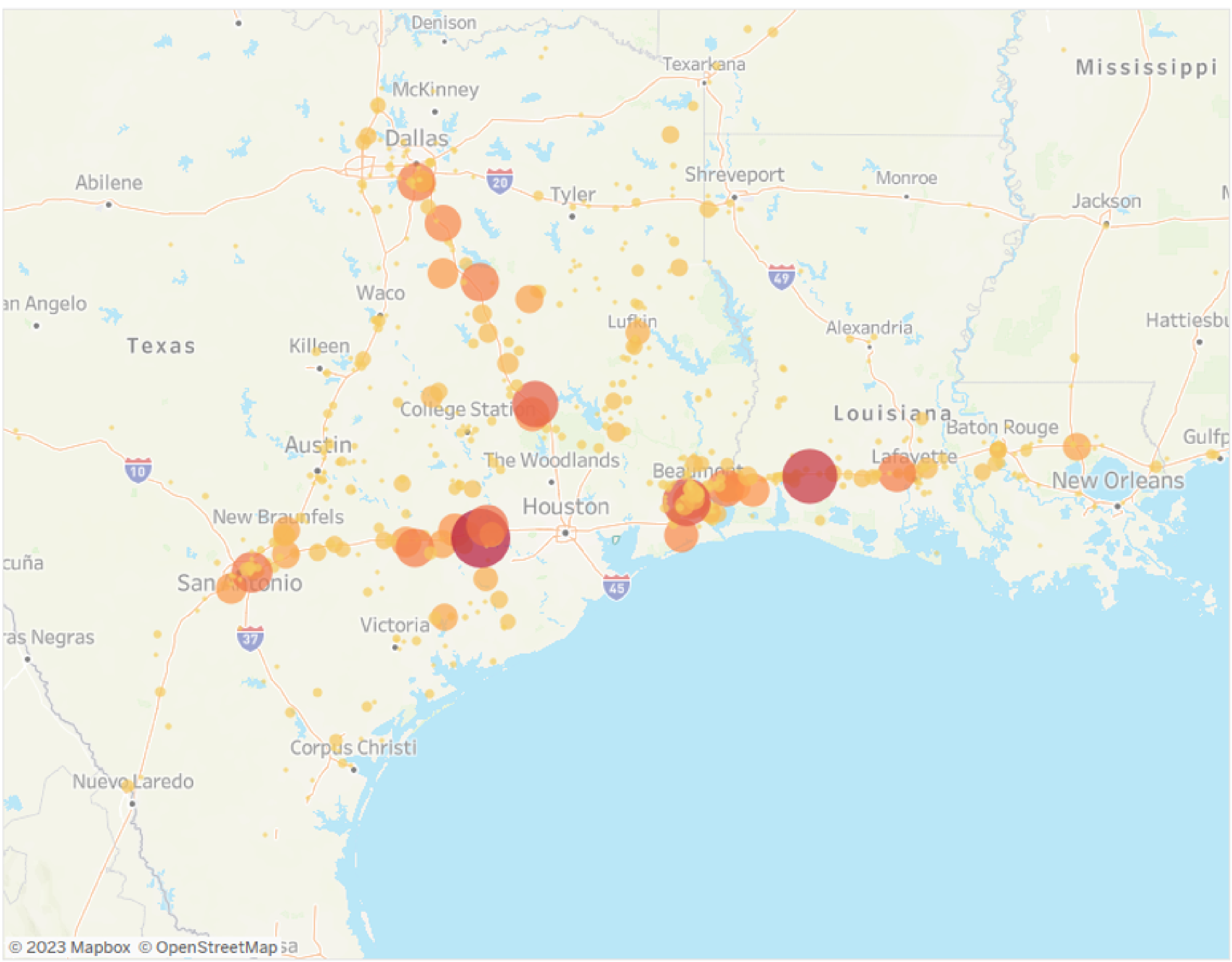


Figure 3-26: Second Leg Inflow Trips – From Outside H-GAC to Cedar Port Industrial Park

3.4.2 Second Leg Outflow Trips – From Cedar Port Industrial Park to Outside H-GAC

It can be seen in **Figure 3-27** below that most trips leaving Cedar Port Industrial Park are heading north towards Dallas along I-45 (about 42 percent of the trips), followed by Beaumont along I-10 East (about 17 percent of the trips), and San Antonio along I-10 West (about 15 percent of the trips).

It is important to note that INRIX data used for this analysis does not track individual trucks throughout their entire journey. If a truck departs from Cedar Port Industrial Park and stops at the Waller County rest area, the data may indicate the trip ended there. When the truck resumes its journey, it could be recorded as a new trip originating from the rest area. Therefore, when analyzing the data, it is advised to assess the overall trip patterns. It is important to exercise judgment and make inferences from the data, considering the possibility of trips being segmented due to stops or breaks along the route.

A similar analysis for Second Leg Origins and Destinations for Barbour's Cut Terminals is shown in Appendix B.

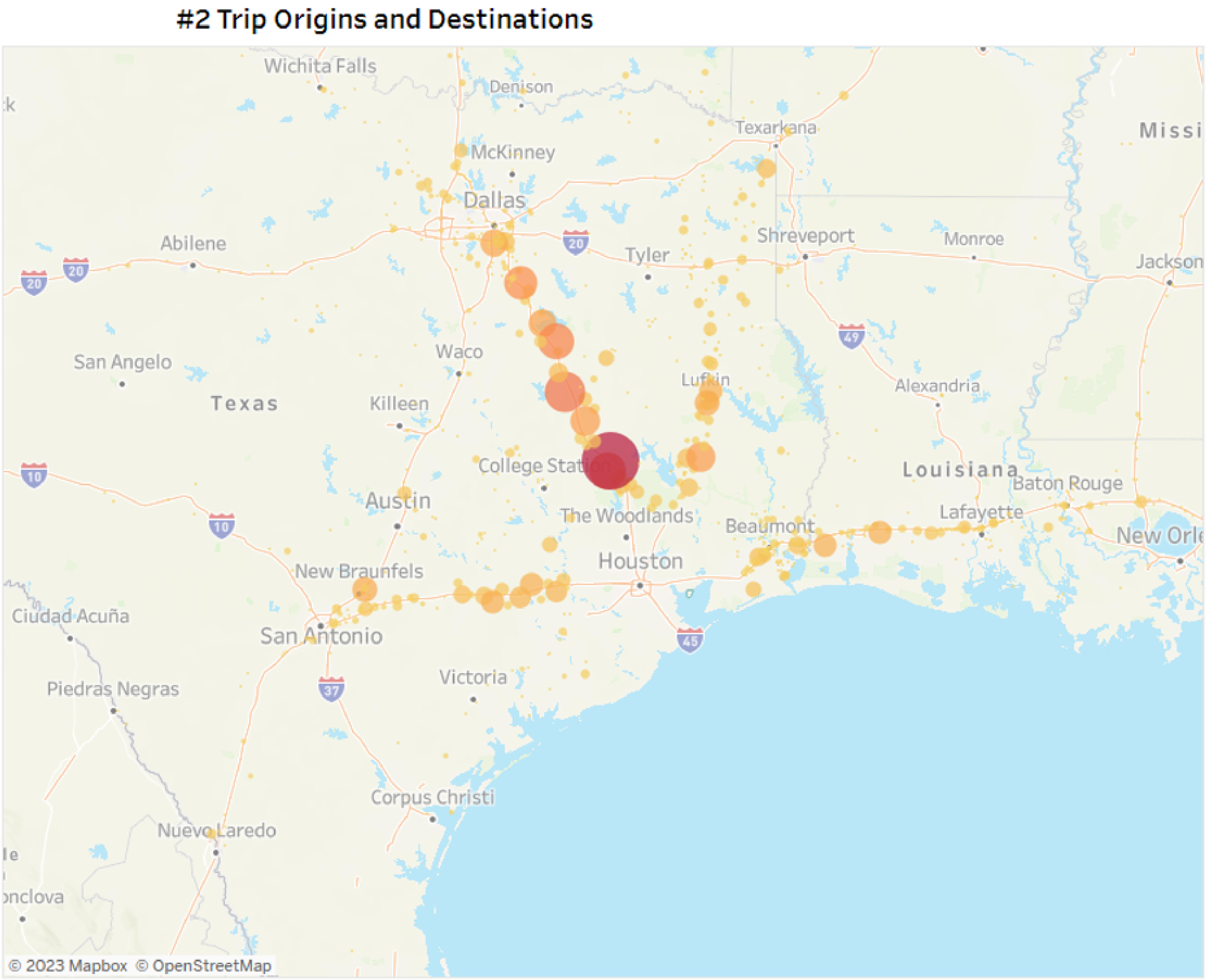


Figure 3-27: Second Leg Outflow Trips – From Cedar Port Industrial Park to Outside H-GAC

3.5 Other Truck Travel Patterns and Key Freight Generators as Noted By Stakeholders

Over the course of the development of this plan, multiple Houston area agencies were interviewed to understand the freight activity and travel patterns across the region. These interviews provided valuable insights from various stakeholders who possess firsthand knowledge of freight-related matters. This information, summarized below, also helped to understand the current state of freight movement and the anticipated future developments within the region.

Port of Houston is the largest freight generator in the H-GAC Region. The Economic Alliance Houston Port Region indicated the 25-mile stretch of the Houston Ship Channel contributes to 20 percent of the state's GDP, underscoring its significant economic importance. The areas adjacent to the Port Houston terminals typically experience substantial truck traffic. Port Houston's growth directly impacts the areas surrounding it, particularly near the Bayport and Barbour's Cut Terminal. For instance, there has been a significant influx of capital investment in the petrochemical industry within the Baytown area. Over the past decade, the region has constructed a new production capacity of over $100 billion. The Cedar Port Industrial Park, located in Chambers County, is the largest rail and water-served industrial park in the U.S. It has experienced rapid growth in the past few years and is expected to keep growing. West Chambers County houses multiple other warehouses and logistic centers due to its proximity to Port Houston terminals. It is also anticipated that the Grand Parkway (SH 99) would become the hub of warehousing and distribution particularly north of Baytown. In the City of Houston, the distribution centers are primarily located to the east side. This area's clustering of distribution centers is primarily due to its convenient access to Port Houston, I-610, I-10, the industrial area and Galena Park. Additionally, the area near Jersey Village along US 290 is experiencing growth, primarily because of its easy access to I-610.

The other area in the H-GAC Region that is experiencing rapid growth in distribution centers and warehousing activity is the Katy-Brookshire area in Waller County. TxDOT also identified this area as a critical freight area in their Regional Express Access Lanes (REAL) plan. TxDOT is exploring adding more public truck parking spaces and collaborating with a local private company to establish a truck parking facility. Under this arrangement, the parking spaces would be contracted out to some of the logistic centers in the area. The plan details multiple freight villages like a clearing house. The Katy-Brookshire location serves as a pilot for this concept; it is currently unclear whether TxDOT will own this "village."

Other than Port Houston, the Ports of Freeport and Galveston and the Houston Airport System (HAS) are involved in the import and export of goods. The Port of Freeport indicated Volkswagen is relocating its operations from Port Houston to the Port of Freeport. The Port of Freeport indicated that expansion opportunities are available in the 100-acre area outside the terminal. The port is collaborating with Volkswagen to develop 150 acres of land, with an additional 250 acres adjacent to that location also being readily available.

The primary function of the Port of Galveston is to serve as a cruise ship terminal; however, it also engages in the import and export of various goods. The Port of Galveston is currently in active discussions with a well-known container mover who has shown keen interest in constructing the upcoming cruise terminal. Moreover, Pelican Island, an area adjacent to the port, offers a substantial expanse of undeveloped land spanning approximately 1,500 to 1,600 acres, which can be used for cargo movement.

IAH, located in Houston, is a major cargo hub, moving 543,000 metric tons of freight annually. The cargo operations at IAH exhibit an average annual growth rate of 2 to 3 percent, with plans to increase it to 5 percent. HAS leadership aims to promote cargo development at IAH aggressively and is exploring expansion opportunities for cargo warehouses and infrastructure improvements. HAS is actively considering the market structure to identify specialized facilities required to attract new cargo businesses, such as those for perishable goods, animals/livestock and HM. HAS has discussed the potential expansion of the cargo center on Lee Road and extending Volta Road to connect with Kenswick Road, enabling direct access to cargo facilities. The future growth focus for airport-driven projects lies in the East Cargo Center on Lee Road.

Other than these primary freight generators, there are other areas in the H-GAC Region that are experiencing freight growth. Brazoria County is witnessing a growth in commercial and industrial sites, primarily in the northern region along county roads. There is also some industrial activity and expansion along SH 288, Lake Jackson, and Freeport. There is interest in developing manufacturing facilities near the future Grand Parkway locations across SH 288. Brazoria County contains many sand pits, which generate a lot of truck traffic. Additionally, Brazoria County is experiencing a significant increase in the development of solar farms and other alternative energy sources.

A large-scale industrial park spanning 1,000 to 1,500 acres is currently being developed in Liberty County, situated on SH 146. This industrial park is located north and west of the rail yard and will have connectivity to FM 1960 and US 90. The park is anticipated to serve as a significant repackaging area within the City of Dayton with products arriving by rail, undergoing repackaging and likely departing by truck. The industrial park construction is currently underway, with an estimated completion timeline of approximately three years. Liberty County is positioned to serve as an Inland Intermodal Freight Exchange, since it is conveniently situated along SH 146 and US 90.

In Fort Bend County, there are a few distribution centers, with most being retail distribution centers. One notable facility is Amazon's distribution center, situated near Harlem Road off SH 99. Another distribution center operated by Amazon is located in Missouri City, positioned off the Fort Bend Parkway. In addition, there is a Dollar Tree/Dollar General distribution facility situated approximately one mile southeast of I-69, accessible via Spur 10. Furthermore, a distribution center operated by Aldi can be found west of Rosenberg.

The individual stakeholders discussed specific corridors and intersections crucial for efficient movement of freight in the region. **Table 3-6** shows the critical interchanges/intersections for freight movement based on stakeholder input and **Table 3-7** shows the critical corridors for freight movement.

Table 3-6: Critical Interchanges/Intersections* for Freight Movement – Stakeholder Input

MAJOR STREET	MINOR STREET	STAKEHOLDER(S)	ADDITIONAL INFORMATION
E Richey Rd.	Union Pacific RR	Harris County	RR crossing improvements.
FM 1960	Lee Rd.	Houston Airport System	Redesign intersection. A couple of signalized intersections near one another causing long backups.
FM 359	Union Pacific RR	Waller County	RR crossing improvements.
FM 529	Golden Gate Dr.	TxDOT	Truck turning radii not adequate. Becoming maintenance issue/costly to replace paddles and delineators.
I-10	San Jacinto River	Economic Alliance	Raise bridge height to 52'.
I-69	Will Clayton Pkwy.	TxDOT	IAH air cargo traffic uses this route. Direct connectors could alleviate traffic backups at lights.
Kenswick Dr.	Will Clayton Pkwy.	Houston Airport System	Provide direct connection for Kenswick Dr. between EB and WB of Will Clayton Pkwy.
Kuykendahl Rd.	Union Pacific RR	Harris County	RR crossing improvements.
Lee Rd.	Will Clayton Pkwy.	Houston Airport System	Reconstruct intersection to provide higher turn radii for trucks.
Lee Rd.	Greens Rd.	Houston Airport System	Expand for additional lanes.
Little York Rd.	Union Pacific RR	Harris County	RR crossing improvements.
Morton Rd.	FM 2855	Waller County	Intersection safety improvements.
Mt. Houston Rd.	Union Pacific RR	Harris County	RR Crossing Improvements.
Port Rd.	RR Crossing	Port Houston Economic Alliance	Provide grade separation over the Railroad crossing.
Rankin Rd.	Union Pacific RR	Harris County	RR crossing improvements.
SH 146	Barbour's Cut Blvd.	TxDOT Port Houston Economic Alliance	Direct access to SH 146 from Barbour's Cut Terminal similar to Bayport DC Ramps just south of this location will alleviate traffic backup at lights.
SH 225	Independence Pkwy.	Economic Alliance	Need a dedicated turn lane to get trucks in and out of Independence Pkwy and increase turning capacity.
SH 225	BW 8	Port Houston Economic Alliance	There is funding available to construct 5 of the 8 direct connectors. It is necessary to construct the remaining three direct connectors.
SH 6	FM 1736	TxDOT	Eighteen wheelers have difficulty crossing due to high traffic volume on SH 6 and narrow median.
SH 6	Kelley Rd.	TxDOT	Eighteen wheelers have difficulty crossing due to high traffic volume on SH 6 and narrow median.
SH 6	FM 2979	TxDOT	Eighteen wheelers have difficulty crossing due to high traffic volume on SH 6 and narrow median. Width of median is insufficient to store an 18-wheeler. There is a truck stop at this location and needs additional left turn storage.
Sheldon Rd.	Union Pacific RR	Harris County	RR crossing improvements.
Waco St.	Union Pacific RR	Liberty County	RR crossing improvements. Relocate the Crossing to the West.
Woods Rd.	Union Pacific RR	Waller County	Realign RR crossing to line up with Woods Rd. Current configuration poses safety risks.

* The 24 intersections/interchanges in this table are listed in alphabetical order.

Table 3-7: Critical Corridors* for Freight Movement – Stakeholder Input

CORRIDOR	LIMITS	STAKEHOLDER(S)	ADDITIONAL INFORMATION
Barbour's Cut Blvd.	From SH 146 to Port Terminal	Port Houston Economic Alliance	Widen to six lanes.
Bay Area Blvd.	From I-45 to Red Bluff Rd.	Harris County	Identified as priority corridor in a previous list developed by the County.
Clay Rd.	From US 290 to Brittmore Rd.	Harris County	Identified as priority corridor in a previous list developed by the County.
Clay Rd.	From SH 99 to Amazon Driveway	Harris County	Identified as priority corridor in a previous list developed by the County.
E Airtex Dr.	From I-45 to Hardy Toll Rd.	Harris County	Identified as priority corridor in a previous list developed by the County.
CR 334	From CR 322 to SH 36	Brazoria County	Need shoulders for additional safety.
CR 59	From FM 521 to Old Airline Rd.	Brazoria County	CR 59 is also used as a cut-through. CR 59 is a two-lane roadway and poses congestion and safety issues.
Fairmont Pkwy.	Within Harris County	Economic Alliance	Needs widening.
FM 1097 E	From SH 75 to Paddock St.	TxDOT	Realign FM 1097, construct two lane road in a new location and construct RR grade separation. City of Willis wants FM 1097 re-aligned and a way to bypass railroad crossing.
FM 1405	Within Chambers County	Chambers County	Identified as critical corridor for Cedar Port industrial park.
FM 1488	Within Waller County	TxDOT Waller County	Heavy truck traffic.
FM 1489	From US 90 to FM 359	TxDOT	Construct two lane truck bypass on new location; extend FM 1489 to 359 and construct RR grade separation. City of Brookshire wants a truck bypass around to relieve FM 359.
FM 1942	From SH 146 to Hatcherville Rd.	TxDOT Chambers County BWCCEDF Economic Alliance	Road improvements required.
FM 2004	From Neville Rd. to N of Highland Bayou and SH 6	TxDOT Port of Freeport	Reconstruct FM 2004 at SH 6 and construct RR grade separation. Some freight traffic from Port of Freeport uses FM 2004.
FM 2855	From US 90 to I-10	TxDOT Waller County	Extend FM 2855 to I-10
FM 2920	Within Waller County	Waller County	Heavy truck traffic.
FM 362	From US 290 to FM 359	Waller County	Trucks use this route to reach the City of Brookshire.
FM 517	From FM 1266 to Dockrell St.	TxDOT Galveston County	Reconstruct FM 517 and construct RR grade separation. City of Dickinson says a lot of refinery traffic gets stuck behind trains.
FM 521	Within Brazoria County	Brazoria County	FM 521 is used as a cut-through to avoid congestion on SH 288.
FM 563	From I-10 to US-90A	Liberty County	FM 563 is used as an alternative route for trucks.
FM 565	From SH 99 to I-10	Chambers County Economic Alliance	Needs road widening.
Harborside Dr.	From I-45 to Ferry Rd. N	Port of Galveston Galveston County TxDOT	Needs grade separation along entire corridor.
Hardy Toll Rd.	From I-45 to I-610	Harris County	Identified as priority corridor in a previous list developed by the County.
Hatcherville Rd.	From 1942 to Chambers/Liberty County Line	Chambers County BWCCEDF	Needs road widening.

I-10	Entire H-GAC Region	TxDOT Economic Alliance Chambers County Harris County	Needs road widening based on PEL study recommendations.
I-610	Near Ship Channel Bridge	Port Houston	RTP has replacement of I-610 bridge. However, the roadway should be widened in conjunction with bridge replacement.
JFK Blvd.	From BW 8 to Lauder Rd.	Harris County	Identified as priority corridor in a previous list developed by the County.
Kenswick Dr.	From FM 1960 to Will Clayton Pkwy.	Houston Airport System	Needs road widening.
Kuykendahl Rd.	From SH 99 to Cypress Creek Pkwy.	Harris County	Identified as priority corridor in a previous list developed by the County.
Lee Rd.	From FM 1960 to Will Clayton Pkwy.	Houston Airport System	Evaluate for airport operations.
Lockwood Dr.	From I-45 to Ley Rd.	City of Houston	Lot of truck traffic.
Louetta Rd.	From I-45 to SH 249	Harris County	Identified as priority corridor in a previous list developed by the County.
Market St.	Various sections within Harris County	Harris County	Identified as priority corridor in a previous list developed by the County.
McCarty St.	From Beaumont Rd. to Clinton Rd.	City of Houston	Lot of truck traffic.
Old Port Industrial Rd.	From Pelican Island Causeway to Harborside Dr.	Port of Galveston Galveston County	Rehabilitate the corridor.
Old SH 146	From SH 146 to Port Rd.	Port Houston Economic Alliance	Reconstruct and widen the road.
Pelican Island Bridge	From Marine Dr. to Port Industrial Rd.	Port of Galveston Galveston County	Replace the bridge.
SH 146	Various sections in Chambers and Harris County	Chambers County Economic Alliance BWCCEDF	Needs road widening.
SH 225	From I-610 to SH 146	TxDOT Port Houston Harris County Economic Alliance	SH 225 is critical for freight movement to Barbour's Cut and Bayport Terminals. Needs road widening based on PEL study recommendations.
SH 288	Within Brazoria County	Port of Freeport Brazoria County	SH 288 is a critical corridor for freight movement from Port of Freeport.
SH 36	Within Brazoria County	Port of Freeport Brazoria County	SH 288 is a critical corridor for freight movement from Port of Freeport. Once widened it is anticipated to generate more freight traffic.
SH 36A N & S	From US 290 to SH 36	Fort Bend County Brazoria County Waller County	New roadway proposed.
SH 99 (Grand Parkway)	From SH 146 to I-45	Chambers County Port Houston Economic Alliance TxDOT	SH 99 is currently one-lane in each direction for majority of its limits. This gives limited passing opportunities and poses safety as well as congestion issues. It needs to be widened to at least two lanes in each direction and exception should be obtained for heavy haul.
Sheldon Rd.	From S of Sheldon Ridge Way to Market St.	Harris County	Identified as priority corridor in a previous list developed by the County.
Tanner Rd.	From N Eldridge Pkwy. to Triway Ln.	City of Houston	Lot of truck traffic.
US 87	From SH 124 to Ferry Terminal	Port of Galveston Galveston County	Adjacent to coastline and experiences flooding. Rehabilitate the corridor since it is critical for movement of goods.
US 90A	Within Liberty County	Liberty County	Need to build a bypass route around Dayton.

* The 47 corridors in this table are listed in alphabetical order.

4. Chapter 4 – Interagency Coordination, Stakeholder and Public Involvement

4.1 Introduction

Public involvement and stakeholder engagement has been an essential element of this plan development. Throughout the planning process, over 30 meetings were held with the Steering Committee, Stakeholder Forum, the Greater Houston Freight Committee (GHFC), the general public, private sector industry groups and individual freight-related interests. These meetings were conducted over the course of the study and provided opportunities to share information, solicit input, summarize data analysis, provide feedback and review plan recommendations.

Meaningful input was obtained through the public involvement process that informed and supported the plan development. Through dialogue with the Steering Committee, stakeholders, the public, industry groups and others, key issues were identified and discussed that were a critical piece of the planning analysis. The following is a summary of the comprehensive public involvement and stakeholder engagement process, including highlights of input from the many meetings and community/stakeholder groups.

Appendix A provides a detailed table of the meetings conducted, timeline, participants, key discussion topics and action items.

4.2 Steering Committee

Early in the planning process, the public involvement effort got underway by identifying Steering Committee members to provide input and oversight throughout the study. The Steering Committee played a vital role in identifying important resources and contacts to include in the plan development. The Steering Committee members reviewed the Plan recommendations and provided direction in establishing priorities and policy positions. The Steering Committee's responsibilities included:

- Provide input on a vision statement and goals for the plan
- Receive, review and provide input throughout the development of the plan on transportation issues, public outreach, proposed projects, and the final plan and deliverable
- Attend meetings as needed during the study
- Recommend stakeholders
- Serve as a champion for the study by informing stakeholders in the study area on the study progress and public meetings

The Steering Committee was comprised of representatives from cities and counties in the H-GAC area, TxDOT, the railroads, area ports, HAS, and area associations and government agencies that have a vested interest in freight mobility. A total of six Steering Committee meetings were held at key milestones during the planning and analysis process. Initially, the meetings were conducted virtually due to the COVID-19 pandemic. As pandemic restrictions eased, the meetings transitioned to in-person with a virtual component. These meetings were very productive and provided an effective forum to share information, identify issues and adjust the planning and analysis process to better address regional freight mobility needs.

A total of six steering committee meetings were conducted in this study. The first meeting was conducted in October 2021, where the vision and goals of the study were discussed along with a discussion on stakeholder criteria. In the second and third meetings conducted in March 2022 and June 2022, respectively, the study team shared information on the existing infrastructure conditions, commodity flow trends, critical truck origins and destinations within the region and a methodology to designate critical urban freight corridors. The comments and input received on the CUFC methodology were incorporated to recommend 90.72 miles of critical corridors in the network, which were subsequently approved by the Transportation Policy Council (TPC).

In fourth meeting, various freight related projects, policies and programs were discussed along with their preferred timeline. Steering committee ranked the types of projects, policies and programs for the study team to develop a more detailed analysis and follow-up action items. Using the input received at this meeting, a methodology was developed to categorize projects within the 2045 Regional Transportation Plan into high-, medium- and low- needs projects. The policies and programs were also grouped to address four primary freight externalities – congestion, safety, emissions and community impact. At the fifth meeting, maps showing project recommendations and next steps for policies and programs were shared for the Steering Committee review and input. Subsequently, comments provided were incorporated to develop a draft version of the Regional Goods Movement Plan, which was reviewed at the final meeting.

4.3 Stakeholder Forum

Stakeholder engagement was also an integral part of the public involvement effort for the development of this plan. Over 200 individuals were invited to participate in the Stakeholder Forum. These individuals represented cities; trucking companies; key industries; economic development organizations; freight carriers, including rail, air cargo, pipeline and maritime; and the freight nodes such as rail intermodal, seaports and airports across the H-GAC Region.

The duties of the Stakeholder Forum were to:

- Attend and participate in stakeholder meetings
- Receive updates on study progress
- Provide input on transportation issues and needs
- Provide feedback on proposed recommendations
- Help publicize the public meetings

Six stakeholder forum meetings were conducted over the course of the study. As with the Steering Committee meetings, the initial Stakeholder Forum meetings were conducted virtually and, over time, were transitioned to in-person gatherings with a virtual option. At each meeting, the project team provided information about the project, updates on the data collection and analysis, and draft project, program and policy recommendations.

The first Stakeholder Forum meeting was held in November 2021. At that meeting, the participants were introduced to the Regional Goods Movement planning process, and the goals and objectives of the plan. The attendees were a diverse group of shippers, carriers, local government officials, airports, ports and other freight-related interests with a variety of mobility, safety and emissions concerns. At the meeting, a real-time survey was conducted with the participants to gain a better understanding of their specific freight interests, major concerns and priorities. Results of the survey suggested that improved mobility (efficiency, reliability, congestion, etc.) and safety were the most critical goals. The attendees emphasized that recurring congestion was a major issue. Other issues included freight transportation costs, workforce availability and freight network resilience.

Picture from Stakeholder Forum Meeting in January 2023

Over the course of the next 16 months, Stakeholder Forum meetings provided additional detailed information about existing conditions and infrastructure, data analysis, freight markets, freight volumes and travel modes. In summary the series of Stakeholder Forum meetings were effective in presenting:

- A review of Texas freight and rail, TIP, RTP and UTP projects, and short list of freight-relevant projects
- Soliciting agency and stakeholder input regarding freight needs and challenges, and incorporating these concerns into the planning, analysis and recommendation phases of the plan
- Development of H-GAC's freight network database including the first/last-mile connectors
- Information regarding the data collection for the freight network and explained how the data is used to evaluate projects
- Shortlisting and refining policies and programs based on previous input

To further support the public involvement process and engagement, a comprehensive project website was developed to provide stakeholders and other interests access to links to the data tools, subscribe to meeting updates, and to previous meeting information and display materials. Stakeholders were presented with the plan recommendations, highlighting the implementable programs and policies and the project evaluation and scoring matrix. The stakeholders were highly engaged throughout the process and provided positive feedback and recommendations for further analysis. The input received from stakeholders proved valuable in understanding concerns, evaluating findings and crafting recommendations. The feedback received was incorporated in the planning effort and is reflected in the policy and program recommendations included in the plan.

Picture from Stakeholder Forum Meeting in April 2023

4.4 Public Meetings

Two public meetings were conducted as part of the RGMP public involvement and engagement effort. These meetings were open to all and an aggressive effort was made to invite the region-wide community to participate. Notices, emails and other correspondence were sent to community groups, civic clubs, churches and other interested groups to advertise the meetings. The first public meeting was conducted virtually over Zoom. Translation services were available in Spanish, Mandarin and Vietnamese. The meeting provided an overview of the project, identified freight mobility issues and summarized existing conditions. As part of the meeting, a real-time survey was conducted to gain a better understanding of who the audience was, what their major concerns were, and how to best keep them informed of the plan development and recommendations. The attendees suggested they wanted solutions and projects that would improve mobility, efficiency and reliability. They also encouraged the project team to find solutions to improve safety, both road and rail related.

The second public meeting was held in June 2023 after the analysis was complete and preliminary recommendations had been drafted. This meeting was held in-person with a virtual component. Spanish translation services were provided. This meeting provided a recap of the project's purpose and why the RGMP was being updated at this time. The audience was presented with a summary of existing conditions, the data collection process, analysis, review of best practices and overview of the project findings. The presentation concluded with the recommended policies, programs and projects designed to address safety, freight-related emissions, economic development, residential and community impacts, congestion and improve freight mobility. Participants, both in-person and via Zoom, were able to view the presentation materials and ask questions. This meeting provided an additional opportunity to solicit input from the public and confirm the RGMP goal of improving freight mobility through a series of recommended policies, programs and future projects.

4.5 Greater Houston Freight Committee

The GHFC is a unique committee sponsored by the H-GAC Transportation Planning Department. The committee was established to ensure full incorporation of freight into the transportation planning process, and promote on-going conversation between the private and public sector regarding freight transportation policies, needs and solutions. GHFC operates with an open membership and anyone with an interest in freight mobility, funding, maintenance and supply is invited to attend the meetings. The committee meets quarterly to discuss the current trends, legislation, technology and various other topics related to the multi-modal freight network and the movement of goods. Every time the committee met from January 2022 to June 2023 (six meetings) there was a presentation and update on the RGMP.

These meetings provided an excellent format to confirm the goals and objectives of the plan and discuss in more detail the issues and needs that impact freight mobility. The committee provided valuable input on where some of the bottlenecks and conflicts exist, and what additional research and analysis should be conducted. They suggested resources and contacts that should also be included in the planning process. Input from the GHFC played an important role in the development, review and recommendations included in the RGMP.

4.6 Private Industry Workshop

A workshop with representatives from the private industry was conducted in February 2023 to gather insights on proposed policies and programs. This meeting provided an opportunity for the private sector to express their concerns, and have an open dialogue regarding freight mobility and policies and programs that directly affect their operations. By involving the private industry, the project team was able to obtain firsthand feedback and expertise, ensuring a more comprehensive understanding of the potential impacts and feasibility of the proposed policies.

The meeting was held in-person at the Economic Alliance Houston Port Region office in east Harris County. A real-time virtual option was also available for those who were not able to attend the meeting in person. The meeting opened with a presentation and overview of the RGMP, but then the floor was opened for free-flowing discussion of key concerns and issues. The following highlights the valuable feedback received on specific policies discussed with the private sector.

- Challenges and Incentives for Off-Peak Deliveries/Pick-ups
- It is recognized that to avoid congestion, it may be best to move freight during the off-peak times of the day/week. However, one of the significant challenges with off-peak deliveries and pick-ups is the limited operating hours of shipping facilities. Trucking companies require extended hours to maximize their delivery capabilities, and restricting deliveries to off-peak times can negatively impact the shipping industry. To encourage off-peak truck travel, it is crucial to have shipping facilities open during both regular business hours and off-peak times. Additionally, all necessary facilities and services, such as restaurants, fuel stops and repair services, should be operational during off-peak hours to support truck drivers.
- Implementing Drop Yards and Matchback/Truck Turn Concepts
- Drop yards have been suggested as an alternative to off-peak hours for deliveries. However, implementing drop yards poses challenges as it requires additional handling and coordination, which may not be cost-effective for shippers currently. Similarly, the adoption of matchback and truck turn concepts faces implementation issues.
- Route Planning and Bypass Routes
- Truck drivers rely on systems like Garmin for route planning, but there are issues with 'No Trucks' and load restrictions. Inefficient route restrictions often lead to trucks using city and county roads, emphasizing the need for better access to efficient routes. It is also important to have a map indicating areas where trucks are not allowed, providing clear guidance on restricted areas. Using bypass routes to avoid congested urban cores can also help mitigate traffic impacts.
- Transition to Zero-Emission Fuels and Increasing Modal Share for Rail and Maritime
- The transition to zero-emission fuels, such as electric or hydrogen trucks, faces challenges related to reliability and supporting infrastructure. There are concerns over the range and availability of charging/fueling infrastructure, which may limit widespread adoption. Increasing modal share for non-truck modes, like rail and maritime, requires operational and transportation changes. However, if the above could be accomplished cost-effectively and efficiently, shippers would be open to the shift.
- Mitigating Impact on Local Communities
- To minimize the effects of freight transportation on local communities, the primary objective should be to alleviate traffic congestion. Constructing flyovers and dedicated lanes for trucks will separate truck traffic from non-truck traffic and improve efficiency.
- Autonomous Trucks
- The industry is exploring advanced technologies, such as autonomous trucks; however, vehicle autonomy has

its limitations and may not be implemented in the near future. Driverless trucks would require dedicated lanes and infrastructure improvements. At this time, it may be better to examine other technologies such as lane assist and automatic braking to enhance safety.

4.7 One-on-One Interviews with Regional Stakeholders

A unique feature of the public involvement effort for the RGMP was the implementation of one-on-one interviews with regional stakeholders to gain a better understanding of the regional freight mobility needs and concerns from multiple perspectives. Fourteen virtual interviews were conducted with government entities, agencies and organizations directly impacted by the movement of freight in the region. The project team heard firsthand about the major concerns and the suggestions for addressing those concerns. The interviews provided critical input that helped confirm the findings of the analysis and develop a series of recommendations that best respond to the needs and concerns that were identified. The following is a summary of the agecy interviews and key issues discussed.

- **TxDOT**

  TxDOT is in the process of developing the REAL Plan, which comprises a network of interconnected managed express lanes and mobility hubs to integrate and connect various transportation systems in the Greater Houston area. The objective is to establish a comprehensive and cohesive multi-modal network that is efficient, fair, adaptable and uninterrupted, catering to commuters and freight transportation. Of particular concern is the rapid growth of logistic centers and warehouses, which increase for additional strategically located truck parking facilities.

- **Economic Alliance Houston Port Region**

  The Economic Alliance Houston Port Region stressed there has been significant growth in the petrochemical industry and regional distribution center and warehouses. With this growth there is a critical need for roadway and infrastructure improvements. A number of key projects have been identified that would greatly enhance the efficient movement of freight in and around the Port Houston Region.

- **Port Houston**

  Over the last six years, the port has doubled its handling of container movement and expects the trend to continue. The port indicated the Regional Freight Priority list includes approximately 45 projects in the region. There is concern that some of the most critical projects are not included in the 10-year Statewide Transportation Program. The port would like to see the plan address these critical needs.

- **Port Freeport**

  Port Freeport is also experiencing significant growth. Volkswagen is relocating to Port Freeport and together, with Volkswagen, over 150 acres of land is being developed at the port. Port Freeport emphasized that careful planning should be undertaken with a forward-looking perspective, for the next 20 years and beyond. Long-term planning is crucial to ensure the effective handling and transportation of freight to and from the port.

- **Port of Galveston/Galveston County**

  The primary function of the Port of Galveston is to serve as a cruise ship terminal; however, it also engages in the import and export of various goods. The port receives grain via rail, subsequently exported to China, Europe and South America. Heavy equipment, particularly agricultural, is imported from China and Europe, and distributed locally and beyond the region using trucks and rail transport. The Port of Galveston is the primary freight generator in Galveston County. One of the top priorities for the county is the replacement of Pelican Island Bridge. Presently the bridge is not included in the National Freight Network. The county and the Port of Galveston identified several roadways and bridges in need of repair. The county could greatly benefit from additional routes or improvements to existing highways to ensure smoother and more reliable travel for commuters and commercial transportation.

- **HAS**

  IAH is a major cargo hub, moving 543,000 metric tons of cargo annually. The airport operates two cargo centers with the export-import balance being evenly split. The HAS leadership aims to promote cargo development at IAH aggressively, and is exploring expansion opportunities for cargo warehouses and infrastructure improvements that will result in greater freight traffic. During the interview, HAS identified several corridors and intersections that pose challenges to freight mobility and vehicular safety.

- **City of Houston**

  The City of Houston faces a significant challenge regarding the overall impact of heavy freight on its roads and neighborhood streets. Many of these roads were not originally designed to accommodate heavy freight traffic and, as a result, have deteriorated over time. Due to lack of zoning, industrial and residential developments are located next to each other. As a result, drivers of heavy trucks often choose to drive on residential roads, tearing them up. Another issue is limited availability of designated parking locations for trucks.

- **Harris County**

  Harris County is focusing on addressing the movement of goods by freight haulers between the deep-water ports in the region. However, an increasing issue arises from pass-through traffic, where goods are transported through the county without being distributed within the county or City of Houston. The challenge lies in catering to the needs of this pass-through traffic, which represents a significant portion of the larger goods movement within the area. The development of warehouses in Harris County is increasing demand on the county's transportation network. The county has also experienced a greater influx of truck and van in neighborhoods, adding to the congestion within the county and surrounding area.

- **Chambers County**

  Chambers County has experienced significant growth in recent years, particularly in west Chambers. Cedar Port is a 15,000-acre industrial park, which boasts the largest rail and water-served industrial park in the U.S. Chambers County lacks a workforce sufficient to meet the demands of its current growth. Employees must commute from surrounding communities to support the demand for employment. The influx of employees traveling to and from the area, particularly during shift change times, results in substantial congestion. During the interview, county officials highlighted several critical roadway improvements needed to support the increased traffic and freight movements.

- **Waller County**

  Like the other neighboring counties, Waller County has been experiencing significant growth, particularly in distribution centers and warehousing. Managing the anticipated traffic influx and upgrading road infrastructure pose ongoing challenges for the county. The county is concerned about heavy truck drivers using smaller county roads as shortcuts and causing damage. The county is interested in collaborating with Google or Waze to discourage heavy truck drivers from using local roads unsuitable for such traffic. The county also lacks sufficient designated truck parking and rest areas. Trucks parking along certain thoroughfares have created a safety problem.

- **Brazoria County**

  Brazoria County is experiencing tremendous growth, particularly in the northern region. There are several commercial and industrial sites that lend themselves to significant truck traffic. Brazoria County works closely with the Port of Freeport and experiences the freight impacts of the ports on numerous roadways. Rail access is limited at the Port of Freeport. This issue must be fixed since the Port of Freeport is a deep-water port and is becoming more important. Greater rail capacity is needed at the port to meet the growing demand of freight moving in and out of the county. There are just a few key corridors for freight movement in Brazoria County. Roadway improvements are needed to reduce congestion and improve safety.

- **Liberty County**

  A large-scale industrial park is currently being developed that will be served by rail and truck. Liberty County is positioned to serve as an Inland Intermodal Freight Exchange and will experience a significant amount of freight traffic. Truck traffic congestion is a major problem in Baytown and the surrounding area. The county suggested a bypass around the City of Dayton may help alleviate some of the congestion in the area. Liberty County also needs designated heavy-haul corridors for trucking. Liberty County is outside the 30-mile radius of Port Houston, excluding it from the 30-mile radius heavy-haul allowance.

- **Fort Bend County**

  There are several distribution centers in Fort Bend County. Most freight transportation in Fort Bend County primarily occurs on state roadways, with only a small portion utilizing county roads. Even newly constructed county roads are not designed to accommodate heavy truck traffic. SH 36 is one of the CFCs in Fort Bend County. The plans for SH 36 reconstruction include a designated route that would allow truck drivers to bypass the cities of Needville, Beasley and Orchard, which would streamline traffic and reduce conflicts. TxDOT is working on improvements on major roadways to increase capacity.

- **Air Alliance Houston**

  Air Alliance Houston was concerned about freight inflow and outflow, and the impact on vulnerable populations and how that will be addressed. Air Alliance Houston recommended to see solutions that show a focus on equity within the region. It was noted the impacts of freight movement are disproportionate on people of color and environmental justice communities.

  Air Alliance Houston is particularly interested in the overall reduction of emissions and moving from freight trucks to lower-emission choices. The discussions with Air Alliance Houston resulted in inclusion of several safety and emission-related policy recommendations, and identification of residential communities along key freight corridors that require careful considerations during corridor improvements. A number of rail crossings were also identified in this plan that need grade separation to alleviate blocked crossing issues in low income and minority communities.

These one-on-one meetings were highly informative and provided the project team with detailed information about current freight activities and mobility needs in the region. The meetings were a key component of the public involvement and engagement process, and were incorporated in the evaluation process and helped in developing plan recommendations for policies, programs and projects.

4.8 Conclusion

A robust public involvement effort, including meetings with many stakeholders and interested parties across the eight-county region, was conducted throughout the course of the RGMP planning process, providing regular updates as milestones were met. Through this process, input and feedback were solicited and incorporated into the study analysis, evaluation and plan recommendations. The public involvement process resulted in a trusted partnership with the community and is reflected in the outcome of the plan.

5. Chapter 5 – Commodity Flow Forecasts

Freight-associated industries produce goods, provide value-added functions (storage, processing, distribution, etc.), physically transport goods and/or substantially depend on the receipt of goods for their business function. The H-GAC Region is one of the largest freight economies in the country with freight-associated industries accounting for 37 percent of the region's employment and 26 percent of all Texas freight-related employment.

5.1 Overview of Commodity Flow Analysis

The commodity flows in the region by origin, destination, mode and trade type were analyzed for recent and future conditions using two available data sources:

- **The Transearch model, a commercial product of Standard & Poor's.** Transearch provides estimates of tons, value, or truck units; by origin and destination (at the county, business economic area or state level), commodity type, mode (truck, rail, air, water, pipeline, other/unknown) and trade type. Typically, Transearch includes domestic and North American Free Trade Agreement (NAFTA) trade volumes, but no other international volumes. However, the TxDOT version of Transearch was modified to include complete international trade information, along with improved coverage of the movement of fracking materials to and from Texas. Transearch does not include domestic pipeline data.
- **The Freight Analysis Framework, version 5 (FAF 5).** A product of the U.S. Department of Transportation, which provides non-confidential estimates of tons and value of cargo moved by truck, rail, air, water and pipeline modes. It offers less geographic and commodity-level detail than Transearch, but includes pipelines and the dataset is available at no cost.

The two databases differ on how the data is reported, so some differences on the datasets exist. The base year for the Texas Transearch database is 2019 with one forecast year in 2050. The FAF 5 base year is 2017 with multiple forecast years available to users. The FAF 5 analysis is based on totals for the Houston-The Woodlands Census Statistical Area (CSA), which is comprised of 14 counties. Two of the counties are not part of the 13-county H-GAC Region (Washington and Trinity) and one county that is part of the H-GAC Region (Colorado) is excluded. In contrast, the Transearch data is aggregated at county level. FAF 5 data includes domestic and international pipeline tonnage, while Transearch includes only NAFTA pipeline. In general, Transearch and FAF 5 agree on long-haul inbound and outbound tonnage, but FAF 5 often reports more short-haul tonnage within region. Overall, FAF 5 2019 total tonnage exceeds Transearch 2019 total tonnage by nearly 276 million tons. However, excluding pipeline tonnage, Transearch 2019 total tonnage is relatively close to FAF 5 tonnage in 2017 and 2019 (**Table 5-8**).

Table 5-8: Transearch and FAF 5 Tonnage Totals Comparison

	TRANSEARCH 2019, H-GAC COUNTIES, INT'L & DOMESTIC MODES COUNTED, NO DOMESTIC PIPELINE	FAF 2017, HOUSTON CSA COUNTIES, ONLY DOMESTIC MODES COUNTED	FAF 2019, HOUSTON CSA COUNTIES, ONLY DOMESTIC MODES COUNTED
Truck	400,542,226	481,911,367	452,415,648
Water	340,125,064	170,820,343	164,001,532
Rail	112,932,749	71,304,727	93,561,334
Pipeline	27,753,051	286,197,996	349,374,808
Air	501,858	188,522	208,081
Transearch Other	52,830		
FAF Other (Multiple Modes, Other & Unknown, No Domestic Mode)		110,727,014	97,984,276
GRAND TOTAL	**881,907,779**	**1,121,149,969**	**1,157,545,679**
TOTAL EXCLUDING PIPELINE	**854,154,728**	**834,951,973**	**808,170,871**

5.2 Freight Forecasts

The information obtained from Transearch and FAF for the years 2019 and 2050 was analyzed to understand the H-GAC region freight flows by quantities (tonnage and value).

5.2.1 Freight Flow Quantities

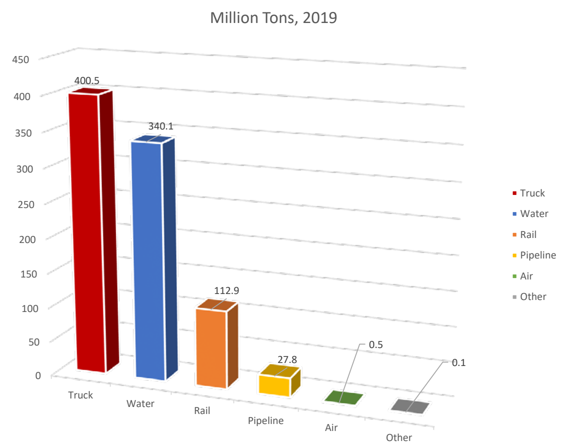
Based on Transearch data, 882 million tons of freight were carried on H-GAC's transportation network in 2019 with a value of $821 billion. The top three mode shares of freight tonnage in the region was carried on the roadway network with 401 million tons (45 percent share) worth $382 billion (47 percent share), with water tonnage following at 340 million tons (39 percent share) valued at $236 billion (29 percent share) as illustrated in **Figure 5-28.** Rail accounted for 113 million tons (13 percent of share) worth $145 billion (18 percent of share), with NAFTA pipeline and air following. It is worth noting that while air tonnage accounted for less than 1 percent of the total tonnage, its value share was 6 percent, since air cargo is typically high value, low tonnage, time sensitive cargo.

Moving forward, freight tonnage is expected to grow at 2.1 percent annually until 2050 to a total of 1.7 billion tons, while value is forecasted to grow 2.9 percent annually to $19 trillion as shown in **Table 5-9**. Truck tonnage share is forecasted to increase from 45 percent to 56 percent as water share will decline from 39 percent to 27 percent, largely due to the decline of energy products like coal.

Table 5-9: H-GAC Tons and Value by Mode, 2019 and 2050

	MILLION TONS, 2019	MILLION TONS, 2050	CAGR 2019-2050	VALUE (BILLION $), 2019	VALUE (BILLION $), 2050	CAGR 2019-2050
Truck	401	933	2.8%	382	1,063	3.4%
Water	340	446	0.9%	236	385	1.6%
Rail	113	244	2.5%	145	392	3.3%
Pipeline	28	42	1.4%	4	6	1.2%
Air	0.5	1.2	2.9%	53	140	3.2%
Other	0.1	0.2	3.1%	1	2	3.6%
GRAND TOTAL	**882**	**1,667**	**2.1%**	**821**	**1,988**	**2.9%**

Source: *Analysis of Texas DOT Transearch model; note that domestic pipeline tonnage is not included in the Transearch totals*



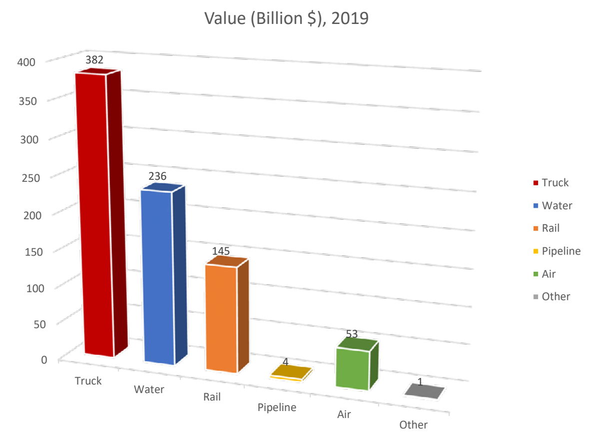


Figure 5-28: Tonnage and Value Modal Share, 2019

Source: *Analysis of Texas DOT Transearch model; note that domestic pipeline tonnage is not included in the Transearch totals*

5.2.2 Freight Flow Direction

As illustrated in **Figure 5-29**, domestic moves from and to the H-GAC Region represented the highest share of tons (476 million) and value ($473 billion) in 2019 and are projected to grow annually at 2.3 percent and 3.0 percent, respectively, by 2050. Combined exports (NAFTA and non-NAFTA) totaled 290 million tons in 2019 and are projected to grow to 452 million tons in 2050; combined imports totaled 116 million tons in 2019 and are projected to grow to 238 million tons in 2050.

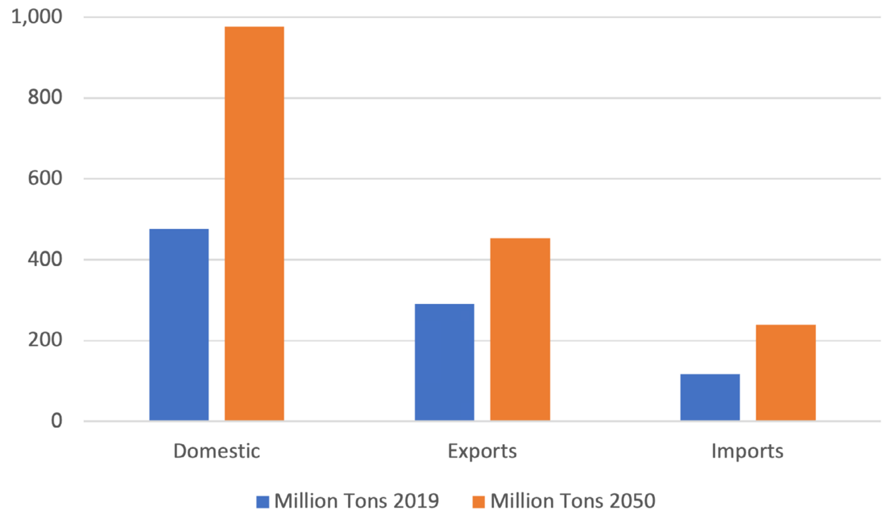


Figure 5-29: Tons by Trade Type, 2019 and 2050

Source: *Analysis of Texas DOT Transearch model; note that domestic pipeline tonnage is not included in the Transearch totals*

More than half (54 percent) of Texas shipments in 2019 were moved within the state's borders, with through-flows accounting for less than 10 percent. Approximately half of the commodity flows through Texas either originated or terminated in California, New Mexico, Louisiana and Illinois. Flows from California and Illinois were mostly rail, while half of New Mexico flows were NAFTA pipeline to and from Mexico. Due to limitations of the Texas dataset provided for this study (only origin and destination state are reported without routing), it was not possible to identify which of this through-traffic flowed through the H-GAC Region. However, based on the geographical location and the transportation infrastructure in the region, it is expected that a large portion of Texas through-traffic flows are through the H-GAC area. As shown in **Figure 5-30** and **Figure 5-31**, H-GAC outbound moves account for the largest share of tonnage (43 percent) and value (41 percent), followed by inbound moves, then by within-county moves (flows originated and terminated in the same H-GAC county), and finally by between-county moves (flows between H-GAC counties). Moves in all directions are projected to grow between 1.8 percent to 2.4 percent annually by weight, and 2.8 percent to 3 percent by value from 2019 to 2050. Flows between H-GAC counties are expected to have the highest annual growth at 2.4 percent by weight and 3 percent by value until 2050, while the lowest growth will be in outbound flows.

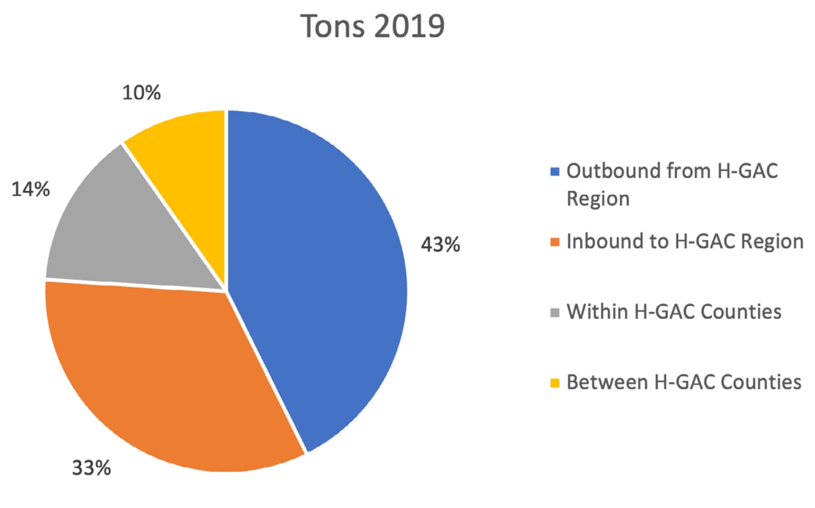


Figure 5-30: H-GAC Tons Share by Flow Direction, 2019

Source: *Analysis of Texas DOT Transearch model; note that domestic pipeline tonnage is not included in the Transearch totals*

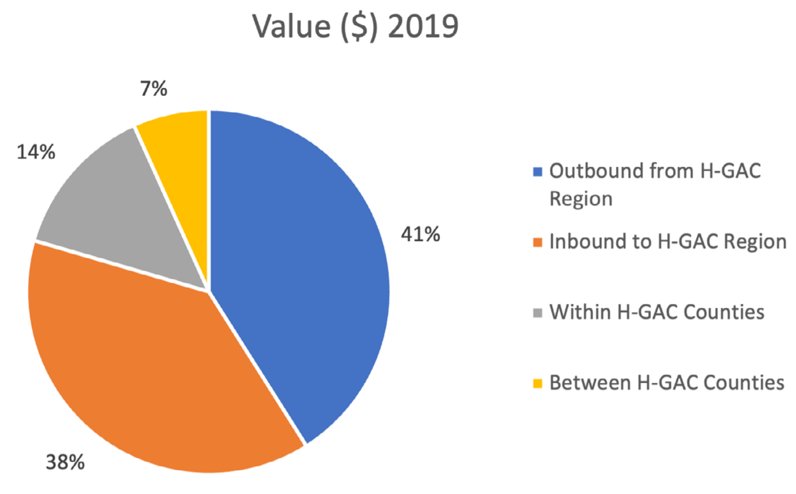


Figure 5-31: H-GAC Value Share by Flow Direction, 2019

Source: *Analysis of Texas DOT Transearch model; note that domestic pipeline tonnage is not included in the Transearch totals*

Most of the freight moving on H-GAC's regional transportation network is in Harris County, the most populous county in Texas (Table 5-10). Approximately 73 percent, or 645 million tons, valued at $658 billion (80 percent of the region) originated, terminated or moved within Harris County's borders. Of these flows, 45 percent of tons and 41 percent of value were outbound flows, with a significant share (17 percent) consumed within the county. Moving forward, no major changes in the share of commodity flows across the counties is expected in the region.

Table 5-10: H-GAC Tons and Value by County, 2019 and 2050

	MILLION TONS, 2019	MILLION TONS, 2050	VALUE (BILLION $), 2019	VALUE (BILLION $), 2050
Harris	645	1,209	658	1,614
Brazoria	74	149	52	117
Galveston	67	114	43	82
Fort Bend	25	43	22	58
Montgomery	21	52	13	36
Liberty	16	39	16	40
Chambers	12	23	8	18
Colorado	6	9	1	2
Waller	5	7	2	5
Matagorda	4	8	3	10
Wharton	3	4	1	2
Austin	2	5	1	2
Walker	2	3	1	1
GRAND TOTAL	**882**	**1,667**	**821**	**1,988**

Source: *Analysis of Texas DOT Transearch model. Note: the combined totals represent the sum of (1) inbound flows to destination counties, (2) outbound flows from origin counties, (3) within county flows, and (4) half of between H-GAC county origins plus half of between H-GAC county destinations. This avoids double counting between H-GAC county data, and allows the grand totals to align with other tables in this section.*

Figure 5-32 through **Figure 5-35** show truck origins and destinations for inbound and outbound flows. As discussed earlier, 54 percent of Texas shipments move within the state's borders. Similarly, truck flows to and from the H-GAC Region, originating or terminating in the rest of Texas, accounted for 60 percent of total flows. Approximately 10 percent of H-GAC inbound traffic in 2019 originated in Louisiana with top commodities being aggregates (23 percent), chemicals, pharmaceuticals, plastics and rubber (23 percent), and energy products (13 percent). Louisiana is also a top destination state with 14 percent share of outbound traffic. Over 50 percent of truck flows from H-GAC to Louisiana were energy products. California is the third highest outbound destination state after Texas and Louisiana, with 5 percent. Energy products (35 percent share) and metals (28 percent share) were the top outbound commodities by truck.

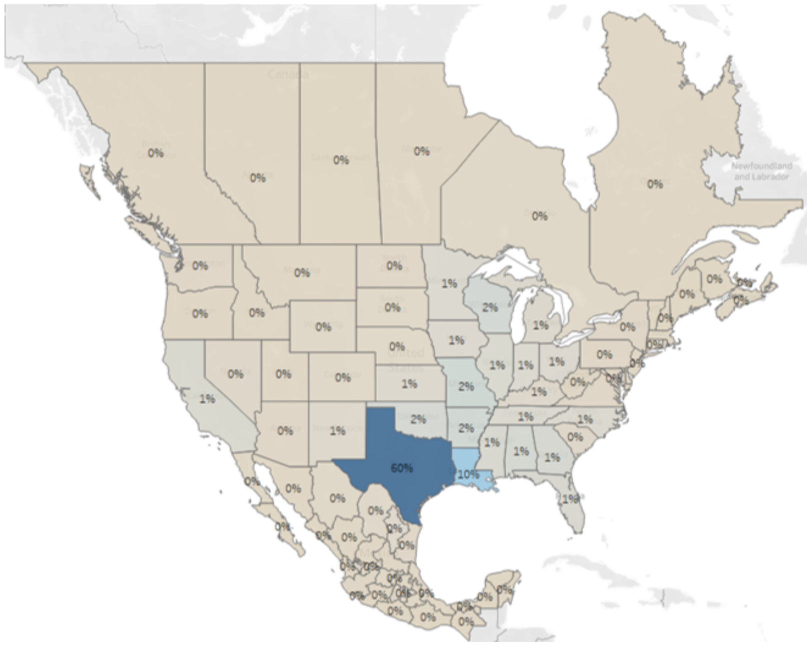


Figure 5-32: Share of Inbound H-GAC Truck Tons by Origin State/Province

Source: *Analysis of Texas DOT Transearch model*

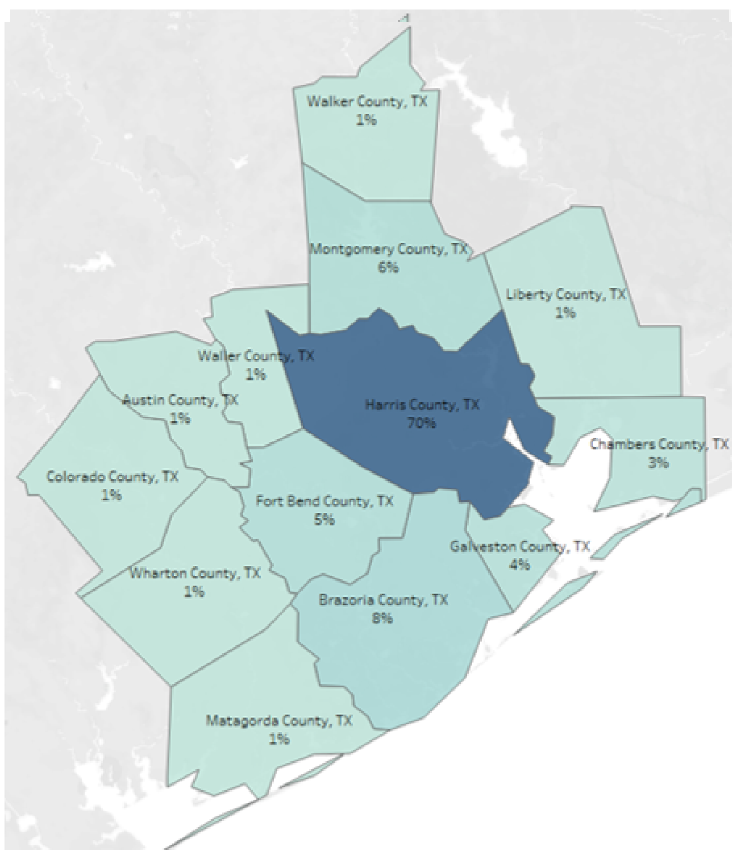


Figure 5-33: Share of Inbound H-GAC Truck Tons by Destination County

Source: *Analysis of Texas DOT Transearch model*

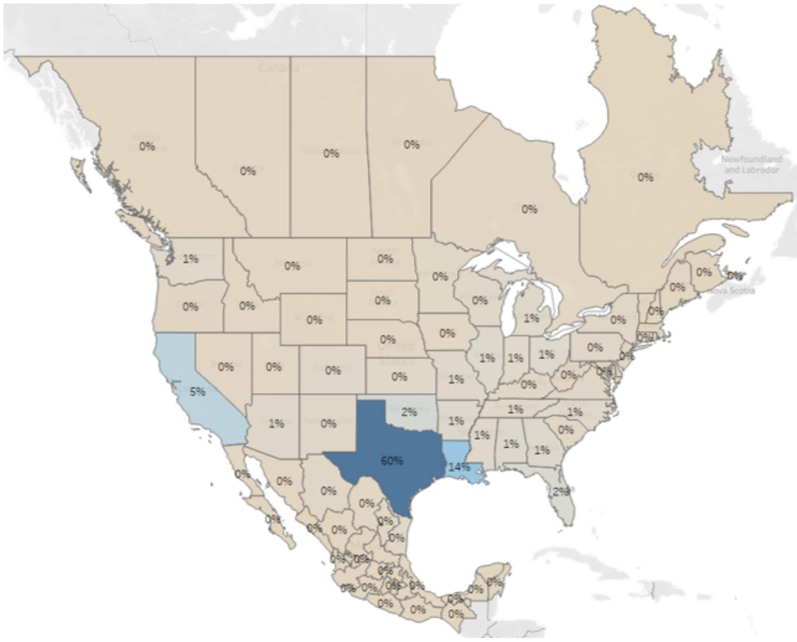


Figure 5-34: Share of Outbound H-GAC Truck Tons by Destination State/Province

Source: *Analysis of Texas DOT Transearch model*

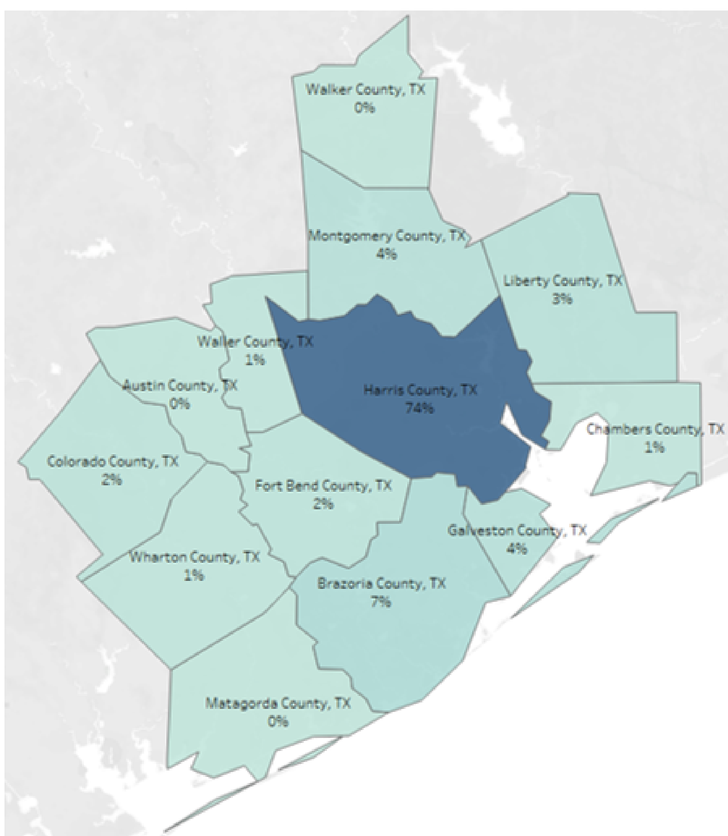


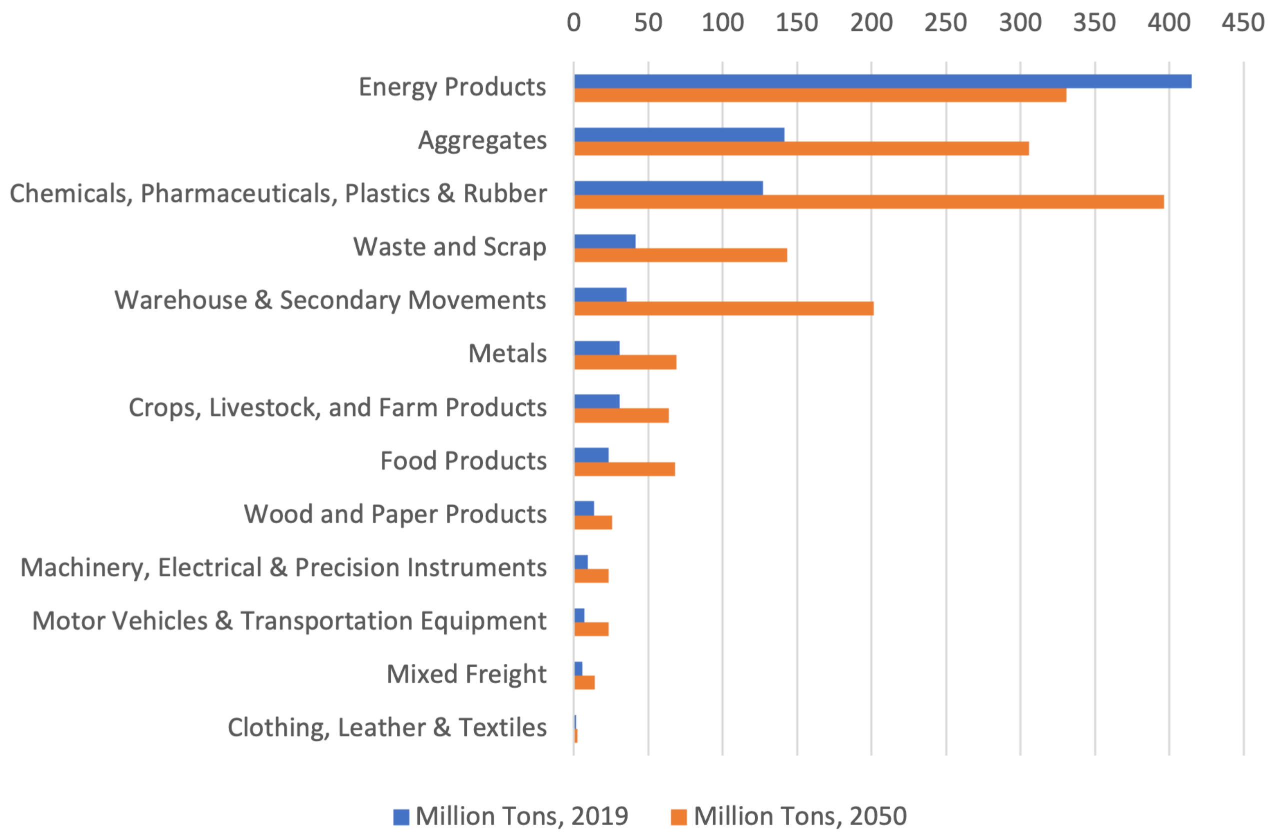
Figure 5-35: Share of Outbound H-GAC Truck Tons by Origin County

Source: *Analysis of Texas DOT Transearch model*

5.2.3 Freight Flow Commodities by County

The composition of freight moving on H-GAC's freight multi-modal network is illustrated in **Figure 5-36**. In 2019, energy products accounted for 47 percent of tonnage, with aggregates; which mainly comprises non-metallic minerals and some construction material; following with 16 percent share. The chemicals, pharmaceuticals, plastics and rubber category accounted for 14 percent of tonnage in 2019; waste and scrap accounted for 5 percent, and warehouse and secondary movements drayage for 4 percent. By 2050, the commodity group with the highest share of tonnage in the region is forecasted to be chemicals, pharmaceuticals, plastics and rubber with 24 percent share or 396 million tons, growing by 3.7 percent compound annual growth rate (CAGR) from 127 million tons in 2019. Energy products tonnage will drop significantly by 2050 to 331 million tons (-0.7 percent CAGR), accounting for 20 percent of total tons moved in the region, largely due to drop in coal and coal products. Aggregates will be the third highest commodity by tonnage with 18 percent share in 2050, growing at 2.5 percent CAGR. The highest increase (5.8 percent CAGR) is expected in warehouse and secondary movements, which is forecasted to reach 202 million tons in 2050 and 12 percent of total tonnage.

Figure 5-36: H-GAC Million Tons by Commodity Group, 2019 and 2050



Source: *Analysis of Texas DOT Transearch model*

A somewhat different picture emerges when freight is evaluated in cargo value as shown in **Figure 5-37**. In 2019, the number one commodity group by value was energy products, worth $177 billion and accounted for 22 percent of value. These products are high tonnage, lower value commodities, resulting in a significantly lower share than the 47 percent tonnage share. Other commodities with high share of total value of goods moved in the H-GAC Region are chemicals, pharmaceuticals, plastics and rubber worth of $174 billion (21 percent share); machinery, electrical and precision instruments valued at $127 billion (15 percent share); metals, and warehouse and secondary movements both with 8 percent share and $70 and $66 billion respectively.
By 2050, energy products are forecasted to drop by 1 percent CAGR to $308 billion, having 7 percent share. Chemicals, pharmaceuticals, plastics and rubber are forecasted to grow 3.6 percent annually, at $694 billion and 26 percent making it the largest commodity group. Other significant commodity groups in 2050 will be machinery, electrical and precision instruments growing at 3 percent annually to a total of $317 billion and 16 percent share; warehouse and secondary movements growing at 4.9 percent to $292 billion or 15 percent share; and motor vehicles and transportation equipment with forecasted value to grow 4.3 percent annually to $220 billion and 11 percent share.

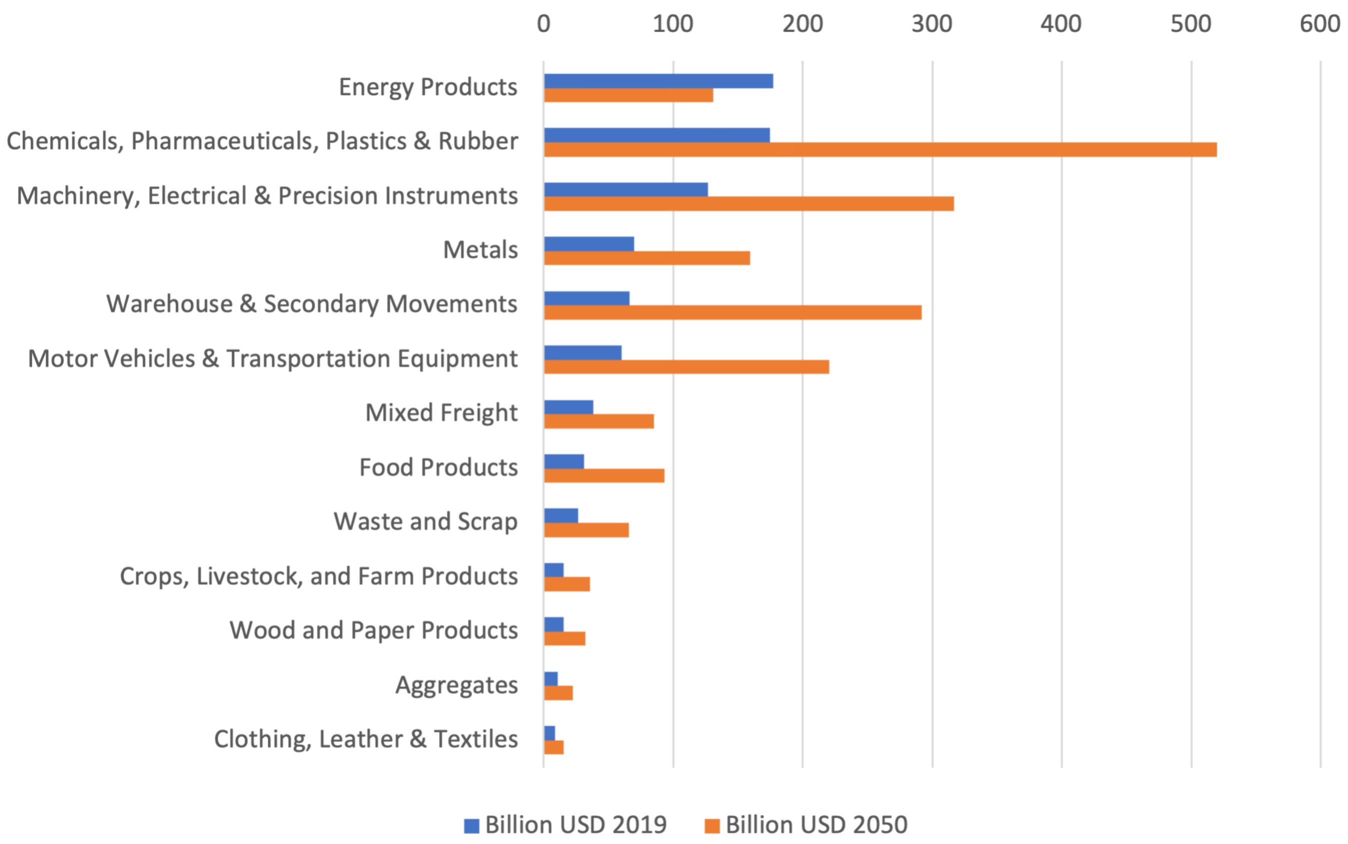


Figure 5-37: H-GAC Value by Commodity Group, 2019 and 2050

Source: *Analysis of Texas DOT Transearch model*

6. Chapter 6 – Recommendations and Implementation

This chapter identifies recommendations for plans, programs and policies, project categorization recommendations, and corridors and intersections for inclusion in the future Regional Transportation Plan (RTP).

6.1 H-GAC Freight Network

During discussions with stakeholders, it became evident most were already familiar with the region's major roadways used for freight movement. The Federal Highway Administration (FHWA) and TxDOT freight networks are known to identify the primary freight corridors in the area. However, stakeholders faced a challenge identifying the additional roadways that truck drivers utilize but are not currently included in the FHWA or TxDOT freight networks.

The efficient transportation of freight in the region relies heavily on the first-mile and last-mile corridors, which are vital elements. However, it is common for these corridors to be overlooked in traditional freight networks. Additionally, the region is witnessing a rapid expansion of freight clusters, leading to a growing list of first and last-mile connectors.

Truck drivers often choose alternative routes or bypasses to avoid congestion on the designated freight corridors. These alternative roadways are crucial for efficient freight movement but may not be recognized or accounted for in the existing freight networks.

Another issue highlighted by stakeholders was the lack of zoning in the region, leading to distribution centers, warehouses and manufacturing plants being located in close proximity to residential areas. This mix of land uses can create challenges related to traffic management, infrastructure design, and potential conflicts between residential communities and truck activities.

Furthermore, the stakeholders noted there had been an increase in online deliveries and subsequent growth in warehouses and associated truck activity in the region, especially in the aftermath of the COVID-19 pandemic.

H-GAC would like to proactively identify these corridors to provide infrastructure improvements to handle freight traffic and implement policies and programs to mitigate any negative impacts experienced by residential communities due to freight movement. As part of this plan, a network of these freight-relevant corridors, not currently included in the other freight networks, was created and called the 'H-GAC Freight Network'.

H-GAC has introduced a new funding category called Regional Goods Movement in its TIP to enhance freight mobility in the region. This category aims to identify, develop and fund projects that improve the safe and reliable movement of goods. The H-GAC freight network provides additional insights to the project selection team, assisting in identifying projects suitable for the Regional Goods Movement funding.

The following steps were used to identify the H-GAC freight network:

- **Stakeholder Input.** A series of interviews were conducted with various stakeholders including the City of Houston, TxDOT, county officials, ports, HAS, the Economic Alliance Houston Port Region and Air Alliance Houston and their input was used to identify intersection issues, key first/last mile connectors and growth trends. This was used to incorporate corridors not currently on the FHWA or TxDOT freight networks into the H-GAC Freight Network.
- **Freight Cluster Based.** The outputs from the OD tool (discussed in Chapter 3) were used to identify the TAZs that generated the highest volume of truck traffic in the H-GAC Region. The TAZs that generated approximately 8,000 truck trips or more per year (inflow plus outflow) were examined to identify major freight generators, such as distribution centers, warehouses and industries, within each. These TAZs were treated as 'Freight Clusters' and the connections between these, and the highways in the existing freight network, were identified as first and last-mile connections critical for freight movement. The freight clusters identified in the TxDOT REAL plan were used to validate the ones generated through the OD tool and any missing ones were added.

The data available and used for this analysis included spring and fall truck travel data from 2019 and 2020. To accurately capture later trends in the freight movement and emergence of warehouses, distribution centers and other facilities since 2020, a reconnaissance of the study area using Google Earth aerial maps was conducted and validated using stakeholder input. Subsequently, a list of first and last-mile connections to these freight clusters was developed and added to the H-GAC Freight Network.

- **Data Based**. The truck delay and volume databases for the H-GAC Region corridors was combined with land use and freight cluster information to identify the primary corridors and alternative corridors used by trucks, in case of congestion on major highways. Among the local corridors that are typically not part of TxDOT or FHWA freight networks, the ones experiencing the highest truck delay (top 10 percentile) and with a Truck Annual Average Daily Traffic (AADT) of 1,000 or more were selected for inclusion in the H-GAC Freight Network.

Together this process generated approximately 520 miles of local freight network for H-GAC, compared to 1,690 miles of TxDOT freight network and 390 miles of FHWA freight network in the H-GAC Region. **Figure 6-38** below shows a map of these three networks.

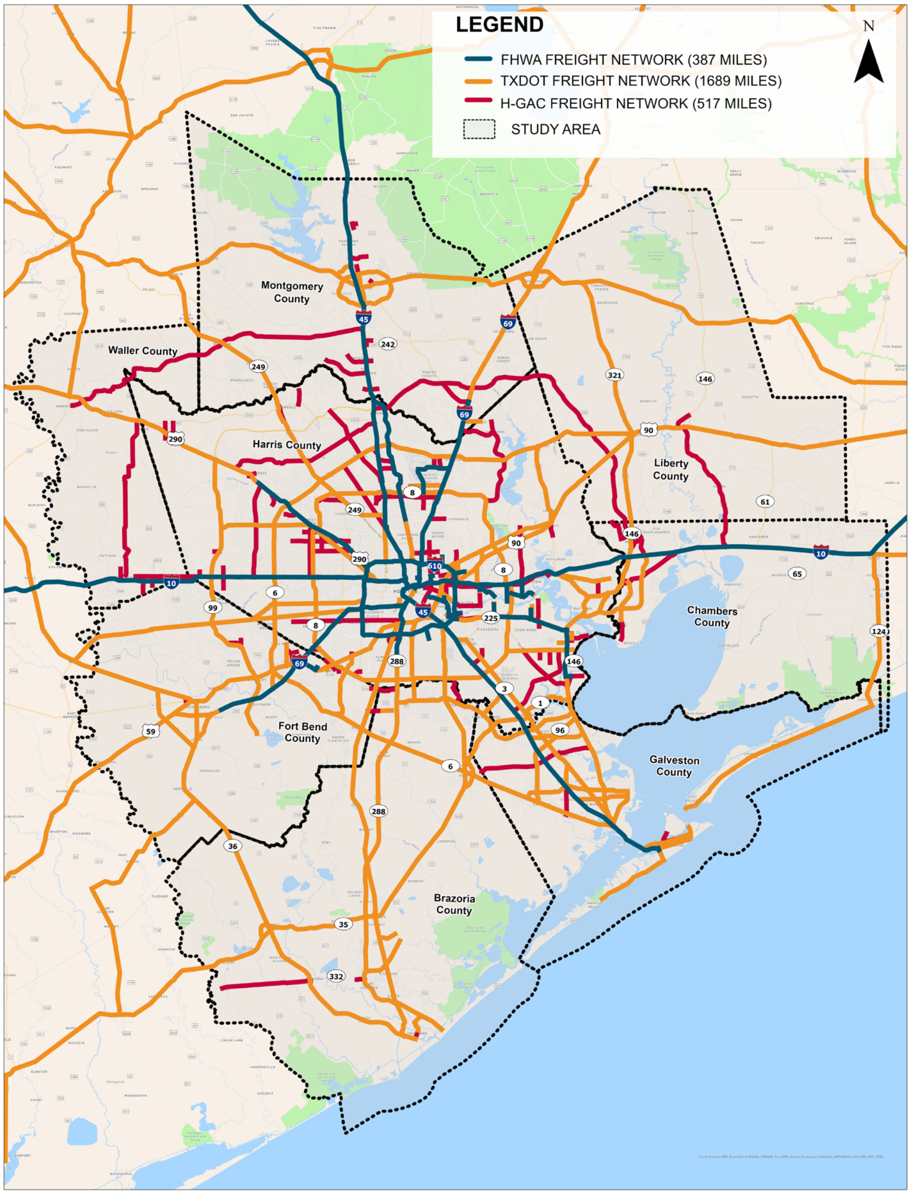


Figure 6-38: Combined Map of FHWA, TxDOT and H-GAC Freight Networks

It should be noted that the TxDOT freight network was updated since the analysis was completed for this study. Therefore, Figure 6-38 does not show some of the corridors on TxDOT freight network such as SH 99 between SH 249 and IH 45. Please refer to TxDOT website for the latest network.

6.2 Redesignation of the Regional Critical Urban Freight Corridor Network

In 2017, TxDOT assigned 90.72 miles of corridors to be recognized as CUFCs for the H-GAC region. As part of a 2022 update, TxDOT assigned another 90.72 miles of H-GAC roadways, a CUFC designation. These corridors typically attract more state and federal funding for freight-relevant projects.

As part of the current update to the RGMP, H-GAC identified critical freight corridors in the region using the process described below and recommended them to TxDOT for a CUFC designation.

A public road designated as a CUFC must be in an urbanized area, regardless of whether the population is above or below 500,000 individuals. The corridors designated as CUFCs are further required to meet one of the following criteria:

1. A public roadway that connects an intermodal facility to:
    - the PHFS
    - the Interstate System
    - an intermodal freight facility
2. Located within a corridor of a route on the PHFS and provides an alternative highway option important to goods movement
3. Serves as a major freight generator, logistic center, or manufacturing and warehouse industrial land
4. Important to the movement of freight within the region, as determined by the Metropolitan Planning Organization (MPO) or the state.

The initial phase of the redesignation process consisted of examining the corridors previously designated as CUFC in 2017. It was noted that freight projects along 70 miles of corridors out of 90.72 miles were either already constructed, currently under construction or scheduled to be constructed within the next four years. The remaining corridors from the 2017 list were evaluated for future consideration along with other critical corridors.

Subsequently, a data-driven methodology described below was used to identify the most critical corridors in the H-GAC region, totaling 90.72 miles.

- Corridors consisting of projects that have "Construction underway or begin within four years" status on the 2021-2024 Transportation Improvement Program (TIP) or TxDOT's Unified Transportation Plan (UTP) were eliminated from further consideration. These corridors were assumed to have assigned funding and did not require Critical Freight Corridor (CFC) designation.
- Out of the remaining corridors on TIP or UTP, the ones identified for capacity improvements were considered for CFC designation.
- A scoring system backed by RGMP's Steering Committee and Stakeholder Forum feedback was developed using the following criteria:
    - Criticality-Vulnerability Index: Corridors designated as 'Moderate or High' criticality/vulnerability on H-GAC's Resiliency Index were considered for scoring. A weighted average of the scores was used for corridors with varying criticality/vulnerability indices along segments
    - High truck volumes and truck percentages
    - Heavy Haul Truck Corridors: Corridors within a 30-mile radius of ports designated as 'Heavy Haul' corridors
    - Connectivity: Corridors that connect to other significant freight corridors and freight clusters, and provide alternative options for freight movement
    - Crash Rate: Crash rate calculated using truck-related crashes

Table 6-11 below describes the individual scores assigned for each of the above criteria and associated sub-criteria.

Table 6-11: Critical Urban Freight Corridors – Scoring Criteria

CRITERIA	SCORES: 0.25	0.50	0.75	1.00	2.00
Criticality — Vulnerability	Moderate Criticality-Moderate Vulnerability	Low Criticality-High Vulnerability High Criticality-Low Vulnerability	Moderate Criticality-High Vulnerability High Criticality-Moderate Vulnerability	High Criticality-High Vulnerability	
Crash Rate	<413	413-887	887-1361	1361-1835	>1835
Truck Volumes (avg. annual daily truck traffic)	<250	251-500	501-1000	>1000	>2000
Truck Percentage (avg. annual daily truck traffic)	0-2.5%	2.6%-5.0%	5.1%-10.0%	10.1%-19.9%	>20.0%
Heavy Truck Corridors				Highways within 30 miles of ports	
Connection		Important corridor to freight movement within region, as determined by MPO or State		Located within a route's corridor on PHFS & provides alt. hwy option for goods movement Serves as major freight generator, logistic center, or manufacturing & warehouse industrial land	Connects intermodal facility to PHFS, Interstate System, or intermodal freight facility

The corridors with capacity projects on the TIP/UTP list were assigned scores listed in Table 1-2. The top 90.72 miles of corridors with highest aggregate scores were selected as CUFC and are shown on the map in **Figure 6-39**.

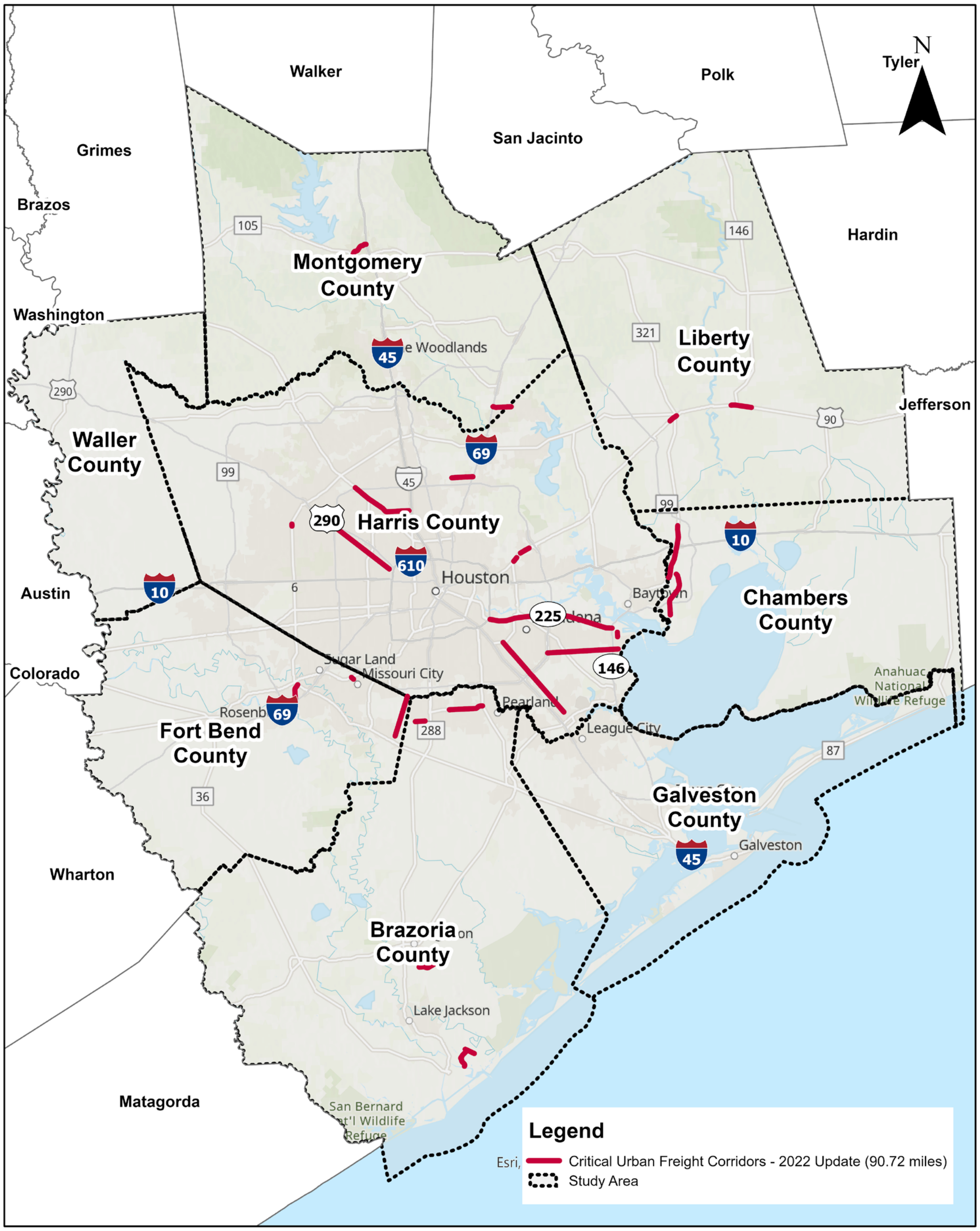


Figure 6-39: H-GAC Critical Urban Freight Corridors Network

6.3 Project Recommendations: Categorization Process

6.3.1 Overview

This section explains the methodological approach taken to categorize the projects listed in H-GAC's 2045 RTP located in the region's freight network, highlighting the steps taken to ensure the exercise is data-driven and anchored to the plan's goals.

The projects from the 2045 RTP located in the FHWA, TxDOT or H-GAC freight networks were categorized using a MCDA approach based on quantitative measures to identify the type of regional freight network needs that each project is trying to address. The type of needs is identified based on the goals that represent the outcomes the RTP aspires to achieve.

Several metrics were chosen to assess each project's contribution to addressing network issues. Each of the metrics were assigned a relative importance in terms of its contribution/relevance to achieving each of the goals. Project-specific data was then used to create the appropriate metrics for the categorization process. After the process was run, a total number of "points" was calculated for each project, and adjusted to account for differences in project types (corridor versus intersection). The adjusted project scores were then used to place each project into one of three categories: projects addressing high-need areas, projects addressing medium-need areas or projects addressing low-need areas.

6.3.2 Purpose and Need

The purpose of this approach is to categorize projects in the freight networks of the region (either FHWA, TxDOT or H-GAC) by the type of needs they address from a goods movement standpoint. The analysis avoids ranking projects against one another and, instead, categorizes them based on data-driven indicators that represent the intensity of the needs being addressed.[16]

6.3.3 Methodology

In the first step, a freight network map was developed for the H-GAC Region (described in 6.1 H-GAC Freight Network) using data collected and stakeholder feedback received during the study. All current 2045 RTP projects on the FHWA, TxDOT or H-GAC freight networks were considered for the categorization process. The all-inclusive map of projects categorized is presented in **Figure 6-40**.

16 This categorization process is different and unrelated from the Transportation Improvement Program "Project Selection" process also used by H-GAC.

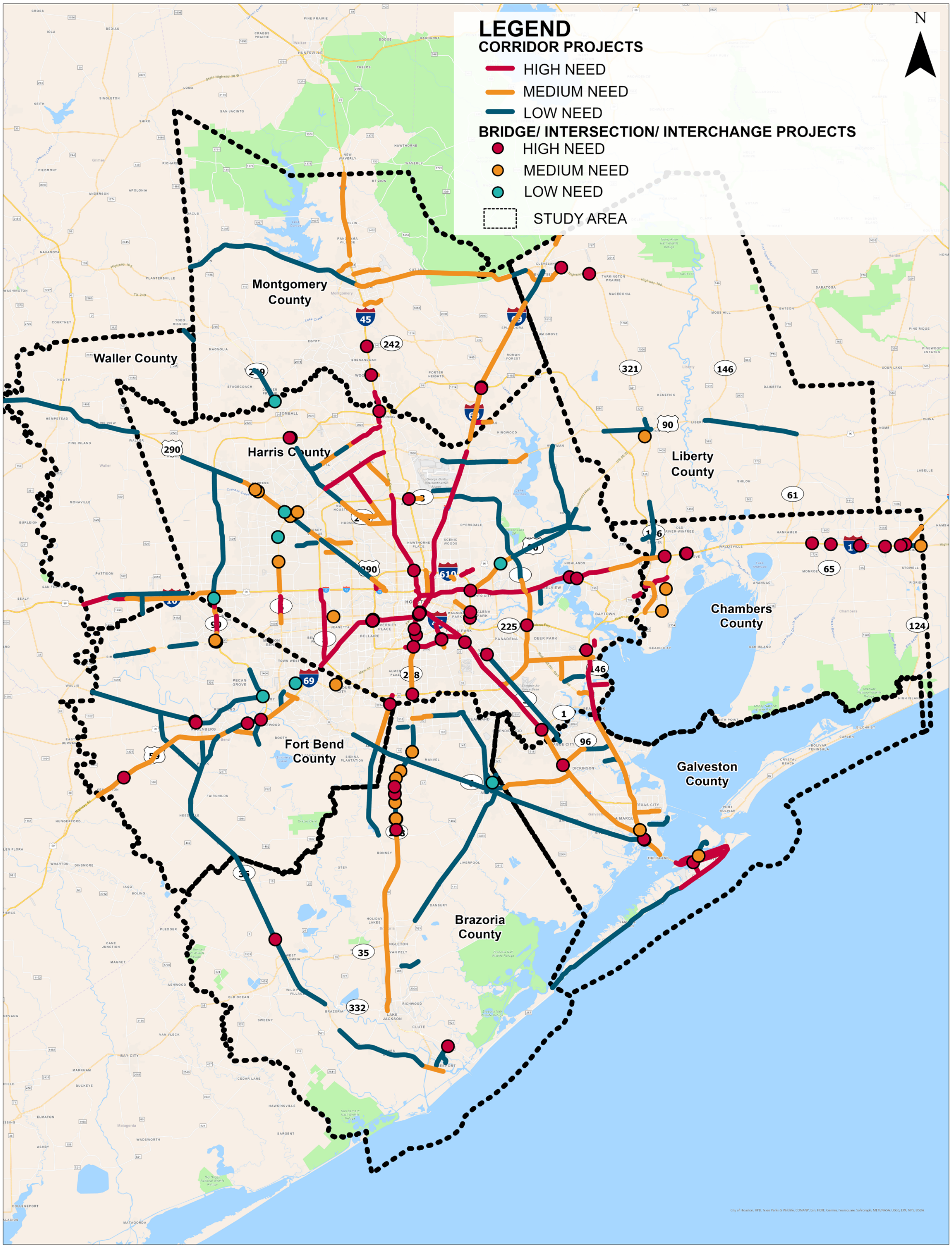


Figure 6-40: Summary of Categorized RTP Projects

The categorization methodology consists of identifying criteria used in the categorization process and using robust data to score each project based on the selected criteria. The identification of the criteria to be used relied on input from both the Steering Committee and the Stakeholder Forum. Members of these groups were asked to rank the study's five goals: safety, move people and goods efficiently, economic competitiveness, state of good repair and protect natural resources. The ranking provided by these groups was used to assign weights for each of the five goals that serve as the criteria in the categorization process. These weights are based on each goal's relative importance (as expressed by these two groups). In parallel, project-level data was combined with the goals used as categorization criteria to develop data-driven scores for each goal at the individual project level. The combination of these project-specific, data-driven scores for each goal and the weights for each goal derived from stakeholder input resulted in a project score, which was the basis for the categorization of projects. A graphical representation of the methodology is provided below in **Figure 6-41**.

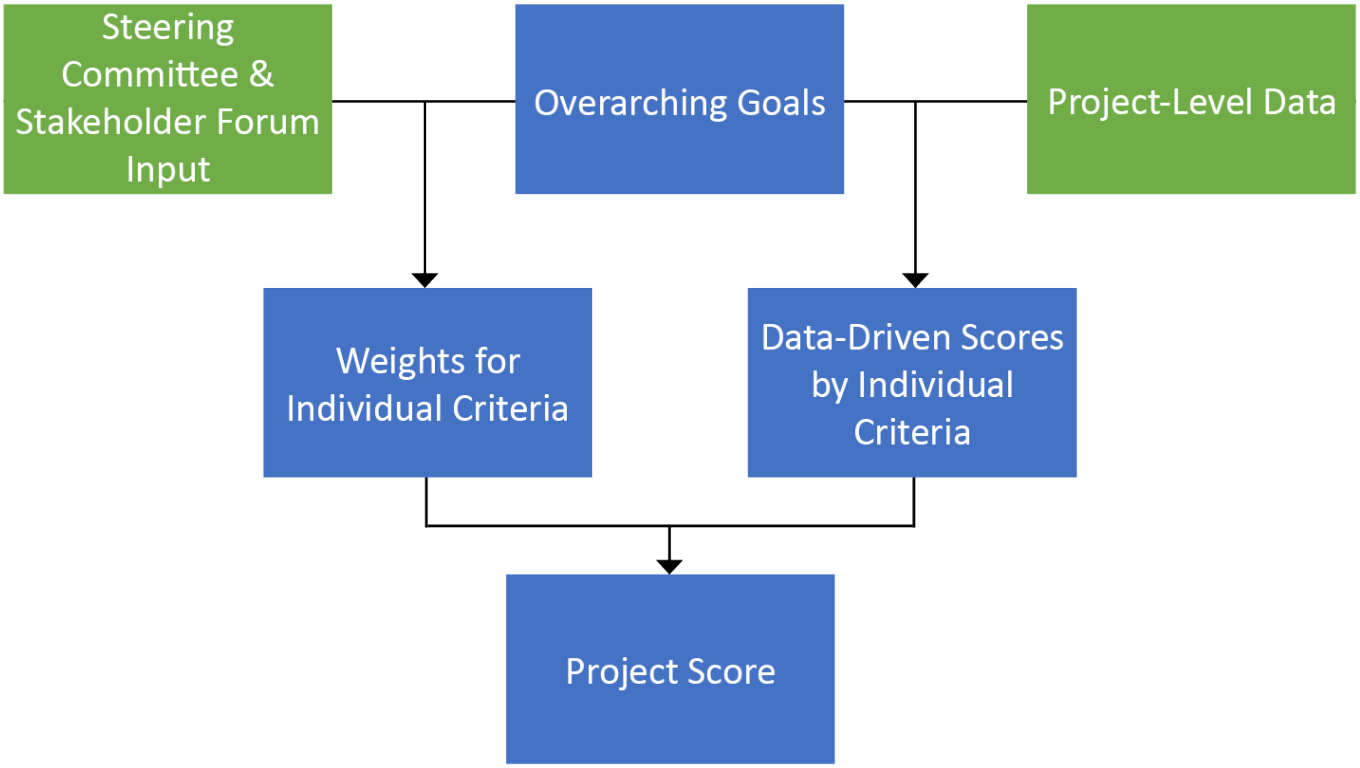


Figure 6-41: Flow Chart of the Project Categorization Process

To develop the weights for the categorization criteria (i.e., the weights for the goals), input on the relative rankings of the five goals was elicited from the Steering Committee and Stakeholder Forum. Both groups identified safety as their top priority. Therefore, the highest weight of 30 percent was assigned. The efficient movement of people and goods was identified by both groups as their second-highest priority, and a weight of 24 percent was assigned to this goal. The two groups were divided over the prioritization of their third goal; the Steering Committee prioritized economic competitiveness, while the Stakeholder Forum prioritized improving the state of good repair. Therefore, equal weights of 17 percent were given to both criteria. Lastly, both groups identified protecting natural resources, addressing climate change and environmental justice as their final goal for the RTP; a weight of 12 percent was assigned to this goal. The weights used for each goal in the categorization process are summarized in **Table 6-12** below.

Table 6-12: Weight Assigned to Project Goals for the Categorization Process

GOALS	WEIGHTS
Safety	30.00%
Move people and goods efficiently	24.00%
Economic competitiveness	17.00%
State of good repair	17.00%
Protect natural resources	12.00%
TOTAL	**100.00%**

Several metrics were used to generate the data-driven scores under each goal for the individual projects. Specifically, nine indicators were identified from a longer list of variables. These variables are used to represent the intensity of the goal-specific need being addressed by an individual project, and were chosen based on their robustness in terms of data collection and standardization. These variables include AADT, Truck Percentage, Heavy Truck Percentage, Truck Crash Rate, Criticality/Vulnerability Index, Bridge Condition, Bridge Clearance, At-Grade Railroad Crossing and Vulnerable Population Index. The methodology assigns a number (or weight) to each one of these variables under each of the five goals. This number represents the (relative) importance each variable has on representing the needs under each individual goal.

To be classified, projects are first divided into two groups: corridor projects and intersection projects. Project-level data for each of the nine variables is used to develop the data-driven scores by individual goal; however, corridor projects use two additional variables in the estimation of scores under each goal:[17] Truck Planning Index and Annual Truck Delay. A brief description of all the variables used in the categorization process is provided below.

- AADT. Average daily traffic on a roadway link for all days of the week during a period of one year, expressed in vehicles per day.
- Truck Percentage. Percentage of average of daily vehicles on the road that are trucks.
- Heavy Truck Percentage. Percentage of daily trucks on the road that are heavy trucks.
- Truck Crash Rate. Crash rate for the road segment expressed as truck crashes per 100 million vehicle-miles of travel (VMT).
- Criticality/Vulnerability Index. A scoring matrix assessing vulnerability against criticality, with assigned scores given for different criticality/vulnerability ratios.
- Bridge Condition. Assessed based on the number of bridges with a “Poor” rating.
- Bridge Clearance. Assessed based on the number of bridges below 14.5-foot clearance.
- At-Grade Railroad Crossing. Summarizes the count of at-grade railroad crossings along a specified area (the project area).
- Vulnerable Population Index. Indicates the density of the vulnerable population along a specified area (the project area).
- Truck Planning Index. Measures the variability of truck travel time along a corridor.
- Annual Truck Delay. Summarizes the delay experienced by a truck on a corridor.

Detailed descriptions and sources for each variable are available in Appendix D.

For each project, relative indicators (ranging between zero and one) are created using the maximum and minimum values for each individual variable.[18] The relative scores for each individual variable are then combined with the importance of each variable in representing the needs of a particular goal (e.g., the degree by which AADT or truck crash rate represent safety needs). Each variables’ relative scores are then

17 Only corridor projects get evaluated on these two variables, since they are not applicable to intersection projects.

18 Relative indicators for each individual variable are created separately for corridor and intersection projects.

combined with their importance in representing each goal's needs to create a total number of "points" for each project. The total points for each project are adjusted to allow comparison between corridor and intersection projects by normalizing the differences in the maximum number of points between the two different project types. Once the score is adjusted, projects are placed into one of three categories: projects that address high-need areas, projects that address medium-need areas or projects that address low-need areas. An illustrative example of the creation of the project scores is presented in **Figure 6-42**.

The categorization process was conducted using a spreadsheet-based tool and was designed to be replicated in future versions of the H-GAC RGMP. To conduct future updates, H-GAC would need to update the project list and the project-level data for the nine relevant variables used in the analysis (11 variables for corridor projects).

	Maximum Scores			Project Scores (Examples)	
Goals	**Corridor**	**Intersection**		**Corridor**	**Intersection**
Safety	30	30		11.77	9.39
Move people and goods efficiently	24	10		7.72	3.91
Economic Competitiveness	17	7		7.42	3.01
State of good repair	17	17		7.12	4.15
Protect natural resources	12	10		4.13	3.51
TOTAL	**100**	**74**		**38.15**	**23.97**
Adjusted Project Scores*				**38.15**	**32.39**
***To account for project type**					

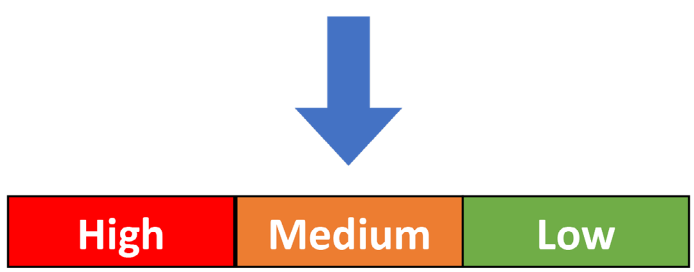


Figure 6-42: Illustration of the Project Categorization Process

6.4 Project Categorization Results

The categorization exercise described in this section was applied to those projects from the 2045 RTP that are in the freight network of the study area. This freight network is comprised of the FHWA Freight Network (387 miles), the TxDOT Freight Network (1,689 miles) and the H-GAC Freight Network (517 miles). The 2045 RTP lists 346 projects within these networks.

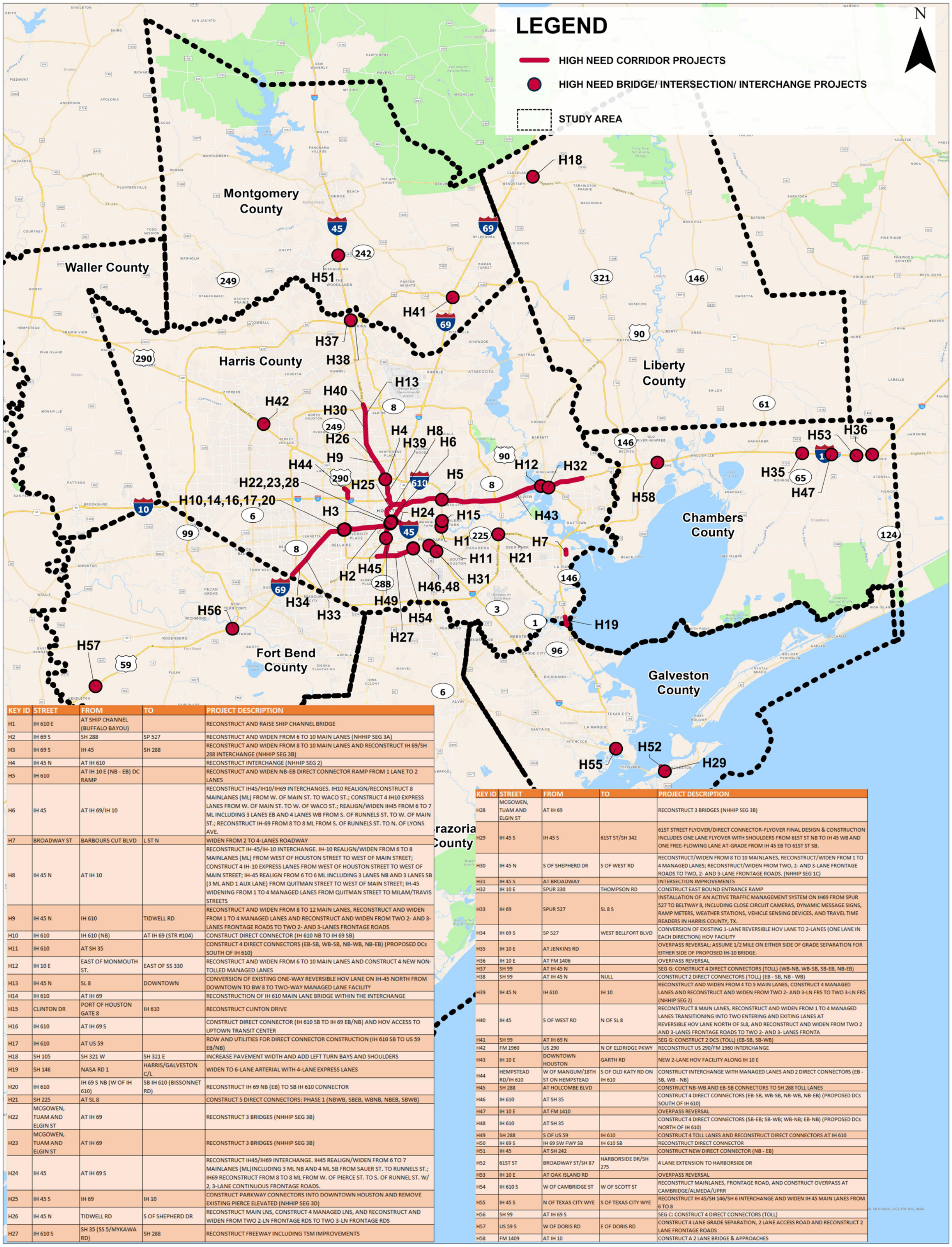
Of the 346 projects evaluated, 116 projects are identified as addressing high-needs, 115 projects address medium-needs and 115 projects address low-needs. The Steering Committee and Stakeholder Forum groups identified additional locations with high and medium needs that do not currently have projects to alleviate them. Due to the date in which the 2045 RTP was released, there could be projects that address high or medium needs but were developed after the creation of the 2045 RTP. These projects were not considered as part of the quantitative categorization process presented here. The study suggests these projects be added to the next RTP.

6.4.1 Projects that Address High Needs

Of the 116 projects in this category:

- 12 are situated on I-10;
- 22 are located on I-45;
- 13 are on I-610; and,
- 14 are on SH 99.

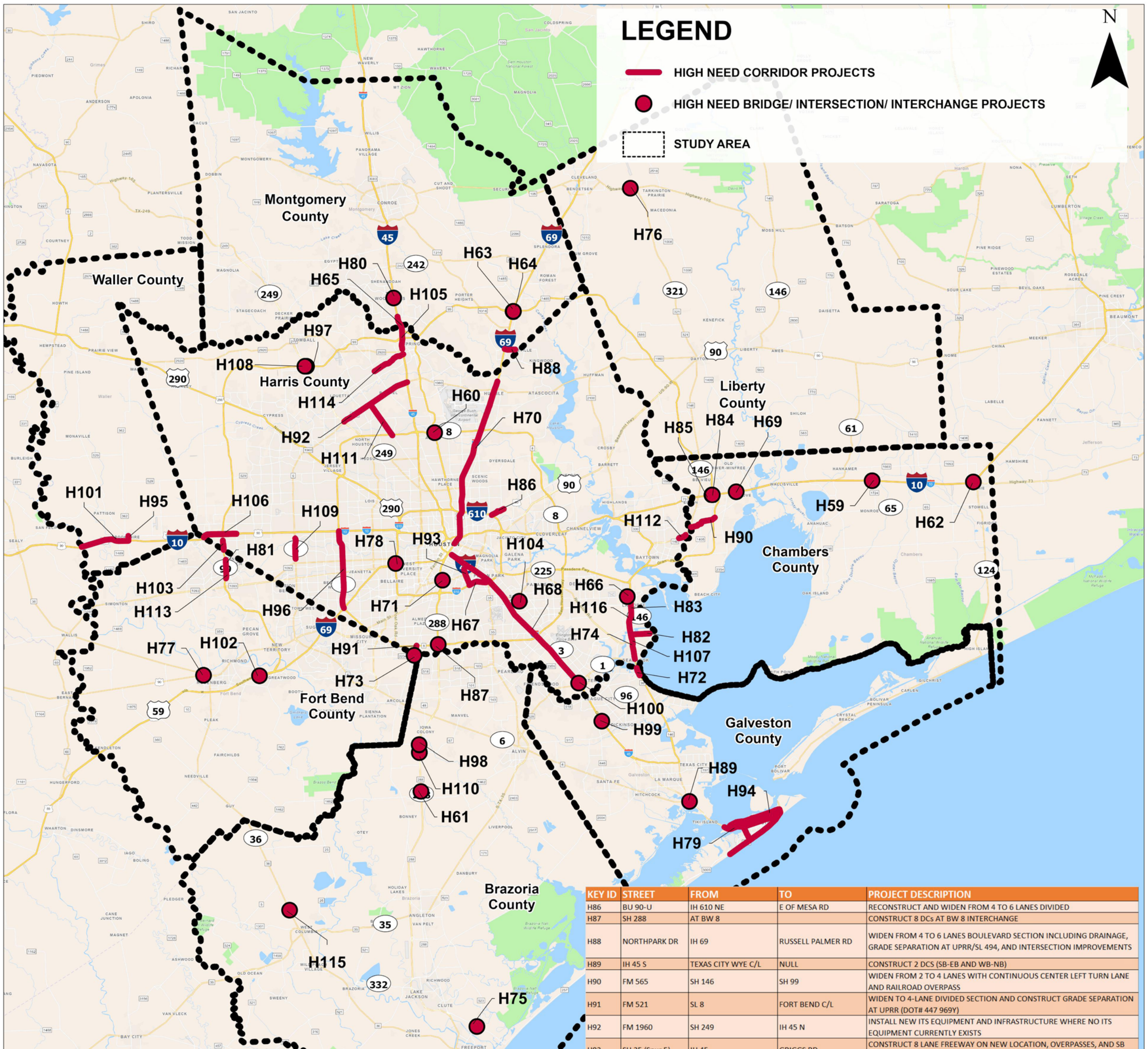
Figure 6-43 and **Figure 6-44** display the location of the projects categorized as addressing high needs.



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H1	IH 610 E	AT SHIP CHANNEL (BUFFALO BAYOU)		RECONSTRUCT AND RAISE SHIP CHANNEL BRIDGE
H2	IH 69 S	SH 288	SP 527	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES (NHHIP SEG 3A)
H3	IH 69 S	IH 45	SH 288	RECONSTRUCT AND WIDEN FROM 8 TO 10 MAIN LANES AND RECONSTRUCT IH 69/SH 288 INTERCHANGE (NHHIP SEG 3B)
H4	IH 45 N	AT IH 610		RECONSTRUCT INTERCHANGE (NHHIP SEG 2)
H5	IH 610	AT IH 10 E (NB - EB) DC RAMP		RECONSTRUCT AND WIDEN NB-EB DIRECT CONNECTOR RAMP FROM 1 LANE TO 2 LANES
H6	IH 45	AT IH 69/IH 10		RECONSTRUCT IH45/IH10/IH69 INTERCHANGES. IH10 REALIGN/RECONSTRUCT 8 MAINLANES (ML) FROM W. OF MAIN ST. TO WACO ST.; CONSTRUCT 4 IH10 EXPRESS LANES FROM W. OF MAIN ST. TO W. OF WACO ST.; REALIGN/WIDEN IH45 FROM 6 TO 7 ML INCLUDING 3 LANES EB AND 4 LANES WB FROM S. OF RUNNELS ST. TO W. OF MAIN ST.; RECONSTRUCT IH-69 FROM 8 TO 8 ML FROM S. OF RUNNELS ST. TO N. OF LYONS AVE.
H7	BROADWAY ST	BARBOURS CUT BLVD	L ST N	WIDEN FROM 2 TO 4-LANES ROADWAY
H8	IH 45 N	AT IH 10		RECONSTRUCT IH-45/IH-10 INTERCHANGE. IH-10 REALIGN/WIDEN FROM 6 TO 8 MAINLANES (ML) FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; CONSTRUCT 4 IH-10 EXPRESS LANES FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; IH-45 REALIGN FROM 6 TO 6 ML INCLUDING 3 LANES NB AND 3 LANES SB (3 ML AND 1 AUX LANE) FROM QUITMAN STREET TO WEST OF MAIN STREET; IH-45 WIDENING FROM 1 TO 4 MANAGED LANES FROM QUITMAN STREET TO MILAM/TRAVIS STREETS
H9	IH 45 N	IH 610	TIDWELL RD	RECONSTRUCT AND WIDEN FROM 8 TO 12 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3-LANES FRONTAGE ROADS
H10	IH 610	IH 610 (NB)	AT IH 69 (STR #104)	CONSTRUCT DIRECT CONNECTOR (IH 610 NB TO IH 69 SB)
H11	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)
H12	IH 10 E	EAST OF MONMOUTH ST.	EAST OF SS 330	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES AND CONSTRUCT 4 NEW NON-TOLLED MANAGED LANES
H13	IH 45 N	SL 8	DOWNTOWN	CONVERSION OF EXISTING ONE-WAY REVERSIBLE HOV LANE ON IH-45 NORTH FROM DOWNTOWN TO BW 8 TO TWO-WAY MANAGED LANE FACILITY
H14	IH 610	AT IH 69		RECONSTRUCTION OF IH 610 MAIN LANE BRIDGE WITHIN THE INTERCHANGE
H15	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE
H16	IH 610	AT IH 69 S		CONSTRUCT DIRECT CONNECTOR (IH 610 SB TO IH 69 EB/NB) AND HOV ACCESS TO UPTOWN TRANSIT CENTER
H17	IH 610	AT US 59		ROW AND UTILITIES FOR DIRECT CONNECTOR CONSTRUCTION (IH 610 SB TO US 59 EB/NB)
H18	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS
H19	SH 146	NASA RD 1	HARRIS/GALVESTON C/L	WIDEN TO 6-LANE ARTERIAL WITH 4-LANE EXPRESS LANES
H20	IH 610	IH 69 S NB (W OF IH 610)	SB IH 610 (BISSONNET RD)	RECONSTRUCT IH 69 NB (EB) TO SB IH 610 CONNECTOR
H21	SH 225	AT SL 8		CONSTRUCT 5 DIRECT CONNECTORS: PHASE 1 (NBWB, SBEB, WBNB, NBEB, SBWB)
H22	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H23	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H24	IH 45	AT IH 69 S		RECONSTRUCT IH45/IH69 INTERCHANGE. IH45 REALIGN/WIDEN FROM 6 TO 7 MAINLANES (ML)INCLUDING 3 ML NB AND 4 ML SB FROM SAUER ST. TO RUNNELS ST.; IH69 RECONSTRUCT FROM 8 TO 8 ML FROM W. OF PIERCE ST. TO S. OF RUNNEL ST. W/ 2, 3-LANE CONTINUOUS FRONTAGE ROADS.
H25	IH 45 S	IH 69	IH 10	CONSTRUCT PARKWAY CONNECTORS INTO DOWNTOWN HOUSTON AND REMOVE EXISTING PIERCE ELEVATED (NHHIP SEG 3D)
H26	IH 45 N	TIDWELL RD	S OF SHEPHERD DR	RECONSTRUCT MAIN LNS, CONSTRUCT 4 MANAGED LNS, AND RECONSTRUCT AND WIDEN FROM TWO 2-LN FRONTAGE RDS TO TWO 3-LN FRONTAGE RDS
H27	IH 610 S	SH 35 (SS 5/MYKAWA RD)	SH 288	RECONSTRUCT FREEWAY INCLUDING TSM IMPROVEMENTS

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H28	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H29	IH 45 S	IH 45 S	61ST ST/SH 342	61ST STREET FLYOVER/DIRECT CONNECTOR-FLYOVER FINAL DESIGN & CONSTRUCTION INCLUDES ONE LANE FLYOVER WITH SHOULDERS FROM 61ST ST NB TO IH 45 WB AND ONE FREE-FLOWING LANE AT-GRADE FROM IH 45 EB TO 61ST ST SB.
H30	IH 45 N	S OF SHEPHERD DR	S OF WEST RD	RECONSTRUCT/WIDEN FROM 8 TO 10 MAINLANES, RECONSTRUCT/WIDEN FROM 1 TO 4 MANAGED LANES; RECONSTRUCT/WIDEN FROM TWO, 2- AND 3-LANE FRONTAGE ROADS TO TWO, 2- AND 3-LANE FRONTAGE ROADS. (NHHIP SEG 1C)
H31	IH 45 S	AT BROADWAY		INTERSECTION IMPROVEMENTS
H32	IH 10 E	SPUR 330	THOMPSON RD	CONSTRUCT EAST BOUND ENTRANCE RAMP
H33	IH 69	SPUR 527	SL 8 S	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON IH69 FROM SPUR 527 TO BELTWAY 8, INCLUDING CLOSE CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, RAMP METERS, WEATHER STATIONS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN HARRIS COUNTY, TX.
H34	IH 69 S	SP 527	WEST BELLFORT BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE TO 2-LANES (ONE LANE IN EACH DIRECTION) HOV FACILITY
H35	IH 10 E	AT JENKINS RD		OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH-10 BRIDGE.
H36	IH 10 E	AT FM 1406		OVERPASS REVERSAL
H37	SH 99	AT IH 45 N		SEG G: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)
H38	SH 99	AT IH 45 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)
H39	IH 45 N	IH 610	IH 10	RECONSTRUCT AND WIDEN FROM 4 TO 5 MAIN LANES, CONSTRUCT 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LN FRS TO TWO 3-LN FRS (NHHIP SEG 2)
H40	IH 45	S OF WEST RD	N OF SL 8	RECONSTRUCT 8 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES TRANSITIONING INTO TWO ENTERING AND EXITING LANES AT REVERSIBLE HOV LANE NORTH OF SL8, AND RECONSTRUCT AND WIDEN FROM TWO 2 AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3- LANES FRONTA
H41	SH 99	AT IH 69 N		SEG G: CONSTRUCT 2 DCS (TOLL) (EB-SB, SB-WB)
H42	FM 1960	US 290	N OF ELDRIDGE PKWY	RECONSTRUCT US 290/FM 1960 INTERCHANGE
H43	IH 10 E	DOWNTOWN HOUSTON	GARTH RD	NEW 2-LANE HOV FACILITY ALONG IH 10 E
H44	HEMPSTEAD RD/IH 610	W OF MANGUM/18TH ST ON HEMPSTEAD	S OF OLD KATY RD ON IH 610	CONSTRUCT INTERCHANGE WITH MANAGED LANES AND 2 DIRECT CONNECTORS (EB - SB, WB - NB)
H45	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES
H46	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)
H47	IH 10 E	AT FM 1410		OVERPASS REVERSAL
H48	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (SB-EB; SB-WB; WB-NB; EB-NB) (PROPOSED DCs NORTH OF IH 610)
H49	SH 288	S OF US 59	IH 610	CONSTRUCT 4 TOLL LANES AND RECONSTRUCT DIRECT CONNECTORS AT IH 610
H50	IH 69 S	IH 69 SW FWY SB	IH 610 SB	RECONSTRUCT DIRECT CONNECTOR
H51	IH 45	AT SH 242		CONSTRUCT NEW DIRECT CONNECTOR (NB - EB)
H52	61ST ST	BROADWAY ST/SH 87	HARBORSIDE DR/SH 275	4 LANE EXTENSION TO HARBORSIDE DR
H53	IH 10 E	AT OAK ISLAND RD		OVERPASS REVERSAL
H54	IH 610 S	W OF CAMBRIDGE ST	W OF SCOTT ST	RECONSTRUCT MAINLANES, FRONTAGE ROAD, AND CONSTRUCT OVERPASS AT CAMBRIDGE/ALMEDA/UPRR
H55	IH 45 S	N OF TEXAS CITY WYE	S OF TEXAS CITY WYE	RECONSTRUCT IH 45/SH 146/SH 6 INTERCHANGE AND WIDEN IH 45 MAIN LANES FROM 6 TO 8
H56	SH 99	AT IH 69 S		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)
H57	US 59 S	W OF DORIS RD	E OF DORIS RD	CONSTRUCT 4 LANE GRADE SEPARATION, 2 LANE ACCESS ROAD AND RECONSTRUCT 2 LANE FRONTAGE ROADS
H58	FM 1409	AT IH 10		CONSTRUCT A 2 LANE BRIDGE & APPROACHES

Figure 6-43: RTP Projects Categorized as High Needs (Map 1 of 2)



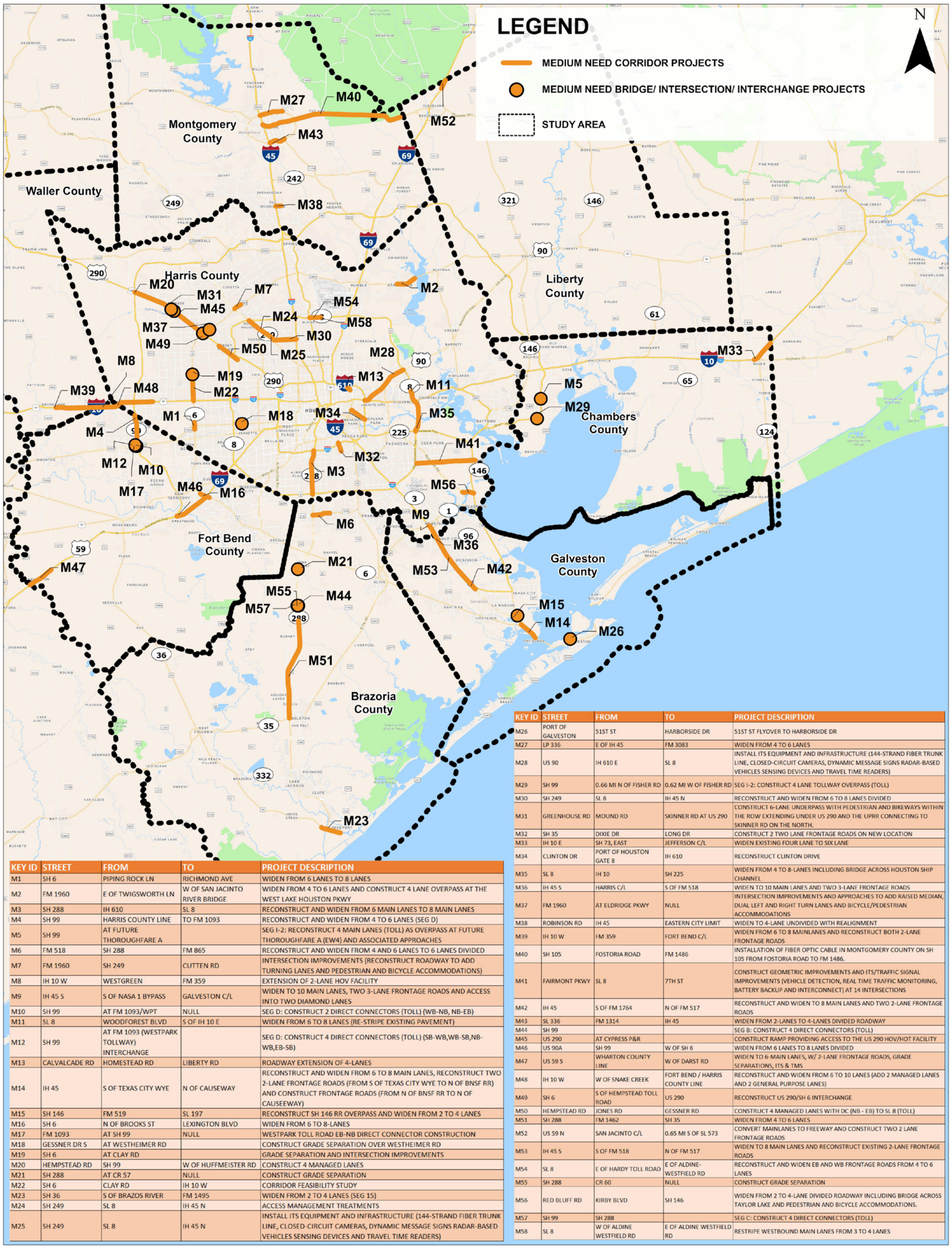
KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H59	IH 10 E	AT FM 1724		OVERPASS REVERSAL
H60	HARDY TOLL RD	AT SL 8		CONSTRUCT EB-SB, SB-WB AND NB-WB DIRECT CONNECTORS
H61	SH 288	SH 99 (CR 60)	FM 1462	UPGRADE ROADWAY TO FREEWAY FACILITY BY ADDING OVERPASSES AND UNDERPASSES
H62	IH 10 E	AT SH 73		ENTRANCE RAMP OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH 10 BRIDGE. SH 73 AT GRADE AND BRIDGE TO BE DEMOED
H63	SH 99	AT IH 69 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)
H64	SH 99	AT US 59 N		SEG H: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)
H65	IH 45	HARRIS C/L	RAYFORD-SAWDUST RD	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING
H66	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
H67	IH 610 S	AT BROADWAY		INTERSECTION IMPROVEMENTS
H68	IH 45 S	DOWNTOWN	BAY AREA BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE
H69	IH 10 OVERPASS	FM 1409	NULL	CONSTRUCT OVERPASS ON IH 10 FOR FUTURE FM 1409; GRADE SEPARATION ONLY AT IH 10
H70	IH 69 N	DOWNTOWN	KIINGWOOD DR	CONVERSION OF EXISTING ONE-WAY REVERSIBLE HOV LANE
H71	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES
H72	SH 146	HARRIS/GALVESTON C/L	FM 518	WIDEN TO 6-LANES ARTERIAL WITH 4-LANE EXPRESS LANES
H73	FM 2234	AT UPRR		CONSTRUCT GRADE SEPARATION (DOT# 447 968S)
H74	SH 146	RED BLUFF RD	NASA 1	WIDEN TO 8-LANES, GS AT MAJOR INTERSECTIONS AND 2 2-LANE FRONTAGE ROADS
H75	SH 332	AT FM 523		CONSTRUCT GRADE SEPARATION
H76	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS
H77	US 90A	0.21 MI W OF LANE DR	FM 3155	REPLACE RAILROAD UNDERPASS
H78	IH 69 S	IH 69 SW FWY NB	IH 610 NB	RECONSTRUCT DIRECT CONNECTOR
H79	IH 45 S	S OF CAUSEWAY	61ST ST	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT BOTH, 2-LANE FRONTAGE ROADS
H80	IH 45	AT WOODLANDS PKWY		CONSTRUCT SINGLE POINT URBAN INTERCHANGE
H81	SH 99	CINCO RANCH BLVD	WESTHEIMER PKWY	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
H82	PORT RD	SH 146	CRUISE ST	WIDEN FROM 4 LANE TO 6 LANE DIVIDED
H83	SH 146	N OF FAIRMONT PKWY	S OF SPENCER HWY	WIDEN FROM 4 TO 6 LANES TO REMOVE BOTTLE NECK
H84	SH 99	AT IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)
H85	SH 99	IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H86	BU 90-U	IH 610 NE	E OF MESA RD	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES DIVIDED
H87	SH 288	AT BW 8		CONSTRUCT 8 DCs AT BW 8 INTERCHANGE
H88	NORTHPARK DR	IH 69	RUSSELL PALMER RD	WIDEN FROM 4 TO 6 LANES BOULEVARD SECTION INCLUDING DRAINAGE, GRADE SEPARATION AT UPRR/SL 494, AND INTERSECTION IMPROVEMENTS
H89	IH 45 S	TEXAS CITY WYE C/L	NULL	CONSTRUCT 2 DCS (SB-EB AND WB-NB)
H90	FM 565	SH 146	SH 99	WIDEN FROM 2 TO 4 LANES WITH CONTINUOUS CENTER LEFT TURN LANE AND RAILROAD OVERPASS
H91	FM 521	SL 8	FORT BEND C/L	WIDEN TO 4-LANE DIVIDED SECTION AND CONSTRUCT GRADE SEPARATION AT UPRR (DOT# 447 969Y)
H92	FM 1960	SH 249	IH 45 N	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE WHERE NO ITS EQUIPMENT CURRENTLY EXISTS
H93	SH 35 (Spur 5)	IH 45	GRIGGS RD	CONSTRUCT 8 LANE FREEWAY ON NEW LOCATION, OVERPASSES, AND SB RAMP TO OLD SPANISH TRAIL (US 90A)
H94	GALVESTON TRAFFIC MANAGEMENT CENTER (TMC)	AT SH 275; SH 342; SH 87; AND FM 3005	VA	INSTALL TRAFFIC MANAGEMENT SYSTEMS THROUGHOUT GALVESTON COUNTY INCLUDING TRAFFIC SIGNAL SYNCHRONIZATION EQUIPMENT, CAMERAS, AND DYNAMIC SIGNS
H95	FM 359	IH 10	US 90	WIDEN FROM 2 TO 4 LANES DIVIDED
H96	SL 8	IH10 W	IH 69 S	VARIOUS ACCESS MANAGEMENT TREATMENTS ALONG THE FRONTAGE ROAD ALONG BELTWAY 8 BETWEEN IH 10 AND US 59 (IH 69).
H97	SH 99	AT SH 249	NULL	SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-SB, NB-WB, WB-SB, NB-EB)
H98	SH 288	AT CR 56	NULL	WIDEN CR 56 BRIDGE FROM 2 TO 4 LANES
H99	SH 99	AT IH 45 S		SEG B: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-NB, SB-WB, NB-WB, EB-SB)
H100	IH 45	AT NASA 1 BYPASS INTERCHANGE		CONSTRUCT 2 DIRECT CONNECTORS (WB - SB, NB - EB)
H101	IH 10 W	BRAZOS RIVER	FM 359	CONSTRUCT 1 ADDITIONAL MAIN LANE IN EACH DIRECTION
H102	FM 2759/FM 762	1000' N OF BNSF RR TO 1000' S		PHASE 2: CONSTRUCT ELEVATED INTERSECTION OF CRABB RIVER ROAD AND THOMPSON'S HIGHWAY OVER BNSF RR
H103	SH 99	N OF KINGSLAND BLVD	FORT BEND COUNTY LINE	SEG D: WIDEN FROM 4 LANES TO 6 LANES
H104	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
H105	IH 45	FM 2920	MONTGOMERY C/L	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING
H106	IH 10 W	FORT BEND C/L	MASON RD	RESTRIPE AND WIDEN FROM 10 MAIN LANES TO 10 MAIN AND 2 MANAGED LANES
H107	SH 146	FAIRMONT PKWY W	NASA 1	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
H108	SH 99	AT SH 249		SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB, SB-EB, WB-NB, EB-NB)
H109	SH 6	MEMORIAL DR	PIPING ROCK LN	RECONSTRUCT AND WIDEN FROM 6 LANES TO 8 LANES DIVIDED
H110	SH 288	AT CR 64	NULL	CONSTRUCT GRADE SEPARATION
H111	VETERANS MEMORIAL DR	FM 1960	W GREENS RD	WIDEN FROM 4 LANE TO 6 LANE ROADWAY
H112	SH 146	AT BS 146E	FERRY RD	CONSTRUCT 4 MAINLANES AND GRADE SEPARATION
H113	SH 99	S FRY ROAD	FM 1093	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
H114	LOUETTA RD	E OF KUYKENDAHL RD	IH 45	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT
H115	SH 36	N OF CR 467/HOGG RANCH RD	SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4 LANES
H116	SH 146	N OF FAIRMONT PARKWAY	S OF RED BLUFF RD	RECONSTRUCT AND WIDEN FROM 4 TO 6-LANES WITH TWO 2-LANE FRONTAGE ROADS

Figure 6-44: RTP Projects Categorized as High Needs (Map 2 of 2)

6.4.2 Projects that Address Medium Needs

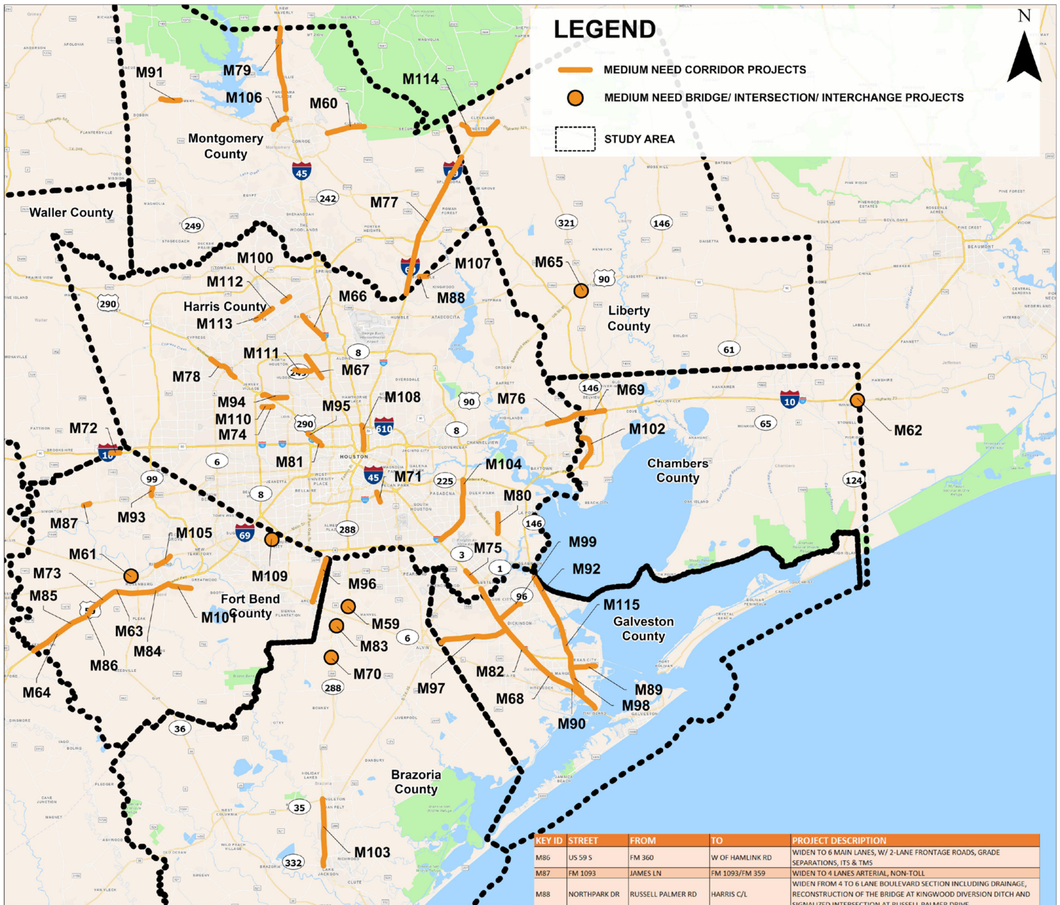
Multiple projects that address medium needs involve widening lanes. **Figure 6-45** and **Figure 6-46** display the location of the projects categorized as addressing medium needs.



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M1	SH 6	PIPING ROCK LN	RICHMOND AVE	WIDEN FROM 6 LANES TO 8 LANES
M2	FM 1960	E OF TWIGSWORTH LN	W OF SAN JACINTO RIVER BRIDGE	WIDEN FROM 4 TO 6 LANES AND CONSTRUCT 4 LANE OVERPASS AT THE WEST LAKE HOUSTON PKWY
M3	SH 288	IH 610	SL 8	RECONSTRUCT AND WIDEN FROM 6 MAIN LANES TO 8 MAIN LANES
M4	SH 99	HARRIS COUNTY LINE	TO FM 1093	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES (SEG D)
M5	SH 99	AT FUTURE THOROUGHFARE A		SEG I-2: RECONSTRUCT 4 MAIN LANES (TOLL) AS OVERPASS AT FUTURE THOROUGHFARE A (EW4) AND ASSOCIATED APPROACHES
M6	FM 518	SH 288	FM 865	RECONSTRUCT AND WIDEN FROM 4 AND 6 LANES TO 6 LANES DIVIDED
M7	FM 1960	SH 249	CUTTEN RD	INTERSECTION IMPROVEMENTS (RECONSTRUCT ROADWAY TO ADD TURNING LANES AND PEDESTRIAN AND BICYCLE ACCOMMODATIONS)
M8	IH 10 W	WESTGREEN	FM 359	EXTENSION OF 2-LANE HOV FACILITY
M9	IH 45 S	S OF NASA 1 BYPASS	GALVESTON C/L	WIDEN TO 10 MAIN LANES, TWO 3-LANE FRONTAGE ROADS AND ACCESS INTO TWO DIAMOND LANES
M10	SH 99	AT FM 1093/WPT	NULL	SEG D: CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (WB-NB, NB-EB)
M11	SL 8	WOODFOREST BLVD	S OF IH 10 E	WIDEN FROM 6 TO 8 LANES (RE-STRIPE EXISTING PAVEMENT)
M12	SH 99	AT FM 1093 (WESTPARK TOLLWAY) INTERCHANGE		SEG D: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB,WB-SB,NB-WB,EB-SB)
M13	CALVALCADE RD	HOMESTEAD RD	LIBERTY RD	ROADWAY EXTENSION OF 4-LANES
M14	IH 45	S OF TEXAS CITY WYE	N OF CAUSEWAY	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES, RECONSTRUCT TWO 2-LANE FRONTAGE ROADS (FROM S OF TEXAS CITY WYE TO N OF BNSF RR) AND CONSTRUCT FRONTAGE ROADS (FROM N OF BNSF RR TO N OF CAUSEEWAY)
M15	SH 146	FM 519	SL 197	RECONSTRUCT SH 146 RR OVERPASS AND WIDEN FROM 2 TO 4 LANES
M16	SH 6	N OF BROOKS ST	LEXINGTON BLVD	WIDEN FROM 6 TO 8-LANES
M17	FM 1093	AT SH 99	NULL	WESTPARK TOLL ROAD EB-NB DIRECT CONNECTOR CONSTRUCTION
M18	GESSNER DR S	AT WESTHEIMER RD		CONSTRUCT GRADE SEPARATION OVER WESTHEIMER RD
M19	SH 6	AT CLAY RD		GRADE SEPARATION AND INTERSECTION IMPROVEMENTS
M20	HEMPSTEAD RD	SH 99	W OF HUFFMEISTER RD	CONSTRUCT 4 MANAGED LANES
M21	SH 288	AT CR 57	NULL	CONSTRUCT GRADE SEPARATION
M22	SH 6	CLAY RD	IH 10 W	CORRIDOR FEASIBILITY STUDY
M23	SH 36	S OF BRAZOS RIVER	FM 1495	WIDEN FROM 2 TO 4 LANES (SEG 15)
M24	SH 249	SL 8	IH 45 N	ACCESS MANAGEMENT TREATMENTS
M25	SH 249	SL 8	IH 45 N	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M26	PORT OF GALVESTON	51ST ST	HARBORSIDE DR	51ST ST FLYOVER TO HARBORSIDE DR
M27	LP 336	E OF IH 45	FM 3083	WIDEN FROM 4 TO 6 LANES
M28	US 90	IH 610 E	SL 8	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)
M29	SH 99	0.66 MI N OF FISHER RD	0.62 MI W OF FISHER RD	SEG I-2: CONSTRUCT 4 LANE TOLLWAY OVERPASS (TOLL)
M30	SH 249	SL 8	IH 45 N	RECONSTRUCT AND WIDEN FROM 6 TO 8 LANES DIVIDED
M31	GREENHOUSE RD	MOUND RD	SKINNER RD AT US 290	CONSTRUCT 6-LANE UNDERPASS WITH PEDESTRIAN AND BIKEWAYS WITHIN THE ROW EXTENDING UNDER US 290 AND THE UPRR CONNECTING TO SKINNER RD ON THE NORTH.
M32	SH 35	DIXIE DR	LONG DR	CONSTRUCT 2 TWO LANE FRONTAGE ROADS ON NEW LOCATION
M33	IH 10 E	SH 73, EAST	JEFFERSON C/L	WIDEN EXISTING FOUR LANE TO SIX LANE
M34	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE
M35	SL 8	IH 10	SH 225	WIDEN FROM 4 TO 8-LANES INCLUDING BRIDGE ACROSS HOUSTON SHIP CHANNEL
M36	IH 45 S	HARRIS C/L	S OF FM 518	WIDEN TO 10 MAIN LANES AND TWO 3-LANE FRONTAGE ROADS
M37	FM 1960	AT ELDRIDGE PKWY	NULL	INTERSECTION IMPROVEMENTS AND APPROACHES TO ADD RAISED MEDIAN, DUAL LEFT AND RIGHT TURN LANES AND BICYCLE/PEDESTRIAN ACCOMMODATIONS
M38	ROBINSON RD	IH 45	EASTERN CITY LIMIT	WIDEN TO 4-LANE UNDIVIDED WITH REALIGNMENT
M39	IH 10 W	FM 359	FORT BEND C/L	WIDEN FROM 6 TO 8 MAINLANES AND RECONSTRUCT BOTH 2-LANE FRONTAGE ROADS
M40	SH 105	FOSTORIA ROAD	FM 1486	INSTALLATION OF FIBER OPTIC CABLE IN MONTGOMERY COUNTY ON SH 105 FROM FOSTORIA ROAD TO FM 1486.
M41	FAIRMONT PKWY	SL 8	7TH ST	CONSTRUCT GEOMETRIC IMPROVEMENTS AND ITS/TRAFFIC SIGNAL IMPROVEMENTS (VEHICLE DETECTION, REAL TIME TRAFFIC MONITORING, BATTERY BACKUP AND INTERCONNECT) AT 14 INTERSECTIONS
M42	IH 45	S OF FM 1764	N OF FM 517	RECONSTRUCT AND WIDEN TO 8 MAIN LANES AND TWO 2-LANE FRONTAGE ROADS
M43	SL 336	FM 1314	IH 45	WIDEN FROM 2-LANES TO 4-LANES DIVIDED ROADWAY
M44	SH 99			SEG B: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)
M45	US 290	AT CYPRESS P&R		CONSTRUCT RAMP PROVIDING ACCESS TO THE US 290 HOV/HOT FACILITY
M46	US 90A	SH 99	W OF SH 6	WIDEN FROM 6 LANES TO 8 LANES DIVIDED
M47	US 59 S	WHARTON COUNTY LINE	W OF DARST RD	WIDEN TO 6-MAIN LANES, W/ 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS
M48	IH 10 W	W OF SNAKE CREEK	FORT BEND / HARRIS COUNTY LINE	RECONSTRUCT AND WIDEN FROM 6 TO 10 LANES (ADD 2 MANAGED LANES AND 2 GENERAL PURPOSE LANES)
M49	SH 6	S OF HEMPSTEAD TOLL ROAD	US 290	RECONSTRUCT US 290/SH 6 INTERCHANGE
M50	HEMPSTEAD RD	JONES RD	GESSNER RD	CONSTRUCT 4 MANAGED LANES WITH DC (NB - EB) TO SL 8 (TOLL)
M51	SH 288	FM 1462	SH 35	WIDEN FROM 4 TO 6 LANES
M52	US 59 N	SAN JACINTO C/L	0.65 MI S OF SL 573	CONVERT MAINLANES TO FREEWAY AND CONSTRUCT TWO 2 LANE FRONTAGE ROADS
M53	IH 45 S	S OF FM 518	N OF FM 517	WIDEN TO 8 MAIN LANES AND RECONSTRUCT EXISTING 2-LANE FRONTAGE ROADS
M54	SL 8	E OF HARDY TOLL ROAD	E OF ALDINE-WESTFIELD RD	RECONSTRUCT AND WIDEN EB AND WB FRONTAGE ROADS FROM 4 TO 6 LANES
M55	SH 288	CR 60	NULL	CONSTRUCT GRADE SEPARATION
M56	RED BLUFF RD	KIRBY BLVD	SH 146	WIDEN FROM 2 TO 4-LANE DIVIDED ROADWAY INCLUDING BRIDGE ACROSS TAYLOR LAKE AND PEDESTRIAN AND BICYCLE ACCOMMODATIONS.
M57	SH 99	SH 288		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)
M58	SL 8	W OF ALDINE WESTFIELD RD	E OF ALDINE WESTFIELD RD	RESTRIPE WESTBOUND MAIN LANES FROM 3 TO 4 LANES

Figure 6-45: RTP Projects Categorized as Medium Needs (Map 1 of 2)



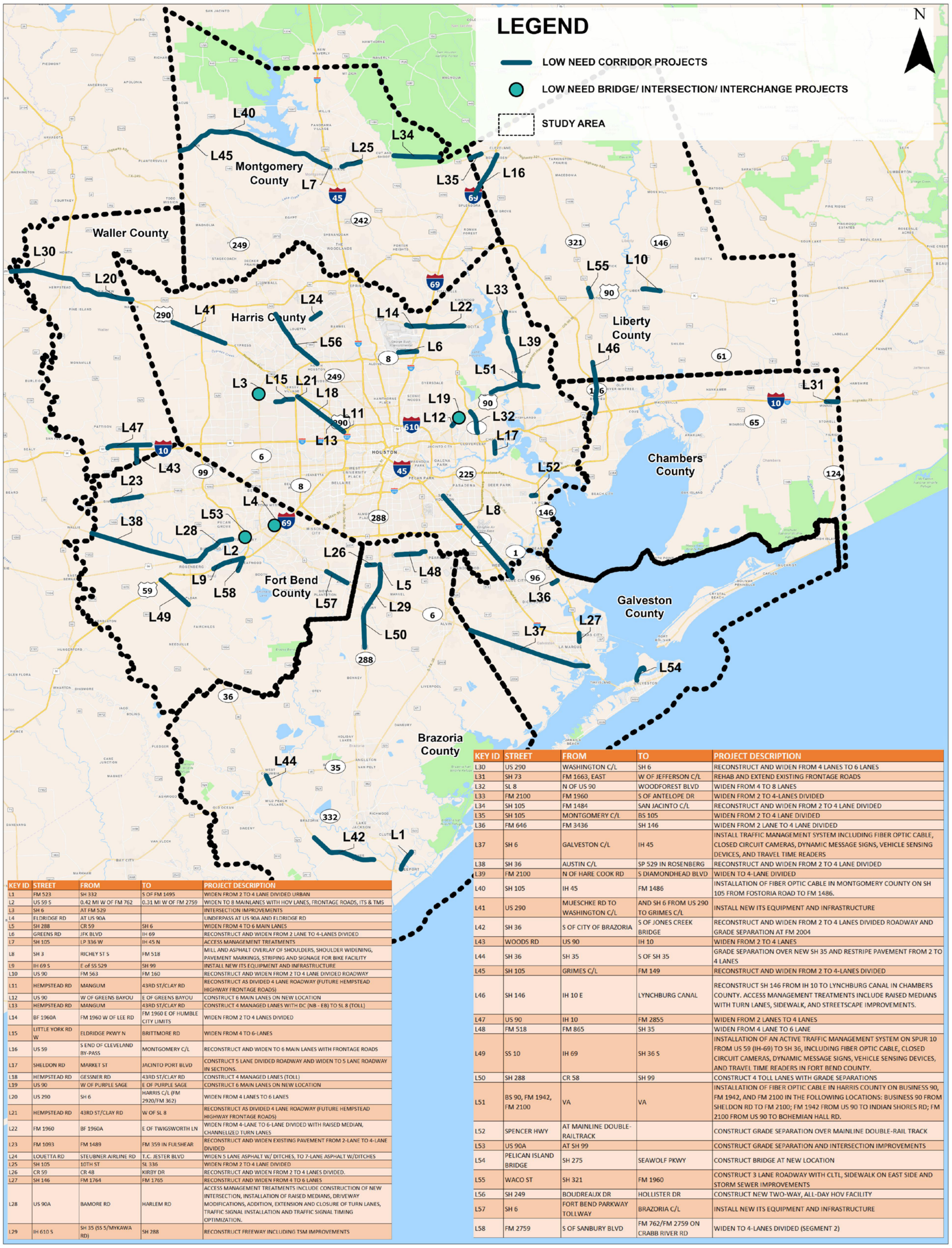
KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M59	SH 288	RODEO PALMS PKWY	SH 6	CONSTRUCT GRADE SEPARATION AND NEW 2-LANE FRONTAGE ROADS.
M60	SH 105	LP 336	FM 1484	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
M61	SH 36	AT UP RR IN ROSENBERG		REPLACE RAILROAD UNDERPASS
M62	SH 73	W OF JEFFERSON C/L	JEFFERSON C/L	GRADE SEPARATION AND CLOSE CROSSOVER
M63	US 59 S	SP 10	W OF SH 36	WIDEN TO 6-LANE RURAL FREEWAY, FRONTAGE ROADS, ITS & TMS
M64	US 59	Wharton C/L	E of SS 529	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
M65	US 90	AT UP RAILROAD		CONSTRUCT GRADE SEPARATIONS AT UP RAILROAD TRACKS
M66	KUYKENDAHL RD	FM 1960	RANKIN RD	WIDEN FROM 4 TO 6 LANE BLVD
M67	VETERANS MEMORIAL DR	SL 8	SH 249	WIDEN FROM 4 LANE TO 6 LANE ROADWAY
M68	IH 45	S OF FM 1764	N OF FM 519	WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT BOTH 2 LANE FRONTAGE ROADS
M69	IH 10 E	HARRIS COUNTY LINE	SH 99	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)
M70	SH 288	CR 63	NULL	CONSTRUCT GRADE SEPARATION
M71	SH 35 (Spur 5)	DIXIE DR	N of GRIGGS RD	CONSTRUCT 8 LANE FREEWAY ON NEW LOCATION
M72	IH 10 W	WALLER C/L	W OF SNAKE CREEK	RECONSTRUCT AND WIDEN FROM 6 TO 10 LANE (ADD 2 MANAGED LANES AND 2 GENERAL PURPOSE LANES)
M73	US 59 S	W OF SP 10	W OF HAMLINK RD	WIDEN TO 6-MAIN LANES, GRADE SEPARATIONS, 2-LANE FRONTAGE ROADS, ITS & TMS
M74	TANNER RD	CAMPBELL RD	TRIWAY LN	WIDEN TO 4-LANE DIVIDED ROAD WITH CURBS AND SIDEWALKS AND NECESSARY UNDERGROUND UTILITIES
M75	IH 45 S	0.4808 MI S OF ELDORADO BLVD	S OF MEDICAL CENTER BLVD	WIDEN AND RECONSTRUCT TO 10 MAIN LANES, TWO 3-LANE FRONTAGE ROADS AND 1 HOV REVERSIBLE LANE
M76	IH 10 E	GARTH RD	CHAMBERS CO LINE	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)
M77	IH 69 N	LIBERTY C/L	HARRIS C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
M78	US 290	E OF TELGE RD	W OF ELDRIDGE PKWY	RECONSTRUCT AND WIDEN TO 8 MAIN LANES WITH 3 REVERSIBLE MANAGED LANES AND TWO 2-LANE FRONTAGE ROADS (SEGMENT 8)
M79	IH 45	WALKER C/L	LEAGUE LINE RD	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
M80	UNDERWOOD RD	FAIRMONT PKWY	RED BLUFF	DESIGN, ACQUIRE ROW AND CONSTRUCT 6-LANE ROADWAY, INCLUDING DRAINAGE AND SIGNALS AT UNDERWOOD
M81	HEMPSTEAD RD & WASHINGTON AVE	W OF 12TH ST	E OF WASHINGTON AVE/KATY RD SPLIT	CONSTRUCT 6-LANE DIVIDED URBAN ST FACILITY W/ AUTOMATIC PUMP STATION AND RR LINE W/ UNDERPASS (PHASE 2)
M82	IH 45 S	NASA 1 BYPASS	S OF SH 146	CONSTRUCT TWO-WAY DIAMOND LANES
M83	SH 288	AT CR 48	NULL	CONSTRUCT GRADE SEPARATION
M84	US 59 S	W OF SH 36	W OF FM 762	WIDEN TO 6-LANE RURAL FREEWAY, FRONTAGE ROADS, ITS & TMS WITH GRADE SEPARATION
M85	US 59 S	W OF DARST RD	FM 360	WIDEN TO 6 MAIN LANE FREEWAY WITH 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M86	US 59 S	FM 360	W OF HAMLINK RD	WIDEN TO 6 MAIN LANES, W/ 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS
M87	FM 1093	JAMES LN	FM 1093/FM 359	WIDEN TO 4 LANES ARTERIAL, NON-TOLL
M88	NORTHPARK DR	RUSSELL PALMER RD	HARRIS C/L	WIDEN FROM 4 TO 6 LANE BOULEVARD SECTION INCLUDING DRAINAGE, RECONSTRUCTION OF THE BRIDGE AT KINGWOOD DIVERSION DITCH AND SIGNALIZED INTERSECTION AT RUSSELL PALMER DRIVE
M89	5TH/4TH AVE	SH 146	LP 197	RECONSTRUCT TWO WAY ROADWAY TO A ONE WAY EASTBOUND FACILITY
M90	IH 45 S	N OF FM 519	N OF TEXAS CITY WYE	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT TWO 2 LANE FRONTAGE ROADS
M91	SH 105	GRIMES C/L	FM 149	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES DIVIDED
M92	SH 146	FM 518	DICKINSON BAYOU	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES WITH GRADE SEPARATION AT SH 96
M93	SH 99	S FRY ROAD	FM 1093	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
M94	LITTLE YORK RD W	US 290	HOUSTON CITY LIMITS	WIDEN 4 TO 6-LANES
M95	HEMPSTEAD RD	IH 610	MANGUM RD	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)
M96	FM 521	SH 6	FM 2234	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES WITH RAISED MEDIANS, INTERSECTION IMPROVEMENTS, SIGNAL IMPROVEMENTS AND PEDESTRIAN ACCESS
M97	FM 517	FM 646	BRAZORIA C/L	RECONSTRUCT AND WIDEN FROM 2 LANES TO 4 LANES AND ACCESS MANAGEMENT TREATMENTS
M98	SH 146	FM 1765	GALVESTON WYE	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES
M99	FM 646	EDMUNDS WAY	FM 1266	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY WITH RAISED MEDIAN AND RAILROAD OVERPASS
M100	LOUETTA RD	T. C. JESTER	KUYKENDAHL	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT
M101	FM 762	US 59	CRABB RIVER RD	WIDEN 2-LANE TO 4-LANE DIVIDED
M102	FM 1405	SH 146	SH 99	WIDEN FROM 2 TO 4 LANES DIVIDED WITH MEDIAN OPENINGS FOR TURNAROUNDS
M103	SH 288	SH 35	SH 332	WIDEN FROM 4 TO 6 LANES
M104	BW 8	SH 225	IH 45	WIDEN FROM 4 TO 8-MAIN LANES IN SECTIONS
M105	US 90A	LP 762	FM 359	WIDEN FROM 4 TO 6-LANES DIVIDED (PHASE 3 OF 3)
M106	FM 3083	SH 105	IH 45	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES
M107	NORTHPARK DR	MONTGOMERY C/L	WOODLANDS HILL DR	WIDEN FROM 4 TO 6 LANE BOULEVARD SECTION INCLUDING DRAINAGE, RECONSTRUCTION OF THE BRIDGE AT BEN'S BRANCH, A PEDESTRIAN TUNNEL AT GLADE VALLEY DRIVE AND A SIGNALIZED INTERSECTION AT WOODLANDS HILL DRIVE
M108	HARDY TOLL RD	IH 610	IH 69	CONSTRUCT 4-LANE TOLL ROAD TO COMPLETE HARDY TOLL" ROAD"
M109	FM 2234	N OF US 90A	S OF US 90A	CONSTRUCT INTERSECTION IMPROVEMENTS
M110	TANNER RD	TRIWAY LN	HEMPSTEAD	WIDEN FROM 2 LANES TO 4-LANE DIVIDED
M111	WEST RD	SH 249	VETERANS MEMORIAL	CONSTRUCT NEW 4-LANE DIVIDED
M112	LOUETTA RD	CHAMPION FOREST	STUEBNER AIRLINE	WIDEN FROM 4 TO 6 LANE ASPHALT, DITCHES, W/ CENTER TURN LANE
M113	LOUETTA RD	OLD LOUETTA RD	CHAMPION FOREST	WIDEN FROM 4 LANE TO 6-LANE ASPHALT, DITCHES, W/ CENTER TURN LANE
M114	SH 105 BYPASS	SH 105 W OF CLEVELAND	SH 321 E OF CLEVELAND	WIDEN FROM 2 TO 4 LANES
M115	SH 146	IH 45	SH 96	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SH 146 FROM IH-45 TO SH 96, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN GALVESTON COUNTY.

Figure 6-46: RTP Projects Categorized as Medium Needs (Map 2 of 2)

6.4.3 Projects that Address Low Needs

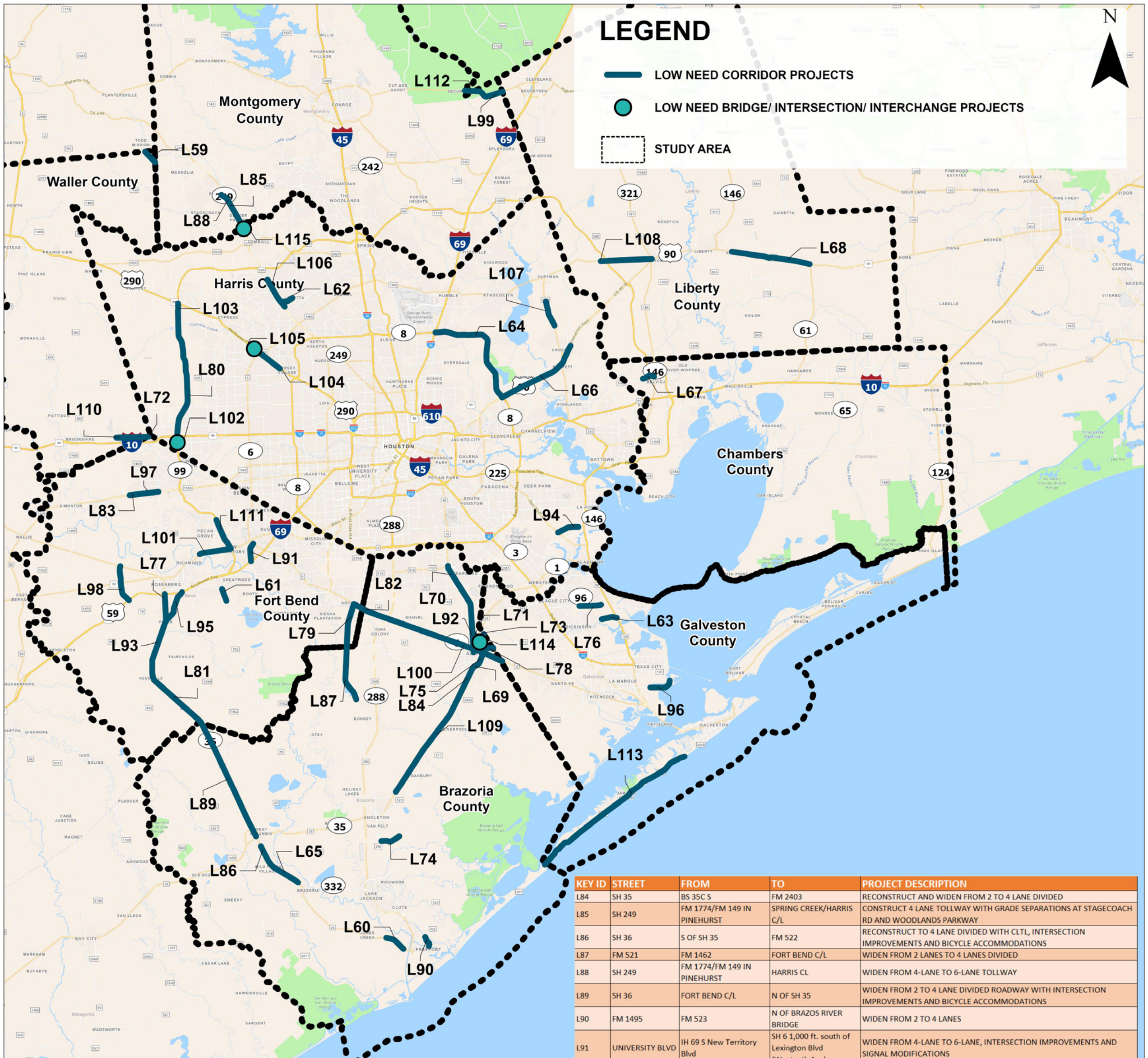
All but eight of the projects addressing low needs are corridor projects. **Figure 6-47** and **Figure 6-48** display the location of the projects categorized as addressing low needs.



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L1	FM 523	SH 332	S OF FM 1495	WIDEN FROM 2 TO 4 LANE DIVIDED URBAN
L2	US 59 S	0.42 MI W OF FM 762	0.31 MI W OF FM 2759	WIDEN TO 8 MAINLANES WITH HOV LANES, FRONTAGE ROADS, ITS & TMS
L3	SH 6	AT FM 529		INTERSECTION IMPROVEMENTS
L4	ELDRIDGE RD	AT US 90A		UNDERPASS AT US 90A AND ELDRIDGE RD
L5	SH 288	CR 59	SH 6	WIDEN FROM 4 TO 6 MAIN LANES
L6	GREENS RD	JFK BLVD	IH 69	RECONSTRUCT AND WIDEN FROM 2 LANE TO 4-LANES DIVIDED
L7	SH 105	LP 336 W	IH 45 N	ACCESS MANAGEMENT TREATMENTS
L8	SH 3	RICHEY ST S	FM 518	MILL AND ASPHALT OVERLAY OF SHOULDERS, SHOULDER WIDENING, PAVEMENT MARKINGS, STRIPING AND SIGNAGE FOR BIKE FACILITY
L9	IH 69 S	E of SS 529	SH 99	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L10	US 90	FM 563	FM 160	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY
L11	HEMPSTEAD RD	MANGUM	43RD ST/CLAY RD	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)
L12	US 90	W OF GREENS BAYOU	E OF GREENS BAYOU	CONSTRUCT 6 MAIN LANES ON NEW LOCATION
L13	HEMPSTEAD RD	MANGUM	43RD ST/CLAY RD	CONSTRUCT 4 MANAGED LANES WITH DC (NB - EB) TO SL 8 (TOLL)
L14	BF 1960A	FM 1960 W OF LEE RD	FM 1960 E OF HUMBLE CITY LIMITS	WIDEN FROM 2 TO 4 LANES DIVIDED
L15	LITTLE YORK RD W	ELDRIDGE PKWY N	BRITTMORE RD	WIDEN FROM 4 TO 6-LANES
L16	US 59	S END OF CLEVELAND BY-PASS	MONTGOMERY C/L	RECONSTRUCT AND WIDEN TO 6 MAIN LANES WITH FRONTAGE ROADS
L17	SHELDON RD	MARKET ST	JACINTO PORT BLVD	CONSTRUCT 5 LANE DIVIDED ROADWAY AND WIDEN TO 5 LANE ROADWAY IN SECTIONS.
L18	HEMPSTEAD RD	GESSNER RD	43RD ST/CLAY RD	CONSTRUCT 4 MANAGED LANES (TOLL)
L19	US 90	W OF PURPLE SAGE	E OF PURPLE SAGE	CONSTRUCT 6 MAIN LANES ON NEW LOCATION
L20	US 290	SH 6	HARRIS C/L (FM 2920/FM 362)	WIDEN FROM 4 LANES TO 6 LANES
L21	HEMPSTEAD RD	43RD ST/CLAY RD	W OF SL 8	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)
L22	FM 1960	BF 1960A	E OF TWIGSWORTH LN	WIDEN FROM 4-LANE TO 6-LANE DIVIDED WITH RAISED MEDIAN, CHANNELIZED TURN LANES
L23	FM 1093	FM 1489	FM 359 IN FULSHEAR	RECONSTRUCT AND WIDEN EXISTING PAVEMENT FROM 2-LANE TO 4-LANE DIVIDED
L24	LOUETTA RD	STEUBNER AIRLINE RD	T.C. JESTER BLVD	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT W/DITCHES
L25	SH 105	10TH ST	SL 336	WIDEN FROM 2 TO 4 LANE DIVIDED
L26	CR 59	CR 48	KIRBY DR	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED.
L27	SH 146	FM 1764	FM 1765	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES
L28	US 90A	BAMORE RD	HARLEM RD	ACCESS MANAGEMENT TREATMENTS INCLUDE CONSTRUCTION OF NEW INTERSECTION, INSTALLATION OF RAISED MEDIANS, DRIVEWAY MODIFICATIONS, ADDITION, EXTENSION AND CLOSURE OF TURN LANES, TRAFFIC SIGNAL INSTALLATION AND TRAFFIC SIGNAL TIMING OPTIMIZATION.
L29	IH 610 S	SH 35 (SS 5/MYKAWA RD)	SH 288	RECONSTRUCT FREEWAY INCLUDING TSM IMPROVEMENTS

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L30	US 290	WASHINGTON C/L	SH 6	RECONSTRUCT AND WIDEN FROM 4 LANES TO 6 LANES
L31	SH 73	FM 1663, EAST	W OF JEFFERSON C/L	REHAB AND EXTEND EXISTING FRONTAGE ROADS
L32	SL 8	N OF US 90	WOODFOREST BLVD	WIDEN FROM 4 TO 8 LANES
L33	FM 2100	FM 1960	S OF ANTELOPE DR	WIDEN FROM 2 TO 4-LANES DIVIDED
L34	SH 105	FM 1484	SAN JACINTO C/L	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L35	SH 105	MONTGOMERY C/L	BS 105	WIDEN FROM 2 TO 4 LANE DIVIDED
L36	FM 646	FM 3436	SH 146	WIDEN FROM 2 LANE TO 4 LANE DIVIDED
L37	SH 6	GALVESTON C/L	IH 45	INSTALL TRAFFIC MANAGEMENT SYSTEM INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS
L38	SH 36	AUSTIN C/L	SP 529 IN ROSENBERG	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L39	FM 2100	N OF HARE COOK RD	S DIAMONDHEAD BLVD	WIDEN TO 4-LANE DIVIDED
L40	SH 105	IH 45	FM 1486	INSTALLATION OF FIBER OPTIC CABLE IN MONTGOMERY COUNTY ON SH 105 FROM FOSTORIA ROAD TO FM 1486.
L41	US 290	MUESCHKE RD TO WASHINGTON C/L	AND SH 6 FROM US 290 TO GRIMES C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L42	SH 36	S OF CITY OF BRAZORIA	S OF JONES CREEK BRIDGE	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY AND GRADE SEPARATION AT FM 2004
L43	WOODS RD	US 90	IH 10	WIDEN FROM 2 TO 4 LANES
L44	SH 36	SH 35	S OF SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4 LANES
L45	SH 105	GRIMES C/L	FM 149	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES DIVIDED
L46	SH 146	IH 10 E	LYNCHBURG CANAL	RECONSTRUCT SH 146 FROM IH 10 TO LYNCHBURG CANAL IN CHAMBERS COUNTY. ACCESS MANAGEMENT TREATMENTS INCLUDE RAISED MEDIANS WITH TURN LANES, SIDEWALK, AND STREETSCAPE IMPROVEMENTS.
L47	US 90	IH 10	FM 2855	WIDEN FROM 2 LANES TO 4 LANES
L48	FM 518	FM 865	SH 35	WIDEN FROM 4 LANE TO 6 LANE
L49	SS 10	IH 69	SH 36 S	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SPUR 10 FROM US 59 (IH-69) TO SH 36, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN FORT BEND COUNTY.
L50	SH 288	CR 58	SH 99	CONSTRUCT 4 TOLL LANES WITH GRADE SEPARATIONS
L51	BS 90, FM 1942, FM 2100	VA	VA	INSTALLATION OF FIBER OPTIC CABLE IN HARRIS COUNTY ON BUSINESS 90, FM 1942, AND FM 2100 IN THE FOLLOWING LOCATIONS: BUSINESS 90 FROM SHELDON RD TO FM 2100; FM 1942 FROM US 90 TO INDIAN SHORES RD; FM 2100 FROM US 90 TO BOHEMIAN HALL RD.
L52	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
L53	US 90A	AT SH 99		CONSTRUCT GRADE SEPARATION AND INTERSECTION IMPROVEMENTS
L54	PELICAN ISLAND BRIDGE	SH 275	SEAWOLF PKWY	CONSTRUCT BRIDGE AT NEW LOCATION
L55	WACO ST	SH 321	FM 1960	CONSTRUCT 3 LANE ROADWAY WITH CLTL, SIDEWALK ON EAST SIDE AND STORM SEWER IMPROVEMENTS
L56	SH 249	BOUDREAUX DR	HOLLISTER DR	CONSTRUCT NEW TWO-WAY, ALL-DAY HOV FACILITY
L57	SH 6	FORT BEND PARKWAY TOLLWAY	BRAZORIA C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L58	FM 2759	S OF SANBURY BLVD	FM 762/FM 2759 ON CRABB RIVER RD	WIDEN TO 4-LANES DIVIDED (SEGMENT 2)

Figure 6-47: RTP Projects Categorized as Low Needs (Map 1 of 2)



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L59	FM 1774	GRIMES C/L	MONTGOMERY C/ L	WIDEN TO 4-LANE DIVIDED RURAL
L60	SH 36	S OF JONES CREEK BRIDGE	N OF BRAZOS RIVER DIVERSION CHANNEL	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES
L61	FM 762	FM 762/FM 2759	S OF LCISD SCHOOL ON CRABB RIVER RD	WIDEN TO 4-LANES DIVIDED (SEGMENT 2)
L62	LOUETTA RD	SH 249	MEMORIAL CHASE	WIDEN 4-LANE BLVD TO 6-LANE BLVD
L63	FM 517	FM 3436	SH 146	WIDEN FROM 2 TO 4 LANES DIVIDED WITH CURB AND GUTTER
L64	SL 8	IH 69	US 90	WIDEN FROM 6 TO 8-LANES
L65	SH 36	SH 35	N OF SH 332	WIDEN FROM 2 TO 4 LANES DIVIDED
L66	US 90	SL 8 E	RUNNEBURG	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON US 90 FROM BELTWAY 8 TO RUNNEBURG ROAD, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN HARRIS COUNTY.
L67	FM 1942	HATCHERVILLE RD	SH 146	INSTALLATION OF FIBER OPTIC COMMUNICATIONS CABLE FOR REAL TIME TRAFFIC MONITORING, SIGNAL ADJUSTMENTS, AND CONGESTION MANAGEMENT
L68	US 90	FM 160	SH 61	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY
L69	SH 99	S OF FM 1462	GALVESTON C/L	SEG B: CONSTRUCT 4 LANE TOLLWAY WITH INTERCHANGES AND TWO NON-CONTINUOUS 2 LANE FRONTAGE ROADS
L70	SH 35	FM 518	S OF SH 6	WIDEN FROM 4 TO 6 LANE DIVIDED
L71	SH 35	BS 35C NORTH	SH 99	CONSTRUCT 4 LANE FREEWAY ON NEW LOCATION
L72	US 90	Waller C/L	FM 1463	WIDEN FROM A 2 LANES TO 4 LANES
L73	SH 35	BS 35 C N (NORTH GORDON ST)	STEELE RD	CONSTRUCT 4 MAIN LANES AND OVERPASSES
L74	CR 220	SH 288	FM 523	WIDEN EXISTING ROADWAY TO 4 LANES (PHASE 2)
L75	SH 35	SH 99	BS 35C SOUTH	CONSTRUCT 4 LANE FREEWAY ON NEW LOCATION
L76	FM 646	FM 1266	FM 3436	WIDEN FROM 2 LANE TO 4 LANE DIVIDED
L77	SH 36	IH 69 S	FM 2218	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED
L78	FM 517	GALVESTON C/L	SH 35	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES
L79	FM 521	BRAZORIA C/L	SH 6	WIDEN FROM 2 LANES TO 4 LANES DIVIDED
L80	SH 99 SEG E	WEST RD	IH 10 W	SEG E: WIDEN EXISTING 4 LANE TOLL FACILITY TO 6 LANE TOLL FACILITY TO MITIGATE CONGESTION AND SUPPORT OPERATIONAL EFFICIENCY
L81	SH 36	S OF NEEDVILLE FAIRCHILDS RD	BRAZORIA C/L	WIDEN FROM 2 LANE TO 4 LANE DIVIDED
L82	SH 6	FORT BEND C/L	SH 288	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L83	FM 359	W of Texas Heritage Pkwy	W of FM 723	CONSTRUCT NEW 4-LANES TOLLWAY

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L84	SH 35	BS 35C S	FM 2403	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L85	SH 249	FM 1774/FM 149 IN PINEHURST	SPRING CREEK/HARRIS C/L	CONSTRUCT 4 LANE TOLLWAY WITH GRADE SEPARATIONS AT STAGECOACH RD AND WOODLANDS PARKWAY
L86	SH 36	S OF SH 35	FM 522	RECONSTRUCT TO 4 LANE DIVIDED WITH CLTL, INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS
L87	FM 521	FM 1462	FORT BEND C/L	WIDEN FROM 2 LANES TO 4 LANES DIVIDED
L88	SH 249	FM 1774/FM 149 IN PINEHURST	HARRIS CL	WIDEN FROM 4-LANE TO 6-LANE TOLLWAY
L89	SH 36	FORT BEND C/L	N OF SH 35	WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY WITH INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS
L90	FM 1495	FM 523	N OF BRAZOS RIVER BRIDGE	WIDEN FROM 2 TO 4 LANES
L91	UNIVERSITY BLVD	IH 69 S New Territory Blvd	SH 6 1,000 ft. south of Lexington Blvd (Wentorth Ave)	WIDEN FROM 4-LANE TO 6-LANE, INTERSECTION IMPROVEMENTS AND SIGNAL MODIFICATIONS
L92	FM 528	BS 35	SH 35 BYPASS	WIDEN FROM 2 TO 4 LANES
L93	SH 36	FM 2218	S OF NEEDVILLE FAIRCHILDS RD	WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY WITH INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS
L94	CHOATE RD	RED BLUFF RD	BAY AREA BLVD	DESIGN, ACQUIRE ROW & CONSTRUCT 4-LANE DIVIDED ROADWAY INCLUDING DRAINAGE AND SIGNALS
L95	FM 2218	US 59	SH 36	WIDEN FROM 2 LANES TO 4-LANE DIVIDED
L96	SHOAL POINT ACCESS RD	LP 197	SOUTHERN END TERMINAL SITE	CONSTRUCT NEW 4 LANE ROADWAY
L97	FM 1093	FM 1463/FM 359	W OF FM 723	CONSTRUCT 4 TOLL LANES
L98	SS 10	IH 69/US 59	SH 36	WIDEN FROM 2- LANES TO 4-LANES DIVIDED
L99	SH 105	SAN JACINTO C/L	LIBERTY C/L	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L100	SH 6	SH 288	GALVESTON C/L	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SH 6 FROM SH 288 TO GALVESTON COUNTY LINE, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN BRAZORIA COUNTY.
L101	US 90A	FM 359	SH 99	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES DIVIDED (PHASE 2 OF 3)
L102	SH 99	AT PEEK RD		RECONSTRUCTION OF OVERPASS. INSTALL TRAFFIC SIGNALS FOR AT-GRADE PORTION OF INTERSECTION AND RECONFIGURE EXISTING ENTRANCE AND EXIT RAMPS FOR SH 99
L103	SH 99 SEG E	US 290	WEST RD	SEG E: WIDEN EXISTING 4 LANE TOLL FACILITY TO 6 LANE TOLL FACILITY TO MITIGATE CONGESTION AND SUPPORT OPERATIONAL EFFICIENCY
L104	HEMPSTEAD RD	W OF HUFFMEISTER	JONES RD	CONSTRUCT 4 MANAGED LANES
L105	US 290	S OF TELGE	S OF SH 6	CONSTRUCT TWO 2-LANES DIRECT CONNECTORS (EB US 290 TO EB HEMPSTEAD MANAGED LANES AND WB HEMPSTEAD MANAGED LANES) TO WB US 290) (THESE ARE TWO PARALLEL FACILITIES)
L106	SH 249	S OF CHASEWOOD PARK DR	N OF GREGSON RD	RESTRIPE EXISTING PAVEMENT FROM 6 TO 8 LANES
L107	FM 2100	S OF ANTELOPE DR	N OF HARE COOK RD	WIDEN TO 4-LANE DIVIDED
L108	FM 1960	SH 321	SH 99	WIDEN ROADWAY FROM 2 LANES TO 4 LANES
L109	SH 35	FM 2403	FM 523	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L110	US 90	FM 2855	FORT BEND C/L	WIDEN FROM 2 LANES TO 4 LANES
L111	SH 99	AIRPORT BLVD W	FM 1464	WIDEN SH 99 FROM 2 TO 4 LANES
L112	SH 105	MONTGOMERY C/L	MONTGOMERY C/L	*INFORMATION ONLY* WIDEN FROM 2 TO 4 LANE DIVIDED
L113	FM 3005	SAN LUIS PASS	W END OF GALVESTON SEAWALL	INSTALL CROSS CULVERTS, DRIVEWAY ADJUSTMENTS, OVERLAY AND STRIPING (PHASE 2)
L114	SH 99	SH 35		CONSTRUCT 2 DIRECT CONNECTORS (TOLL)
L115	FM 2978	AT SPRING CREEK		REPLACE BRIDGE AND APPROACHES

Figure 6-48: RTP Projects Categorized as Low Needs (Map 2 of 2)

6.4.4 Corridors and Intersections Recommended for Addition to Future RTP

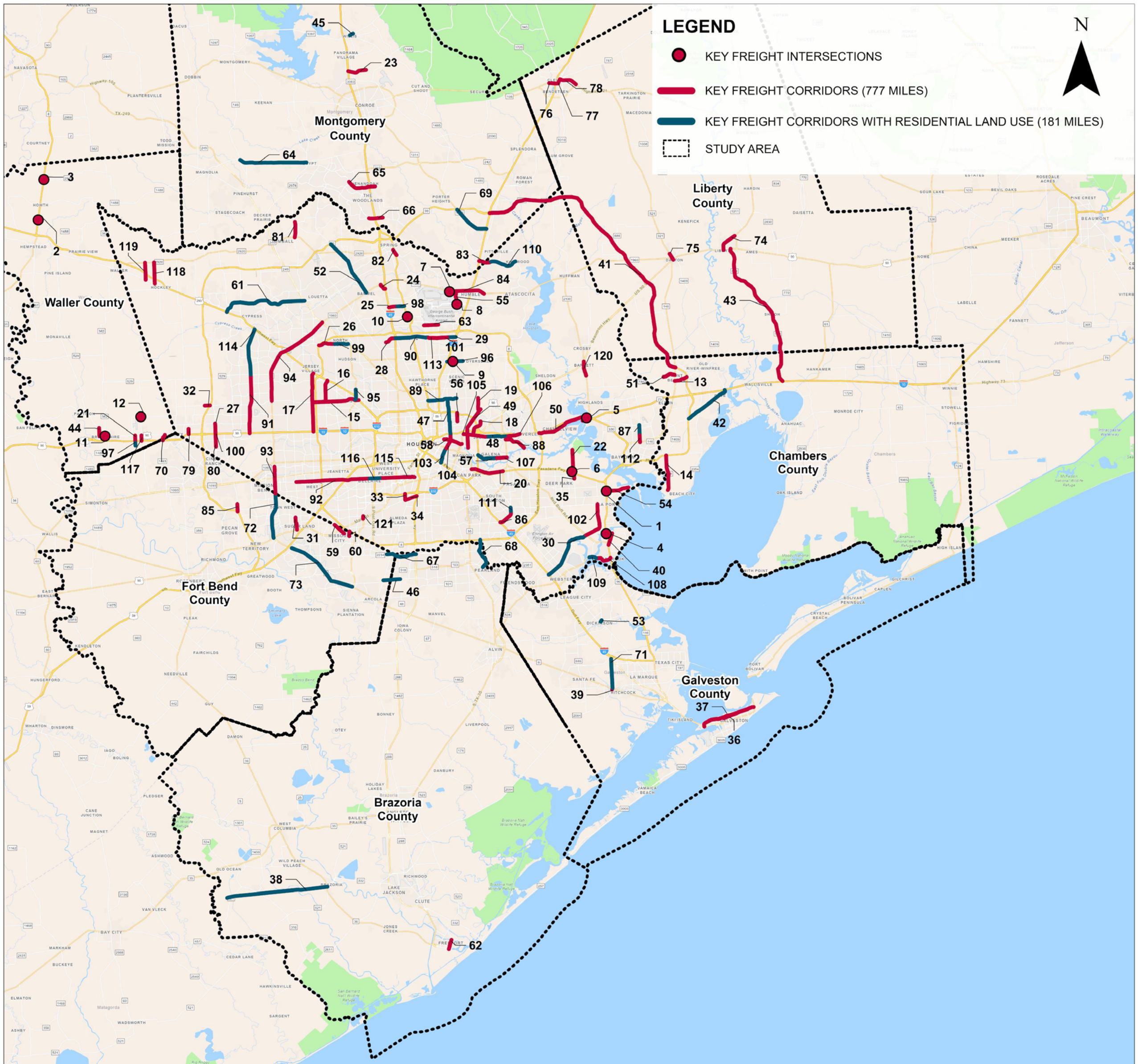
After the 2045 RTP projects that are part of the freight networks were sorted, key freight corridors and intersections were identified to support future RTP project selection.

These key freight corridors were identified using the following criteria:

- corridors with high truck volumes (1,000 or more per day for local streets and 5,000 or more per day for highways);
- in the top ten percentile for truck delays (using data from TTI);
- near industrial/commercial land use;
- in close proximity to freight centers like warehouses, industrial centers, manufacturing or other highways/ports/airports, and act as a bypass route or intermodal connector; or,
- recommended by either the Steering Committee or Stakeholder Forum groups.

The key intersections were specific requests that came up during agency coordination.

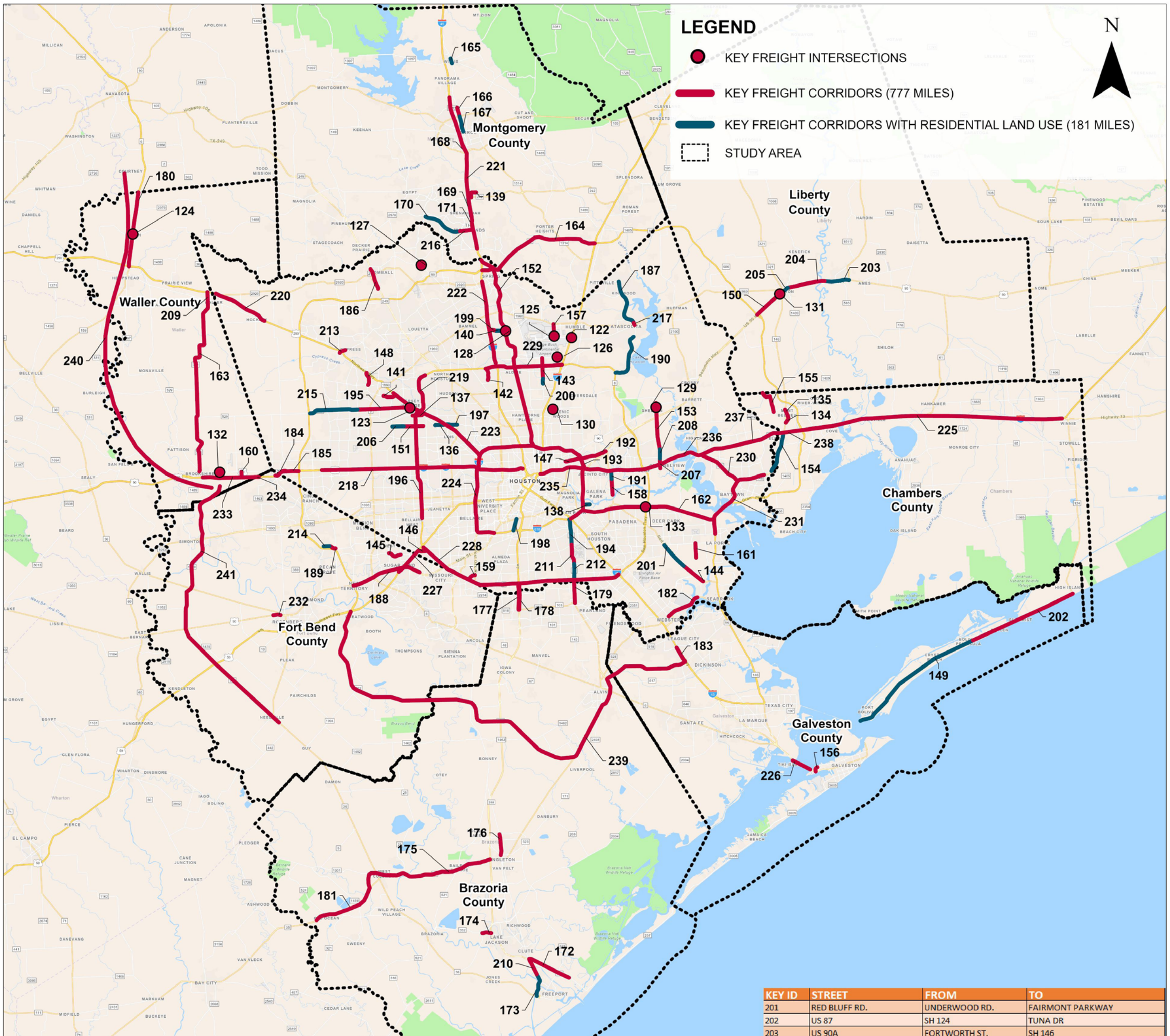
More than 240 corridors and intersections were identified for inclusion in the future RTP. **Figure 6-49** and **Figure 6-50** identify those corridors/intersections. The segments of the corridors surrounded by residential land use are highlighted in the maps below for special consideration during project development to mitigate the truck-related impacts on the adjacent community.



KEY ID	STREET	FROM	TO
1	SH 146	BARBOURS CUT BLVD	
2	SH 6	KELLEY RD	
3	SH 6	FM 2979	
4	PORT RD	RR CROSSING	
5	IH 10	SAN JACINTO RIVER	
6	SH 225	INDEPENDENCE PARKWAY	
7	FM 1960	LEE RD	
8	KENSWICK DR	WILL CLAYTON PARKWAY	
9	MT HOUSTON RD	UNION PACIFIC RR	
10	RANKIN RD	UNION PACIFIC RR	
11	FM 359	FM 362	
12	MORTON RD	FM 2855	
13	N FM 565	SH 146	SH 99
14	FM 1405	SH 99	FM 2354
15	CLAY RD.	US 290	BRITTMORE RD.
16	S GESSNER RD.	US 290	CLAY RD.
17	BRITTMOORE RD.	IH 10	US 290
18	GELLHORN DR.	MARKET ST.	WALLISVILLE RD.
19	MESA DR.	WALLISVILLE RD.	LIBERTY RD.
20	LAWNDALE AVE.	S RICHEY ST.	BROADWAY ST.
21	IGLOO RD.	US 90A	MILLER RD.
22	INDEPENDENCE PKWY	SH 225	VOPAK DRIVEWAY
23	LEAGUE LINE RD.	IH 45	POLLOK DR.
24	CYPRESS STATION DR.	IH 45	CYPRESS CREEK PARKWAY
25	E AIRTEX DR.	IH 45	HARDY TOLL RD.
26	FALLBROOK DR.	BW 8	FAIRBANKS NORTH HOUSTON RD.
27	N MASON RD.	IH 10	FRANZ RD.
28	FALLBROOK DR.	IH 45	ELLA BLVD.
29	ALDINE BENDER RD.	VICKERY DR.	EASTEX FREEWAY
30	BAY AREA BLVD.	IH 45	RED BLUFF RD.
31	INDUSTRIAL BLVD.	W AIRPORT BLVD.	US 90A
32	CLAY RD.	SH 99	AMAZON DRIVEWAY
33	FANNIN ST.	IH 610	HOLMES RD.
34	HOLMES RD.	SH 288	FANNIN ST.
35	OLD UNDERWOOD RD.	SH 225	E X ST.
36	HARBORSIDE DR.	IH 45	FERRY RD. N
37	OLD PORT INDUSTRIAL RD.	PELICAN ISLAND CAUSEWAY	HARBORSIDE DR.
38	CR 334	CR 322	SH 36
39	FM 2004	NEVILLE RD.	N OF HIGHLAND BAYOU AND SH 6
40	OLD SH 146	PORT RD.	SH 146
41	GRAND PARKWAY (SH 99) (SECTIONS H & I)	SH 146	US 59
42	FM 565	SH 99	IH 10
43	FM 563	IH-10	US-90A
44	FM 1489	US 90	FM 359
45	FM 1097 E	SH 75 (DANVILLE ST.)	PADDOCK ST.
46	CR 59	FM 521	OLD AIRLINE RD.
47	LOCKWOOD DR.	SONORA ST.	E CROSSTIMBERS ST.
48	MARKET ST.	OATES RD.	SHEFFIELD BLVD.
49	McCARTY ST	BEAUMONT RD.	CLINTON RD.
50	MARKET ST.	IH 10	KIRBY INLAND MARINE OPER CENTER
51	FM 1942	HATCHERVILLE RD.	SH 146
52	KUYKENDAHL RD.	CYPRESS CREEK PARKWAY	SH 99
53	FM 517	FM 1266 (DICKINSON AVE.)	DOCKRELL ST.
54	BARBOUR'S CUT BLVD.	SH 146	PORT TERMINAL
55	KENSWICK DR.	FM 1960	WILL CLAYTON PARKWAY
56	HOMESTEAD RD.	IH 610	LIBERTY RD.
57	CLINTON DR.	IH 610	CROWN ST.
58	CLINTON DR.	N WAYSIDE DR.	HIRSCH RD.
59	CRAVENS RD.	S GESSNER RD.	BUFFALO LAKES DR.
60	FONDREN RD.	BW 8	WILLOW OAK DR.
61	LOUETTA RD.	IH 45	SH 249
62	FM 1495	N OF BRAZOS RIVER	SH 36
63	GREENS RD.	JFK BLVD	ALDINE WESTFIELD RD.
64	FM 1488	FM 149	HONEA EGYPT ROAD
65	RESEARCH FOREST DR.	SHADOWBEND PI	JOHNSON RD
66	SAWDUST RD.	GROGANS MILL RD	LAZY LN
67	FM 2234	SH 288	WEST DR.
68	PEARLAND PARKWAY	BW 8	FM 518
69	FM 1314	SH 99	US 59
70	CANE ISLAND PARKWAY	US 90	IH 10
71	FM 2094	IH 45	SH 6
72	SH 6	FORTBEND C/L	US 90A
73	SH 6	LEXINGTON BLVD,	FORT BEND PARKWAY TOLL RD.
74	N MAIN ST.	US 90 A	SH 146 BYPASS
75	N CLEVELAND ST	W LINNEY ST.	US 90A
76	SH 105	FM 1725	FM 573
77	FM 573	W SOUTHLINE ST.	W HOUSTON ST.
78	SH 321	S WASHINGTON AVE.	SH 105
79	KATY FORT BEND RD.	COLONIAL PARKWAY	IH 10
80	S MASON RD.	IH 10	ROCK CANYON DR.
81	HUFSMITH KOHRVILLE RD.	FM 2920	HUFSMITH RD.
82	ALDINE WESTFIELD RD.	HARDY TOLL RD.	CYPRESSWOOD DR.
83	KINGWOOD DR.	US 59	LADBROOK DR
84	FM 1960	LEE RD.	BF 1960
85	HARLEM RD.	GRAND PARKWAY	AMAZON DRIVEWAY
86	S SHAVER ST.	IH 45	PARLIAMENT DR.
87	N MAIN ST.	MASSEY TOMPKINS RD	CEDAR BAYOU LYNCHBURG RD.
88	INDUSTRIAL RD.	FONDREN RD.	PORT OF HOUSTON
89	E CROSSTIMBERS ST.	HARDY TOLL RD.	HEMPSTEAD RD.
90	ALDINE BENDER RD.	IH 45	MIRANDA ST.
91	BARKER CYPRESS RD.	FM 529	IH 10
92	BELLAIRE BLVD.	DAIRY ASHFORD RD.	S RICE AVE.
93	SH 6	RICHMOND AVE.	HARRIS C/L
94	SH 6	SH 249	CLAY RD
95	BINGLE RD.	W TIDWELL RD.	CLAY RD.
96	MT. HOUSTON RD.	US 59	SUBURBAN RD.
97	IGLOO RD.	W MILLER RD.	KINGSLAND BLVD.
98	E AIRTEX DR.	IMPERIAL GREEN DR.	HARDY TOLL RD.
99	FALLBROOK DR.	FAIRBANKS NORTH HOUSTON RD.	SH 249
100	N MASON RD.	IH 10	COLONIAL PKWY.
101	ALDINE BENDER RD.	JFK BLVD.	VICKERY DR.
102	BAY AREA BLVD.	RED BLUFF RD.	FAIRMONT PARKWAY
103	LOCKWOOD DR.	IH 45	NAVIGATION BLVD.
104	LOCKWOOD DR.	SONORA ST.	NAVIGATION BLVD.
105	MARKET ST.	OATES DR.	N WAYSIDE DR.
106	MARKET ST.	IH 10	SHEFFIELD BLVD.
107	CLINTON DR.	CROWN ST.	FEDERAL RD.
108	NASA RD	LAKESHORE DR.	SH 146
109	NASA RD	SH 3	LAKESHORE DR.
110	KINGWOOD DR.	LADBROOK DR	W LAKE HOUSTON PKWY
111	S SHAVER ST.	IH 45	EDGEBROOK DR.
112	N MAIN ST.	SH 146	MASSEY TOMPKINS RD.
113	ALDINE BENDER RD.	MIRANDA ST.	JFK BLVD.
114	BARKER CYPRESS RD.	HEMPSTEAD RD.	IH 10
115	BELLAIRE BLVD.	MULBERRY LN.	ALAMEDA RD.
116	BELLAIRE BLVD.	S RICE AVE.	MULBERRY LN.
117	FM 2855	US 90	IH 10
118	KERMIER RD.	FM 2920	HEMPSTEAD RD.
119	KICKAPOO RD.	FM 2920	HEMPSTEAD RD.
120	CROSBY LYNCHBURG RD.	US 90	S OF FLOYD
121	CHIMNEY ROCK RD	MAIN ST.	W AIRPORT BLVD.

Texas Parks & Wildlife, CONANP, Esri, HERE, Garmin, Foursquare, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA

Figure 6-49: Corridors and Intersections Identified for Future RTP (Map 1 of 2)



KEY ID	STREET	FROM	TO
122	IH 69	WILL CLAYTON PARKWAY	
123	FM 529	GOLDEN GATE DR	
124	SH 6	FM 1736	
125	LEE RD	WILL CLAYTON PARKWAY	
126	LEE RD	GREENS RD	
127	KUYKENDAHL RD	UNION PACIFIC RR	
128	E RICHEY RD	UNION PACIFIC RR	
129	SHELDON RD	UNION PACIFIC RR	
130	LITTLE YORK RD	UNION PACIFIC RR	
131	WACO ST	UNION PACIFIC RR	
132	WOODS RD	UNION PACIFIC RR	
133	SH 225	BW 8	
134	MAIN ST.	SH 146	N FM 565
135	MAIN ST.	N FM 565	SH 146
136	W TIDWELL RD.	HEMPSTEAD RD.	US 290
137	W LITTLE YORK RD.	US 290	BRITTMORE RD.
138	MANCHESTER ST.	IH 610	97TH ST.
139	TRADE CENTER PARKWAY	SH 242	DONWICK DR.
140	E RICHEY RD.	WOODHAM DR.	HARDY TOLL RD.
141	WEST RD.	US 290	JACKRABBIT RD.
142	ELLA BLVD.	BW 8	COCA COLA DRIVEWAY
143	JFK BLVD.	BW 8	CYPRESS KNEE LN.
144	RED BLUFF RD.	UNDERWOOD RD.	KIRBY BLVD.
145	W AIRPORT BLVD.	ELDRIDGE RD.	DAIRY ASHFORD RD.
146	W BELLFORT AVE.	IH 69	BW 8
147	WALLISVILLE RD.	IH 610	HARBOR ST.
148	TELGE RD.	US 290	TUCKERTON DR.
149	US 87	TUNA DR	FERRY TERMINAL
150	US 90A	SH 99	SH 146
151	TANNER RD.	BRITTMOORE PARK	TRIWAY LN.
152	HARDY TOLL RD.	IH 45	IH 610
153	SHELDON RD.	S OF SHELDON RIDGE	JACINTOPORT BLVD.
154	SH 146	FERRY RD.	IH 10
155	HATCHERVILLE RD.	FM 1942	CHAMBERS / LIBERTY COUNTY LINE
156	SH 275 (HARBORSIDE DR)	IH 45 S	77th ST
157	LEE RD.	FM 1960	WILL CLAYTON PARKWAY
158	FEDERAL RD.	CLINTON DR.	INDUSTRIAL RD.
159	W FUQUA ST.	BW 8	S POST OAK RD.
160	PEDERSON RD.	IH 10	US 90A

KEY ID	STREET	FROM	TO
161	BAY PARK RD.	W FAIRMONT PARKWAY	AVE D
162	SH 225	IH 610	SH 146
163	FM 362	ORANGE AVE.	FM 359
164	SH 99	IH 45	IH 69
165	SH 75	W ROGERS ST.	E POWELL ST
166	SH 75	TEAS RD	LOOP 336
167	SH 75	LOOP 336	SH 105
168	IH 45 SBFR	GLADSTELL ST.	LOOP 336
169	IH 45 SBFR	SH 242	RESEARCH FOREST DR
170	WOODLANDS PKWY	IH 45	KUYKENDAHL RD.
171	IH 45 SBFR	LAKE WOODLANDS DR	WOODLANDS PKWY
172	SH 332	SH 288	FREEPORT LNG FACILITY
173	SH 288	VICTORIA ST.	SH 36
174	SH 332	SH 288	FM 2004
175	SH 35	SH 288	SH 36
176	SH 288 BU	FM 523	ANCHOR RD.
177	SH 288 SBFR	BW 8	FM 518
178	SH 288 NBFR	BW 8	FM 518
179	TELEPHONE RD	BW 8	FM 518
180	SH 6	US 290	WALLER C/L
181	SH 35	SH 36	SH 35 BR
182	NASA RD	SH 3	SH 146
183	IH 45 SBFR	LEAGUE CITY PKWY	FM 646
184	IH 10 WBFR	POST OAK RD	KATY FORT BEND RD.
185	IH 10 EBFR	SH 99	HIGHWAY BLVD.
186	SH 249	TOMBALL TOLLWAY N	TOMBALL TOLLWAY S
187	W LAKE HOUSTON PKWY.	NORTHPARK DR.	S OF WILD VIOLET DR.
188	US 90A	SH 99	MURPHY RD.
189	W BELLFORT ST.	OXFORD CHASE TRL.	HARLEM RD.
190	W LAKE HOUSTON PKWY.	BW 8	WILL CLAYTON PKWY.
191	FONDREN RD.	IH 10	CAIN CIR.
192	WALLISVILLE RD.	IH 610	US 90
193	IH 610 SBFR	N McCARTY ST.	IH 10
194	TELEPHONE RD.	AIRPORT BLVD.	IH 610
195	FM 529	QUEENSTON BLVD.	US 290
196	BW 8 (INCL. FRONTAGE RD)	W LITTLE YORK RD.	BELLAIRE BLVD.
197	W TIDWELL RD.	US 290	BINGLE RD.
198	ALMEDA RD.	US 90	IH 610
199	E RICHEY RD.	IH 45	WOODHAM DR.
200	JFK BLVD.	CYPRESS KNEE LN.	LAUDER RD.

KEY ID	STREET	FROM	TO
201	RED BLUFF RD.	UNDERWOOD RD.	FAIRMONT PARKWAY
202	US 87	SH 124	TUNA DR
203	US 90A	FORTWORTH ST.	SH 146
204	US 90A	FORTHWORTH ST.	S COLBERT ST.
205	US 90A	SH 146	S COLBERT ST.
206	TANNER RD.	N ELDRIDGE PARKWAY	BRITTMOORE PARK
207	SHELDON RD.	RIDLON ST.	JACINTOPORT BLVD.
208	SHELDON RD.	ASHLAND BLVD.	JACINTOPORT BLVD.
209	FM 362	US 290	ORANGE AVE.
210	SH 288	SH 332	VICTORIA ST.
211	TELEPHONE RD	ALMEDA GENOA RD	AIRPORT BLVD.
212	TELEPHONE RD	ALMEDA GENOA RD.	BW 8
213	SPRING CYPRESS RD.	HEMPSTEAD RD.	SKINNER RD.
214	W BELLFORT ST.	MASON RD.	OXFORD CHASE TRL.
215	FM 529	SH 99	QUEENSTON BLVD.
216	WOODLANDS PKWY	IH 45	GROGANS MILL RD.
217	W LAKE HOUSTON PKWY.	FM 1960	S OF WILD VIOLET DR.
218	IH 10	N WESTGREEN BLVD.	IH 45
219	BW8	US 290	GESSNER RD.
220	US 290	FIELDS STORE RD.	
221	IH 45	LEAGUE LINE RD.	RAYFORD RD.
222	IH 45	SPRING CYPRESS RD.	GREENS RD.
223	US 290	ELDRIDGE PKWY.	IH 610
224	IH 610	BROADWAY ST.	S MAIN ST.
225	IH 10	SH 99	SH 73
226	IH 45	N OF CAUSEWAY	S OF CAUSEWAY
227	IH 69	W BELLFORT AVE.	SUGAR CREEK BLVD.
228	BW 8	IH 69	IH 45
229	BW 8	IH 69	ELLA BLVD.
230	SH 330	IH 10	SH 146
231	SH 146	W MAIN ST.	CEDAR BAYOU RD.
232	US 90A W	SH 36	ALDI DRIVEWAY
233	IH 10	FM 359	FORT BEND COUNTY LINE
234	IH 10	CANE ISLAND PKWY	WALLER COUNTY LINE
235	IH 10	IH 69	BW 8
236	IH 10	BW 8	SS 330
237	IH 10	SS 330	CHAMBERS COUNTY LINE
238	IH 10	HARRIS COUNTY LINE	SH 99
239	SH 99	IH 69	IH 45
240	SH 36A N	IH 10 W	US 290
241	SH 36A S	IH 10 W	US 290

Figure 6-50: Corridors and Intersections Identified for Future RTP (Map 2 of 2)

6.5 Intelligent Transportation Systems for Freight Applications

As part of the numerous freight planning initiatives championed by H-GAC, the ITS for Freight Applications outlines best practice opportunities, innovative strategies and responsibilities that ITS technologies provide for meeting regional economic goals, addressing mobility challenges, mitigating impacts on the environment and contributing to quality of life. These advanced technology solutions supplement findings from the Port's Area Mobility Study and other locally led studies to establish a comprehensive Transportation System Management and Operations (TSMO) Program of integrated strategies to optimize efficiency, safety and reliability of the region's transportation infrastructure.

H-GAC will play a significant role in the planning of corridors for successful accommodation of freight technology solutions, securing federal and state funding for dedicated technology projects, and ensuring technologies are included on all MPO projects through the system's engineering process. The Houston Region already has several technology deployments and projects under development that require continued support and expansion in addition to discovering new projects or programs. The recommendations shown in **Table 6-13** are opportunities for H-GAC to lead programs, pilot projects and planning efforts to continue progressing freight technologies on transportation networks.

Table 6-13: Recommended H-GAC Opportunities for Freight Technology Advancement and Target Timeline

RECOMMENDED H-GAC OPPORTUNITY FOR FREIGHT TECHNOLOGY ADVANCEMENT	TARGET TIMELINE
Identify a Freight Technology Representative within the H-GAC TSMO Subcommittee	1 Month
Identify projects and programs to submit for federal grants through various existing programs and new/upcoming Infrastructure Investment and Jobs Act (IIJA) opportunities	On-Going
Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program	2 Months
Advanced Transportation Technologies and Innovative Mobility Deployment (ATTIMD) Program, also known as Advanced Transportation Technologies and Innovation (ATTAIN)	2 Months
Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)	1-2 Years
Ensure Freight Technology Service Packages during the Regional ITS Architecture update reflect emerging needs of the private industry	1 Year
Develop plan to provide freight industry with real-time information from Houston Regional Traffic Signal Map (Houston TranStar – Traffic Signal Map)	4-5 Years
Standardize Connected Intersections plan so regional traffic signals can disseminate real-time signal phasing and timing information	2-3 Years
Evaluate H-GAC Critical Freight Corridors map and prioritize locations for early-stage deployments of Smart Freight Connector strategies within the statewide FNTOP	2-3 Years
Coordinate with private sector autonomous trucking companies that have piloted hauls within the Greater Houston Region and identify specific corridor needs to enhance operations	6 Months
Coordinate with TxDOT on FHWA guidance for Heavy-Duty Freight Truck Electric Vehicle Charging Network	1-2 Years
Coordinate H-GAC freight project technology needs with TxDOT on the current update of the Texas Freight Mobility Plan (Texas Delivers 2050)	1-2 Years
Coordinate freight and connected vehicle technologies during Planning and Environmental Linkages (PEL) Studies currently led by TxDOT Houston District	On-Going
• I-45 South from US 59 / I-69 to Beltway 8 South in Harris County	-
• I-10 from I-69 / US 59 to SH 99 in Harris and Chambers counties	-
• I-45 from Beltway 8 North to Loop 336 South in Harris and Montgomery counties	-
• I-69 from Spur 527 to Beltway 8 in Harris County	-
• SH 225 from I-610 to SH 146 in Harris County	-
• I-610 East from Broadway Street to Clinton Drive in Harris County	-
Update Regional Project Call Scoring Criteria for Freight Technology Projects	1-2 Years
Develop Resource Plan for Regional Operation, Management, and Maintenance of Technologies for Freight Applications	4-5 Years

6.6 Policy and Program Recommendations

This plan has identified key recommendations associated with a wide range of policies and programs that various stakeholders from both the private and public sectors could adopt to address safety and reduce congestion, emissions, and residential and community impacts from freight activity. Input from various stakeholders, findings from data analysis identified in previous chapters, and information gathered from other reports and research have been used to inform these policies and programs.

6.6.1 Safety Policies and Programs

In Chapter 2, safety was identified as a key issue, with the Houston Region accounting for 17.6 percent of all crashes in the state involving large trucks, 11.9 percent of the number of large trucks involved in fatal crashes in the state, and 21 percent of the number of HM crashes involving large trucks. The policies and programs listed below are in addition to safety improvements associated with infrastructure projects.

6.6.1.1 INTEGRATE TRUCK SAFETY INITIATIVES INTO LOCAL AND REGIONAL VISION ZERO AND SAFETY PLANS

Many of the local and regional safety plans do not make specific references to crashes involving trucks or include measures to routinely monitor truck crash trends. Including truck crashes in these plans can assist cities and municipalities in developing actions to reduce the crashes, seek funding and monitor trends.

Participants: H-GAC, cities and municipalities

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	MEDIUM (5-10 YEARS)
H-GAC to engage cities/munici-palities	Update as necessary
H-GAC to provide annual analysis of truck crash related data for cities	
On the next update of the H-GAC Regional Safety Plan, include additional truck specific actions and measures	

6.6.1.2 ESTABLISH REGIONAL TRUCK SAFETY TASK FORCE

Given the high number of truck crashes in the region and recognizing there are multiple parties and entities involved to improve safety, a Regional Truck Safety Task Force should be established. TxDOT should chair and lead the task force.

Participants: TxDOT, H-GAC, local municipalities, law enforcement agencies, Texas Trucking Association, TTI Center for Transportation Safety, private fleets

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	MEDIUM (5-10 YEARS)
Establish Task Force; identify participants and roles/ responsibilities	Assess effectiveness of Task Force in Year 6
Task Force to undertake in-depth analysis of regional truck crashes to identify trends and hotspots. (potentially commission TTI to undertake this analysis)	Continue to analyze data and identify trends
Task Force to develop solutions, including pilots and trials, to reduce the number of truck crashes.	
Deploy pilot, trials and solutions	Continue to identify trends and deploy solutions

6.6.1.3 INCREASE THE NUMBER OF TRUCK PARKING SPACES IN THE REGION

A Federal Motor Carrier Safety Administration (FMCSA) study reported that 13 percent of commercial vehicle drivers were considered to be fatigued at the time of their crash. The availability of safe and secure truck parking spaces is crucial to a region with heavy volumes of trucking activity associated with long haul movement, to ensure those drivers have adequate rest facilities. The recent TxDOT Truck Parking Study identified the Houston Region as having high-existing and high-future truck parking needs.

The TxDOT Truck Parking Recommendations and Action Plan identifies the strategies and actions to increase the number of truck parking spaces in the Houston Region.

6.6.1.4 UPDATE THE NATIONAL HAZARDOUS MATERIALS ROUTE REGISTRY

As outlined in Chapter 1, several highways have designations associated with the NHMRR. The Texas Transportation Code (§644.202) requires municipalities with populations greater than 850,000 to designate a route or set of routes for commercial motor vehicles transporting non-radioactive hazardous materials (NRHM) on roads or highways within the municipality's boundaries, and to submit the proposed route(s) to TxDOT for approval. However, many of these designations occurred years ago:

- 1970 (Harris County)
- 1972 (Galveston County)
- 1991 (Brazoria County)
- 1990 (Fort Bend County)
- 1987 (Chambers County)
- 1984 (Waller County)

Since the designations were adopted, urban and residential areas have grown and the volume of HM trucks has increased. There have undoubtedly been new locations producing and receiving hazardous goods. It is recommended to review the region's NHMRR, ensuring it is fit for purpose, supports the movement of HM and protects the region's population.

Participants: H-GAC (lead-coordinator), cities/counties, TxDOT, Texas Department of Public Safety, HM industry

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
H-GAC to engage cities, counties, state departments and the region's HM industry	Review NMRR in Year 10
H-GAC to co-ordinate output from individual cities and municipalities to ensure consistency across the region.	
Submit amendments and revised designation to State for submittal to FMCSA	

6.6.1.5 INCREASE UPTAKE OF TRUCK SAFETY EQUIPMENT

National Highway Traffic Safety Administration (NHTSA) regulations specify the safety equipment required on trucks, such as rear impact guards mounted on the rear of trailers to prevent under-ride crashes when a passenger vehicle crashes into the rear of the truck. However, the federal regulations do not address all issues, and technology is available on the market that can help prevent crashes and reduce the severity of truck-involved crashes, especially those involving trucks and vulnerable road users such as bicyclists and pedestrians. These technologies include the following:

Hi-Vision Truck Cabs. These truck cabs offer more visibility for truck drivers, eliminating or reducing blind spots, including the blind zone in front of a conventional front-engine truck design.

Source: *Dennis eagle*

Additional Mirrors and Proximity Sensors. Additional mirrors and proximity sensors that can detect objects in blind spots can be added to vehicles to help reduce blind spots. One example is the crossover mirror required on truck operating in New York City.

Source: *NYCDOT*

Truck Side Guards. During a crash with a truck or other vehicle with high ground clearance, vulnerable road users can fall into the exposed space between the front and rear wheels and suffer fatal crashing injuries. Side guards work by physically covering that exposed space, shielding vulnerable road users from being swept underneath the truck's rear wheels.

Source: FHWA

Participants: HGAC (lead-coordinator), cities/municipal fleets, private fleets engaged in municipal contracts, private fleets on a voluntary basis

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
H-GAC to engage with cities and municipalities to agree adoption of enhanced safety equipment in public fleets.	Promote adoption schemes to private industry
Identify grant funding	
H-GAC to include requirements for additional safety equipment for vehicles funded via the Clean Vehicles Program that are expected to spend a significant amount of their duty cycle on local and city streets, where the conflicts with pedestrians and bicyclists are high, e.g., waste collection vehicles.	Identify additional grant funding
Cities and municipalities to include additional safety equipment requirements for newly purchased trucks/fleet replacement.	

6.6.2 Congestion Related Policies and Programs

The congestion-related policies and programs described below aim to improve the efficiency of freight movement and reduce congestion of the region's highway network. Feedback from stakeholders identified have supported the development of these policies and programs.

6.6.2.1 ENCOURAGE MORE OFF-PEAK TRUCK ACTIVITY

Much of the highway network is under-utilized outside of peak travel times. Encouraging freight movement to use the network outside of the peak times helps to reduce congestion, improves on-time journey reliability, reduces emissions and potentially reduces overall freight costs. However, when freight travels on the highway network is dependent upon opening and closure times of freight generators such as retail stores, restaurants, ports, warehouses and industrial facilities.

Participants: H-GAC (lead-coordinator), Greater Houston Freight Committee (GHFC), ports, private sector, TxDOT

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
H-GAC to develop marketing campaign to promote benefits of off-peak activity to the freight sector.	Consider other approaches such as time-of-day tolling
H-GAC to assess financial incentivization scheme.	Identify additional grant funding
Extend gate times at ports	
H-GAC to identify grant funding.	

6.6.2.2 PORT TRANSPORTATION OPTIMIZATION AND EFFICIENCY TASK FORCE/WORKING GROUP

The region's ports are key elements in the region's freight infrastructure and support local, regional, and national businesses with the import and export of goods and materials. They are also significant freight trip generators, but many initiatives such as Matchbacks,[18] Freight Shuttle, Container-on-Barge, Inland Port and port extended gate times, which can improve port-related transport, require the involvement of multiple stakeholders. Establishing a task force/working group

19 An import container move is matched with an export container booking inland to reduce truck miles associated with the transportation of empty containers

is recommended to bring together the required stakeholders, and to develop and implement initiatives with support (administration, grant application writing and funding) provided by H-GAC. This could potentially be formed along similar lines to the Houston Area Rail Transformation (HART) program.

Participants: GHFC (lead/chair)[19], H-GAC (support), ports, Economic Alliance Houston Port Region, TxDOT, shippers and goods receivers, shipping lines, drayage companies

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
GHFC and H-GAC to establish task force/working group	Rollout and promote initiatives
GHFC selects initiatives to pilot/trial	Establish new trial(s)
GHFC supports and oversees trial(s)	
H-GAC to identify financing/pump priming opportunities including grants	Support as required

6.6.2.3 RAILROAD CROSSINGS

There are approximately 1,600 railroad crossings in the Houston Region. When closed, these crossings delay vehicles including freight vehicles, which increases costs and emissions and reduces overall productivity. Recognizing the work already underway through the HART program, actions associated with railroad crossings could be led by HART, which is being supported by H-GAC. However, it is recommended that crossings with a high truck count and impact on truck journey times are identified and afforded some form of priority within the HART program.

6.6.3 Emissions Programs and Policies

As outlined in Chapter 2, the Houston Region is designated as a non-attainment area for ground-level ozone and 25 percent of all ozone-forming NOx pollution is associated with the on-road transportation sector. Feedback from stakeholders also identified the need to reduce emissions associated with freight movement in the region. The policies and programs detailed in this section aim to reduce freight-related emissions in the region.

6.6.3.1 REDUCE EMISSIONS FROM FREIGHT FACILITIES

Freight facilities such as ports, railyards and warehouses utilize mobile equipment and other machinery to move rail cars, trailers and containers within these facilities. Emissions from sea-going vessels unloading in ports would also be addressed in this program. Reducing emissions will also support improving air quality in those communities bordering these facilities. There are multiple grants available to reduce emissions including Reduction of Truck Emissions at Port Facilities; Congestion Mitigation and Air Quality (CMAQ) Improvement; Diesel Emissions Reduction Act (DERA); Texas Emissions Reduction Program grants including Emissions Reduction Incentive Grants, and Seaport and Rail Yard Areas Emissions Reduction Programs. Coordinating with public and private entities will help target resources to replace older more polluting equipment, with newer, cleaner and more efficient technologies.

Participants: H-GAC (lead), GHFC, cities/municipalities, private sector, ports, Texas Commission on Environmental Quality (TCEQ)

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
H-GAC to establish a Freight Emissions Program Manager	Update inventory at Years 5 and 10
GHFC to partner with industry and create inventory of yard equipment	Continue to work with industry
Develop pathways to replace older, most polluting equipment	Seek grant funding
Pilot/trial new technology	
H-GAC to seek grant funding and support application development	

6.6.3.2 REDUCE EMISSIONS FROM OLDER TRUCKS

Older trucks, especially model year trucks prior to 2007, are unlikely to be installed with modern pollution abatement equipment. Replacing these trucks with newer models would reduce emissions from the trucking sector. However, it is recognized that many trucks are operated by owner-operators, and truck replacement programs should consider the challenges this trucking sector has including knowledge and administration associated with grant applications and access to capital.

Participants: H-GAC (lead), GHFC, cities/municipalities, private sector, ports, TCEQ

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
H-GAC to identify number and industry sector of pre-2010 trucks in the region	Assess inventory of pre-2010 trucks at Years 5 and 10
H-GAC and TCEQ to develop a program targeted at replacing pre-2010 trucks	Continue to work with industry
GHFC to explore measures to reduce/eliminate older trucks at ports	Seek grant funding

6.6.3.3 INCREASE NUMBER OF ZERO EMISSION FREIGHT RELATED VEHICLES

ZEV, such as battery electric trucks and vans and hydrogen-powered fuel cell vehicles (FCEV), are expected to play a significant role in reducing emissions from surface transportation. Companies within the H-GAC Region are already piloting this technology. The region has significant expertise in hydrogen production, and this could be used to support an increasing number of FCEVs in the region. However, the transition from pilots to wider adoption across the regional trucking community needs support and recognition.

Participants: H-GAC (lead), GHFC, cities/municipalities, private sector, ports, TCEQ, Economic Alliance Houston Port Region, hydrogen industry, utilities.

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
H-GAC to support companies with access to grant applications for vehicles and charging infrastructure.	GHFC to develop a recognition program to reward those companies making extensive efforts to reduce freight-related emissions.
GHFC to identify "early adopter" fleets and work them to explore ZEV uptake.	H-GAC to continue to support and fund cleaner vehicles, and charging and fueling infrastructure including promoting trials and pilots.
H-GAC and utilities to assess the local and regional electricity grid capacity to support electric truck charging.	
GHFC and Economic Alliance Houston Port Region to create a coalition to maximize the strengths of Houston's hydrogen expertise and establish Houston as the first choice for companies deploying clean Hydrogen freight technology.	Expand access to fueling and charging infrastructure
Pilot fueling solutions for FCEV in the region	

6.6.4 Mitigating Residential and Community Impacts

Stakeholders identified in previous chapters have provided feedback. Municipalities and advocacy groups that identified many of the region's communities are blighted by freight activity for a variety of reasons. The recommendations provided below identify a series of actions that could be adopted to better manage freight activity and, in conjunction with multiple actions identified in this chapter, seek to reduce the impact of freight activity on the region's communities.

6.6.4.1 DEVELOP A REGIONAL TRUCK ROUTE MAP

Many cities in the region already have a truck route network to manage where trucks can or cannot travel, but the information is not particularly accessible. Developing a regional truck map, including the identification of corridors for high and heavy traffic, and bringing together the individual city truck routes onto one platform would help the freight industry better plan their routes. Feedback from the City of Houston and Harris County identified they are working towards developing a truck route network within their jurisdictions. Once these efforts are completed, a region-wide truck route network identifying the high- and heavy-truck routes and HM routes could be implemented in a short timeline.

Participants: H-GAC (lead), GHFC, cities/municipalities, private sector, mapping and navigation providers

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
Develop a regional truck route map with cities and other agencies	Update maps and information
Share data with GPS mapping companies	
Promote truck route map to industry	
Develop protocols for updating information	
Seek a common protocol amongst cities with truck route standards, e.g., definition of a truck, reasons for off-route travel	

6.6.4.2 MITIGATE RESIDENTIAL IMPACT

Residential areas can be exposed to high volumes of truck traffic, largely because of legacy decisions associated with land use and commercial development. The population of such areas are typically exposed to higher emissions, truck intrusion on residential streets, near sensitive locations such as schools, and greater conflicts with vulnerable road users such as bicyclists and pedestrians.

Participants: H-GAC (lead), GHFC, cities/municipalities, private sector, mapping and navigation providers

Actions and Timeline	
SHORT (LESS THAN 5 YEARS)	**MEDIUM (5-10 YEARS)**
Define and identify residential impacts, e.g., pass-through truck traffic, access to commercial areas	Assess other locations
Identify locations with specific impacts; focus on LaPorte, Seabrook, Baytown, Mont Belvieu, Deer Park and Pasadena	
Collect law enforcement data	
Assess interventions, e.g., increased law enforcement, education, communication channels, review of ordinances, establishment of truck route networks	
Implement interventions	

The policies and programs discussed above were presented for review and feedback from the Steering Committee in December 2022 and the Stakeholder Forum in January 2023. Attendees were asked to rank the policies and programs along with a preferred timeline of implementation to indicate short term, mid-term or long term. The survey results from those two meetings are provided in Appendix A.

Among the policies and programs discussed above, the top three, as ranked by the Steering Committee and Stakeholders, are identified below in the order of preference:

Off-Peak Truck Travel. Incentives and restrictions to promote truck travel during off-peak hours is ranked as the most favorable policy to be achieved in a short timeline. However, promoting truck travel during off-peak times is a gradual and challenging process that requires participation from regional agencies and the private industry. As noted during an industry workshop hosted in February 2023, some companies are already using this strategy for long- and medium-haul trips. While others are interested, some of the challenges noted were the hours of the receiving and shipping facilities, lack of facilities required by drivers (such as restaurants, fuel stops, repair services, roadside assistance), and additional costs associated with overtime compensation for drivers, office support staff and personnel on the receiver's end. The industry is also wary of travel time restrictions and losing business to other ports. However, the benefits are recognized and welcomed. Incentives such as subsidizing tolls (e.g., SH 99), offsetting additional costs, pay-for-fuel programs, free overnight roadside assistance, providing additional infrastructure (e.g., truck driver stops), and designated truck lanes during midday hours may encourage more shippers and trucking companies to adopt this strategy.

Truck Route Map. Developing a truck network map for the entire region across jurisdictions is identified as the second most popular policy/program to be achieved in a short timeline. This map would assist truck drivers identify vertical clearance issues, weight limits, truck restricted local streets and HAZMAT routes. The City of Houston and Harris County informed that they are working towards developing a truck route network within their jurisdictions. Once these efforts are completed, a region-wide truck route network identifying the high- and heavy-truck routes and HAZMAT routes could be implemented in a short timeline.

Designated Truck Lanes. Shared and designated truck lanes is the third most popular policy to be achieved in a short timeline. These lanes require careful planning and consideration, such as TxDOT's inclusion of this scenario in the SH 225 and I-610 PEL studies. A benefit-cost analysis and additional infrastructure requirements such as pavement thickness need to be identified. Repurposing managed lanes such as the ones on I-10 and I-45 for freight usage during mid-day hours is one of the quicker ways to implement this strategy. Truck-only ramps from roadways identified by stakeholders, such as Barbours Cut Boulevard to provide direct connection to SH 146/SH 225, are other potential considerations

7. Chapter 7 – Funding and Financing

This chapter details the potential funding opportunities at the federal and state levels that are available to improve the movement of goods in the H-GAC Region. The funding opportunities are a combination of formulaic funding, competitive discretionary grants and other sources.

The IIJA, also referred to as the Bipartisan Infrastructure Bill (BIL), is a key federal funding opportunity to improve the movement of goods in the region. It represents a generational investment in roads, bridges, transit, passenger and freight rail, ports and airports, delivering clean water, moving toward greater renewable energy production and closing the digital divide by expanding broadband deployment. The IIJA increases funding and modifies eligibility to existing programs, and creates new funding programs to restore and rebuild the nation's infrastructure.

7.1 Infrastructure Investment and Jobs Act Funding Options

The IIJA reauthorizes surface transportation programs for another five years and appropriates over $257 billion in new investments in roads, bridges, public transportation, ports and airports. It creates new funding programs to bring the nation's transportation system into a state of good repair, with substantial investments in electric vehicle charging, data-driven planning and ITS solutions. The funding opportunities are broken down into formulaic grant programs, discretionary grant programs and other programs.

7.1.1 Formulaic Grants Programs

Formula grant programs allocate federal funding to recipients based on formulas set by Congress. Recipients include states, federally recognized tribal recipients and transit agencies. The funds may be further allocated to localities at state, tribal or agency discretion. Some of the programs that can be used to fund improvements related to goods movement include:

- **Carbon Reduction Program (CRP).** The CRP funds projects designed to reduce transportation emissions, defined as carbon dioxide (CO_2) emissions from on-road highway sources.
- **CMAQ.** This program provides a funding source for state and local governments to fund transportation projects and programs that help meet the requirements of the Clean Air Act (CAA) and its amendments. CMAQ funds transportation projects that reduce mobile-source emissions in the areas designated by the EPA to maintain National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide and particulate matter. Funds allocated to the states are administered through state Departments of Transportation (DOT) and/or MPOs.
- **Highway Safety Improvement Plan (HSIP).** The program's purpose is to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The program requires a comprehensive, data-driven state strategic highway safety plan (SHSP) that defines state safety goals and describes a program of strategies to improve safety.
- **Metropolitan Planning Program (MPP).** The MPP provides funding for state and metropolitan planning related to transportation.
- **National Highway Freight Program (NHFP).** The program aims to improve the efficient movement of freight on the NHFN and support the investment in infrastructure that reduces the cost of freight transportation, improves safety and resiliency of freight transportation, and reduces the environmental impacts of freight movement.
- **National Highway Performance Program (NHPP).** The NHPP provides support for the condition and performance of the National Highway System (NHS); supports the construction of new facilities on the NHS; ensures investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a state's

asset management plan for the NHS; and supports activities to increase the resiliency of the NHS to mitigate the cost of damages from sea level rise, extreme weather events, flooding, wildfires or other natural disasters.

- **Promoting Resilient Operations for Transformative, Efficient and Cost Saving Transportation (PROTECT).** The formulaic funding under this program supports the resiliency of surface transportation to natural hazards.
- **Surface Transportation Block Grant Program (STBG).** The program promotes flexibility in state and local transportation decisions and provides flexible funding to best address state and local transportation needs.

7.1.2 Discretionary Grants Programs

Discretionary grants are federal funds awarded on a competitive basis where applications are reviewed based on the eligibility requirements. Some of the discretionary grants for which goods movement improvements are eligible include:

- **Bridge Investment Program.** This program provides grants to improve bridge condition and the safety, efficiency, and reliability of the movement of people and freight over bridges. Under this program, DOTs authorize grants to three types of bridge projects: Large Projects, Other Than Large Projects and Planning Grants. Large Projects include projects that cost more than $100 million, and Other Than Large Projects grants are awarded for projects that cost less than $100 million. Planning Grants are awarded for planning, feasibility analysis and revenue forecasting work of a project.
- **Consolidated Rail Infrastructure and Safety Improvements Program (CRISI).** The program funds projects that improve rail safety, efficiency and reliability of intercity passenger, as well as freight rail. Regional rail and corridor service development plans, and any projects required to enhance multi-modal connections and facilitate service integration between rail service and other service modes, are funded by this program.
- **Federal Land Access Program.** The program supports the improvement of transportation facilities that provide access to, are adjacent to, or are located within Federal lands. The program is funded by contract authority from the Highway Trust Fund and is allocated using a statutory formula based on road mileage, number of bridges, land area and visitation.
- **Federal Land Transportation Program.** The program supports projects that improve the transportation infrastructure owned and maintained by the Federal Land Management Agencies including the National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), USDA Forest Service (USFS), Bureau of Land Management (BLM), USACE, Bureau of Reclamation, and independent Federal agencies with land and natural resource management responsibilities.
- **National Significant Multimodal Freight and Highway Projects (INFRA).** The program awards competitive grants for multi-modal freight and highway projects to improve the safety, efficiency, and reliability of the movement of freight and people. Projects that improve safety, generate economic benefits, reduce congestion, enhance resiliency, and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements are eligible.
- **National Infrastructure Project Assistance (Mega Grant Program).** The program supports large complex projects that are difficult to fund by other means and are likely to generate national or regional economic, mobility or safety benefits.
- **PROTECT.** The program funds projects that improve the resilience of the surface transportation system, including highways, public transportation, ports and intercity passenger rail.
- **Railroad Crossing Elimination Program (RCE).** This program funds highway-rail or pathway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods. Projects that involve grade separation or closure, track relocation, installation of signs, and others relating to safety and mobility are supported by this grant program.
- **Rebuilding American Infrastructure with Sustainability and Equity (RAISE).** The grant funds DOTs to invest in road, rail, transit and port projects that will have significant local or regional impacts.
- **Rural Surface Transportation Grant Program.** The program supports projects that improve and expand the surface transportation infrastructure in rural areas to increase connectivity, improve the safety and reliability of the movement of people and freight, and generate regional economic growth and improve quality of life.

7.2 Non-Infrastructure Investment and Jobs Act Funding Options

These funding options are comprised of opportunities at the Federal level that are not included in the IIJA. These funding opportunities are primarily provided through discretionary and credit assistance programs.

- **DERA.** DERA funds grants and rebates that protect human health and improve air quality by reducing harmful emissions from diesel engines.
- **Economic Development Administration Economic Adjustment Assistance (EAA) Grants.** The program improves economic outcomes in disadvantaged communities. It supports projects that will bring critical infrastructures to underinvested communities, create workforce development program and pathways to good-paying jobs in communities in need, and develop business ecosystems that will allow small businesses and entrepreneurs to grow, share learnings and flourish.
- **High Priority Grant Program.** This discretionary grant program is administered by FMCSA and provides Federal financial assistance to enhance states' commercial vehicle safety plan activities including commercial vehicle inspections, traffic enforcement, and outreach while supporting innovative technology development and/or new project(s) not included in the commercial vehicle safety plan that will have a positive impact on commercial vehicle safety.
- **Motor Carrier Safety Program.** This program focuses on reducing the number and severity of crashes involving commercial vehicles.
- **Railroad Rehabilitation and Improvement Financing (RRIF).** This program provides direct loans and loan guarantees to finance development of railroad infrastructures. The loans can be used to acquire, improve or rehabilitate intermodal equipment or facilities, develop or establish new intermodal or railroad facilities, reimburse planning and design, refinance outstanding debt, and finance transit-oriented development.
- **Transportation Infrastructure Finance and Innovation Act (TIFIA) Program.** This discretionary program extends credit assistance to eligible infrastructure projects. It leverages Federal funds to attract private and other non-Federal co-investment for transportation projects. This can take the form of secured (direct) loans, loan guarantees and lines of credit.

7.3 State Funding Sources

State funding sources are comprised of TxDOT funding and public-private partnerships (PPP).

7.3.1 TxDOT Programmatic Funding

TxDOT funds infrastructure projects through the UTP process. The UTP is TxDOT's 10-year investment plan, which projects anticipated revenues from Federal-aid highway programs and dedicated state revenue sources throughout the specified period, and assigns funds to specific projects and initiatives. There are 12 UTP funding categories, with each category intended to address a specific type of project or a range of eligible activities.

Funds from some Federal programs, such as the STBG, can be used in nearly all UTP categories, while funds from other programs such as the CMAQ Program can only be used under specific UTP categories. The distribution of Federal funds is made based on the requirements of each program and the types of projects that are eligible under each UTP category.

State sources of funding for the UTP include the State Highway Fund, the State Infrastructure Bank, Statewide Propositions (such as Proposition 1 and Proposition 7), and funds directed by State House of Representatives through legislative actions. Normally these funds can be used in all UTP categories, but can only be spent as directed by law.

The UTP categories that could be used to fund goods movement improvements include:

- **Category 1:** Preventative Maintenance and Rehabilitation. Addresses preventive maintenance and rehabilitation of the existing highway system, including pavement signs, traffic signals and other infrastructure assets. Funding is allocated to each TxDOT district based on formulas.
- **Category 2:** Metropolitan and Urban Area Corridor Projects. Mobility and added capacity projects along a corridor that improve transportation facilities in metropolitan and urbanized areas. This includes widening of freeway or non-freeway, roadway operational improvements, freeway interchanges and others.

- **Category 3:** Non-Traditionally Funded Transportation Projects. For transportation projects that qualify for funding from sources not traditionally part of the State Highway Fund, including state bond financing (such as Proposition 12 and Proposition 14), the Texas Mobility Fund, pass-through financing, regional revenue and concession funds, and local funding. Category 3 also contains funding for the development costs of design-build projects. Common project types include new-location roadways, roadway widening (both freeway and non-freeway), and interchange improvements.
- **Category 4:** Statewide Connectivity Corridor Projects. The program addresses mobility on major state highway system corridors, which provide connectivity between urban areas and other statewide corridors. Projects must be located on the designated highway connectivity network. The designated connectivity network was selected by the Texas Transportation Commission and includes three corridor types: Mobility Corridors, Connectivity Corridors and Strategic Corridors.
- **Category 5:** CMAQ Improvement. The program addresses attainment of NAAQS in non-attainment areas (currently the DFW, Houston, San Antonio and El Paso metro areas). Each project is evaluated to quantify its air quality improvement benefits. Funds cannot be used to add capacity for single-occupancy vehicles. Common project types include interchange improvements, local transit operations, and bike and pedestrian infrastructure.
- **Category 6:** Structures Replacement and Rehabilitation (Bridge). Addresses bridge improvements through the following sub-programs: Highway Bridge Program, Bridge Maintenance and Improvement Program, and Bridge System Safety Program. Category 6 funding is allocated to TxDOT's Bridge Division, which selects projects statewide.
- **Category 7:** Metropolitan Mobility and Rehabilitation. Addresses transportation needs within the boundaries of MPOs with populations of 200,000 or greater – known as transportation management areas (TMAs). This funding can be used on any roadway with a functional classification greater than a local road or rural minor collector. Common project types include roadway widening (both freeway and non-freeway), new-location roadways and interchange improvements. Distribution is based on the population of each TMA.
- **Category 8:** Safety. Addresses highway safety improvements through specific sub-programs. Common Category 8 project types include medians, turn lanes, intersections, traffic signals and rumble strips. Category 8 funding is allocated to TxDOT's Traffic Safety Division, which selects projects statewide.
- **Category 10:** Supplemental Transportation Programs. Category 10 addresses a variety of transportation improvements through the following sub-programs: Coordinated Border Infrastructure (CBI), Supplemental Transportation Projects, Federal Land Access Program (FLAP), Texas Park and Wildlife Department (TPWD), Green Ribbon Program, Americans with Disabilities Act (ADA) Pedestrian Program, Landscape Incentive Awards, Railroad Grade Crossing and Replanking Program, and Railroad Signal Maintenance Program.
- **Category 11:** District Discretionary. Category 11 addresses TxDOT district transportation needs through the sub-programs including District Discretionary, Energy Sector, Border Infrastructure and District Safety. Projects eligible for Federal or state funding selected at the district engineer's discretion.
- **Category 12:** Strategic Priority. Category 12 addresses projects with specific importance to the state, including those that improve congestion and connectivity, economic opportunity, energy sector access, border and port connectivity, efficiency of military deployment routes, or retention of military assets in response to the Federal Military Base Realignment and Closure Report. The ability to respond to both man-made and natural emergencies.

7.3.2 Public-Private Partnerships

The Texas Transportation Commission, via TxDOT, can enter into PPPs under comprehensive development agreements (CDAs) through which the state may contract with another entity to deliver, operate and/or maintain any of the projects specified in the authorizing legislation.

7.4 Funding to Support Policies and Programs

Several funding programs outlined above could be used to support the policies and programs outlined in Chapter 6, which primarily addressed the following four freight-related issues: Safety, Congestion, Emissions and Residential/Community Impacts. **Table 7-14** identifies potential funding streams for implementing each of these four freight activity policies and programs.

All funding sources are federal, unless otherwise stated.

Table 7-14: Potential Funding Sources for Policies and Programs

POLICY & PROGRAM	POTENTIAL FUNDING SOURCE
Safety	FMCSA High Priority Grant Program
	CRISI
	RCE
	ATTIMD
Congestion Reduction	America's Marine Highway Program
	Port Infrastructure Development Program (PIDP)
	Congestion Relief Program
	CRISI
	RCE
	CRP
Emissions	DERA
	CMAQ
	PIDP
	Clean Ports Program
	Reduction of Truck Emissions at Port Facilities
	Emissions Reduction Incentive Grants, Seaport and Rail Yard Areas Emissions Reduction Program – TCEQ
	CRP
Residential and Community Impacts	FMCSA High Priority Grant Program

7.5 Funding to Support Projects

Multiple sources identified in this chapter can be used to fund the projects identified in Chapter 6. The specific funding sources that are well-suited for each project will depend on the individual characteristics of each project, including issue being addressed, type of improvement proposed, location of the project, etc. The primary types of intersection and corridor projects categorized into high, medium and low needs in this study are matched with applicable funding sources in **Table 7-15** and **Table 7-16** to serve as a guide for project champions.

Table 7-15: Potential Funding Sources for Intersection/ Interchange Projects

PROJECT TYPE	POTENTIAL FUNDING SOURCE
Construction/ Reconstruction of bridges (including overpass, underpass, flyover, etc.)	NHFP (formulaic)
	NHPP (formulaic)
	Bridge Investment Program (discretionary)
	INFRA (discretionary)
	RAISE (discretionary)
	TxDOT Funding, Category 6
	TxDOT Funding, Category 7
Construction of direct connectors	NHPP (formulaic)
	STBG (formulaic)
	INFRA (discretionary)
	RAISE (discretionary)
	TxDOT Funding, Category 2
Construction of Grade Separation (Typically over RR Crossings)	HSIP (formulaic)
	RCE (discretionary)
Intersection Improvements	CRP (formulaic)
	CMAQ (formulaic)
	HSIP (formulaic)
	INFRA (discretionary)
	TxDOT Funding, Category 5

Table 7-16: Potential Funding Sources for Corridor Projects

PROJECT TYPE	POTENTIAL FUNDING SOURCE
Widening / reconstructing existing roadways	NHFP (formulaic) NHPP (formulaic) STBG (formulaic) INFRA (discretionary) RAISE (discretionary) TxDOT Funding, Category 2 TxDOT Funding, Category 7
Constructing new roadways (including extending existing roadways to new points)	NHFP (formulaic) NHPP (formulaic) STBG (formulaic) INFRA (discretionary) RAISE (discretionary) TxDOT Funding, Category 2 TxDOT Funding, Category 7
Corridor improvements (access management, restriping, etc.)	NHFP (formulaic) HSIP (formulaic) INFRA (discretionary) TxDOT Funding, Category 2 TxDOT Funding, Category 8
Installing ITS equipment and infrastructure (including Traffic Management Systems)	NHFP (formulaic) HSIP (formulaic) INFRA (discretionary)
Construction of new tolled roadways	TIFIA PPPs

7.6 Funding and Implementation Strategies

The RGMP Update was developed to address and identify current needs in the region related to the movement of goods. To be considered for H-GAC funding and implementation, a proposed project needs to be identified in a specified plan, such as the RGMP. The next step is to review the recommended projects, conduct more detailed analysis with a focus on inclusion in the long-range RTP. At this phase, a project sponsor such as TxDOT, a county, city or management district, or a combination of interested entities, are identified to champion the project and assist with advancement. Project benefits, costs, impacts and potential funding sources are identified as part of this development phase. With the project in the pipeline, further analysis and project refinement is conducted and the project is evaluated from both a quantitative and qualitative perspective. Through this process, H-GAC collects information about the project and works with the sponsor to move the project through the funding and implementation pipeline. The next step in the funding process would be inclusion in the H-GAC TIP, along with detailed plans for implementation.

To achieve funding for projects through other state and federal funding programs listed in this chapter, the sponsor agencies have opportunities to collaborate with other interested parties (e.g., TxDOT and H-GAC) through H-GAC-backed consortiums and committees such as GHFC and HART. A collaborative effort to raise awareness for issues and solutions among partner agencies and political leadership using the tools and platform provided by H-GAC will strongly position the regional projects for innovative federal and state funding programs.

Appendix A

Outreach and Meetings

APPENDIX A

REGIONAL GOODS MOVEMENT PLAN
PUBLIC INVOLVEMENT MEETING MATRIX

MEETINGS	DATE	PURPOSE OF MEETING	LOCATION	ATTENDEES	DISCUSSION HIGHLIGHTS	ACTION ITEMS
Steering Committee #1	10/28/2021	1. Introduce the project, study team, & steering committee. 2. Review project vision & goals. 3. Overview of study area, existing conditions, & planning process.	Virtual - MS Teams.	14, plus project team.	1. Discussed major issues impacting freight mobility. 2. ID stakeholders to participate in the study.	1. Update CUFC. 2. Review & add to stakeholders. 3. Detailed O/D data w/secondary truck movements.
Stakeholder Meeting #1	11/17/2021	1. Project overview. 2. Survey to learn more about stakeholder issues & concerns.	Virtual - Zoom.	14, plus project team.	1. Study area should reflect waterways with interconnnecting options. 2. Mobility (congestion) and safety are most critical concerns.	1. Share meeting survey results. 2. Include Carriers in Stakeholders.
Greater Houston Freight Committee	1/13/2022	1. Overview of RGMP update (an agenda item as part of the committee meeting).	Virtual.	N/A.	1. Discussion of current freight issues & challenges. 2. Access to freight dashboard.	1. Identify CUFC's.
Steering Committee #2	2/24/2022	1. Discuss existing conditions, data collection, & analysis. 2. Overview of freight movements, volumes, and commodity types.	Virtual - MS Teams.	13, plus project team.	1. Movement of freight in and through the region. 2. Introduced the Freight Analysis Dashboard. 3. Discussion of heavy haul corridors, bottlenecks, infrastructure needs, & expected growth.	1. Updated list of COH-blocked rail crossings. 2. Committee members to respond to the survey.
Greater Houston Freight Committee	3/3/2022	1. Review of exisiting conditions. 2.CUFC criteria (an agenda item as part of committee meeting).	Virtual.	N/A.	1. Data sources and analysis. 2. Key evaluation criteria in identifying projects.	1. Identification of CUFC's. 2. Review of data analysis.
Stakeholder Meeting #2	3/10/2022	1. Recap of project vision, goals, and process. 2. Presentation of Houston commodity flows, existing freight infrastructure, and Freight Analysis Framework Dashboard review.	Virtual - Zoom.	21, plus project team.	1. Discussion of existing conditions. 2. Discussion of identifying the CUFCs. 3. Additional analysis regarding overweight corridors. 4. Analysis of the Texas Freight Network roadways in vulnerable/critical corridors.	1. Review O/D numbers & validate with land use data. 2. Complete existing conditions analysis & identify issues & concerns. 3. Identify CUFC based on available data and existing conditions analysis.
Public Meeting #1	3/31/2022	1. Project overview. 2. Solicit input and comments from the community. 3. Conduct a survey with participants.	Virtual - Zoom.	18, plus project team.	1. Desired plan outcome - projects that improve mobility, efficiency, and reliability. 2. Freight analysis framework dashboard.	1. Share explanation of project dashboard with interested groups. 2. Continue data collection & analysis . 3. Develop plan with achievable solutions.

REGIONAL GOODS MOVEMENT PLAN
PUBLIC INVOLVEMENT MEETING MATRIX

MEETINGS	DATE	PURPOSE OF MEETING	LOCATION	ATTENDEES	DISCUSSION HIGHLIGHTS	ACTION ITEMS
Steering Committee #3	6/21/2022	1. Discuss 3 key areas of the RGMP update: Commodity Flows, Origin/Destination Analysis, Critical Urban Freight Corridors.	Virtual - Zoom.	13, plus project team.	1. Update on data received from Transearch. 2. Origin/Destination analysis using data from INRIX (2019 and 2020 numbers). 3. Review of freight dashboard.	1. Validation of O/D data. 2. Review of secondary truck trips. 3. Confirmation of projects on freight network.
Greater Houston Freight Committee	6/23/2022	1. Review of data analysis. 2. CUFC selection methodology (an agenda item as part of the committee meeting).	Virtual.	N/A.	1. CUFC criteria and scoring. 2. Next steps. 3. Development of recommendations.	1. Development of recommendations & implementation strategies.
Stakeholder Meeting #3	6/28/2022	1. Provide an update on the study process. 2. Present preliminary findings. 3. Review the proposed CUFC.	In person at H-GAC with Zoom option.	17, plus project team.	1. CUFC evaluation. 2. Discussion of the importance of both quantitative & qualitative analysis in selecting CUFC. 3. Review and discussion of projects included on the map.	1. Update the regional map with additional corridors. 2. Update the timeline for conducting analysis and making recommendations.
Greater Houston Freight Committee	10/18/2022	1. Freight Goods Equity Framework Overview. 2. Survey of attendees (an agenda item as part of committee meeting).	Virtual.	N/A.	1. H-GAC Freight Goods Movement Equity Framework.	1. Refine evaluation criteria that appropriately address equity.
Interview with TxDOT	11/14/2022	1. Overview of plan update. 2. TxDOT input and plan feedback.	Virtual.	2, plus project team.	1. Real Plan.	N/A.
Interview with Economic Alliance Houston Port Region.	11/14/2022	1. Overview of plan update. 2. Economic Alliance input and speicifc concerns.	Virtual.	1, plus project team.	1. Growth and investment in the region. 2. Need for mobility improvements.	1. Review of key improvement projects.
Interview with Port Freeport	11/14/2022	1. Overview of plan update. 2. Port Freeport input and specific concerns.	Virtual.	2, plus project team.	1. Growth and facility development at Port Freeport. 2. Long-term planning.	N/A.
Interview with Harris County	11/21/2022	1. Overview of plan update. 2. Specific Harris County issues and concerns.	Virtual.	1, plus project team.	1. Pass-through freight traffic. 2. Freight mobility is not prioritized. 3. Safety concerns.	N/A.
Interview with City of Houston	11/22/2022	1. Overview of plan update. 2. Specific City of Houston issues and concerns.	Virtual.	3, plus project team.	1. Impact heavy freight movement on roadways and neighborhoods. 2. Need for increased truck parking facilities.	N/A.
Interview with Port of Houston	11/28/2022	1. Overview of plan update. 2. Plan input and feedback.	Virtual.	3, plus project team.	1. Significant growth in container movement. 2. Have identified over 45 improvement projects in the region.	1. Inclusion of critical improvement projects in regional freight network.
Interview with Chambers County	11/30/2022	1. Overview of plan update. 2. Chamber County issues and challenges.	Virtual.	4, plus project team.	1. Extensive growth in West Chambers County. 2. Workforce commuters.	N/A.

REGIONAL GOODS MOVEMENT PLAN
PUBLIC INVOLVEMENT MEETING MATRIX

MEETINGS	DATE	PURPOSE OF MEETING	LOCATION	ATTENDEES	DISCUSSION HIGHLIGHTS	ACTION ITEMS
Steering Committee #4	12/1/2022	1. Update of data analysis. 2. Identification of CUFC. 3. Review of freight forecasts. 4. Survey regarding goals, priorities, and strategies. 5. Review of preliminary recommendations.	In person at H-GAC with Virtual component.	11, plus project team.	1. Safety and congestion are major concerns. 2. Region is not prepared for growth in freight traffic. 3. Need to address highway crash hot spots 7 at-grade crossings. 4. Incentives for off-peak freight movements.	1. Review freight-related plans & projects. 2. Update projects list & maps. 3. Confirm proposed policies/programs. 4. Develop ranking & prioritize projects.
Interview with Brazoria County	12/6/2022	1. Overview of plan update. 2. Input and feedback.	Virtual.	1, plus project team.	1. SH 288 and SH 36 are major freight corridors. 2. Freight needs greatest in the Port Freeport area.	N/A.
Interview with Fort Bend County	12/9/2022	1. Overview of plan update. 2. Input and feedback.	Virtual.	1, plus project team.	1. Most freights move on State roads, not County roads. 2. SH 36 is critical improvement.	N/A.
Interview with Houston Airport System	12/9/2022	1. Overview of plan update. 2. Input and feedback.	Virtual.	5, plus project team.	1. Discussion of IAH Cargo operations. 2. Challenges to freight mobility and safety.	N/A.
Interview with Galveston County/ Port of Galveston	12/19/2022	1. Overview of plan update. 2. Input and feedback.	Virtual.	2, plus project team.	1. Port's cruise and freight operations. 2. Listed critical mobility projects.	N/A.
Interview with Liberty County	12/19/2022	1. Overview of plan update. 2. Input and feedback.	Virtual.	1, plus project team.	1. Serves as Inland Freight Exchange. 2. Congestion is a problem. 3. Experiencing a significant increase in freight traffic.	N/A.
Interview with Waller County	12/19/2022	1. Overview of plan update. 2. Input and feedback.	Virtual.	3, plus project team.	1. Significant freight activity. 2. Roadways not designed for heavy freight. 3. Lack of parking.	N/A.
Interview with Air Alliance Houston	1/10/2023	1. Overview of projects. 2. Respond to questions and concerns.	Virtual.	3, plus project team.	1. Impact to vulnerable populations, out reach to all communities, plan equity.	1. Share meeting information, link to dashboard and survey tool.
Stakeholder Mtg #4	1/12/2023	1. Discuss proposed recommendations (projects, policies/programs). 2. Stakeholder survey & solicit feedback. 3. Discuss implementation considerations.	In person at H-GAC with virtual option.	16, plus project team.	1. Freight tonnage-how calculated and origins. 2. Inventory of truck parking facilities. 3. Role of private industry in the planning effort. 4. At-grade rail crossings. 5. Alternative fuels.	1. Invite private industry to participate. 2. Need more data regarding secondary destinations. 3. Recommendations need to include strategies to implement.
Greater Houston Freight Committee	2/15/2023	1. Preliminary recommendations (an agenda item as part of committee meeting).	Virtual.	N/A.	1. Review of policy and program strategies.	1. Present refined recommendations.

REGIONAL GOODS MOVEMENT PLAN
PUBLIC INVOLVEMENT MEETING MATRIX

MEETINGS	DATE	PURPOSE OF MEETING	LOCATION	ATTENDEES	DISCUSSION HIGHLIGHTS	ACTION ITEMS
Private Industry Workshop	2/20/2023	1. Open discussion with freight related with private industry interests.	1. In person at Economic Alliance in Deer Park with virtual component.	7, plus project team	1. Private industry concern to safely and efficiently move freight. 2. Off-peak operations. 3. Specific freight routes. 4. Matchbacks and bypass routes.	1. Incorporate truck routes identified by industry in truck route map. 2. Refine evaulation criteria as result of discussion.
Steering Committee #5	4/6/2023	1. Discuss Policies and Program recommendations. 2. Discuss project recommendations. 3. Review maps and previous comments.	In person at H-GAC with Virtual component.	22, plus project team	1. Some projects considered in regional Freight Network but are not in RTP. 2. Discussion on scoring and weighting and ranking criteria. 3. Scoring to look at environmental concerns. 4. Survey of regarding policis & programs.	1. Review survey responses. 2. Incorporate feedback in the evaluation process. 3. Review comments and update projects in different categories. 4. Finalize recommendations.
Stakeholder Mtg #5	4/27/2023	1. Discuss refined policies/programs & project prioritization criteria. 2. Solicit feedback from stakeholders. 3. Define next steps including implementation considerations.	In-person at H-GAC with virtual MS Teams option.	23, plus project team.	1. Detailed discussion regarding critieria & scoring. 2. Review of the freight network map and identified needed additions. 3. Review of high and medium needs projects.	1. Revise scoring. 2. Further discussion of the status and development of the 36A project. 3. Re-examine truck crash rate vs. ADTs under the safety criteria. 4. Review last-mile connections.
Public Meeting # 2	6/6/2023	1. Discuss project findings. 2. Solicit feedback. 3. Update study recommendations and finalize.	In Person at Economic Alliance in Deer Park, with virtual option.	Approx 22, plus project team.	1. Data findings and freight trends. 2. Recommendations - Policies/Programs. 3. Recommendations - projects.	1. Refine recommendations. 2. Confirm implementation strategies.
Greater Houston Freight Committee	6/15/2023	1. Review of recommendations - policies, programs and projects (an agenda item as part of committee meeting).	Virtual.	N/A.	1. Policies and program recommendations and impacts. 2. Project prioritization.	1. Refine and finalize recommendations.
Steering/Stakeholder Meeting #6	8/10/2023	Review of DRAFT Report	Virtual.	32 plus project team.	1. Discussion on content of the report 2. Discussion on comments received prior to the meeting and how to address them 3. New comments received during the meeting	1. Project team to address comments and send a revised draft for discussion during Aug 17th meeting.
Steering/Stakeholder Meeting #7	8/17/2023	Review of DRAFT Report	Virtual.	31 plus project team.	1. Discussion on content of the report and how comments were addressed 2. Discussion on Environmental aspects and Equity Considerations	Finalize report and submit to H-GAC for TPC Approval.

Survey Outputs

Stakeholder Meeting #1

November 17, 2021

Mentimeter Survey Results:

Q1. Please rank the Goal areas by order of importance to you.

<table>
<tr><th>Rank</th><th>Option</th></tr>
<tr><td>1</td><td>Mobility (efficiency, reliability, congestion, etc.)</td></tr>
<tr><td>2</td><td>Safety</td></tr>
<tr><td rowspan="2">3</td><td>Infrastructure (new projects & maintenance)</td></tr>
<tr><td>Economic development</td></tr>
<tr><td>5</td><td>Environmental</td></tr>
<tr><td>6</td><td>Equity</td></tr>
</table>

Q2. Focusing on Freight Transportation, what are the top 3 **current** issues that concern you most?

<table>
<tr><th>Rank</th><th>Option</th><th>Number of Votes</th></tr>
<tr><td>1</td><td>Freight network resilience</td><td>6</td></tr>
<tr><td rowspan="3">2</td><td>Condition of the region’s Roadway network (efficiency, reliability, resiliency, & safety)</td><td rowspan="3">5</td></tr>
<tr><td>Funding and financing to maintain and expand the roadway network</td></tr>
<tr><td>Shortage of labor (truck drivers & rail engineers)</td></tr>
<tr><td rowspan="2">3</td><td>Operational needs for trucks (information, safety, oversize & overweight)</td><td rowspan="2">4</td></tr>
<tr><td>Intermodal connectivity between freight modes</td></tr>
<tr><td rowspan="3">4</td><td>Condition of the region’s Rail network (efficiency, reliability, resiliency, & safety)</td><td rowspan="3">1</td></tr>
<tr><td>Truck parking (capacity & locations)</td></tr>
<tr><td>Lack of modal choice & access</td></tr>
<tr><td>None</td><td>Adequate truck and rail service in outlying areas</td><td>0</td></tr>
</table>

None	Inconsistency & complexity in truck size & weight regulations	0
None	Adapting to technologies (training, equipment costs, etc.)	0

Q3. Select all modes of freight transportation you actively use in your business or industry.

Rank	Option	Number of Votes
1	Truck	8
2	Maritime (ship or barge)	6
3	Rail	4
	Pipeline	
4	Air	2

Q4. Shippers: What are your most significant issues in transporting goods and commodities to market?

Rank	Option	Number of Votes
1	Freight transportation costs	2
	Carrier capacity/availability	
	Carrier reliability (picking up and/or delivering on time)	
2	Workforce (availability & retaining of workers, skills etc.)	1
	Intermodal connectivity (access & availability to switch between modes)	
None	Lack access to rail	0
None	Other	0

Q5. Carriers: What are your most significant issues in transporting goods and commodities to market?

<table>
<tr><th>Rank</th><th>Option</th><th>Number of Votes</th></tr>
<tr><td>1</td><td>Workforce (hiring qualified drivers/operators & retention)</td><td>2</td></tr>
<tr><td rowspan="5">2</td><td>Equipment costs (Trucks, trailers, etc.)</td><td rowspan="5">1</td></tr>
<tr><td>Operating costs (fuel, maintenance & labor)</td></tr>
<tr><td>Customer hours of operation & scheduling</td></tr>
<tr><td>Risk management – Safety (crashes & violations), security (theft & cargo damage), insurance, legal support</td></tr>
<tr><td>Other: Congestion and delays at rail and port terminals to access international containers</td></tr>
<tr><td>None</td><td>Adapting & integrating technology</td><td>0</td></tr>
</table>

Q6. Focusing on Truck safety, what are the top 3 issues that concern you most?

<table>
<tr><th>Rank</th><th>Option</th><th>Number of Votes</th></tr>
<tr><td>1</td><td>Recuring congestion</td><td>8</td></tr>
<tr><td>2</td><td>Lack of an efficient & integrated truck routing system</td><td>6</td></tr>
<tr><td>3</td><td>Roadway geometry & condition</td><td>5</td></tr>
<tr><td rowspan="4">4</td><td>At-grade rail crossings</td><td rowspan="4">2</td></tr>
<tr><td>Information on roadway situations</td></tr>
<tr><td>Environmental conditions (Weather, climate change)</td></tr>
<tr><td>Driver/operator behavior (speeding, in-cab distractions)</td></tr>
<tr><td>5</td><td>Hazardous materials being transported</td><td>1</td></tr>
<tr><td>None</td><td>Low underpasses</td><td>0</td></tr>
<tr><td>None</td><td>Other: ____________________</td><td>0</td></tr>
</table>

Q7. What **trends** in freight transportation concern you most?

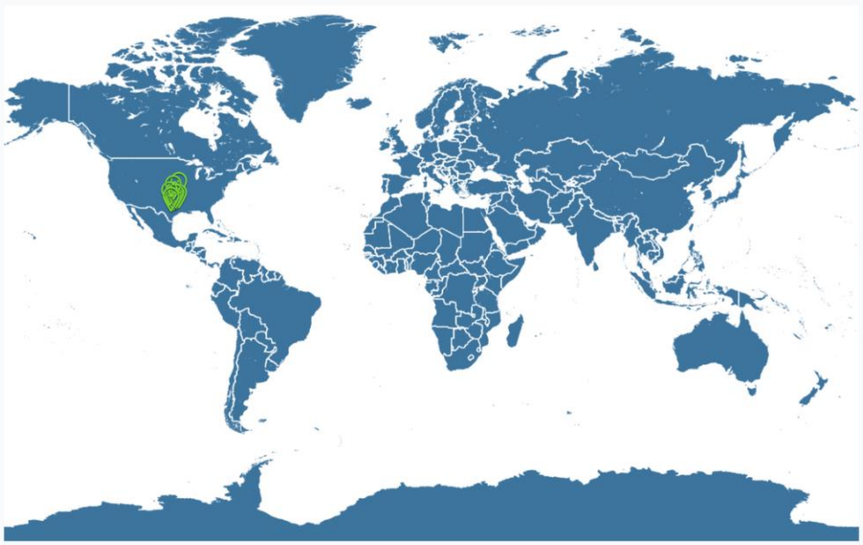
Rank	Option	Number of Votes
1	Workforce (availability & skills)	6
2	Maintaining supply chains (efficient, reliable & flexibility)	5
3	Regulatory requirements	3
	Environmental (climate change)	
	Transportation operating costs (Maintenance, fuel & wages, labor)	
4	Integrating new technology (training & costs)	2
	Autonomous vehicle operation	
5	Alternative fuels (Electric, hydrogen, CNG/LNG)	1
	Switching from fuel taxes to Mileage-Based User Fee	
None	Other: ___________________________________	0

Public Meeting #1

March 31, 2022

When poll is active, respond at **pollev.com/tracidonatto118**

Where do you live?



When poll is active, respond at **pollev.com/tracidonatto118**
Text **TRACIDONATTO118** to **22333** once to join

What inspired you to join this meeting?

“ Has HGAC considered truck only lanes to manage freight? ”

“ To learn what the public is concerned about ”

“ I stopped riding my bike in Houston because I was nearly hit by a truck. How can safety be improved in

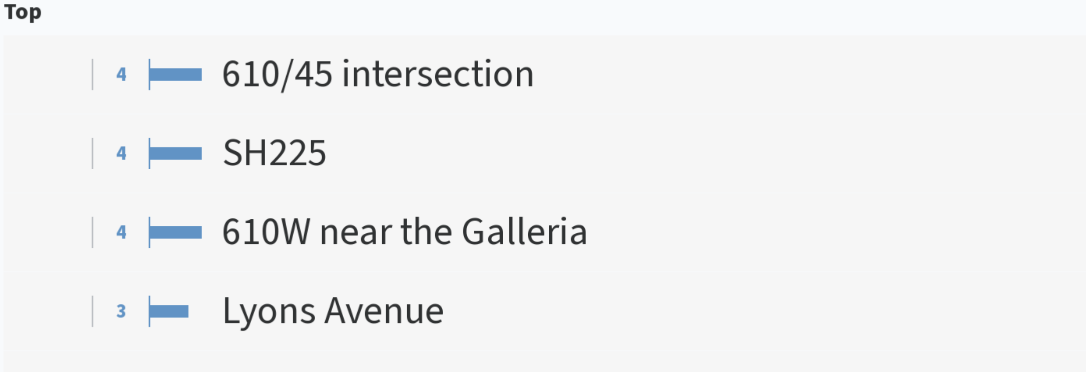
When poll is active, respond at **pollev.com/tracidonatto118**
Text **TRACIDONATTO118** to **22333** once to join

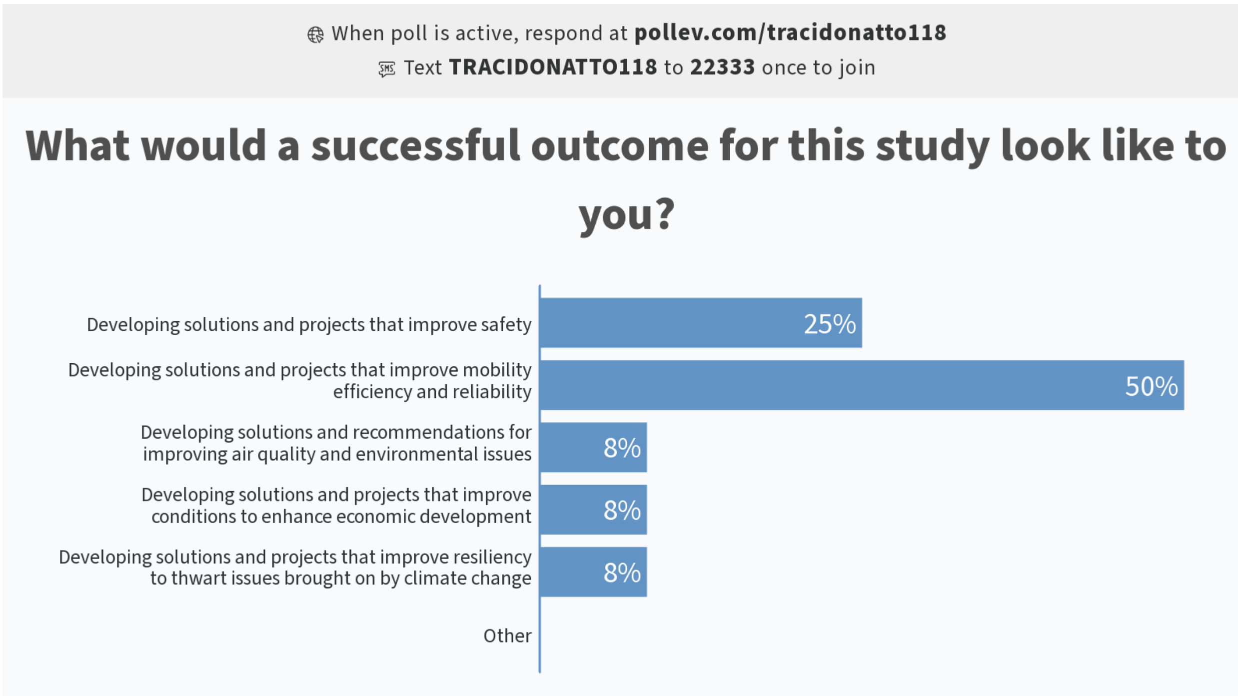
What words or images come to mind when you hear the term "freight movement"?

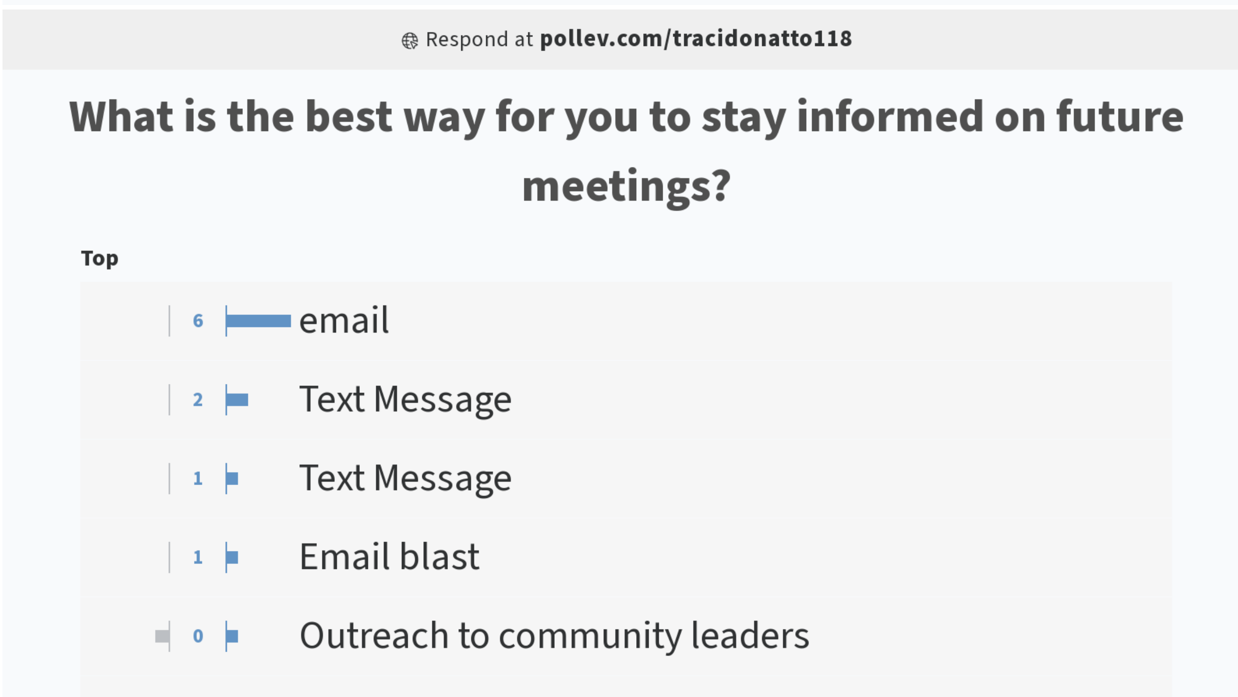
When poll is active, respond at **pollev.com/tracidonatto118**

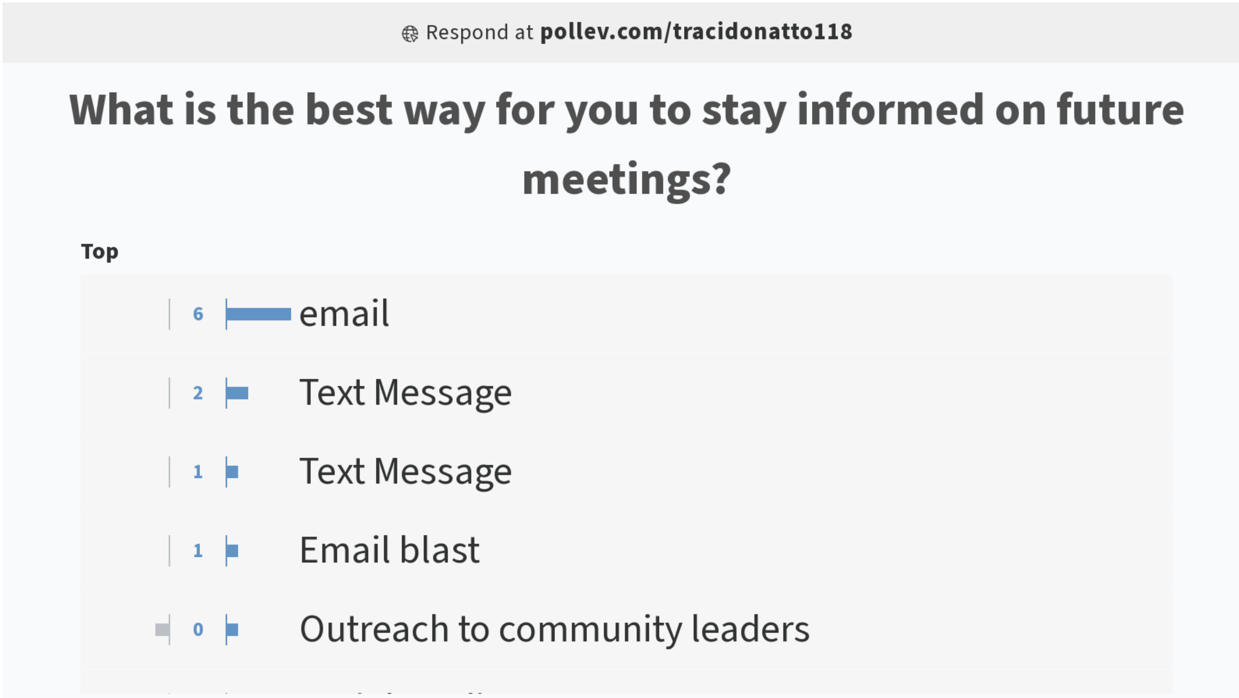
Which corridors / roadways impact your daily life the most in terms of interaction with trucks, trains, or other forms of freight movement?

Top




When poll is active, respond at **pollev.com/tracidonatto118**
Text **TRACIDONATTO118** to **22333** once to join
What would a successful outcome for this study look like to you?
Developing solutions and projects that improve safety
25%
Developing solutions and projects that improve mobility efficiency and reliability
50%
Developing solutions and recommendations for improving air quality and environmental issues
8%
Developing solutions and projects that improve conditions to enhance economic development
8%
Developing solutions and projects that improve resiliency to thwart issues brought on by climate change
8%
Other

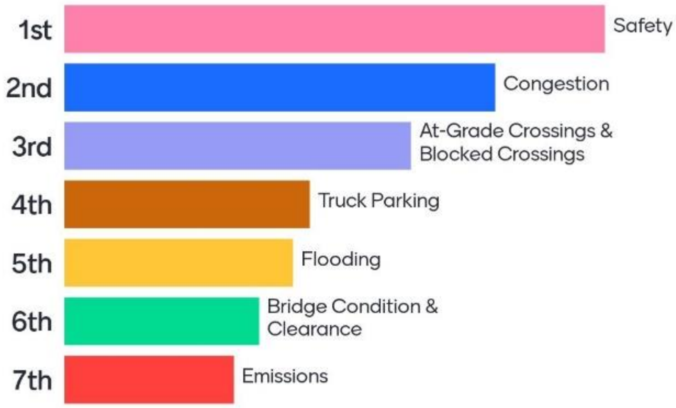

Respond at **pollev.com/tracidonatto118**
What is the best way for you to stay informed on future meetings?
Top
6
email
2
Text Message
1
Text Message
1
Email blast
0
Outreach to community leaders


Respond at pollev.com/tracidonatto118
What is the best way for you to stay informed on future meetings?
Top
6 email
2 Text Message
1 Text Message
1 Email blast
0 Outreach to community leaders

Steering Committee Meeting #4

December 1, 2022

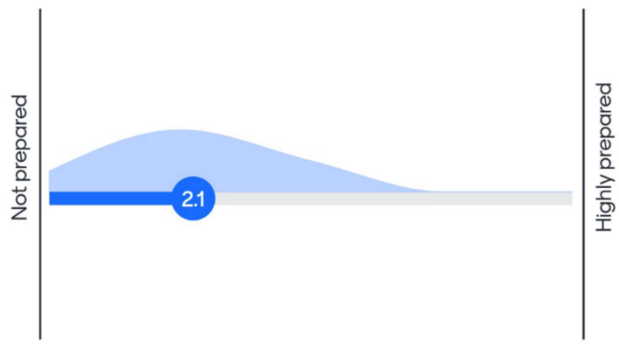
Question: Which three key issues do you believe should be prioritized?



Question: Are there any other key issues that should be included?

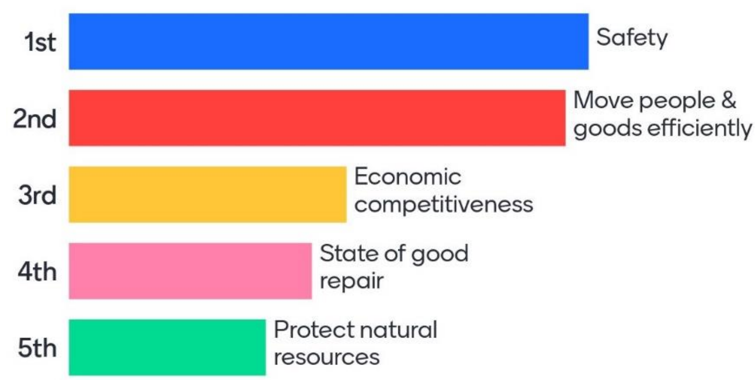
Freight Forecast Discussion

Question: How well prepared do you think the region's transportation network is to accommodate this growth in freight traffic?



Project Recommendations and Strategies Discussion

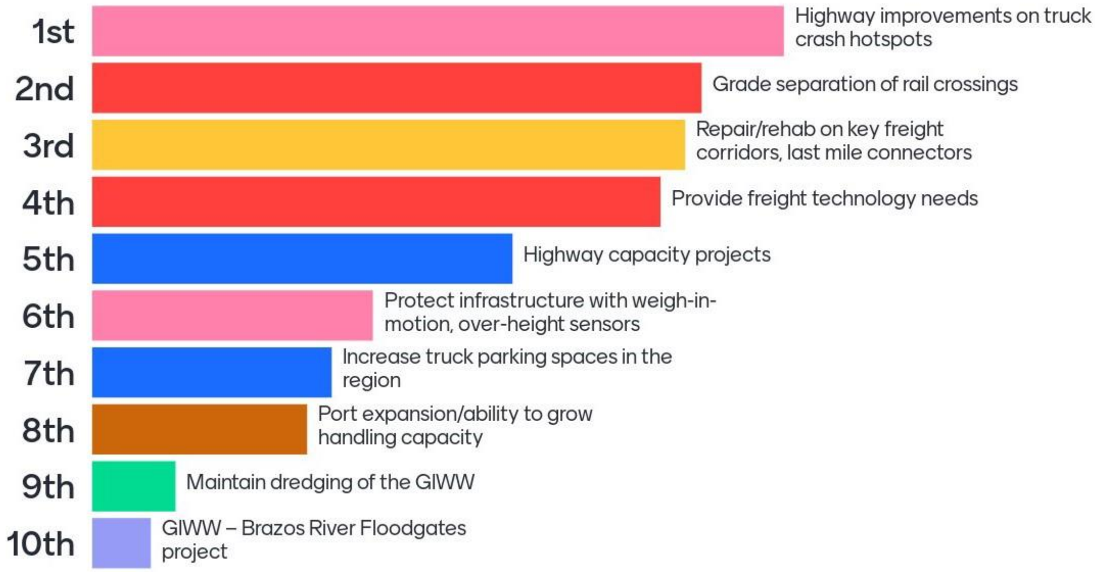
Question: Rank the goals by order of importance.



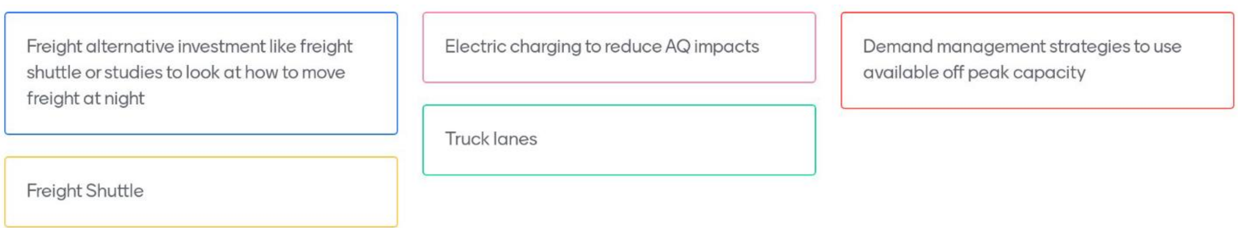
Question: Are there any other goals associated with freight movement that you believe are important?

- Minimize impacts to local community
- Moving freight movement in available capacity and in alternate ways.
- Find alternative way of moving goods.
- Reduce risks and harm borne by EJ communities
- Move forward as a region as one voice
- Freight Shuttle
- Possibility of combining or expanding the scopes of existing projects to include freight-related improvements

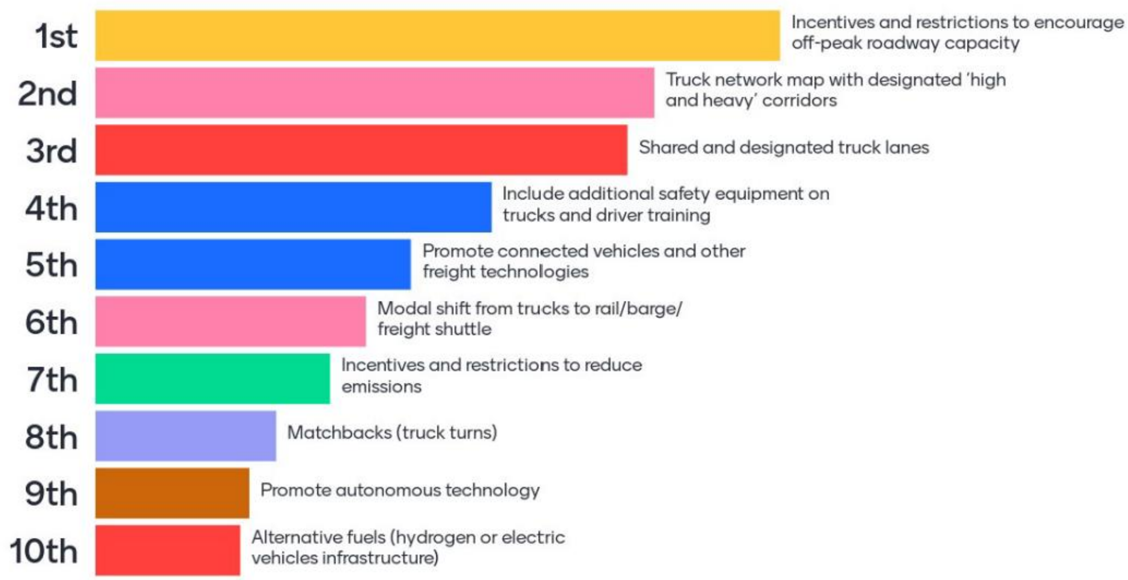
Question: Out of the 10 projects shown, which three are the most important for the wider region?



Question: Are there any other projects that should be listed?



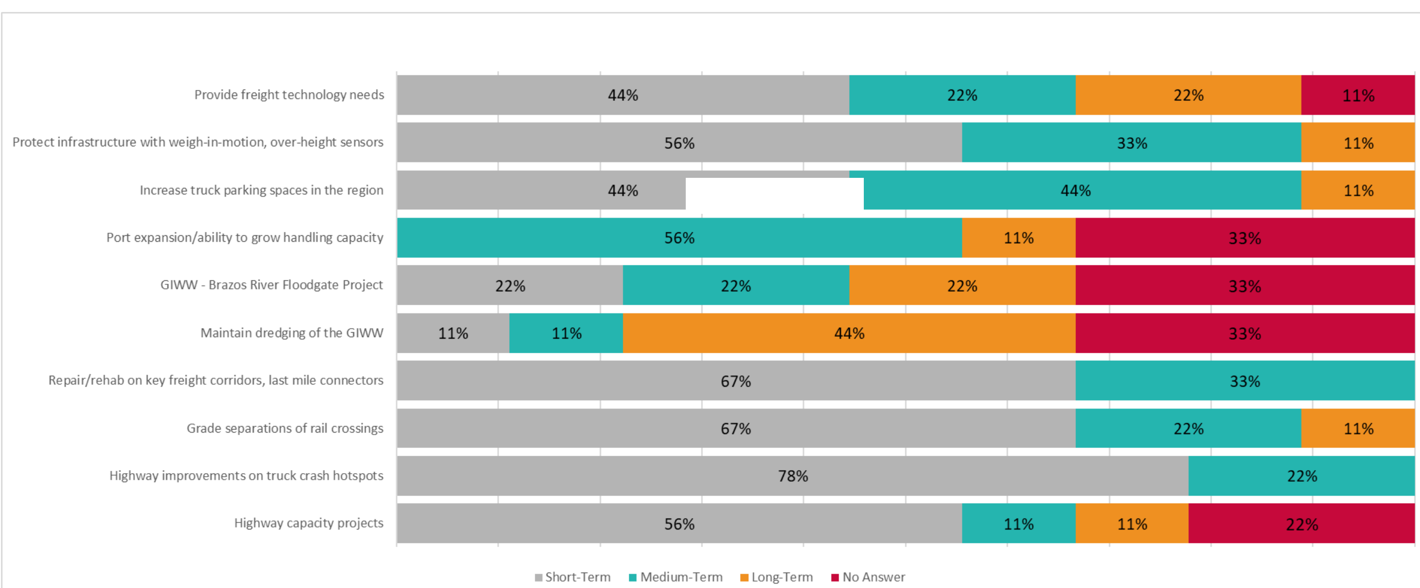
Question: What are your top three recommendations associated with policies and programs out of the ones listed?



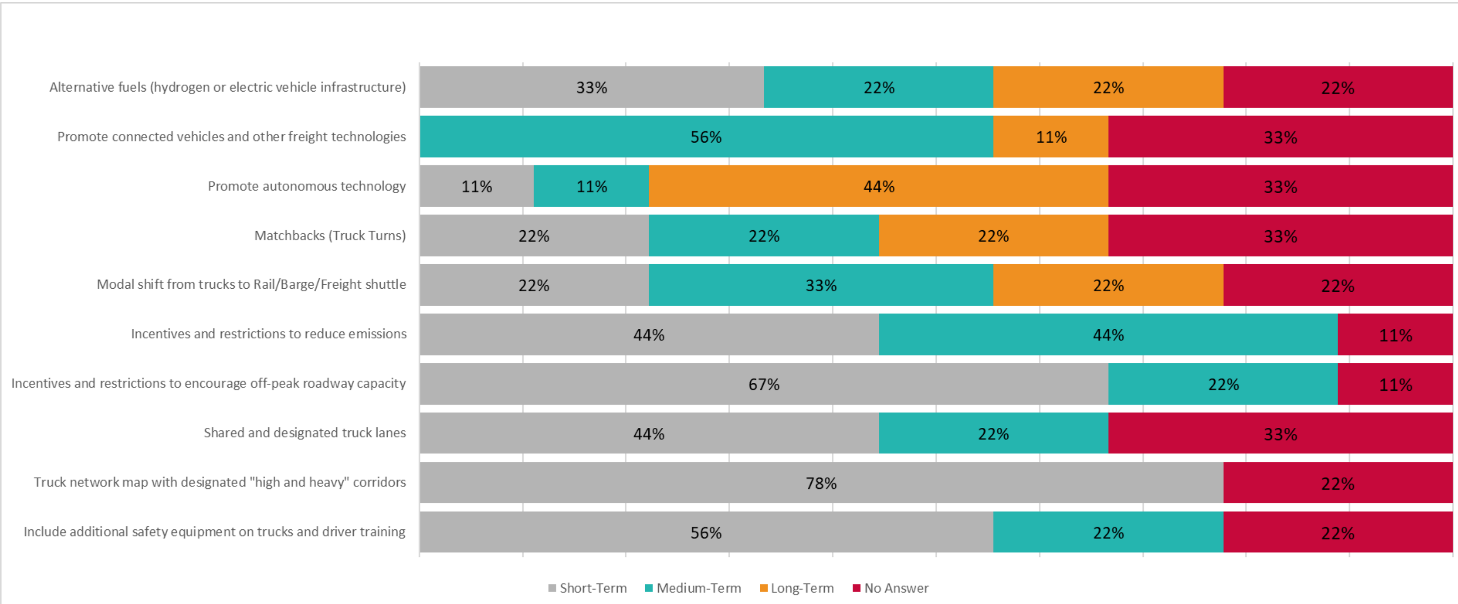
Question: Are there any other policies or programs that should be listed?

- Attention to hazardous goods movement
- Federal or state funding of pilot programs (freight shuttle, hydrogen fuel cells, etc)
- Quiet zones identified and implemented
- Chemical spill emergency response training
- Freight routing program
- Funding air filtration in homes and public buildings like schools
- Implement air monitoring network

Question 6: Rate the following 10 project types as short, medium or, long term based on what you believe is most important for the wider region.



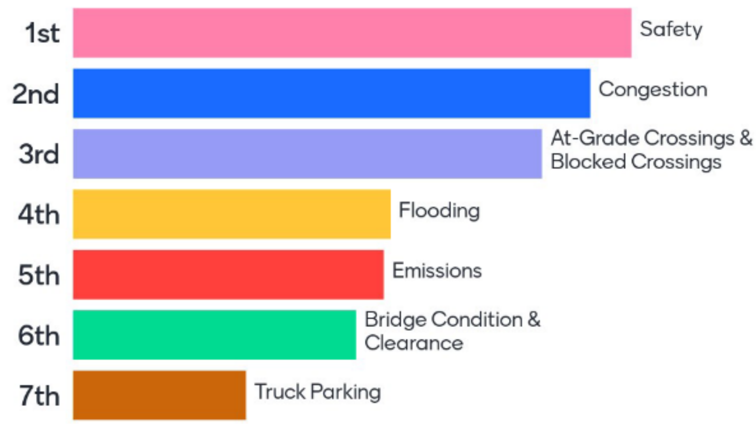
Question 8: Rate the following recommendations based on what you believe should be a short, medium, or long-term focus.



Stakeholder Meeting #4

January 12, 2023

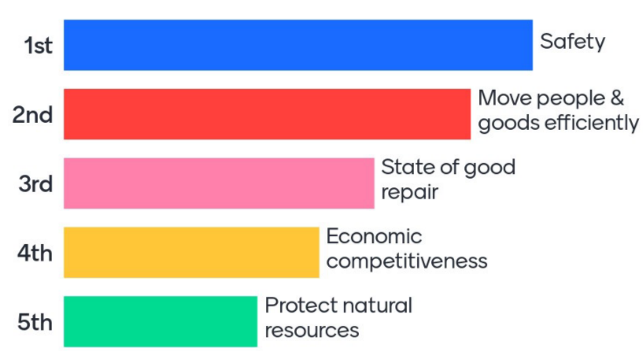
Survey Question: Which three key issues do you believe should be prioritized?



Survey Question: Are there any other key issues that should be included?

- Lack of adequate funding
- Funding
- Equitable distribution of impacts
- Congestion at Port Houston.
- Truck routes and truck only lanes
- Integration of technology for freight movement
- Emerging technologies
- Consistency between planning documents
- Thru-freight routing around (rather than through downtown core)
- Equity in impact
- Innovation
- Input from freight facility owners.
- Technology integration
- Residential-freight traffic integration
- Electrification of fright and it's impact on routes and parking, charging infra

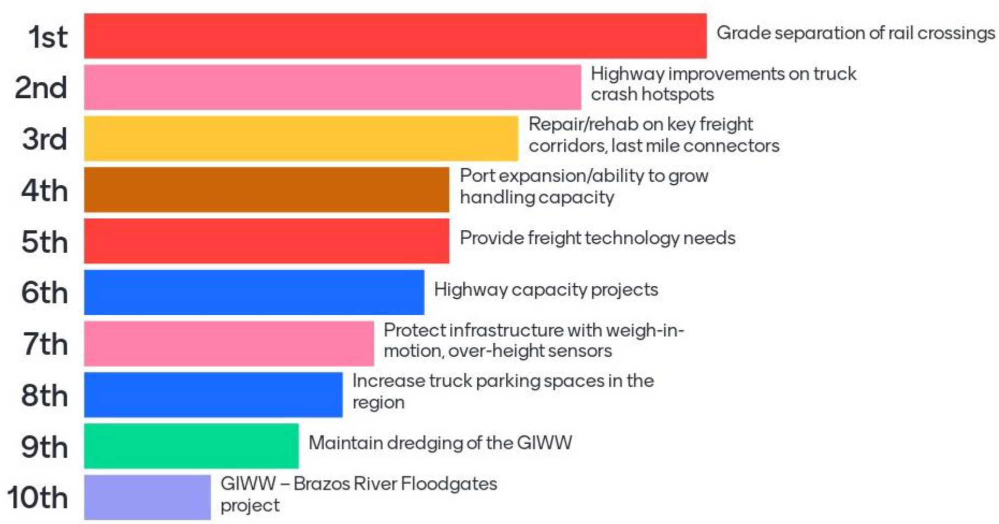
Survey Question: Rank the goals by order of importance



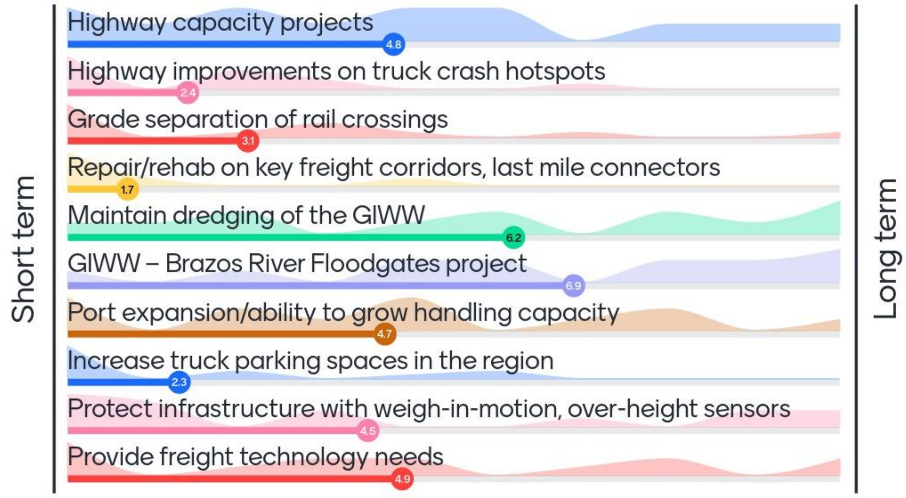
Survey Question: Are there any other goals associated with freight movement that you believe are important but not captured in the list of goals?

- Air quality
- Equity
- Efficiency
- Modal shift
- Equity
- Autonomous transportation
- Security
- Local system
- Environmental impact, sustainability, alternative fuel, alternative transportation
- Impact on surrounding communities.
- Future proofing for technology shift
- Innovation
- Long term impact on communities already impacted by freight
- Supply chain
- Land use planning
- Community involvement
- Modal integration
- Subsidize maritime containers to get truck freight off the roadways
- Innovation in freight movement
- Grade separation at rail crossings
- Rehab heavy freight corridors

Survey Question: In the previous three slides, we identified ten types of projects. Which three do you think are the most important for the wide region?



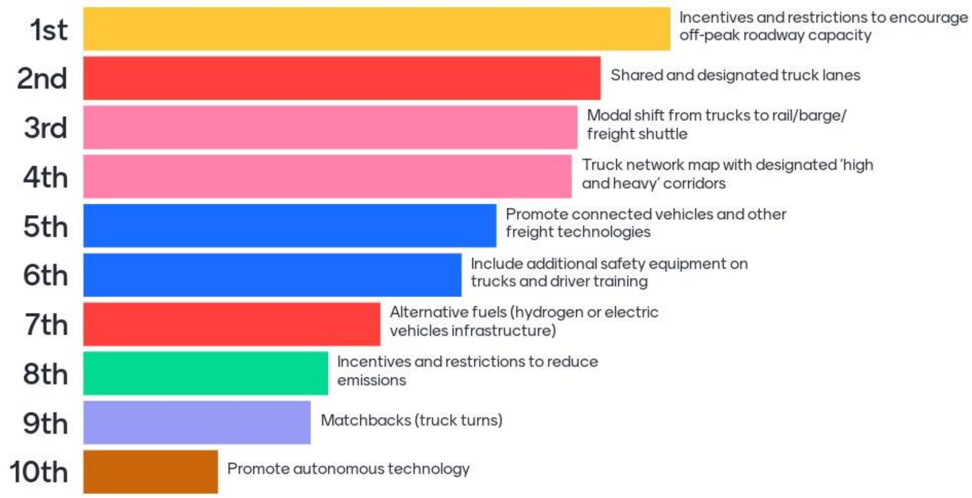
Survey Question: What's the preferred timeline for implementation of these projects? Please identify short, mid, or long-term for each option.



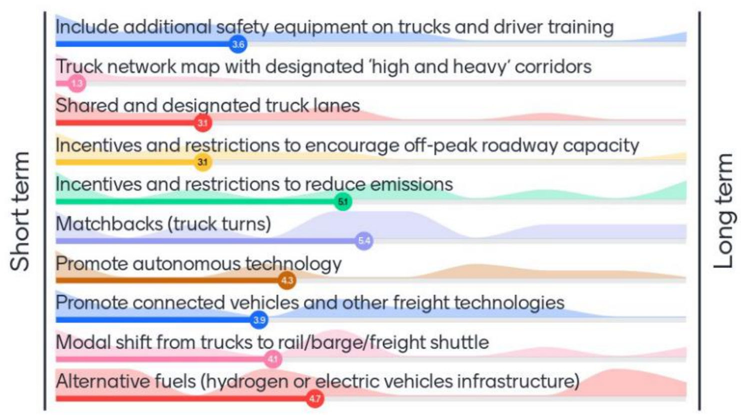
Survey Question: Are there any other projects that should be listed?

- Freight shuttle or similar technology, hydrogen fueling
- Designation of freight routes away from sensitive land uses
- Flood readiness
- Public private partnerships
- Projects to move freight from truck to rail or new technologies
- Subsidize costs for container on barge at ports to lessen the freight on the highways.
- Reallocation of general purpose capacity to fright only
- Freight shuttle
- Community partnerships
- Thru freight routing
- Combining truck parking with alt fuel sites
- The REAL Plan
- Conservation
- Logistical hubs with truck parking
- Modal subsidies to lessen trucks on road
- Capacity expansions with railroads that have public benefits (is double tracking rail bridges to increase fluidity and capacity and reduce blocking)

Survey Question: We acknowledge there are multiple recommendations associated with policies and programs. What are your top three?



Survey Question: What's the preferred timeline for implementation of these policies and programs? Please identify short, mid, or long-term for each option.



Survey Question: Are there any other policies/programs that should be listed?

PPP incentives

Funding for truck alternative freight technology

Real plan

Avoid low income/minority communities

fund rail capacity or relocation when there is a public benefit.

Any time we're bringing industry into the conversation, bring the residential community in too

Long term community partnership efforts

Funding and programming for already impacted communities to actually have equity in this plan

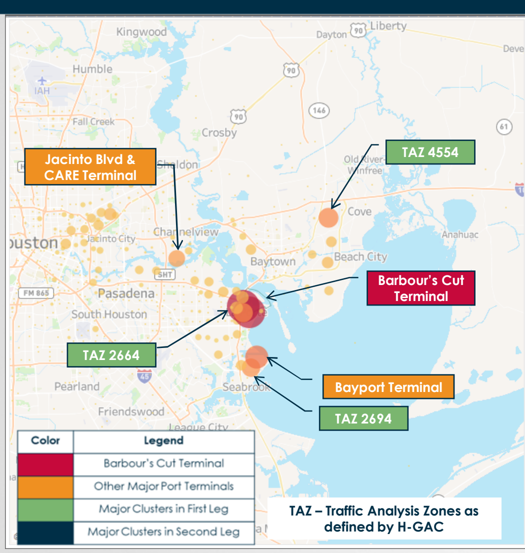
Freight Industry Partnership Program

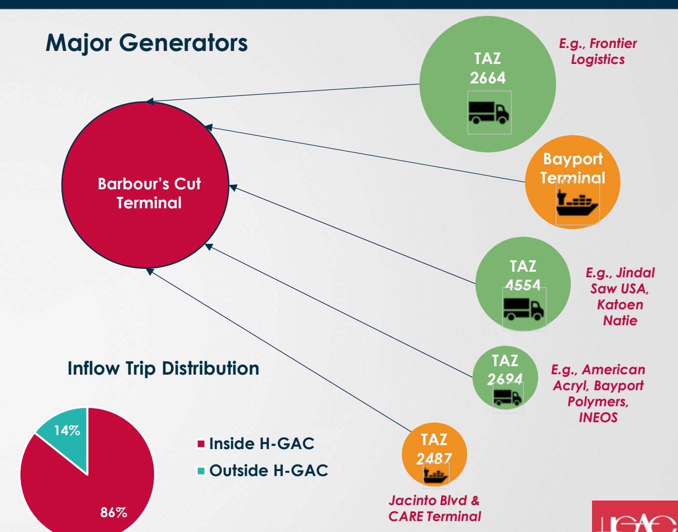
Appendix B

Origin — Destination : Primary and Secondary Trip Analysis

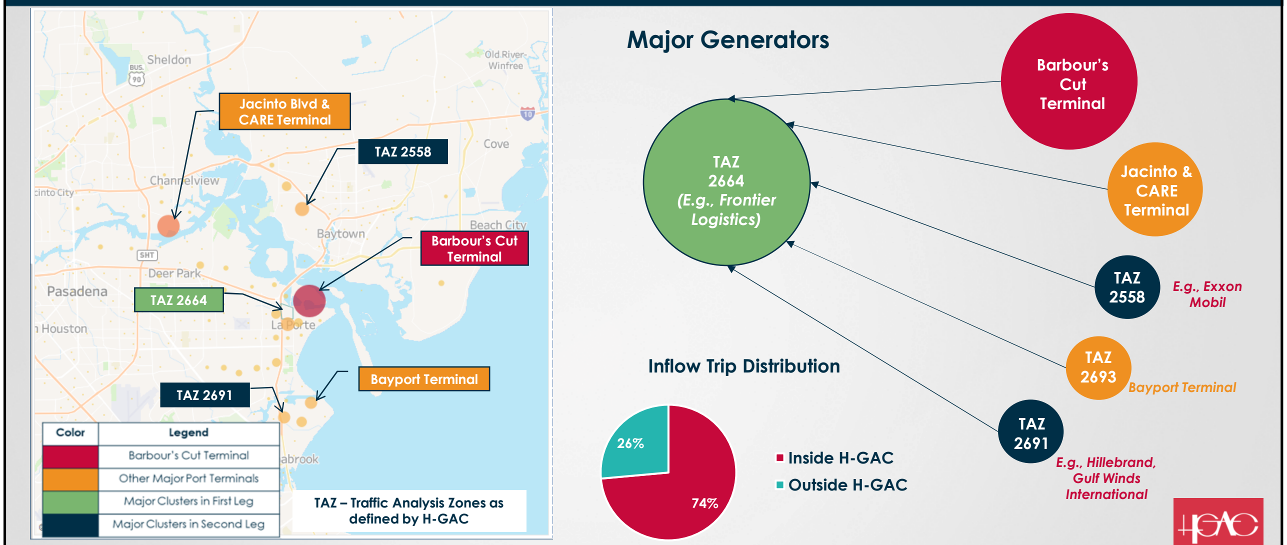
Barbour's Cut Inflow Analysis

Barbour's Cut Terminal – Inflow within H-GAC





Second Leg -TAZ 2664 – Inflow within H-GAC



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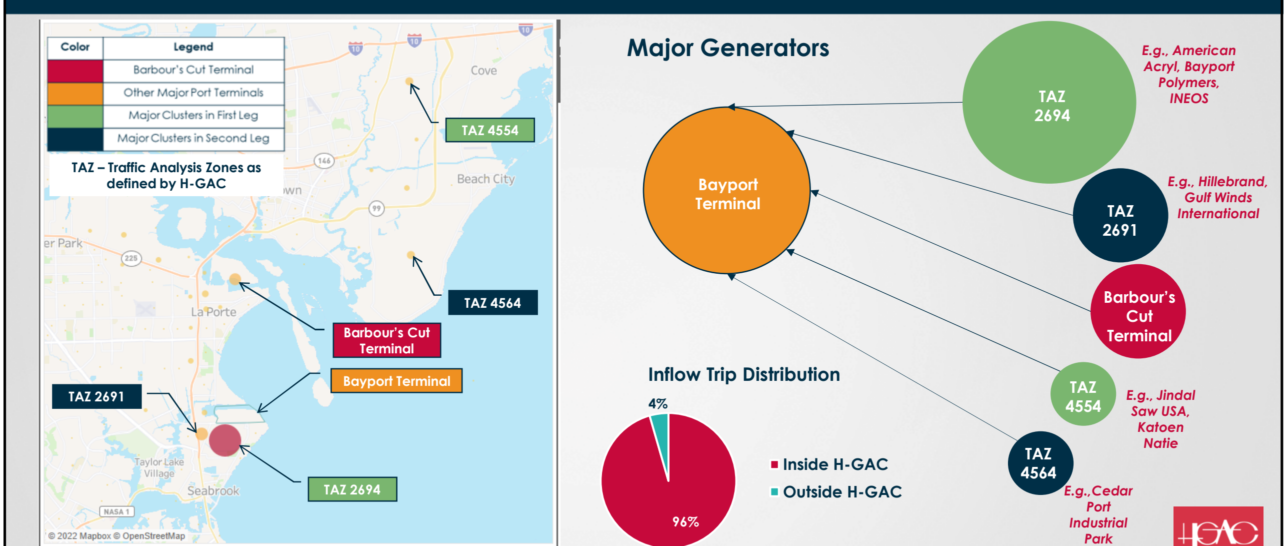
Second Leg -Bayport Terminal – Inflow within H-GAC



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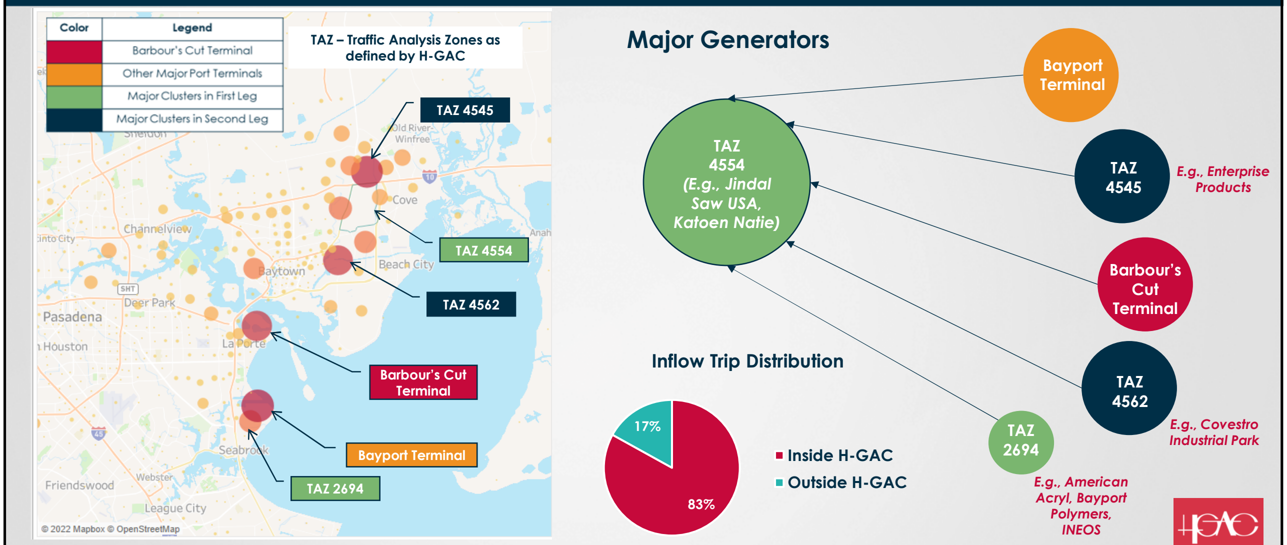
Second Leg -TAZ 4554 – Inflow within H-GAC



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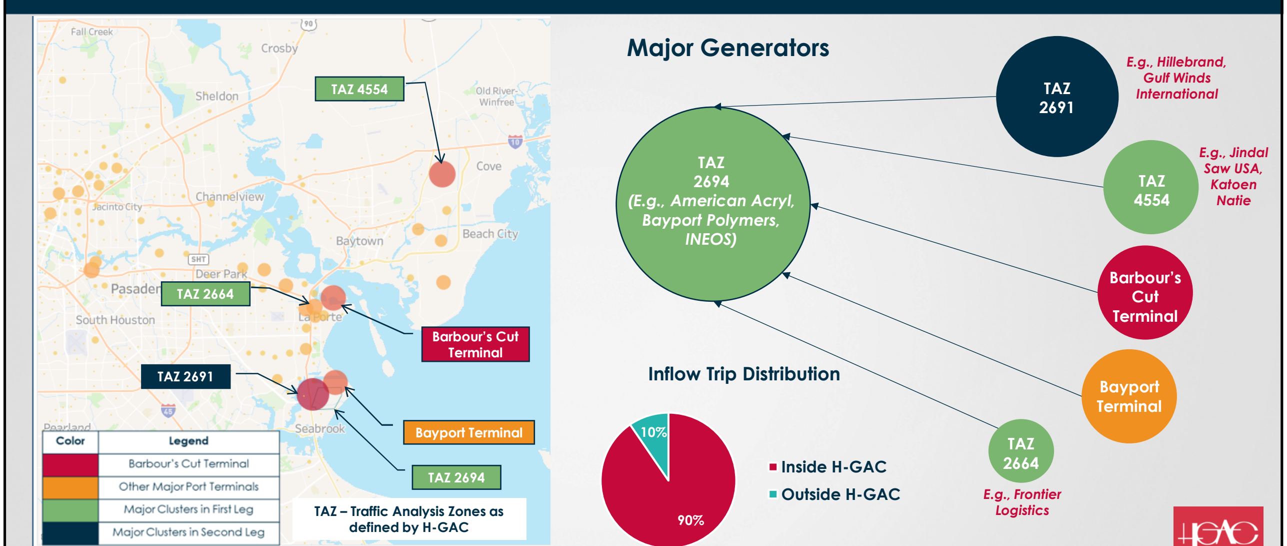
Second Leg - TAZ 2694 – Inflow within H-GAC



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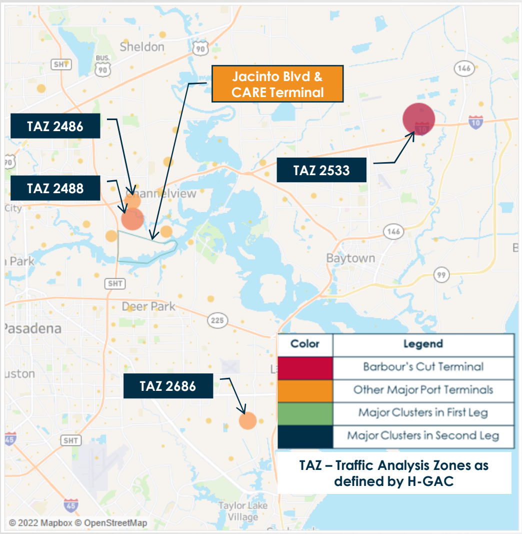
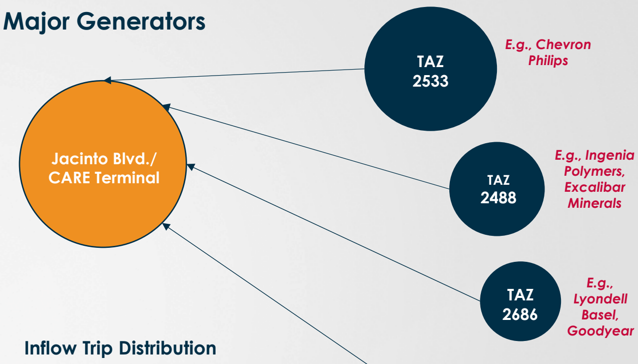
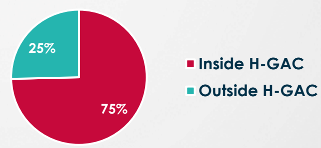
Second Leg - Jacinto Blvd. / CARE Terminal – Inflow within H-GAC



Major Generators

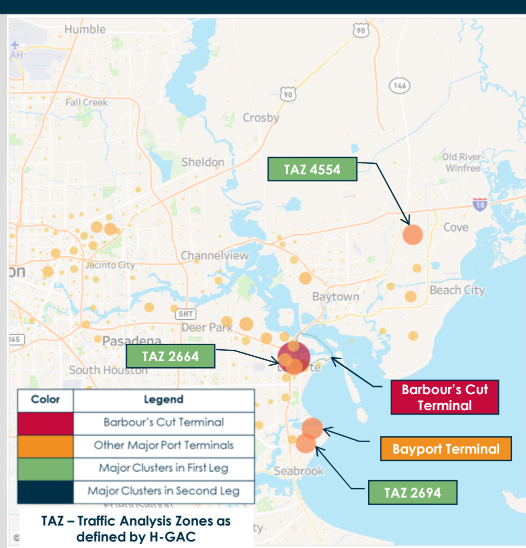


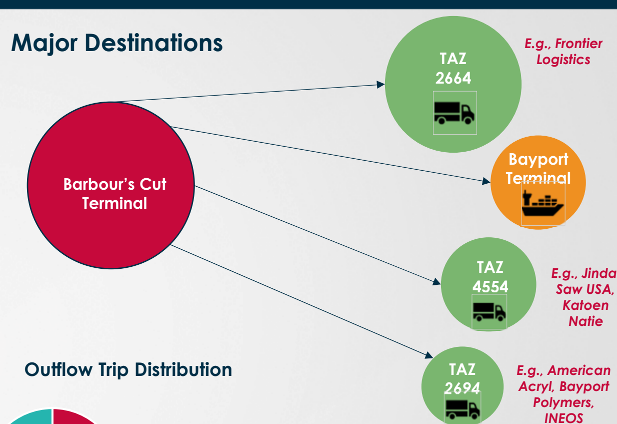
Inflow Trip Distribution

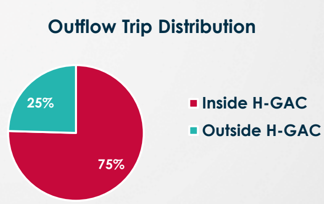


Barbour’s Cut Outflow Analysis

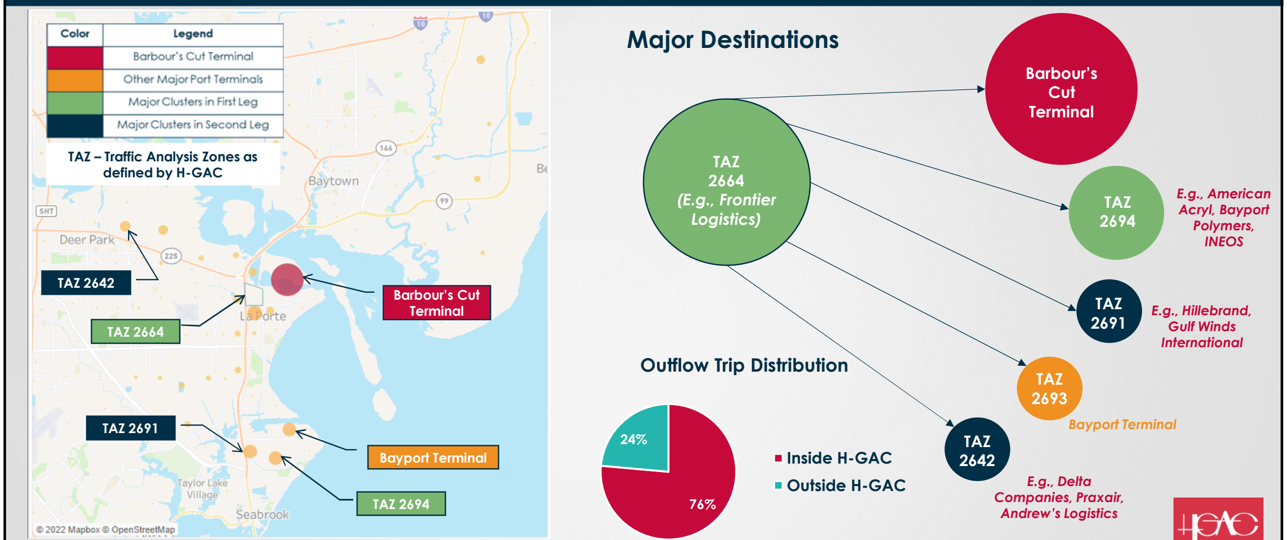
Barbour’s Cut Terminal – Outflow within H-GAC







Second Leg - TAZ 2664 – Outflow within H-GAC



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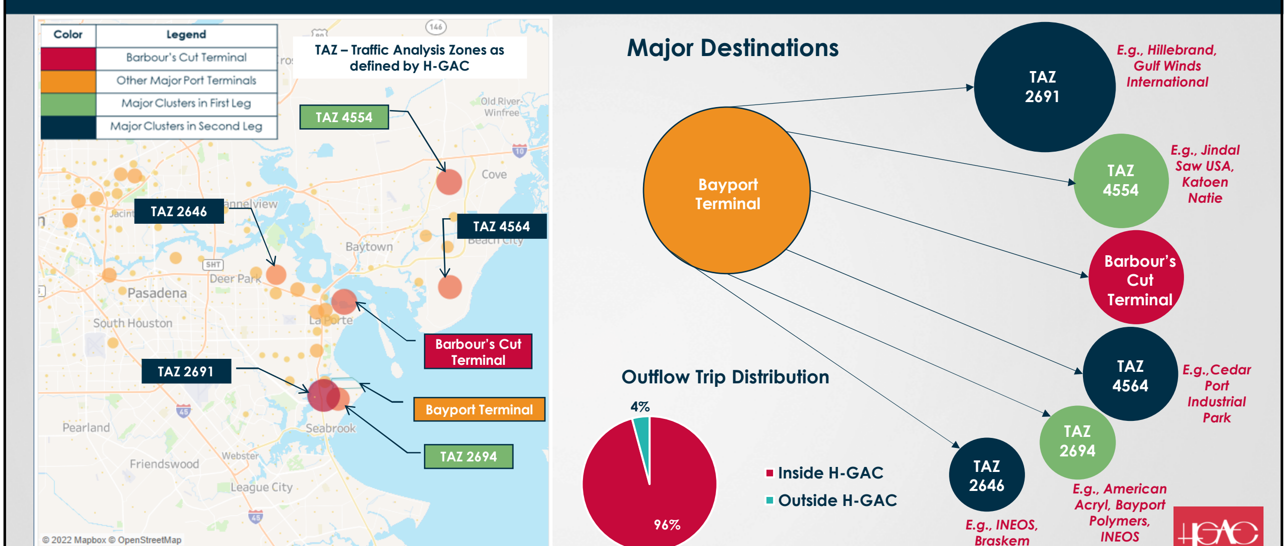
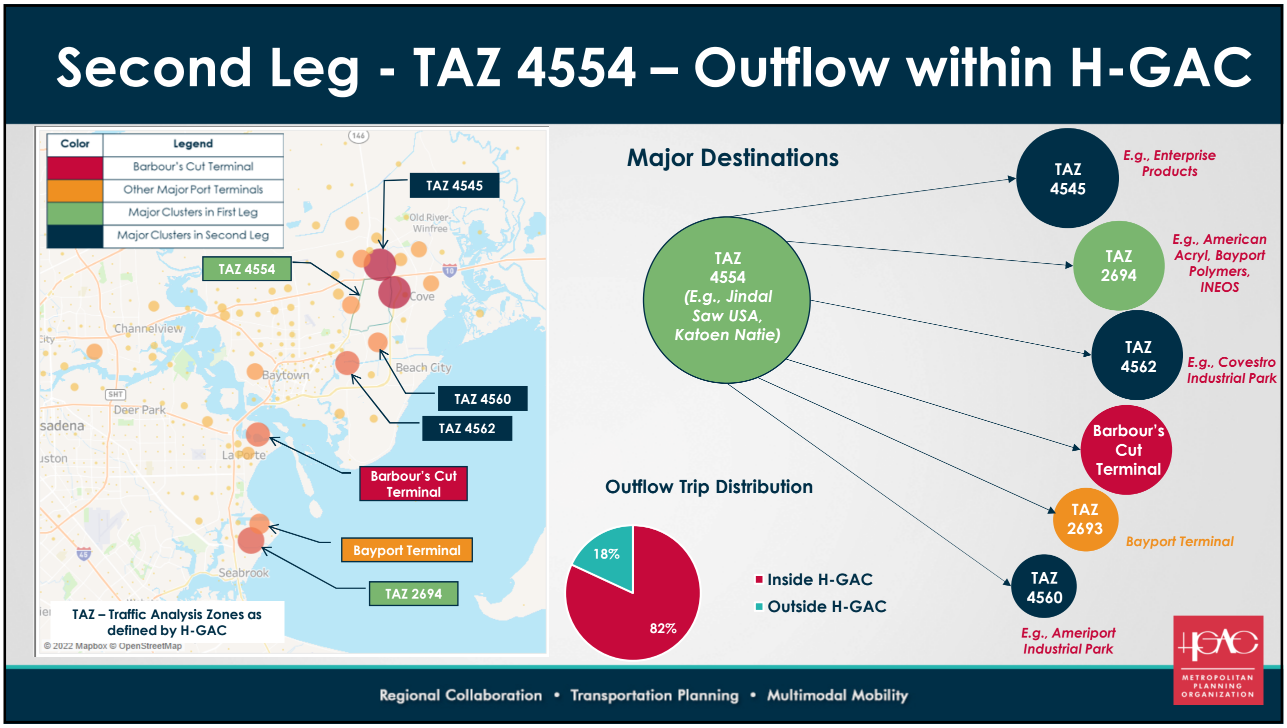
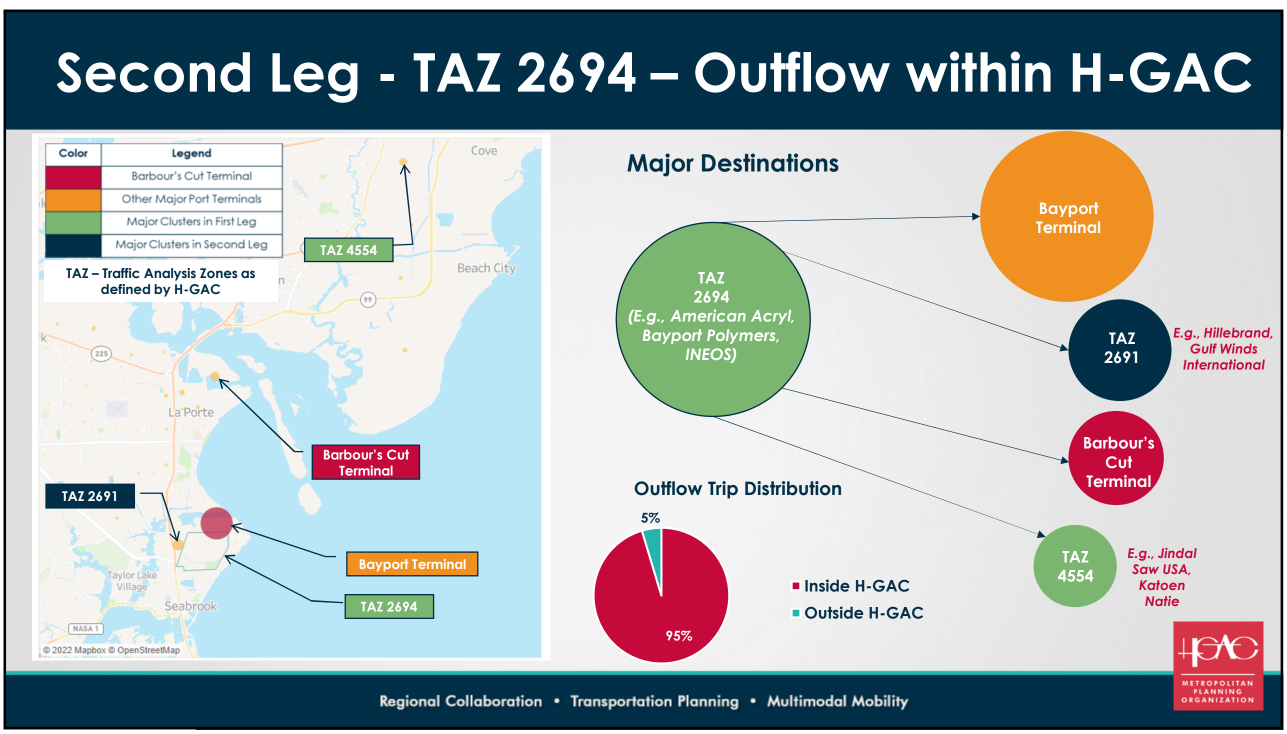
Second Leg - Bayport Terminal – Outflow within H-GAC



Regional Collaboration • Transportation Planning • Multimodal Mobility



Second Leg - TAZ 4554 – Outflow within H-GAC
Color
Legend
Barbour's Cut Terminal
Other Major Port Terminals
Major Clusters in First Leg
Major Clusters in Second Leg
TAZ 4545
TAZ 4554
TAZ 4560
TAZ 4562
Barbour's Cut Terminal
Bayport Terminal
TAZ 2694
Channelview
Baytown
Beach City
Deer Park
La Porte
Seabrook
Cove
Old River-Winfree
TAZ – Traffic Analysis Zones as defined by H-GAC
© 2022 Mapbox © OpenStreetMap
Major Destinations
TAZ 4554 (E.g., Jindal Saw USA, Katoen Natie)
TAZ 4545
E.g., Enterprise Products
TAZ 2694
E.g., American Acryl, Bayport Polymers, INEOS
TAZ 4562
E.g., Covestro Industrial Park
Barbour's Cut Terminal
TAZ 2693
Bayport Terminal
TAZ 4560
E.g., Ameriport Industrial Park
Outflow Trip Distribution
18%
82%
Inside H-GAC
Outside H-GAC
METROPOLITAN PLANNING ORGANIZATION
Regional Collaboration • Transportation Planning • Multimodal Mobility



Second Leg - TAZ 2694 – Outflow within H-GAC
Color
Legend
Barbour's Cut Terminal
Other Major Port Terminals
Major Clusters in First Leg
Major Clusters in Second Leg
TAZ – Traffic Analysis Zones as defined by H-GAC
TAZ 4554
Barbour's Cut Terminal
TAZ 2691
Bayport Terminal
TAZ 2694
Cove
Beach City
La Porte
Taylor Lake Village
Seabrook
© 2022 Mapbox © OpenStreetMap
Major Destinations
TAZ 2694 (E.g., American Acryl, Bayport Polymers, INEOS)
Bayport Terminal
TAZ 2691
E.g., Hillebrand, Gulf Winds International
Barbour's Cut Terminal
TAZ 4554
E.g., Jindal Saw USA, Katoen Natie
Outflow Trip Distribution
5%
95%
Inside H-GAC
Outside H-GAC
METROPOLITAN PLANNING ORGANIZATION
Regional Collaboration • Transportation Planning • Multimodal Mobility

Barbour's Cut Terminal TAZ - Inflow Analysis

S.No.	Name of the Terminal	Total Trips	Trips From Inside H-GAC Region	% of Trips Inside H-GAC	Trips From Outside H-GAC Region	% of Trips Outside H-GAC
1	Barbour's Cut Terminal	31,476	26,996	85.8%	4,480	14.2%

Trips Inside H-GAC - Top Generators - First Leg

S.No.	First Leg (TAZ ID)	Trips	% of Trips
1	2664	3023.5	11.20%
2	2665	2863.5	10.61%
3	2693	1514	5.61%
4	4554	1123	4.16%
5	2663	1052	3.90%
6	2694	964.5	3.57%
7	2487	798	2.96%

First Leg Of The Trip - Freight Generators Inside H-GAC

S.No.	First Leg (TAZ ID)	Potential Freight Generators
1	2664	1. The Dow Chemical Company
		2. Integrated Industries
		3. Frontier Logistics
		4. Dragon La Porte
2	2665	1. Gulf Winds International
		2. Americold
		3. National Inspection Services
3	2693	1. Bayport Container Terminal
4	4554	1. Jindal Saw USA
		2. Katoen Natie
		3. Houston Raceway
5	2663	1. Lion King Truck Stop/ Americold
6	2694	1. American Acryl LLP
		2. Bayport Polymers
		3. INEOS Styrolution America
7	2487	1. Gulfstream Marine-Care Terminal
		2. Stolthaven Houston
		3. Cargill Inc.

Second Leg Of The Trip - H-GAC vs Outside H-GAC

S.No.	TAZ ID	Total "Inflow" Trips	Trips From Inside H-GAC Region	% of Trips Inside H-GAC	Trips From Outside H-GAC Region	% of Trips Outside H-GAC
1	2664	20,005	14,719	73.6%	5,286	26.4%
2	2665	6,883	5,731	83.3%	1,152	16.7%
3	2693	28,019	26,777	95.6%	1,242	4.4%
4	4554	29,239	24,274	83.0%	4,965	17.0%
5	2663	8,034	6,880	85.6%	1,154	14.4%
6	2694	22,634	20,472	90.4%	2,162	9.6%
7	2487	17,622	13,155	74.7%	4,467	25.3%

Second Leg Of The Trip - Freight Generators inside H-GAC

S.No.	TAZ ID	Second Leg (TAZ ID)	Trips	% of Trips
1	2664	2660	3389.5	23.03%
		2487	1599	10.86%
		2558	640	4.35%
		2663	602	4.09%
		2691	508	3.45%
		2693	478.5	3.25%
3	2693	2694	10998.5	41.08%
		2691	1698	6.34%
		2660	1479.5	5.53%
		4554	830	3.10%
		4564	694	2.59%
4	4554	2693	1527	6.29%
		4545	1459.5	6.01%
		2660	1327	5.47%
		4562	1284.5	5.29%
		4553	775.5	3.19%
		2694	720.5	2.97%
		4560	715.5	2.95%
6	2694	2691	2116	10.34%
		4554	1413	6.90%
		2660	1286	6.28%
		2693	1237.5	6.04%
		2664	523.5	2.56%
		1264	506	2.47%
7	2487	2533	2061	15.67%
		2488	1015.5	7.72%
		2686	617.5	4.69%
		2486	542.5	4.12%

Barbour's Cut Terminal TAZ - Outflow Analysis

S.No.	Name of the Terminal	Total Trips	Trips To Inside H-GAC Region	% of Trips Inside H-GAC	Trips To Outside H-GAC Region	% of Trips Outside H-GAC
1	Barbour's Cut Terminal	37,172	28,046	75.4%	9,126	24.6%

Trips Inside H-GAC - Top Destinations - First Leg

S.No.	First Leg (TAZ ID)	Trips	% of Trips
1	2664	3389.5	12.09%
2	2693	1479.5	5.28%
3	4554	1327	4.73%
4	2694	1286	4.59%
5	2663	911.5	3.25%

First Leg Of The Trip - Freight Destinations Inside H-GAC

S.No.	First Leg (TAZ ID)	Potential Freight Destinations
1	2664	1. The Dow Chemical Company
		2. Integrated Industries
		3. Frontier Logistics
		4. Dragon La Porte
2	2693	1. Bayport Container Terminal
3	4554	1. Jindal Saw USA
		2. Katoen Natie
		3. Houston Raceway
4	2694	1. American Acryl LLP
		2. Bayport Polymers
		3. INEOS Styrolution America
5	2663	1. Lion King Truck Stop/ Americold

Second Leg Of The Trip - H-GAC vs Outside H-GAC

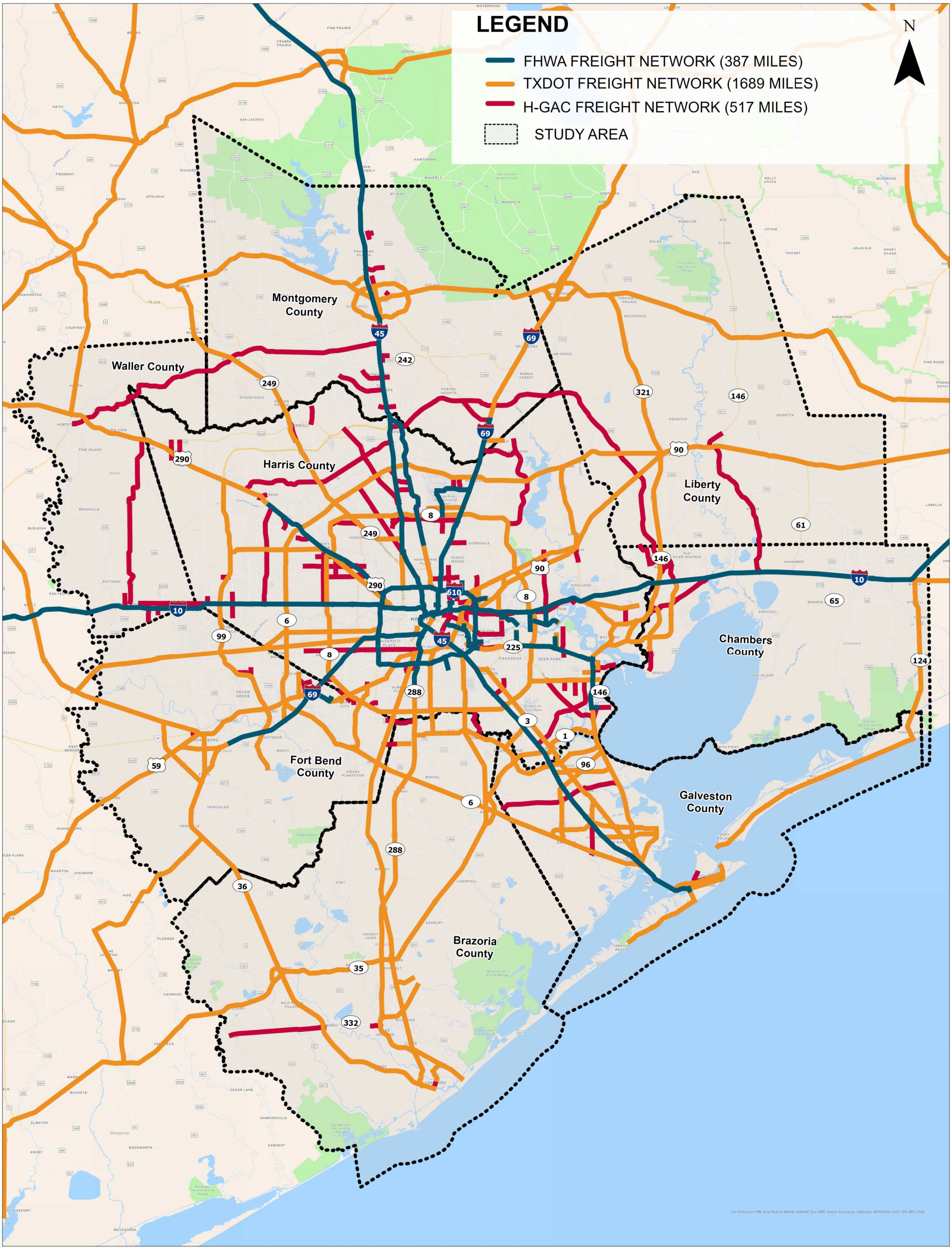
S.No.	TAZ	Total "Outflow" Trips	Trips To Inside H-GAC Region	% of Trips Inside H-GAC	Trips To Outside H-GAC Region	% of Trips Outside H-GAC
1	2664	16,424	12,557	76.5%	3,867	23.5%
2	2693	27,216	26,071	95.8%	1,145	4.2%
3	4554	32,864	26,916	81.9%	5,948	18.1%
4	2694	22,674	21,613	95.3%	1,061	4.7%
5	2663	8,056	6,729	83.5%	1,327	16.5%

Second Leg Of The Trip - Freight Destinations Inside H-GAC

S.No.	TAZ ID	Second Leg (TAZ ID)	Trips	% of Trips
1	2664	2660	3023.5	24.08%
		2663	602	4.79%
		2694	523.5	4.17%
		2691	502.5	4.00%
		2693	486	3.87%
2	2693	2691	2437.5	9.35%
		4554	1527	5.86%
		2660	1514	5.81%
		4564	1310	5.02%
		2694	1237.5	4.75%
		2646	952.5	3.65%
3	4554	4545	2096	7.79%
		4566	2092.5	7.77%
		2694	1413	5.25%
		4562	1165.5	4.33%
		2660	1123	4.17%
		2693	830	3.08%
4	2694	2693	10998.5	50.89%
		2691	1348.5	6.24%
		2660	964.5	4.46%
		4554	720.5	3.33%

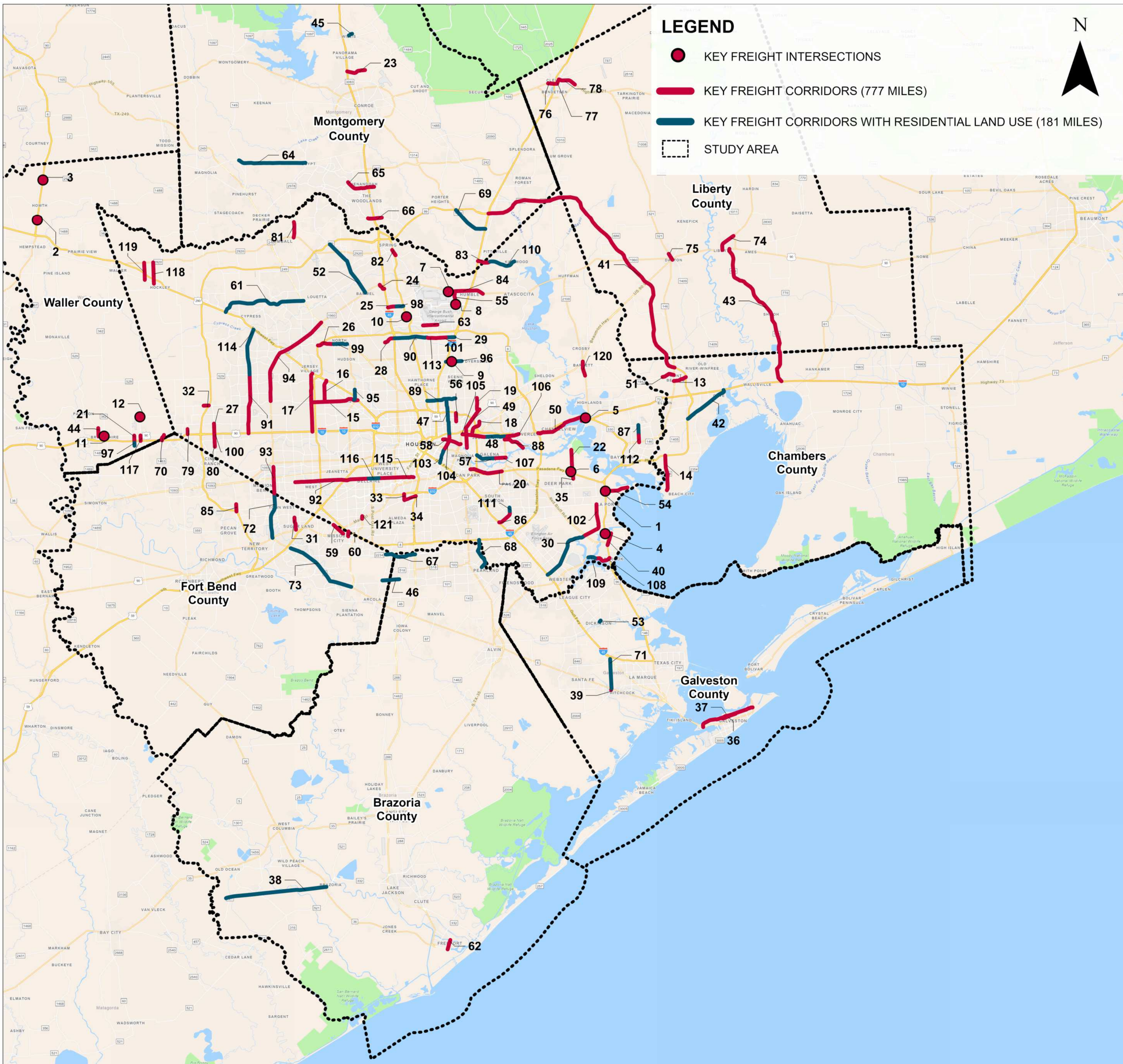
Appendix C

High Resolution Maps



Regional Goods Movement Plan

Freight Network Map



KEY ID	STREET	FROM	TO
1	SH 146	BARBOURS CUT BLVD	
2	SH 6	KELLEY RD	
3	SH 6	FM 2979	
4	PORT RD	RR CROSSING	
5	IH 10	SAN JACINTO RIVER	
6	SH 225	INDEPENDENCE PARKWAY	
7	FM 1960	LEE RD	
8	KENSWICK DR	WILL CLAYTON PARKWAY	
9	MT HOUSTON RD	UNION PACIFIC RR	
10	RANKIN RD	UNION PACIFIC RR	
11	FM 359	FM 362	
12	MORTON RD	FM 2855	
13	N FM 565	SH 146	SH 99
14	FM 1405	SH 99	FM 2354
15	CLAY RD.	US 290	BRITTMORE RD.
16	S GESSNER RD.	US 290	CLAY RD.
17	BRITTMOORE RD.	IH 10	US 290
18	GELLHORN DR.	MARKET ST.	WALLISVILLE RD.
19	MESA DR.	WALLISVILLE RD.	LIBERTY RD.
20	LAWNDALE AVE.	S RICHEY ST.	BROADWAY ST.
21	IGLOO RD.	US 90A	MILLER RD.
22	INDEPENDENCE PKWY	SH 225	VOPAK DRIVEWAY
23	LEAGUE LINE RD.	IH 45	POLLOK DR.
24	CYPRESS STATION DR.	IH 45	CYPRESS CREEK PARKWAY
25	E AIRTEX DR.	IH 45	HARDY TOLL RD.
26	FALLBROOK DR.	BW 8	FAIRBANKS NORTH HOUSTON RD.
27	N MASON RD.	IH 10	FRANZ RD.
28	FALLBROOK DR.	IH 45	ELLA BLVD.
29	ALDINE BENDER RD.	VICKERY DR.	EASTEX FREEWAY
30	BAY AREA BLVD.	IH 45	RED BLUFF RD.
31	INDUSTRIAL BLVD.	W AIRPORT BLVD.	US 90A
32	CLAY RD.	SH 99	AMAZON DRIVEWAY
33	FANNIN ST.	IH 610	HOLMES RD.
34	HOLMES RD.	SH 288	FANNIN ST.
35	OLD UNDERWOOD RD.	SH 225	E X ST.
36	HARBORSIDE DR.	IH 45	FERRY RD. N
37	OLD PORT INDUSTRIAL RD.	PELICAN ISLAND CAUSEWAY	HARBORSIDE DR.
38	CR 334	CR 322	SH 36
39	FM 2004	NEVILLE RD.	N OF HIGHLAND BAYOU AND SH 6
40	OLD SH 146	PORT RD.	SH 146
41	GRAND PARKWAY (SH 99) (SECTIONS H & I)	SH 146	US 59
42	FM 565	SH 99	IH 10
43	FM 563	IH-10	US-90A
44	FM 1489	US 90	FM 359
45	FM 1097 E	SH 75 (DANVILLE ST.)	PADDOCK ST.

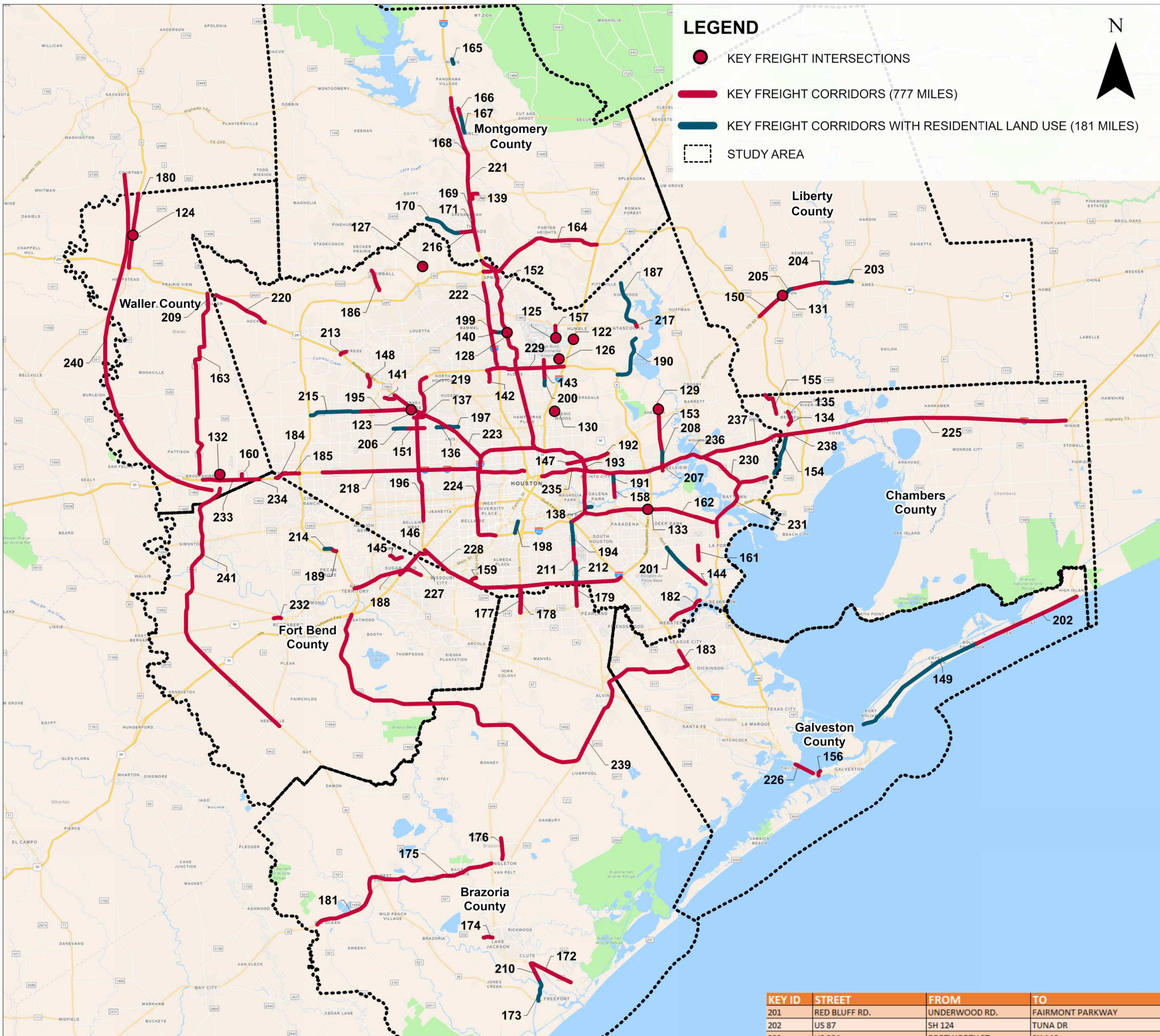
KEY ID	STREET	FROM	TO
46	CR 59	FM 521	OLD AIRLINE RD.
47	LOCKWOOD DR.	SONORA ST.	E CROSSTIMBERS ST.
48	MARKET ST.	OATES RD.	SHEFFIELD BLVD.
49	McCARTY ST	BEAUMONT RD.	CLINTON RD.
50	MARKET ST.	IH 10	KIRBY INLAND MARINE OPER CENTER
51	FM 1942	HATCHERVILLE RD.	SH 146
52	KUYKENDAHL RD.	CYPRESS CREEK PARKWAY	SH 99
53	FM 517	FM 1266 (DICKINSON AVE.)	DOCKRELL ST.
54	BARBOUR'S CUT BLVD.	SH 146	PORT TERMINAL
55	KENSWICK DR.	FM 1960	WILL CLAYTON PARKWAY
56	HOMESTEAD RD.	IH 610	LIBERTY RD.
57	CLINTON DR.	IH 610	CROWN ST.
58	CLINTON DR.	N WAYSIDE DR.	HIRSCH RD.
59	CRAVENS RD.	S GESSNER RD.	BUFFALO LAKES DR.
60	FONDREN RD.	BW 8	WILLOW OAK DR.
61	LOUETTA RD.	IH 45	SH 249
62	FM 1495	N OF BRAZOS RIVER	SH 36
63	GREENS RD.	JFK BLVD	ALDINE WESTFIELD RD.
64	FM 1488	FM 149	HONEA EGYPT ROAD
65	RESEARCH FOREST DR.	SHADOWBEND PI	JOHNSON RD
66	SAWDUST RD.	GROGANS MILL RD	LAZY LN
67	FM 2234	SH 288	WEST DR.
68	PEARLAND PARKWAY	BW 8	FM 518
69	FM 1314	SH 99	US 59
70	CANE ISLAND PARKWAY	US 90	IH 10
71	FM 2094	IH 45	SH 6
72	SH 6	FORTBEND C/L	US 90A
73	SH 6	LEXINGTON BLVD,	FORT BEND PARKWAY TOLL RD.
74	N MAIN ST.	US 90 A	SH 146 BYPASS
75	N CLEVELAND ST	W LINNEY ST.	US 90A
76	SH 105	FM 1725	FM 573
77	FM 573	W SOUTHLINE ST.	W HOUSTON ST.
78	SH 321	S WASHINGTON AVE.	SH 105
79	KATY FORT BEND RD.	COLONIAL PARKWAY	IH 10
80	S MASON RD.	IH 10	ROCK CANYON DR.
81	HUFSMITH KOHRVILLE RD.	FM 2920	HUFSMITH RD.
82	ALDINE WESTFIELD RD.	HARDY TOLL RD.	CYPRESSWOOD DR.
83	KINGWOOD DR.	US 59	LADBROOK DR
84	FM 1960	LEE RD.	BF 1960
85	HARLEM RD.	GRAND PARKWAY	AMAZON DRIVEWAY
86	S SHAVER ST.	IH 45	PARLIAMENT DR.
87	N MAIN ST.	MASSEY TOMPKINS RD	CEDAR BAYOU LYNCHBURG RD.
88	INDUSTRIAL RD.	FONDREN RD.	PORT OF HOUSTON
89	E CROSSTIMBERS ST.	HARDY TOLL RD.	HEMPSTEAD RD.
90	ALDINE BENDER RD.	IH 45	MIRANDA ST.

KEY ID	STREET	FROM	TO
91	BARKER CYPRESS RD.	FM 529	IH 10
92	BELLAIRE BLVD.	DAIRY ASHFORD RD.	S RICE AVE.
93	SH 6	RICHMOND AVE.	HARRIS C/L
94	SH 6	SH 249	CLAY RD
95	BINGLE RD.	W TIDWELL RD.	CLAY RD.
96	MT. HOUSTON RD.	US 59	SUBURBAN RD.
97	IGLOO RD.	W MILLER RD.	KINGSLAND BLVD.
98	E AIRTEX DR.	IMPERIAL GREEN DR.	HARDY TOLL RD.
99	FALLBROOK DR.	FAIRBANKS NORTH HOUSTON RD.	SH 249
100	N MASON RD.	IH 10	COLONIAL PKWY.
101	ALDINE BENDER RD.	JFK BLVD.	VICKERY DR.
102	BAY AREA BLVD.	RED BLUFF RD.	FAIRMONT PARKWAY
103	LOCKWOOD DR.	IH 45	NAVIGATION BLVD.
104	LOCKWOOD DR.	SONORA ST.	NAVIGATION BLVD.
105	MARKET ST.	OATES DR.	N WAYSIDE DR.
106	MARKET ST.	IH 10	SHEFFIELD BLVD.
107	CLINTON DR.	CROWN ST.	FEDERAL RD.
108	NASA RD	LAKESHORE DR.	SH 146
109	NASA RD	SH 3	LAKESHORE DR.
110	KINGWOOD DR.	LADBROOK DR	W LAKE HOUSTON PKWY
111	S SHAVER ST.	IH 45	EDGEBROOK DR.
112	N MAIN ST.	SH 146	MASSEY TOMPKINS RD.
113	ALDINE BENDER RD.	MIRANDA ST.	JFK BLVD.
114	BARKER CYPRESS RD.	HEMPSTEAD RD.	IH 10
115	BELLAIRE BLVD.	MULBERRY LN.	ALAMEDA RD.
116	BELLAIRE BLVD.	S RICE AVE.	MULBERRY LN.
117	FM 2855	US 90	IH 10
118	KERMIER RD.	FM 2920	HEMPSTEAD RD.
119	KICKAPOO RD.	FM 2920	HEMPSTEAD RD.
120	CROSBY LYNCHBURG RD.	US 90	S OF FLOYD
121	CHIMNEY ROCK RD	MAIN ST.	W AIRPORT BLVD.

0 4 8 16 Miles

Regional Goods Movement Plan

Recommendations for Future Regional Transportation Plan (RTP) - 1



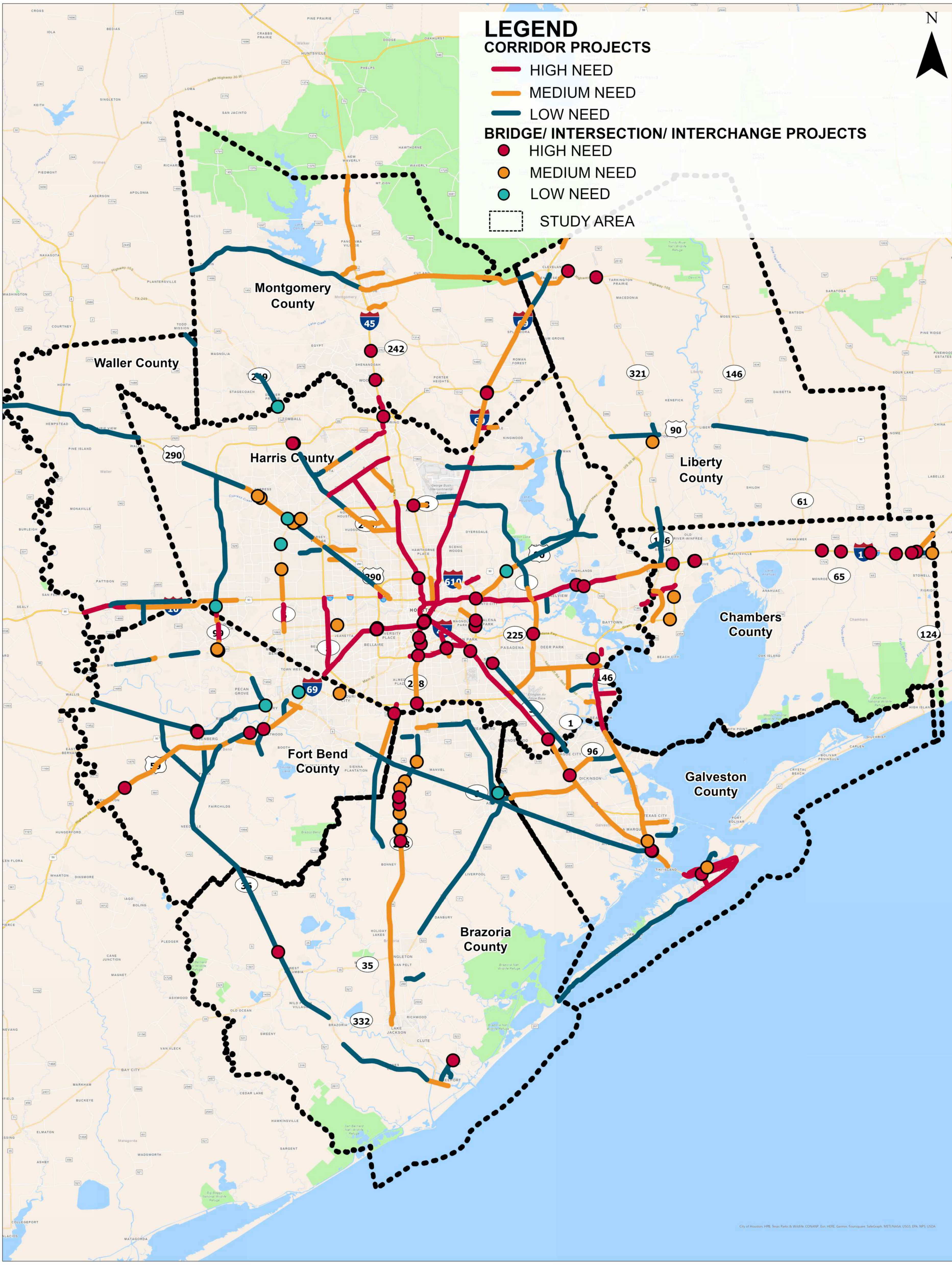
KEY ID	STREET	FROM	TO
122	IH 69	WILL CLAYTON PARKWAY	
123	FM 529	GOLDEN GATE DR	
124	SH 6	FM 1736	
125	LEE RD	WILL CLAYTON PARKWAY	
126	LEE RD	GREENS RD	
127	KUYKENDAHL RD	UNION PACIFIC RR	
128	E RICHEY RD	UNION PACIFIC RR	
129	SHELDON RD	UNION PACIFIC RR	
130	LITTLE YORK RD	UNION PACIFIC RR	
131	WACO ST	UNION PACIFIC RR	
132	WOODS RD	UNION PACIFIC RR	
133	SH 225	BW 8	
134	MAIN ST.	SH 146	N FM 565
135	MAIN ST.	N FM 565	SH 146
136	W TIDWELL RD.	HEMPSTEAD RD.	US 290
137	W LITTLE YORK RD.	US 290	BRITTMORE RD.
138	MANCHESTER ST.	IH 610	97TH ST.
139	TRADE CENTER PARKWAY	SH 242	DONWICK DR.
140	E RICHEY RD.	WOODHAM DR.	HARDY TOLL RD.
141	WEST RD.	US 290	JACKRABBIT RD.
142	ELLA BLVD.	BW 8	COCA COLA DRIVEWAY
143	JFK BLVD.	BW 8	CYPRESS KNEE LN.
144	RED BLUFF RD.	UNDERWOOD RD.	KIRBY BLVD.
145	W AIRPORT BLVD.	ELDRIDGE RD.	DAIRY ASHFORD RD.
146	W BELLFORT AVE.	IH 69	BW 8
147	WALLISVILLE RD.	IH 610	HARBOR ST.
148	TELGE RD.	US 290	TUCKERTON DR.
149	US 87	TUNA DR	FERRY TERMINAL
150	US 90A	SH 99	SH 146
151	TANNER RD.	BRITTMOORE PARK	TRIWAY LN.
152	HARDY TOLL RD.	IH 45	IH 610
153	SHELDON RD.	S OF SHELDON RIDGE	JACINTOPORT BLVD.
154	SH 146	FERRY RD.	IH 10
155	HATCHERVILLE RD.	FM 1942	CHAMBERS / LIBERTY COUNTY LINE
156	SH 275 (HARBORSIDE DR)	IH 45 S	77th ST
157	LEE RD.	FM 1960	WILL CLAYTON PARKWAY
158	FEDERAL RD.	CLINTON DR.	INDUSTRIAL RD.
159	W FUQUA ST.	BW 8	S POST OAK RD.
160	PEDERSON RD.	IH 10	US 90A

KEY ID	STREET	FROM	TO
161	BAY PARK RD.	W FAIRMONT PARKWAY	AVE D
162	SH 225	IH 610	SH 146
163	FM 362	ORANGE AVE.	FM 359
164	SH 99	IH 45	IH 69
165	SH 75	W ROGERS ST.	E POWELL ST
166	SH 75	TEAS RD	LOOP 336
167	SH 75	LOOP 336	SH 105
168	IH 45 SBFR	GLADSTELL ST.	LOOP 336
169	IH 45 SBFR	SH 242	RESEARCH FOREST DR
170	WOODLANDS PKWY	IH 45	KUYKENDAHL RD.
171	IH 45 SBFR	LAKE WOODLANDS DR	WOODLANDS PKWY
172	SH 332	SH 288	FREEPORT LNG FACILITY
173	SH 288	VICTORIA ST.	SH 36
174	SH 332	SH 288	FM 2004
175	SH 35	SH 288	SH 36
176	SH 288 BU	FM 523	ANCHOR RD.
177	SH 288 SBFR	BW 8	FM 518
178	SH 288 NBFR	BW 8	FM 518
179	TELEPHONE RD	BW 8	FM 518
180	SH 6	US 290	WALLER C/L
181	SH 35	SH 36	SH 35 BR
182	NASA RD	SH 3	SH 146
183	IH 45 SBFR	LEAGUE CITY PKWY	FM 646
184	IH 10 WBFR	POST OAK RD	KATY FORT BEND RD.
185	IH 10 EBFR	SH 99	HIGHWAY BLVD.
186	SH 249	TOMBALL TOLLWAY N	TOMBALL TOLLWAY S
187	W LAKE HOUSTON PKWY.	NORTHPARK DR.	S OF WILD VIOLET DR.
188	US 90A	SH 99	MURPHY RD.
189	W BELLFORT ST.	OXFORD CHASE TRL.	HARLEM RD.
190	W LAKE HOUSTON PKWY.	BW 8	WILL CLAYTON PKWY.
191	FONDREN RD.	IH 10	CAIN CIR.
192	WALLISVILLE RD.	IH 610	US 90
193	IH 610 SBFR	N McCARTY ST.	IH 10
194	TELEPHONE RD.	AIRPORT BLVD.	IH 610
195	FM 529	QUEENSTON BLVD.	US 290
196	BW 8 (INCL. FRONTAGE RD)	W LITTLE YORK RD.	BELLAIRE BLVD.
197	W TIDWELL RD.	US 290	BINGLE RD.
198	ALMEDA RD.	US 90	IH 610
199	E RICHEY RD.	IH 45	WOODHAM DR.
200	JFK BLVD.	CYPRESS KNEE LN.	LAUDER RD.

KEY ID	STREET	FROM	TO
201	RED BLUFF RD.	UNDERWOOD RD.	FAIRMONT PARKWAY
202	US 87	SH 124	TUNA DR
203	US 90A	FORTWORTH ST.	SH 146
204	US 90A	FORTHWORTH ST.	S COLBERT ST.
205	US 90A	SH 146	S COLBERT ST.
206	TANNER RD.	N ELDRIDGE PARKWAY	BRITTMOORE PARK
207	SHELDON RD.	RIDLON ST.	JACINTOPORT BLVD.
208	SHELDON RD.	ASHLAND BLVD.	JACINTOPORT BLVD.
209	FM 362	US 290	ORANGE AVE.
210	SH 288	SH 332	VICTORIA ST.
211	TELEPHONE RD	ALMEDA GENOA RD	AIRPORT BLVD.
212	TELEPHONE RD	ALMEDA GENOA RD.	BW 8
213	SPRING CYPRESS RD.	HEMPSTEAD RD.	SKINNER RD.
214	W BELLFORT ST.	MASON RD.	OXFORD CHASE TRL.
215	FM 529	SH 99	QUEENSTON BLVD.
216	WOODLANDS PKWY	IH 45	GROGANS MILL RD.
217	W LAKE HOUSTON PKWY.	FM 1960	S OF WILD VIOLET DR.
218	IH 10	N WESTGREEN BLVD.	IH 45
219	BW8	US 290	GESSNER RD.
220	US 290	FIELDS STORE RD.	
221	IH 45	LEAGUE LINE RD.	RAYFORD RD.
222	IH 45	SPRING CYPRESS RD.	GREENS RD.
223	US 290	ELDRIDGE PKWY.	IH 610
224	IH 610	BROADWAY ST.	S MAIN ST.
225	IH 10	SH 99	SH 73
226	IH 45	N OF CAUSEWAY	S OF CAUSEWAY
227	IH 69	W BELLFORT AVE.	SUGAR CREEK BLVD.
228	BW 8	IH 69	IH 45
229	BW 8	IH 69	ELLA BLVD.
230	SH 330	IH 10	SH 146
231	SH 146	W MAIN ST.	CEDAR BAYOU RD.
232	US 90A W	SH 36	ALDI DRIVEWAY
233	IH 10	FM 359	FORT BEND COUNTY LINE
234	IH 10	CANE ISLAND PKWY	WALLER COUNTY LINE
235	IH 10	IH 69	BW 8
236	IH 10	BW 8	SS 330
237	IH 10	SS 330	CHAMBERS COUNTY LINE
238	IH 10	HARRIS COUNTY LINE	SH 99
239	SH 99	IH 69	IH 45
240	SH 36A N	IH 10 W	US 290
241	SH 36A S	IH 10 W	US 290

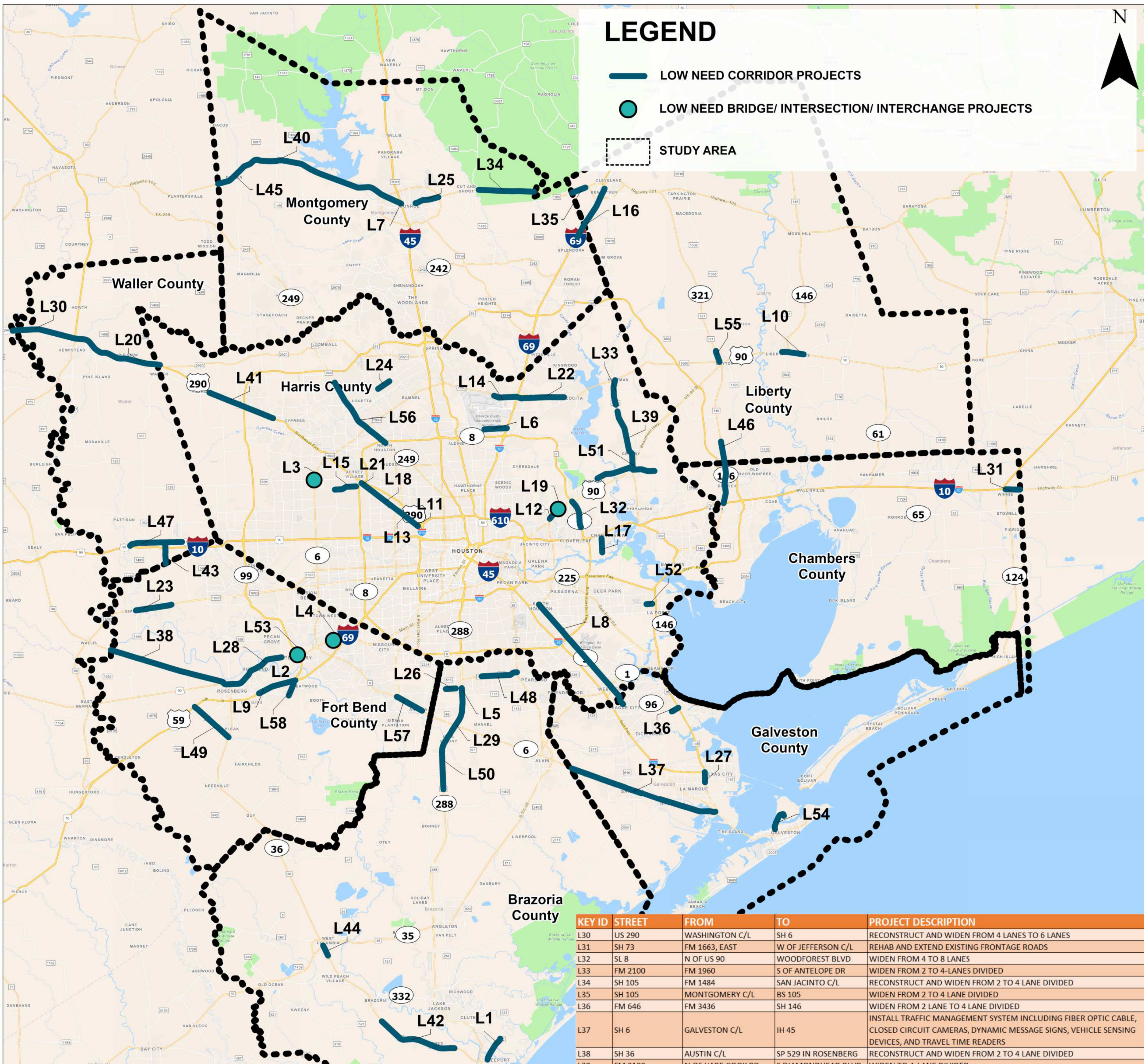
0 4 8 16 Miles

Regional Goods Movement Plan
Recommendations for Future Regional Transportation Plan (RTP) - 2



Regional Goods Movement Plan

RTP 2045 Projects on Freight Network



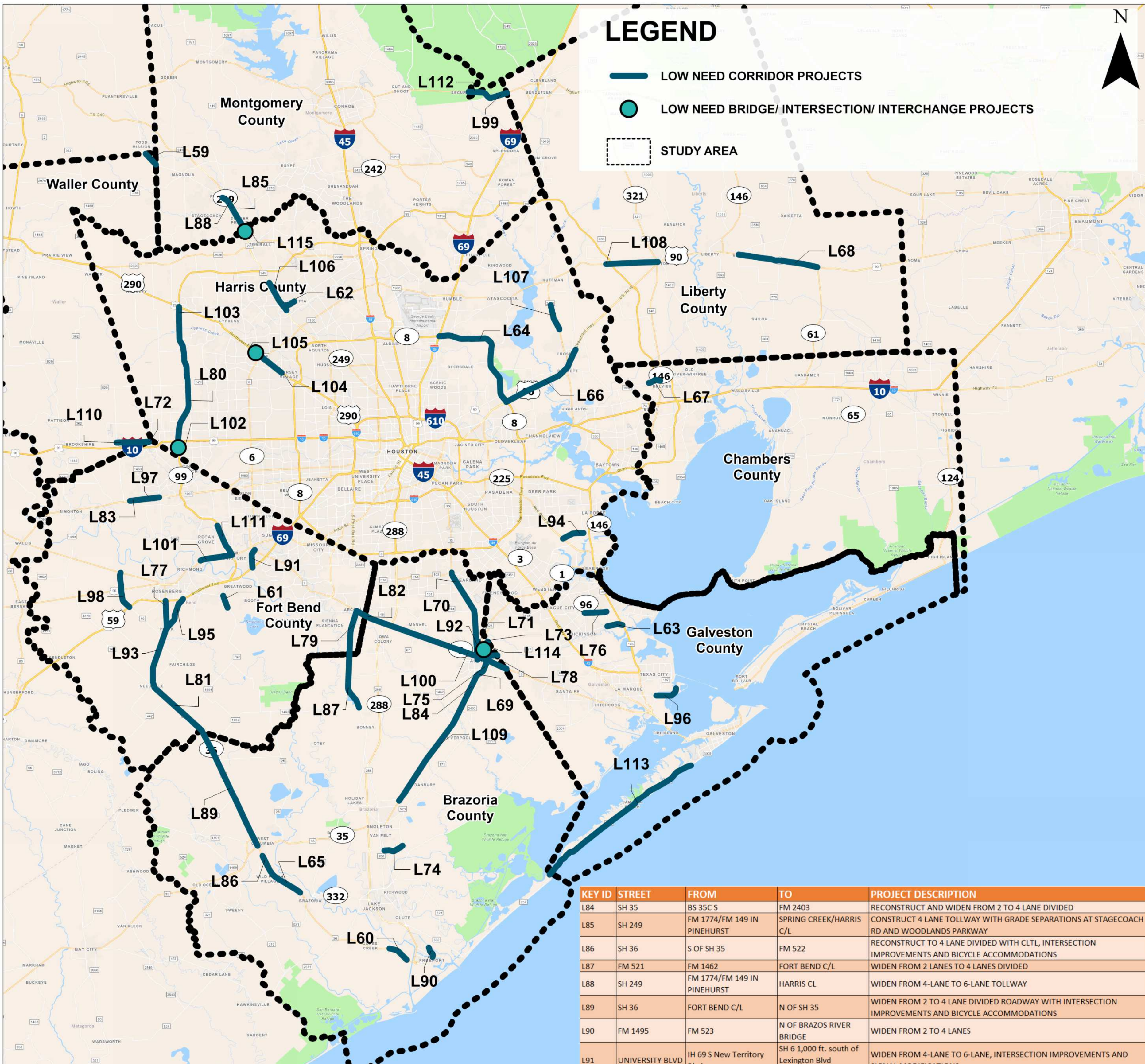
KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L1	FM 523	SH 332	S OF FM 1495	WIDEN FROM 2 TO 4 LANE DIVIDED URBAN
L2	US 59 S	0.42 MI W OF FM 762	0.31 MI W OF FM 2759	WIDEN TO 8 MAINLANES WITH HOV LANES, FRONTAGE ROADS, ITS & TMS
L3	SH 6	AT FM 529		INTERSECTION IMPROVEMENTS
L4	ELDRIDGE RD	AT US 90A		UNDERPASS AT US 90A AND ELDRIDGE RD
L5	SH 288	CR 59	SH 6	WIDEN FROM 4 TO 6 MAIN LANES
L6	GREENS RD	JFK BLVD	IH 69	RECONSTRUCT AND WIDEN FROM 2 LANE TO 4-LANES DIVIDED
L7	SH 105	LP 336 W	IH 45 N	ACCESS MANAGEMENT TREATMENTS
L8	SH 3	RICHEY ST S	FM 518	MILL AND ASPHALT OVERLAY OF SHOULDERS, SHOULDER WIDENING, PAVEMENT MARKINGS, STRIPING AND SIGNAGE FOR BIKE FACILITY
L9	IH 69 S	E of SS 529	SH 99	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L10	US 90	FM 563	FM 160	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY
L11	HEMPSTEAD RD	MANGUM	43RD ST/CLAY RD	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)
L12	US 90	W OF GREENS BAYOU	E OF GREENS BAYOU	CONSTRUCT 6 MAIN LANES ON NEW LOCATION
L13	HEMPSTEAD RD	MANGUM	43RD ST/CLAY RD	CONSTRUCT 4 MANAGED LANES WITH DC (NB - EB) TO SL 8 (TOLL)
L14	BF 1960A	FM 1960 W OF LEE RD	FM 1960 E OF HUMBLE CITY LIMITS	WIDEN FROM 2 TO 4 LANES DIVIDED
L15	LITTLE YORK RD W	ELDRIDGE PKWY N	BRITTMORE RD	WIDEN FROM 4 TO 6-LANES
L16	US 59	S END OF CLEVELAND BY-PASS	MONTGOMERY C/L	RECONSTRUCT AND WIDEN TO 6 MAIN LANES WITH FRONTAGE ROADS
L17	SHELDON RD	MARKET ST	JACINTO PORT BLVD	CONSTRUCT 5 LANE DIVIDED ROADWAY AND WIDEN TO 5 LANE ROADWAY IN SECTIONS.
L18	HEMPSTEAD RD	GESSNER RD	43RD ST/CLAY RD	CONSTRUCT 4 MANAGED LANES (TOLL)
L19	US 90	W OF PURPLE SAGE	E OF PURPLE SAGE	CONSTRUCT 6 MAIN LANES ON NEW LOCATION
L20	US 290	SH 6	HARRIS C/L (FM 2920/FM 362)	WIDEN FROM 4 LANES TO 6 LANES
L21	HEMPSTEAD RD	43RD ST/CLAY RD	W OF SL 8	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)
L22	FM 1960	BF 1960A	E OF TWIGSWORTH LN	WIDEN FROM 4-LANE TO 6-LANE DIVIDED WITH RAISED MEDIAN, CHANNELIZED TURN LANES
L23	FM 1093	FM 1489	FM 359 IN FULSHEAR	RECONSTRUCT AND WIDEN EXISTING PAVEMENT FROM 2-LANE TO 4-LANE DIVIDED
L24	LOUETTA RD	STEUBNER AIRLINE RD	T.C. JESTER BLVD	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT W/DITCHES
L25	SH 105	10TH ST	SL 336	WIDEN FROM 2 TO 4 LANE DIVIDED
L26	CR 59	CR 48	KIRBY DR	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED.
L27	SH 146	FM 1764	FM 1765	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES
L28	US 90A	BAMORE RD	HARLEM RD	ACCESS MANAGEMENT TREATMENTS INCLUDE CONSTRUCTION OF NEW INTERSECTION, INSTALLATION OF RAISED MEDIANS, DRIVEWAY MODIFICATIONS, ADDITION, EXTENSION AND CLOSURE OF TURN LANES, TRAFFIC SIGNAL INSTALLATION AND TRAFFIC SIGNAL TIMING OPTIMIZATION.
L29	IH 610 S	SH 35 (SS 5/MYKAWA RD)	SH 288	RECONSTRUCT FREEWAY INCLUDING TSM IMPROVEMENTS

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L30	US 290	WASHINGTON C/L	SH 6	RECONSTRUCT AND WIDEN FROM 4 LANES TO 6 LANES
L31	SH 73	FM 1663, EAST	W OF JEFFERSON C/L	REHAB AND EXTEND EXISTING FRONTAGE ROADS
L32	SL 8	N OF US 90	WOODFOREST BLVD	WIDEN FROM 4 TO 8 LANES
L33	FM 2100	FM 1960	S OF ANTELOPE DR	WIDEN FROM 2 TO 4-LANES DIVIDED
L34	SH 105	FM 1484	SAN JACINTO C/L	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L35	SH 105	MONTGOMERY C/L	BS 105	WIDEN FROM 2 TO 4 LANE DIVIDED
L36	FM 646	FM 3436	SH 146	WIDEN FROM 2 LANE TO 4 LANE DIVIDED
L37	SH 6	GALVESTON C/L	IH 45	INSTALL TRAFFIC MANAGEMENT SYSTEM INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS
L38	SH 36	AUSTIN C/L	SP 529 IN ROSENBERG	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L39	FM 2100	N OF HARE COOK RD	S DIAMONDHEAD BLVD	WIDEN TO 4-LANE DIVIDED
L40	SH 105	IH 45	FM 1486	INSTALLATION OF FIBER OPTIC CABLE IN MONTGOMERY COUNTY ON SH 105 FROM FOSTORIA ROAD TO FM 1486.
L41	US 290	MUESCHKE RD TO WASHINGTON C/L	AND SH 6 FROM US 290 TO GRIMES C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L42	SH 36	S OF CITY OF BRAZORIA	S OF JONES CREEK BRIDGE	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY AND GRADE SEPARATION AT FM 2004
L43	WOODS RD	US 90	IH 10	WIDEN FROM 2 TO 4 LANES
L44	SH 36	SH 35	S OF SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4 LANES
L45	SH 105	GRIMES C/L	FM 149	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES DIVIDED
L46	SH 146	IH 10 E	LYNCHBURG CANAL	RECONSTRUCT SH 146 FROM IH 10 TO LYNCHBURG CANAL IN CHAMBERS COUNTY. ACCESS MANAGEMENT TREATMENTS INCLUDE RAISED MEDIANS WITH TURN LANES, SIDEWALK, AND STREETSCAPE IMPROVEMENTS.
L47	US 90	IH 10	FM 2855	WIDEN FROM 2 LANES TO 4 LANES
L48	FM 518	FM 865	SH 35	WIDEN FROM 4 LANE TO 6 LANE
L49	SS 10	IH 69	SH 36 S	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SPUR 10 FROM US 59 (IH-69) TO SH 36, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN FORT BEND COUNTY.
L50	SH 288	CR 58	SH 99	CONSTRUCT 4 TOLL LANES WITH GRADE SEPARATIONS
L51	BS 90, FM 1942, FM 2100	VA	VA	INSTALLATION OF FIBER OPTIC CABLE IN HARRIS COUNTY ON BUSINESS 90, FM 1942, AND FM 2100 IN THE FOLLOWING LOCATIONS: BUSINESS 90 FROM SHELDON RD TO FM 2100; FM 1942 FROM US 90 TO INDIAN SHORES RD; FM 2100 FROM US 90 TO BOHEMIAN HALL RD.
L52	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
L53	US 90A	AT SH 99		CONSTRUCT GRADE SEPARATION AND INTERSECTION IMPROVEMENTS
L54	PELICAN ISLAND BRIDGE	SH 275	SEAWOLF PKWY	CONSTRUCT BRIDGE AT NEW LOCATION
L55	WACO ST	SH 321	FM 1960	CONSTRUCT 3 LANE ROADWAY WITH CLTL, SIDEWALK ON EAST SIDE AND STORM SEWER IMPROVEMENTS
L56	SH 249	BOUDREAUX DR	HOLLISTER DR	CONSTRUCT NEW TWO-WAY, ALL-DAY HOV FACILITY
L57	SH 6	FORT BEND PARKWAY TOLLWAY	BRAZORIA C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L58	FM 2759	S OF SANBURY BLVD	FM 762/FM 2759 ON CRABB RIVER RD	WIDEN TO 4-LANES DIVIDED (SEGMENT 2)

0 4 8 16 Miles

Regional Goods Movement Plan

RTP 2045 Low Need Projects - 1



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L59	FM 1774	GRIMES C/L	MONTGOMERY C/ L	WIDEN TO 4-LANE DIVIDED RURAL
L60	SH 36	S OF JONES CREEK BRIDGE	N OF BRAZOS RIVER DIVERSION CHANNEL	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES
L61	FM 762	FM 762/FM 2759	S OF LCISD SCHOOL ON CRABB RIVER RD	WIDEN TO 4-LANES DIVIDED (SEGMENT 2)
L62	LOUETTA RD	SH 249	MEMORIAL CHASE	WIDEN 4-LANE BLVD TO 6-LANE BLVD
L63	FM 517	FM 3436	SH 146	WIDEN FROM 2 TO 4 LANES DIVIDED WITH CURB AND GUTTER
L64	SL 8	IH 69	US 90	WIDEN FROM 6 TO 8-LANES
L65	SH 36	SH 35	N OF SH 332	WIDEN FROM 2 TO 4 LANES DIVIDED
L66	US 90	SL 8 E	RUNNEBURG	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON US 90 FROM BELTWAY 8 TO RUNNEBURG ROAD, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN HARRIS COUNTY.
L67	FM 1942	HATCHERVILLE RD	SH 146	INSTALLATION OF FIBER OPTIC COMMUNICATIONS CABLE FOR REAL TIME TRAFFIC MONITORING, SIGNAL ADJUSTMENTS, AND CONGESTION MANAGEMENT
L68	US 90	FM 160	SH 61	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY
L69	SH 99	S OF FM 1462	GALVESTON C/L	SEG B: CONSTRUCT 4 LANE TOLLWAY WITH INTERCHANGES AND TWO NON-CONTINUOUS 2 LANE FRONTAGE ROADS
L70	SH 35	FM 518	S OF SH 6	WIDEN FROM 4 TO 6 LANE DIVIDED
L71	SH 35	BS 35C NORTH	SH 99	CONSTRUCT 4 LANE FREEWAY ON NEW LOCATION
L72	US 90	Waller C/L	FM 1463	WIDEN FROM A 2 LANES TO 4 LANES
L73	SH 35	BS 35 C N (NORTH GORDON ST)	STEELE RD	CONSTRUCT 4 MAIN LANES AND OVERPASSES
L74	CR 220	SH 288	FM 523	WIDEN EXISTING ROADWAY TO 4 LANES (PHASE 2)
L75	SH 35	SH 99	BS 35C SOUTH	CONSTRUCT 4 LANE FREEWAY ON NEW LOCATION
L76	FM 646	FM 1266	FM 3436	WIDEN FROM 2 LANE TO 4 LANE DIVIDED
L77	SH 36	IH 69 S	FM 2218	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED
L78	FM 517	GALVESTON C/L	SH 35	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES
L79	FM 521	BRAZORIA C/L	SH 6	WIDEN FROM 2 LANES TO 4 LANES DIVIDED
L80	SH 99 SEG E	WEST RD	IH 10 W	SEG E: WIDEN EXISTING 4 LANE TOLL FACILITY TO 6 LANE TOLL FACILITY TO MITIGATE CONGESTION AND SUPPORT OPERATIONAL EFFICIENCY
L81	SH 36	S OF NEEDVILLE FAIRCHILDS RD	BRAZORIA C/L	WIDEN FROM 2 LANE TO 4 LANE DIVIDED
L82	SH 6	FORT BEND C/L	SH 288	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
L83	FM 359	W of Texas Heritage Pkwy	W of FM 723	CONSTRUCT NEW 4-LANES TOLLWAY

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
L84	SH 35	BS 35C S	FM 2403	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L85	SH 249	FM 1774/FM 149 IN PINEHURST	SPRING CREEK/HARRIS C/L	CONSTRUCT 4 LANE TOLLWAY WITH GRADE SEPARATIONS AT STAGECOACH RD AND WOODLANDS PARKWAY
L86	SH 36	S OF SH 35	FM 522	RECONSTRUCT TO 4 LANE DIVIDED WITH CLTL, INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS
L87	FM 521	FM 1462	FORT BEND C/L	WIDEN FROM 2 LANES TO 4 LANES DIVIDED
L88	SH 249	FM 1774/FM 149 IN PINEHURST	HARRIS CL	WIDEN FROM 4-LANE TO 6-LANE TOLLWAY
L89	SH 36	FORT BEND C/L	N OF SH 35	WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY WITH INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS
L90	FM 1495	FM 523	N OF BRAZOS RIVER BRIDGE	WIDEN FROM 2 TO 4 LANES
L91	UNIVERSITY BLVD	IH 69 S New Territory Blvd	SH 6 1,000 ft. south of Lexington Blvd (Wentorth Ave)	WIDEN FROM 4-LANE TO 6-LANE, INTERSECTION IMPROVEMENTS AND SIGNAL MODIFICATIONS
L92	FM 528	BS 35	SH 35 BYPASS	WIDEN FROM 2 TO 4 LANES
L93	SH 36	FM 2218	S OF NEEDVILLE FAIRCHILDS RD	WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY WITH INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS
L94	CHOATE RD	RED BLUFF RD	BAY AREA BLVD	DESIGN, ACQUIRE ROW & CONSTRUCT 4-LANE DIVIDED ROADWAY INCLUDING DRAINAGE AND SIGNALS
L95	FM 2218	US 59	SH 36	WIDEN FROM 2 LANES TO 4-LANE DIVIDED
L96	SHOAL POINT ACCESS RD	LP 197	SOUTHERN END TERMINAL SITE	CONSTRUCT NEW 4 LANE ROADWAY
L97	FM 1093	FM 1463/FM 359	W OF FM 723	CONSTRUCT 4 TOLL LANES
L98	SS 10	IH 69/US 59	SH 36	WIDEN FROM 2- LANES TO 4-LANES DIVIDED
L99	SH 105	SAN JACINTO C/L	LIBERTY C/L	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L100	SH 6	SH 288	GALVESTON C/L	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SH 6 FROM SH 288 TO GALVESTON COUNTY LINE, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN BRAZORIA COUNTY.
L101	US 90A	FM 359	SH 99	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES DIVIDED (PHASE 2 OF 3)
L102	SH 99	AT PEEK RD		RECONSTRUCTION OF OVERPASS. INSTALL TRAFFIC SIGNALS FOR AT-GRADE PORTION OF INTERSECTION AND RECONFIGURE EXISTING ENTRANCE AND EXIT RAMPS FOR SH 99
L103	SH 99 SEG E	US 290	WEST RD	SEG E: WIDEN EXISTING 4 LANE TOLL FACILITY TO 6 LANE TOLL FACILITY TO MITIGATE CONGESTION AND SUPPORT OPERATIONAL EFFICIENCY
L104	HEMPSTEAD RD	W OF HUFFMEISTER	JONES RD	CONSTRUCT 4 MANAGED LANES
L105	US 290	S OF TELGE	S OF SH 6	CONSTRUCT TWO 2-LANES DIRECT CONNECTORS (EB US 290 TO EB HEMPSTEAD MANAGED LANES AND WB HEMPSTEAD MANAGED LANES) TO WB US 290) (THESE ARE TWO PARALLEL FACILITIES)
L106	SH 249	S OF CHASEWOOD PARK DR	N OF GREGSON RD	RESTRIPE EXISTING PAVEMENT FROM 6 TO 8 LANES
L107	FM 2100	S OF ANTELOPE DR	N OF HARE COOK RD	WIDEN TO 4-LANE DIVIDED
L108	FM 1960	SH 321	SH 99	WIDEN ROADWAY FROM 2 LANES TO 4 LANES
L109	SH 35	FM 2403	FM 523	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
L110	US 90	FM 2855	FORT BEND C/L	WIDEN FROM 2 LANES TO 4 LANES
L111	SH 99	AIRPORT BLVD W	FM 1464	WIDEN SH 99 FROM 2 TO 4 LANES
L112	SH 105	MONTGOMERY C/L	MONTGOMERY C/L	*INFORMATION ONLY* WIDEN FROM 2 TO 4 LANE DIVIDED
L113	FM 3005	SAN LUIS PASS	W END OF GALVESTON SEAWALL	INSTALL CROSS CULVERTS, DRIVEWAY ADJUSTMENTS, OVERLAY AND STRIPING (PHASE 2)
L114	SH 99	SH 35		CONSTRUCT 2 DIRECT CONNECTORS (TOLL)
L115	FM 2978	AT SPRING CREEK		REPLACE BRIDGE AND APPROACHES

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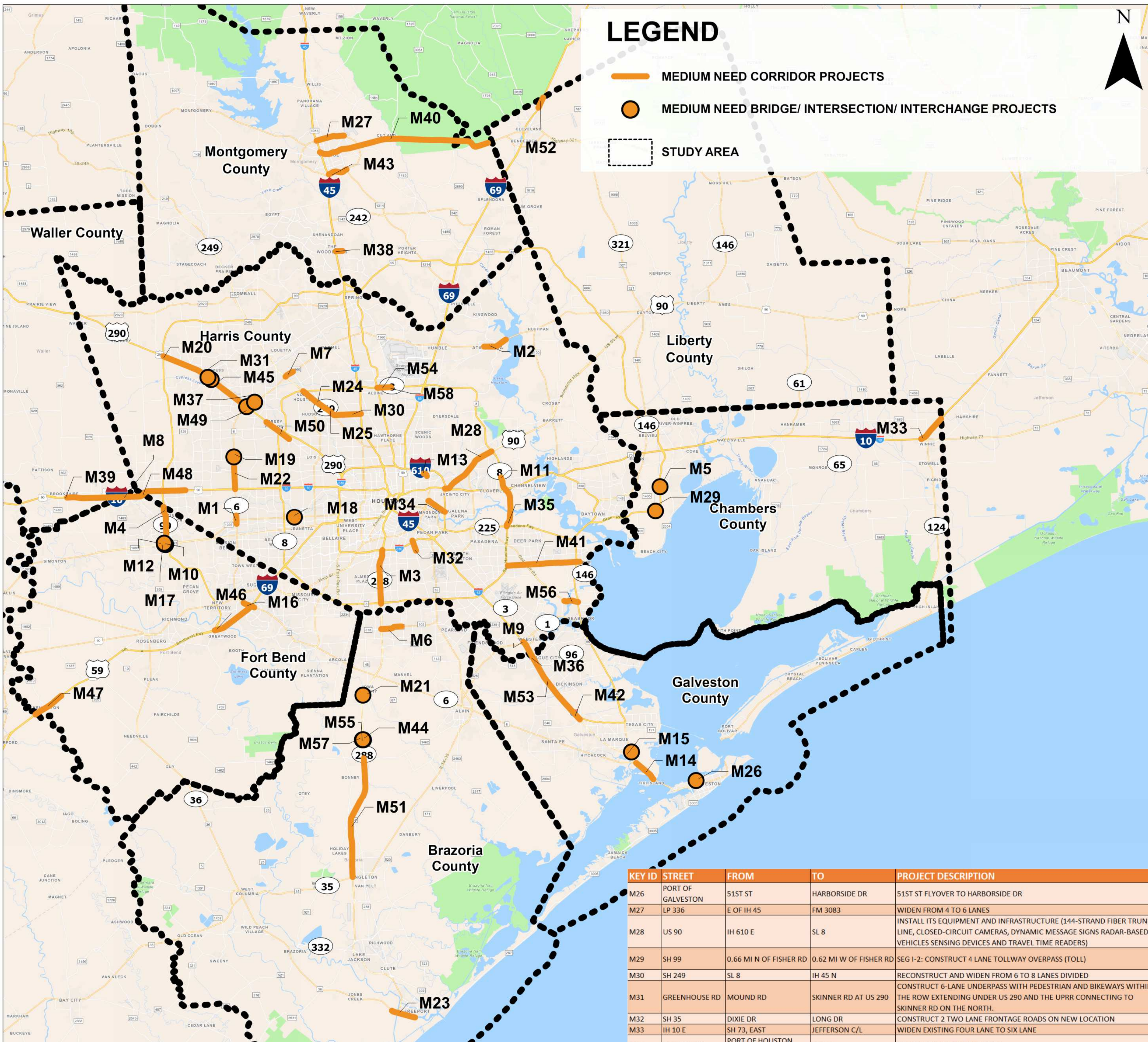
Regional Goods Movement Plan

RTP 2045 Low Need Projects - 2



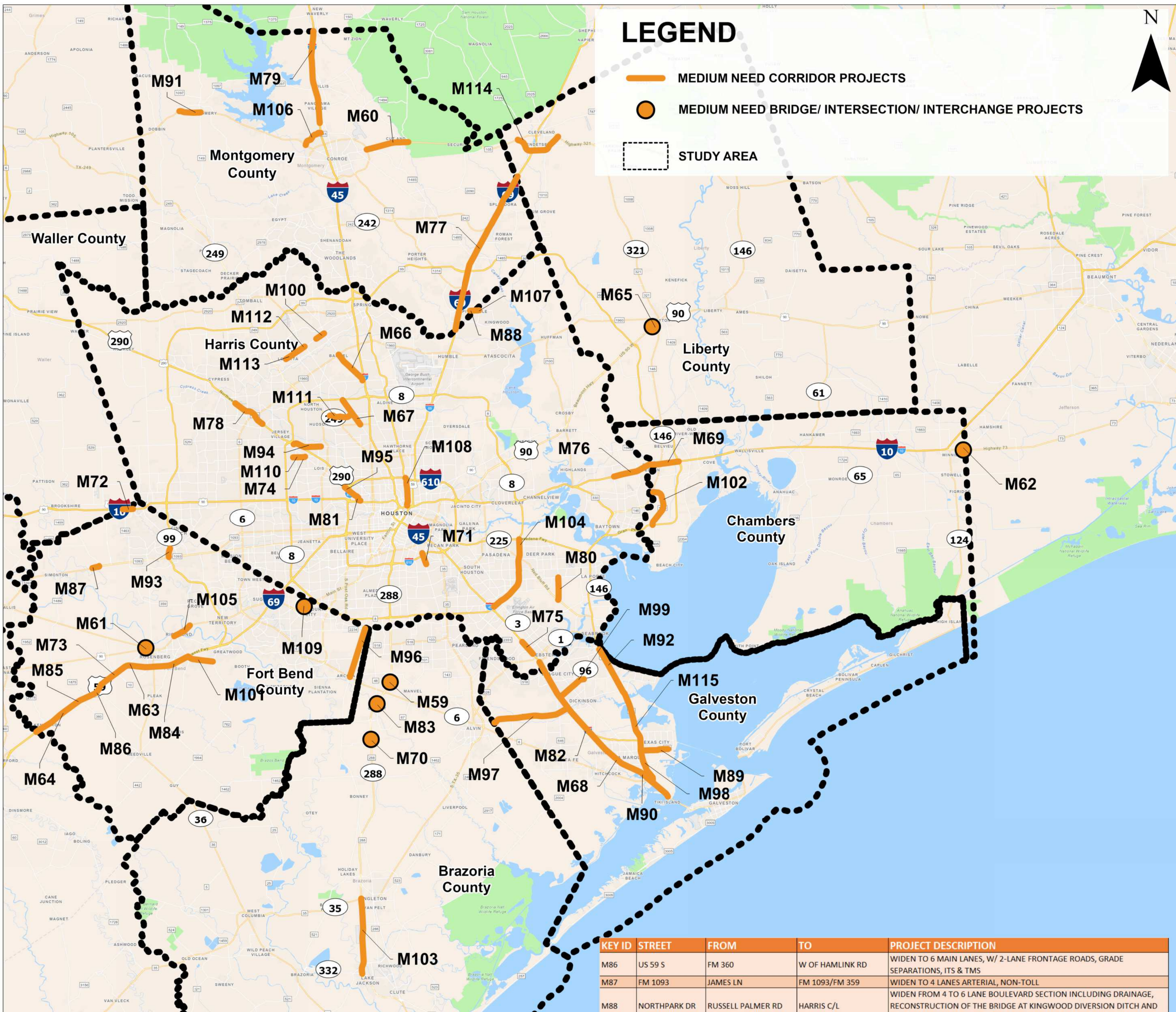
KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M1	SH 6	PIPING ROCK LN	RICHMOND AVE	WIDEN FROM 6 LANES TO 8 LANES
M2	FM 1960	E OF TWIGSWORTH LN	W OF SAN JACINTO RIVER BRIDGE	WIDEN FROM 4 TO 6 LANES AND CONSTRUCT 4 LANE OVERPASS AT THE WEST LAKE HOUSTON PKWY
M3	SH 288	IH 610	SL 8	RECONSTRUCT AND WIDEN FROM 6 MAIN LANES TO 8 MAIN LANES
M4	SH 99	HARRIS COUNTY LINE	TO FM 1093	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES (SEG D)
M5	SH 99	AT FUTURE THOROUGHFARE A		SEG I-2: RECONSTRUCT 4 MAIN LANES (TOLL) AS OVERPASS AT FUTURE THOROUGHFARE A (EW4) AND ASSOCIATED APPROACHES
M6	FM 518	SH 288	FM 865	RECONSTRUCT AND WIDEN FROM 4 AND 6 LANES TO 6 LANES DIVIDED
M7	FM 1960	SH 249	CUTTEN RD	INTERSECTION IMPROVEMENTS (RECONSTRUCT ROADWAY TO ADD TURNING LANES AND PEDESTRIAN AND BICYCLE ACCOMMODATIONS)
M8	IH 10 W	WESTGREEN	FM 359	EXTENSION OF 2-LANE HOV FACILITY
M9	IH 45 S	S OF NASA 1 BYPASS	GALVESTON C/L	WIDEN TO 10 MAIN LANES, TWO 3-LANE FRONTAGE ROADS AND ACCESS INTO TWO DIAMOND LANES
M10	SH 99	AT FM 1093/WPT	NULL	SEG D: CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (WB-NB, NB-EB)
M11	SL 8	WOODFOREST BLVD	S OF IH 10 E	WIDEN FROM 6 TO 8 LANES (RE-STRIPE EXISTING PAVEMENT)
M12	SH 99	AT FM 1093 (WESTPARK TOLLWAY) INTERCHANGE		SEG D: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB,WB-SB,NB-WB,EB-SB)
M13	CALVALCADE RD	HOMESTEAD RD	LIBERTY RD	ROADWAY EXTENSION OF 4-LANES
M14	IH 45	S OF TEXAS CITY WYE	N OF CAUSEWAY	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES, RECONSTRUCT TWO 2-LANE FRONTAGE ROADS (FROM S OF TEXAS CITY WYE TO N OF BNSF RR) AND CONSTRUCT FRONTAGE ROADS (FROM N OF BNSF RR TO N OF CAUSEEWAY)
M15	SH 146	FM 519	SL 197	RECONSTRUCT SH 146 RR OVERPASS AND WIDEN FROM 2 TO 4 LANES
M16	SH 6	N OF BROOKS ST	LEXINGTON BLVD	WIDEN FROM 6 TO 8-LANES
M17	FM 1093	AT SH 99	NULL	WESTPARK TOLL ROAD EB-NB DIRECT CONNECTOR CONSTRUCTION
M18	GESSNER DR S	AT WESTHEIMER RD		CONSTRUCT GRADE SEPARATION OVER WESTHEIMER RD
M19	SH 6	AT CLAY RD		GRADE SEPARATION AND INTERSECTION IMPROVEMENTS
M20	HEMPSTEAD RD	SH 99	W OF HUFFMEISTER RD	CONSTRUCT 4 MANAGED LANES
M21	SH 288	AT CR 57	NULL	CONSTRUCT GRADE SEPARATION
M22	SH 6	CLAY RD	IH 10 W	CORRIDOR FEASIBILITY STUDY
M23	SH 36	S OF BRAZOS RIVER	FM 1495	WIDEN FROM 2 TO 4 LANES (SEG 15)
M24	SH 249	SL 8	IH 45 N	ACCESS MANAGEMENT TREATMENTS
M25	SH 249	SL 8	IH 45 N	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M26	PORT OF GALVESTON	51ST ST	HARBORSIDE DR	51ST ST FLYOVER TO HARBORSIDE DR
M27	LP 336	E OF IH 45	FM 3083	WIDEN FROM 4 TO 6 LANES
M28	US 90	IH 610 E	SL 8	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)
M29	SH 99	0.66 MI N OF FISHER RD	0.62 MI W OF FISHER RD	SEG I-2: CONSTRUCT 4 LANE TOLLWAY OVERPASS (TOLL)
M30	SH 249	SL 8	IH 45 N	RECONSTRUCT AND WIDEN FROM 6 TO 8 LANES DIVIDED
M31	GREENHOUSE RD	MOUND RD	SKINNER RD AT US 290	CONSTRUCT 6-LANE UNDERPASS WITH PEDESTRIAN AND BIKEWAYS WITHIN THE ROW EXTENDING UNDER US 290 AND THE UPRR CONNECTING TO SKINNER RD ON THE NORTH.
M32	SH 35	DIXIE DR	LONG DR	CONSTRUCT 2 TWO LANE FRONTAGE ROADS ON NEW LOCATION
M33	IH 10 E	SH 73, EAST	JEFFERSON C/L	WIDEN EXISTING FOUR LANE TO SIX LANE
M34	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE
M35	SL 8	IH 10	SH 225	WIDEN FROM 4 TO 8-LANES INCLUDING BRIDGE ACROSS HOUSTON SHIP CHANNEL
M36	IH 45 S	HARRIS C/L	S OF FM 518	WIDEN TO 10 MAIN LANES AND TWO 3-LANE FRONTAGE ROADS
M37	FM 1960	AT ELDRIDGE PKWY	NULL	INTERSECTION IMPROVEMENTS AND APPROACHES TO ADD RAISED MEDIAN, DUAL LEFT AND RIGHT TURN LANES AND BICYCLE/PEDESTRIAN ACCOMMODATIONS
M38	ROBINSON RD	IH 45	EASTERN CITY LIMIT	WIDEN TO 4-LANE UNDIVIDED WITH REALIGNMENT
M39	IH 10 W	FM 359	FORT BEND C/L	WIDEN FROM 6 TO 8 MAINLANES AND RECONSTRUCT BOTH 2-LANE FRONTAGE ROADS
M40	SH 105	FOSTORIA ROAD	FM 1486	INSTALLATION OF FIBER OPTIC CABLE IN MONTGOMERY COUNTY ON SH 105 FROM FOSTORIA ROAD TO FM 1486.
M41	FAIRMONT PKWY	SL 8	7TH ST	CONSTRUCT GEOMETRIC IMPROVEMENTS AND ITS/TRAFFIC SIGNAL IMPROVEMENTS (VEHICLE DETECTION, REAL TIME TRAFFIC MONITORING, BATTERY BACKUP AND INTERCONNECT) AT 14 INTERSECTIONS
M42	IH 45	S OF FM 1764	N OF FM 517	RECONSTRUCT AND WIDEN TO 8 MAIN LANES AND TWO 2-LANE FRONTAGE ROADS
M43	SL 336	FM 1314	IH 45	WIDEN FROM 2-LANES TO 4-LANES DIVIDED ROADWAY
M44	SH 99			SEG B: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)
M45	US 290	AT CYPRESS P&R		CONSTRUCT RAMP PROVIDING ACCESS TO THE US 290 HOV/HOT FACILITY
M46	US 90A	SH 99	W OF SH 6	WIDEN FROM 6 LANES TO 8 LANES DIVIDED
M47	US 59 S	WHARTON COUNTY LINE	W OF DARST RD	WIDEN TO 6-MAIN LANES, W/ 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS
M48	IH 10 W	W OF SNAKE CREEK	FORT BEND / HARRIS COUNTY LINE	RECONSTRUCT AND WIDEN FROM 6 TO 10 LANES (ADD 2 MANAGED LANES AND 2 GENERAL PURPOSE LANES)
M49	SH 6	S OF HEMPSTEAD TOLL ROAD	US 290	RECONSTRUCT US 290/SH 6 INTERCHANGE
M50	HEMPSTEAD RD	JONES RD	GESSNER RD	CONSTRUCT 4 MANAGED LANES WITH DC (NB - EB) TO SL 8 (TOLL)
M51	SH 288	FM 1462	SH 35	WIDEN FROM 4 TO 6 LANES
M52	US 59 N	SAN JACINTO C/L	0.65 MI S OF SL 573	CONVERT MAINLANES TO FREEWAY AND CONSTRUCT TWO 2 LANE FRONTAGE ROADS
M53	IH 45 S	S OF FM 518	N OF FM 517	WIDEN TO 8 MAIN LANES AND RECONSTRUCT EXISTING 2-LANE FRONTAGE ROADS
M54	SL 8	E OF HARDY TOLL ROAD	E OF ALDINE-WESTFIELD RD	RECONSTRUCT AND WIDEN EB AND WB FRONTAGE ROADS FROM 4 TO 6 LANES
M55	SH 288	CR 60	NULL	CONSTRUCT GRADE SEPARATION
M56	RED BLUFF RD	KIRBY BLVD	SH 146	WIDEN FROM 2 TO 4-LANE DIVIDED ROADWAY INCLUDING BRIDGE ACROSS TAYLOR LAKE AND PEDESTRIAN AND BICYCLE ACCOMMODATIONS.
M57	SH 99	SH 288		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)
M58	SL 8	W OF ALDINE WESTFIELD RD	E OF ALDINE WESTFIELD RD	RESTRIPE WESTBOUND MAIN LANES FROM 3 TO 4 LANES

0 4 8 16 Miles

Regional Goods Movement Plan

RTP 2045 Medium Need Projects - 1



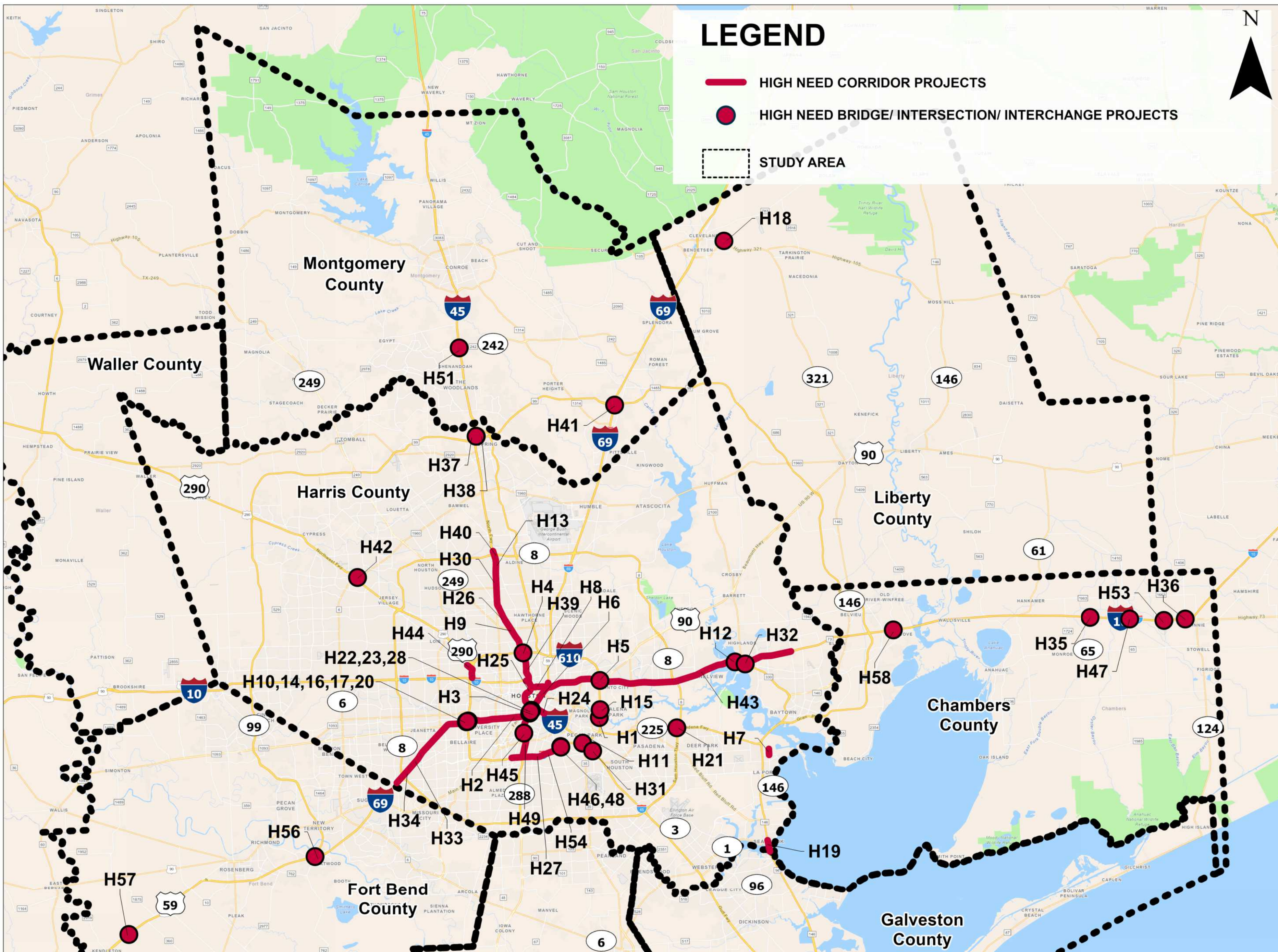
KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M59	SH 288	RODEO PALMS PKWY	SH 6	CONSTRUCT GRADE SEPARATION AND NEW 2-LANE FRONTAGE ROADS.
M60	SH 105	LP 336	FM 1484	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED
M61	SH 36	AT UP RR IN ROSENBERG		REPLACE RAILROAD UNDERPASS
M62	SH 73	W OF JEFFERSON C/L	JEFFERSON C/L	GRADE SEPARATION AND CLOSE CROSSOVER
M63	US 59 S	SP 10	W OF SH 36	WIDEN TO 6-LANE RURAL FREEWAY, FRONTAGE ROADS, ITS & TMS
M64	US 59	Wharton C/L	E of SS 529	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
M65	US 90	AT UP RAILROAD		CONSTRUCT GRADE SEPARATIONS AT UP RAILROAD TRACKS
M66	KUYKENDAHL RD	FM 1960	RANKIN RD	WIDEN FROM 4 TO 6 LANE BLVD
M67	VETERANS MEMORIAL DR	SL 8	SH 249	WIDEN FROM 4 LANE TO 6 LANE ROADWAY
M68	IH 45	S OF FM 1764	N OF FM 519	WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT BOTH 2 LANE FRONTAGE ROADS
M69	IH 10 E	HARRIS COUNTY LINE	SH 99	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)
M70	SH 288	CR 63	NULL	CONSTRUCT GRADE SEPARATION
M71	SH 35 (Spur 5)	DIXIE DR	N of GRIGGS RD	CONSTRUCT 8 LANE FREEWAY ON NEW LOCATION
M72	IH 10 W	WALLER C/L	W OF SNAKE CREEK	RECONSTRUCT AND WIDEN FROM 6 TO 10 LANE (ADD 2 MANAGED LANES AND 2 GENERAL PURPOSE LANES)
M73	US 59 S	W OF SP 10	W OF HAMLINK RD	WIDEN TO 6-MAIN LANES, GRADE SEPARATIONS, 2-LANE FRONTAGE ROADS, ITS & TMS
M74	TANNER RD	CAMPBELL RD	TRIWAY LN	WIDEN TO 4-LANE DIVIDED ROAD WITH CURBS AND SIDEWALKS AND NECESSARY UNDERGROUND UTILITIES
M75	IH 45 S	0.4808 MI S OF ELDORADO BLVD	S OF MEDICAL CENTER BLVD	WIDEN AND RECONSTRUCT TO 10 MAIN LANES, TWO 3-LANE FRONTAGE ROADS AND 1 HOV REVERSIBLE LANE
M76	IH 10 E	GARTH RD	CHAMBERS CO LINE	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)
M77	IH 69 N	LIBERTY C/L	HARRIS C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
M78	US 290	E OF TELGE RD	W OF ELDRIDGE PKWY	RECONSTRUCT AND WIDEN TO 8 MAIN LANES WITH 3 REVERSIBLE MANAGED LANES AND TWO 2-LANE FRONTAGE ROADS (SEGMENT 8)
M79	IH 45	WALKER C/L	LEAGUE LINE RD	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
M80	UNDERWOOD RD	FAIRMONT PKWY	RED BLUFF	DESIGN, ACQUIRE ROW AND CONSTRUCT 6-LANE ROADWAY, INCLUDING DRAINAGE AND SIGNALS AT UNDERWOOD
M81	HEMPSTEAD RD & WASHINGTON AVE	W OF 12TH ST	E OF WASHINGTON AVE/KATY RD SPLIT	CONSTRUCT 6-LANE DIVIDED URBAN ST FACILITY W/ AUTOMATIC PUMP STATION AND RR LINE W/ UNDERPASS (PHASE 2)
M82	IH 45 S	NASA 1 BYPASS	S OF SH 146	CONSTRUCT TWO-WAY DIAMOND LANES
M83	SH 288	AT CR 48	NULL	CONSTRUCT GRADE SEPARATION
M84	US 59 S	W OF SH 36	W OF FM 762	WIDEN TO 6-LANE RURAL FREEWAY, FRONTAGE ROADS, ITS & TMS WITH GRADE SEPARATION
M85	US 59 S	W OF DARST RD	FM 360	WIDEN TO 6 MAIN LANE FREEWAY WITH 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
M86	US 59 S	FM 360	W OF HAMLINK RD	WIDEN TO 6 MAIN LANES, W/ 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS
M87	FM 1093	JAMES LN	FM 1093/FM 359	WIDEN TO 4 LANES ARTERIAL, NON-TOLL
M88	NORTHPARK DR	RUSSELL PALMER RD	HARRIS C/L	WIDEN FROM 4 TO 6 LANE BOULEVARD SECTION INCLUDING DRAINAGE, RECONSTRUCTION OF THE BRIDGE AT KINGWOOD DIVERSION DITCH AND SIGNALIZED INTERSECTION AT RUSSELL PALMER DRIVE
M89	5TH/4TH AVE	SH 146	LP 197	RECONSTRUCT TWO WAY ROADWAY TO A ONE WAY EASTBOUND FACILITY
M90	IH 45 S	N OF FM 519	N OF TEXAS CITY WYE	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT TWO 2 LANE FRONTAGE ROADS
M91	SH 105	GRIMES C/L	FM 149	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES DIVIDED
M92	SH 146	FM 518	DICKINSON BAYOU	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES WITH GRADE SEPARATION AT SH 96
M93	SH 99	S FRY ROAD	FM 1093	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
M94	LITTLE YORK RD W	US 290	HOUSTON CITY LIMITS	WIDEN 4 TO 6-LANES
M95	HEMPSTEAD RD	IH 610	MANGUM RD	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)
M96	FM 521	SH 6	FM 2234	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES WITH RAISED MEDIANS, INTERSECTION IMPROVEMENTS, SIGNAL IMPROVEMENTS AND PEDESTRIAN ACCESS
M97	FM 517	FM 646	BRAZORIA C/L	RECONSTRUCT AND WIDEN FROM 2 LANES TO 4 LANES AND ACCESS MANAGEMENT TREATMENTS
M98	SH 146	FM 1765	GALVESTON WYE	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES
M99	FM 646	EDMUNDS WAY	FM 1266	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY WITH RAISED MEDIAN AND RAILROAD OVERPASS
M100	LOUETTA RD	T. C. JESTER	KUYKENDAHL	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT
M101	FM 762	US 59	CRABB RIVER RD	WIDEN 2-LANE TO 4-LANE DIVIDED
M102	FM 1405	SH 146	SH 99	WIDEN FROM 2 TO 4 LANES DIVIDED WITH MEDIAN OPENINGS FOR TURNAROUNDS
M103	SH 288	SH 35	SH 332	WIDEN FROM 4 TO 6 LANES
M104	BW 8	SH 225	IH 45	WIDEN FROM 4 TO 8-MAIN LANES IN SECTIONS
M105	US 90A	LP 762	FM 359	WIDEN FROM 4 TO 6-LANES DIVIDED (PHASE 3 OF 3)
M106	FM 3083	SH 105	IH 45	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES
M107	NORTHPARK DR	MONTGOMERY C/L	WOODLANDS HILL DR	WIDEN FROM 4 TO 6 LANE BOULEVARD SECTION INCLUDING DRAINAGE, RECONSTRUCTION OF THE BRIDGE AT BEN'S BRANCH, A PEDESTRIAN TUNNEL AT GLADE VALLEY DRIVE AND A SIGNALIZED INTERSECTION AT WOODLANDS HILL DRIVE
M108	HARDY TOLL RD	IH 610	IH 69	CONSTRUCT 4-LANE TOLL ROAD TO COMPLETE HARDY TOLL" ROAD"
M109	FM 2234	N OF US 90A	S OF US 90A	CONSTRUCT INTERSECTION IMPROVEMENTS
M110	TANNER RD	TRIWAY LN	HEMPSTEAD	WIDEN FROM 2 LANES TO 4-LANE DIVIDED
M111	WEST RD	SH 249	VETERANS MEMORIAL	CONSTRUCT NEW 4-LANE DIVIDED
M112	LOUETTA RD	CHAMPION FOREST	STUEBNER AIRLINE	WIDEN FROM 4 TO 6 LANE ASPHALT, DITCHES, W/ CENTER TURN LANE
M113	LOUETTA RD	OLD LOUETTA RD	CHAMPION FOREST	WIDEN FROM 4 LANE TO 6-LANE ASPHALT, DITCHES, W/ CENTER TURN LANE
M114	SH 105 BYPASS	SH 105 W OF CLEVELAND	SH 321 E OF CLEVELAND	WIDEN FROM 2 TO 4 LANES
M115	SH 146	IH 45	SH 96	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SH 146 FROM IH-45 TO SH 96, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN GALVESTON COUNTY.

0 4 8 16 Miles

Regional Goods Movement Plan

RTP 2045 Medium Need Projects - 2



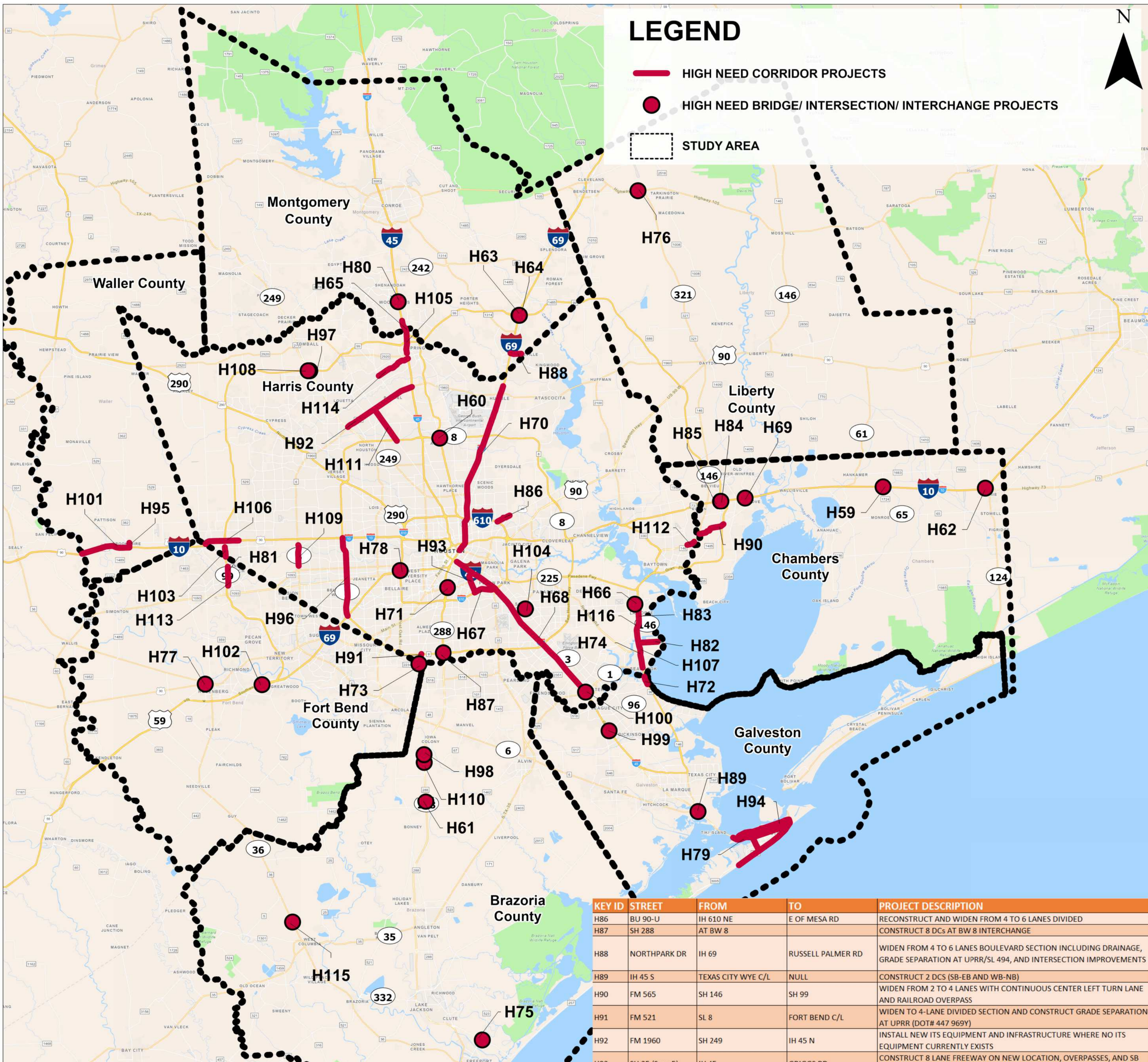
KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H1	IH 610 E	AT SHIP CHANNEL (BUFFALO BAYOU)		RECONSTRUCT AND RAISE SHIP CHANNEL BRIDGE
H2	IH 69 S	SH 288	SP 527	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES (NHHIP SEG 3A)
H3	IH 69 S	IH 45	SH 288	RECONSTRUCT AND WIDEN FROM 8 TO 10 MAIN LANES AND RECONSTRUCT IH 69/SH 288 INTERCHANGE (NHHIP SEG 3B)
H4	IH 45 N	AT IH 610		RECONSTRUCT INTERCHANGE (NHHIP SEG 2)
H5	IH 610	AT IH 10 E (NB - EB) DC RAMP		RECONSTRUCT AND WIDEN NB-EB DIRECT CONNECTOR RAMP FROM 1 LANE TO 2 LANES
H6	IH 45	AT IH 69/IH 10		RECONSTRUCT IH45/IH10/IH69 INTERCHANGES. IH10 REALIGN/RECONSTRUCT 8 MAINLANES (ML) FROM W. OF MAIN ST. TO WACO ST.; CONSTRUCT 4 IH10 EXPRESS LANES FROM W. OF MAIN ST. TO W. OF WACO ST.; REALIGN/WIDEN IH45 FROM 6 TO 7 ML INCLUDING 3 LANES EB AND 4 LANES WB FROM S. OF RUNNELS ST. TO W. OF MAIN ST.; RECONSTRUCT IH-69 FROM 8 TO 8 ML FROM S. OF RUNNELS ST. TO N. OF LYONS AVE.
H7	BROADWAY ST	BARBOURS CUT BLVD	L ST N	WIDEN FROM 2 TO 4-LANES ROADWAY
H8	IH 45 N	AT IH 10		RECONSTRUCT IH-45/IH-10 INTERCHANGE. IH-10 REALIGN/WIDEN FROM 6 TO 8 MAINLANES (ML) FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; CONSTRUCT 4 IH-10 EXPRESS LANES FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; IH-45 REALIGN FROM 6 TO 6 ML INCLUDING 3 LANES NB AND 3 LANES SB (3 ML AND 1 AUX LANE) FROM QUITMAN STREET TO WEST OF MAIN STREET; IH-45 WIDENING FROM 1 TO 4 MANAGED LANES FROM QUITMAN STREET TO MILAM/TRAVIS STREETS
H9	IH 45 N	IH 610	TIDWELL RD	RECONSTRUCT AND WIDEN FROM 8 TO 12 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3-LANES FRONTAGE ROADS
H10	IH 610	IH 610 (NB)	AT IH 69 (STR #104)	CONSTRUCT DIRECT CONNECTOR (IH 610 NB TO IH 69 SB)
H11	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)
H12	IH 10 E	EAST OF MONMOUTH ST.	EAST OF SS 330	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES AND CONSTRUCT 4 NEW NON-TOLLED MANAGED LANES
H13	IH 45 N	SL 8	DOWNTOWN	CONVERSION OF EXISTING ONE-WAY REVERSIBLE HOV LANE ON IH-45 NORTH FROM DOWNTOWN TO BW 8 TO TWO-WAY MANAGED LANE FACILITY
H14	IH 610	AT IH 69		RECONSTRUCTION OF IH 610 MAIN LANE BRIDGE WITHIN THE INTERCHANGE
H15	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE
H16	IH 610	AT IH 69 S		CONSTRUCT DIRECT CONNECTOR (IH 610 SB TO IH 69 EB/NB) AND HOV ACCESS TO UPTOWN TRANSIT CENTER
H17	IH 610	AT US 59		ROW AND UTILITIES FOR DIRECT CONNECTOR CONSTRUCTION (IH 610 SB TO US 59 EB/NB)
H18	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS
H19	SH 146	NASA RD 1	HARRIS/GALVESTON C/L	WIDEN TO 6-LANE ARTERIAL WITH 4-LANE EXPRESS LANES
H20	IH 610	IH 69 S NB (W OF IH 610)	SB IH 610 (BISSONNET RD)	RECONSTRUCT IH 69 NB (EB) TO SB IH 610 CONNECTOR
H21	SH 225	AT SL 8		CONSTRUCT 5 DIRECT CONNECTORS: PHASE 1 (NBWB, SBEB, WBNB, NBEB, SBWB)
H22	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H23	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H24	IH 45	AT IH 69 S		RECONSTRUCT IH45/IH69 INTERCHANGE. IH45 REALIGN/WIDEN FROM 6 TO 7 MAINLANES (ML)INCLUDING 3 ML NB AND 4 ML SB FROM SAUER ST. TO RUNNELS ST.; IH69 RECONSTRUCT FROM 8 TO 8 ML FROM W. OF PIERCE ST. TO S. OF RUNNEL ST. W/ 2, 3-LANE CONTINUOUS FRONTAGE ROADS.
H25	IH 45 S	IH 69	IH 10	CONSTRUCT PARKWAY CONNECTORS INTO DOWNTOWN HOUSTON AND REMOVE EXISTING PIERCE ELEVATED (NHHIP SEG 3D)
H26	IH 45 N	TIDWELL RD	S OF SHEPHERD DR	RECONSTRUCT MAIN LNS, CONSTRUCT 4 MANAGED LNS, AND RECONSTRUCT AND WIDEN FROM TWO 2-LN FRONTAGE RDS TO TWO 3-LN FRONTAGE RDS
H27	IH 610 S	SH 35 (SS 5/MYKAWA RD)	SH 288	RECONSTRUCT FREEWAY INCLUDING TSM IMPROVEMENTS

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H28	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)
H29	IH 45 S	IH 45 S	61ST ST/SH 342	61ST STREET FLYOVER/DIRECT CONNECTOR-FLYOVER FINAL DESIGN & CONSTRUCTION INCLUDES ONE LANE FLYOVER WITH SHOULDERS FROM 61ST ST NB TO IH 45 WB AND ONE FREE-FLOWING LANE AT-GRADE FROM IH 45 EB TO 61ST ST SB.
H30	IH 45 N	S OF SHEPHERD DR	S OF WEST RD	RECONSTRUCT/WIDEN FROM 8 TO 10 MAINLANES, RECONSTRUCT/WIDEN FROM 1 TO 4 MANAGED LANES; RECONSTRUCT/WIDEN FROM TWO, 2- AND 3-LANE FRONTAGE ROADS TO TWO, 2- AND 3-LANE FRONTAGE ROADS. (NHHIP SEG 1C)
H31	IH 45 S	AT BROADWAY		INTERSECTION IMPROVEMENTS
H32	IH 10 E	SPUR 330	THOMPSON RD	CONSTRUCT EAST BOUND ENTRANCE RAMP
H33	IH 69	SPUR 527	SL 8 S	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON IH69 FROM SPUR 527 TO BELTWAY 8, INCLUDING CLOSE CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, RAMP METERS, WEATHER STATIONS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN HARRIS COUNTY, TX.
H34	IH 69 S	SP 527	WEST BELLFORT BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE TO 2-LANES (ONE LANE IN EACH DIRECTION) HOV FACILITY
H35	IH 10 E	AT JENKINS RD		OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH-10 BRIDGE.
H36	IH 10 E	AT FM 1406		OVERPASS REVERSAL
H37	SH 99	AT IH 45 N		SEG G: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)
H38	SH 99	AT IH 45 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)
H39	IH 45 N	IH 610	IH 10	RECONSTRUCT AND WIDEN FROM 4 TO 5 MAIN LANES, CONSTRUCT 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LN FRS TO TWO 3-LN FRS (NHHIP SEG 2)
H40	IH 45	S OF WEST RD	N OF SL 8	RECONSTRUCT 8 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES TRANSITIONING INTO TWO ENTERING AND EXITING LANES AT REVERSIBLE HOV LANE NORTH OF SL8, AND RECONSTRUCT AND WIDEN FROM TWO 2 AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3- LANES FRONTA
H41	SH 99	AT IH 69 N		SEG G: CONSTRUCT 2 DCS (TOLL) (EB-SB, SB-WB)
H42	FM 1960	US 290	N OF ELDRIDGE PKWY	RECONSTRUCT US 290/FM 1960 INTERCHANGE
H43	IH 10 E	DOWNTOWN HOUSTON	GARTH RD	NEW 2-LANE HOV FACILITY ALONG IH 10 E
H44	HEMPSTEAD RD/IH 610	W OF MANGUM/18TH ST ON HEMPSTEAD	S OF OLD KATY RD ON IH 610	CONSTRUCT INTERCHANGE WITH MANAGED LANES AND 2 DIRECT CONNECTORS (EB - SB, WB - NB)
H45	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES
H46	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)
H47	IH 10 E	AT FM 1410		OVERPASS REVERSAL
H48	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (SB-EB; SB-WB; WB-NB; EB-NB) (PROPOSED DCs NORTH OF IH 610)
H49	SH 288	S OF US 59	IH 610	CONSTRUCT 4 TOLL LANES AND RECONSTRUCT DIRECT CONNECTORS AT IH 610
H50	IH 69 S	IH 69 SW FWY SB	IH 610 SB	RECONSTRUCT DIRECT CONNECTOR
H51	IH 45	AT SH 242		CONSTRUCT NEW DIRECT CONNECTOR (NB - EB)
H52	61ST ST	BROADWAY ST/SH 87	HARBORSIDE DR/SH 275	4 LANE EXTENSION TO HARBORSIDE DR
H53	IH 10 E	AT OAK ISLAND RD		OVERPASS REVERSAL
H54	IH 610 S	W OF CAMBRIDGE ST	W OF SCOTT ST	RECONSTRUCT MAINLANES, FRONTAGE ROAD, AND CONSTRUCT OVERPASS AT CAMBRIDGE/ALMEDA/UPRR
H55	IH 45 S	N OF TEXAS CITY WYE	S OF TEXAS CITY WYE	RECONSTRUCT IH 45/SH 146/SH 6 INTERCHANGE AND WIDEN IH 45 MAIN LANES FROM 6 TO 8
H56	SH 99	AT IH 69 S		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)
H57	US 59 S	W OF DORIS RD	E OF DORIS RD	CONSTRUCT 4 LANE GRADE SEPARATION, 2 LANE ACCESS ROAD AND RECONSTRUCT 2 LANE FRONTAGE ROADS
H58	FM 1409	AT IH 10		CONSTRUCT A 2 LANE BRIDGE & APPROACHES

0 3.5 7 14 Miles

Regional Goods Movement Plan

RTP 2045 High Need Projects - 1



KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H59	IH 10 E	AT FM 1724		OVERPASS REVERSAL
H60	HARDY TOLL RD	AT SL 8		CONSTRUCT EB-SB, SB-WB AND NB-WB DIRECT CONNECTORS
H61	SH 288	SH 99 (CR 60)	FM 1462	UPGRADE ROADWAY TO FREEWAY FACILITY BY ADDING OVERPASSES AND UNDERPASSES
H62	IH 10 E	AT SH 73		ENTRANCE RAMP OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH 10 BRIDGE. SH 73 AT GRADE AND BRIDGE TO BE DEMOED
H63	SH 99	AT IH 69 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)
H64	SH 99	AT US 59 N		SEG H: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)
H65	IH 45	HARRIS C/L	RAYFORD-SAWDUST RD	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING
H66	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
H67	IH 610 S	AT BROADWAY		INTERSECTION IMPROVEMENTS
H68	IH 45 S	DOWNTOWN	BAY AREA BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE
H69	IH 10 OVERPASS	FM 1409	NULL	CONSTRUCT OVERPASS ON IH 10 FOR FUTURE FM 1409; GRADE SEPARATION ONLY AT IH 10
H70	IH 69 N	DOWNTOWN	KIINGWOOD DR	CONVERSION OF EXISTING ONE-WAY REVERSIBLE HOV LANE
H71	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES
H72	SH 146	HARRIS/GALVESTON C/L	FM 518	WIDEN TO 6-LANES ARTERIAL WITH 4-LANE EXPRESS LANES
H73	FM 2234	AT UPRR		CONSTRUCT GRADE SEPARATION (DOT# 447 968S)
H74	SH 146	RED BLUFF RD	NASA 1	WIDEN TO 8-LANES, GS AT MAJOR INTERSECTIONS AND 2 2-LANE FRONTAGE ROADS
H75	SH 332	AT FM 523		CONSTRUCT GRADE SEPARATION
H76	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS
H77	US 90A	0.21 MI W OF LANE DR	FM 3155	REPLACE RAILROAD UNDERPASS
H78	IH 69 S	IH 69 SW FWY NB	IH 610 NB	RECONSTRUCT DIRECT CONNECTOR
H79	IH 45 S	S OF CAUSEWAY	61ST ST	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT BOTH, 2-LANE FRONTAGE ROADS
H80	IH 45	AT WOODLANDS PKWY		CONSTRUCT SINGLE POINT URBAN INTERCHANGE
H81	SH 99	CINCO RANCH BLVD	WESTHEIMER PKWY	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
H82	PORT RD	SH 146	CRUISE ST	WIDEN FROM 4 LANE TO 6 LANE DIVIDED
H83	SH 146	N OF FAIRMONT PKWY	S OF SPENCER HWY	WIDEN FROM 4 TO 6 LANES TO REMOVE BOTTLE NECK
H84	SH 99	AT IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)
H85	SH 99	IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)

KEY ID	STREET	FROM	TO	PROJECT DESCRIPTION
H86	BU 90-U	IH 610 NE	E OF MESA RD	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES DIVIDED
H87	SH 288	AT BW 8		CONSTRUCT 8 DCs AT BW 8 INTERCHANGE
H88	NORTHPARK DR	IH 69	RUSSELL PALMER RD	WIDEN FROM 4 TO 6 LANES BOULEVARD SECTION INCLUDING DRAINAGE, GRADE SEPARATION AT UPRR/SL 494, AND INTERSECTION IMPROVEMENTS
H89	IH 45 S	TEXAS CITY WYE C/L	NULL	CONSTRUCT 2 DCS (SB-EB AND WB-NB)
H90	FM 565	SH 146	SH 99	WIDEN FROM 2 TO 4 LANES WITH CONTINUOUS CENTER LEFT TURN LANE AND RAILROAD OVERPASS
H91	FM 521	SL 8	FORT BEND C/L	WIDEN TO 4-LANE DIVIDED SECTION AND CONSTRUCT GRADE SEPARATION AT UPRR (DOT# 447 969Y)
H92	FM 1960	SH 249	IH 45 N	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE WHERE NO ITS EQUIPMENT CURRENTLY EXISTS
H93	SH 35 (Spur 5)	IH 45	GRIGGS RD	CONSTRUCT 8 LANE FREEWAY ON NEW LOCATION, OVERPASSES, AND SB RAMP TO OLD SPANISH TRAIL (US 90A)
H94	GALVESTON TRAFFIC MANAGEMENT CENTER (TMC)	AT SH 275; SH 342; SH 87; AND FM 3005	VA	INSTALL TRAFFIC MANAGEMENT SYSTEMS THROUGHOUT GALVESTON COUNTY INCLUDING TRAFFIC SIGNAL SYNCHRONIZATION EQUIPMENT, CAMERAS, AND DYNAMIC SIGNS
H95	FM 359	IH 10	US 90	WIDEN FROM 2 TO 4 LANES DIVIDED
H96	SL 8	IH10 W	IH 69 S	VARIOUS ACCESS MANAGEMENT TREATMENTS ALONG THE FRONTAGE ROAD ALONG BELTWAY 8 BETWEEN IH 10 AND US 59 (IH 69).
H97	SH 99	AT SH 249	NULL	SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-SB, NB-WB, WB-SB, NB-EB)
H98	SH 288	AT CR 56	NULL	WIDEN CR 56 BRIDGE FROM 2 TO 4 LANES
H99	SH 99	AT IH 45 S		SEG B: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-NB, SB-WB, NB-WB, EB-SB)
H100	IH 45	AT NASA 1 BYPASS INTERCHANGE		CONSTRUCT 2 DIRECT CONNECTORS (WB - SB, NB - EB)
H101	IH 10 W	BRAZOS RIVER	FM 359	CONSTRUCT 1 ADDITIONAL MAIN LANE IN EACH DIRECTION
H102	FM 2759/FM 762	1000' N OF BNSF RR TO 1000' S		PHASE 2: CONSTRUCT ELEVATED INTERSECTION OF CRABB RIVER ROAD AND THOMPSON'S HIGHWAY OVER BNSF RR
H103	SH 99	N OF KINGSLAND BLVD	FORT BEND COUNTY LINE	SEG D: WIDEN FROM 4 LANES TO 6 LANES
H104	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK
H105	IH 45	FM 2920	MONTGOMERY C/L	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING
H106	IH 10 W	FORT BEND C/L	MASON RD	RESTRIPE AND WIDEN FROM 10 MAIN LANES TO 10 MAIN AND 2 MANAGED LANES
H107	SH 146	FAIRMONT PKWY W	NASA 1	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE
H108	SH 99	AT SH 249		SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB, SB-EB, WB-NB, EB-NB)
H109	SH 6	MEMORIAL DR	PIPING ROCK LN	RECONSTRUCT AND WIDEN FROM 6 LANES TO 8 LANES DIVIDED
H110	SH 288	AT CR 64	NULL	CONSTRUCT GRADE SEPARATION
H111	VETERANS MEMORIAL DR	FM 1960	W GREENS RD	WIDEN FROM 4 LANE TO 6 LANE ROADWAY
H112	SH 146	AT BS 146E	FERRY RD	CONSTRUCT 4 MAINLANES AND GRADE SEPARATION
H113	SH 99	S FRY ROAD	FM 1093	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD
H114	LOUETTA RD	E OF KUYKENDAHL RD	IH 45	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT
H115	SH 36	N OF CR 467/HOGG RANCH RD	SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4 LANES
H116	SH 146	N OF FAIRMONT PARKWAY	S OF RED BLUFF RD	RECONSTRUCT AND WIDEN FROM 4 TO 6-LANES WITH TWO 2-LANE FRONTAGE ROADS

Regional Goods Movement Plan

RTP 2045 High Need Projects - 2

Appendix D

Data Variables Description

Regional Goods Movement Plan

Data Variables For Project Needs Evaluation

Prepared for:

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April 06, 2023

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1 Introduction

The document summarizes the data variables used for the project needs evaluation. The document also summarizes the data sources for the data variables.

2 Data Variables

1. **Annual Average Daily Traffic (AADT)** – This data is obtained from the TxDOT roadway inventory data. For missing data, alternative data sources (counts from cities, counties, and previous studies are used) or data from similar roadways is replicated on the data.

2. **Truck %** - This data is obtained from the TxDOT roadway inventory data. The truck % is calculated using the following formula:

$$Truck\ \% = \frac{Total\ Truck\ Count}{Annual\ Average\ Daily\ Traffic}$$

3. **Heavy Truck %** - This metric measures the composition of the truck traffic. In the TxDOT roadway inventory, the “Combination Trucks” are considered Heavy Trucks. The heavy truck % is calculated using the following formula:

$$Heavy\ Truck\ \% = \frac{Heavy\ \ Truck\ Count}{Total\ Truck\ Count}$$

4. **Truck Crash Rate** – The crash data for performing the analysis was obtained from the TxDOT CRIS database (2017 – 2021).

   The segment crash rate for trucks was obtained using the following formula:

$$R = \frac{100{,}000{,}000 * C}{365 * N * V * L}$$

   Where:

   R = Crash rate for the road segment expressed as crashes per 100 million vehicle-miles of travel (VMT)
   C= Total number of Truck Crashes in the Study Period
   N = Number of years of data (5 years in this study)
   V = Average Annual Daily Traffic
   L = Length of the roadway segment in miles

The intersection crash rate for trucks was obtained using the following formula:

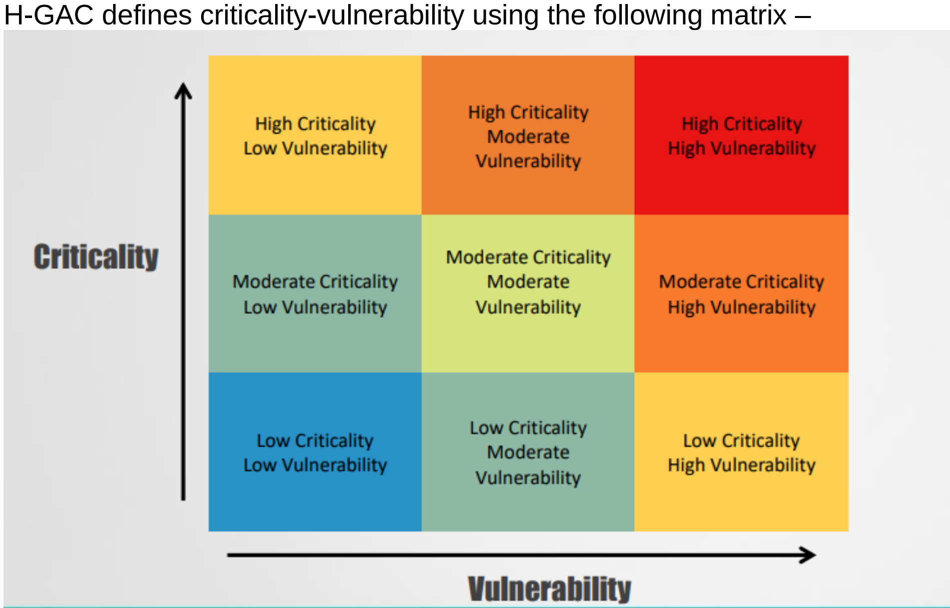
$$R = \frac{1{,}000{,}000 * C}{365 * N * V * L}$$

Where:

R = Crash rate for the intersection expressed as accidents per million entering vehicles (MEV)
C= Total number of intersection Truck Crashes in the Study Period
N = Number of years of data (5 years in this study)
V = Average Annual Daily Traffic entering the intersection

5. **Criticality / Vulnerability Index** –The source of the data is the H-GAC resilience study, 2021. This is a measure of the resilience of the project corridors.

H-GAC defines criticality-vulnerability using the following matrix –



HDR used the following scoring matrix for obtaining the weighted average score for a project. Anything category not indicated below is scored a zero.

	SCORES			
	0.25	0.50	0.75	1.00
Criticality — Vulnerability	Moderate Criticality-Moderate Vulnerability	Low Criticality-High Vulnerability High Criticality-Low Vulnerability	Moderate Criticality-High Vulnerability High Criticality-Moderate Vulnerability	High Criticality-High Vulnerability

6. **Bridge Condition –** The data source is the TxDOT bridge inventory. In this study, only corridors with a "Poor" condition bridge are assigned a score. The project with the maximum number of poor bridges is assigned the maximum score. All the projects without a poor bridge are assigned a 0 score. The other projects are assigned scores based on a relative scale.

7. **Bridge Clearance –** The data source is the TxDOT bridge inventory. In this study, only projects with bridges with clearance less than 14.5' are assigned a score. The project with the maximum number of low-clearance bridges is assigned the maximum corridor. All the projects without low clearance bridges are assigned a 0 score. The other projects are assigned scores based on a relative scale.

8. **At Grade RR –** The data source is the Federal Railroad Administration. This metric summarizes the count of At-Grade RR along a project.

9. **Vulnerable Population Index –** The data source is the H-GAC regional equity tool. This metric indicates the density of the vulnerable population along a project. Additional information on how the variable was calculated can be found here https://datalab.h-gac.com/reference/demographic/vp.pdf

10. **Annual Truck Delay per Truck per Mile –** The data source is the Texas A&M Transportation Institute Analysis of INRIX data. The metric summarizes the delay experienced by a truck on a corridor per mile traveled.

11. **Truck 95% Planning Time Index –** The data source is the Texas A&M Transportation Institute Analysis of INRIX data. The metric is a measure of the variability of travel time along a corridor. The delay reported in the previous metric is an average of the whole year but the planning time index shows the variation of delay in a year and can be used to calculate the travel time a commuter needs to plan to arrive at their destination on time for 95% of their trips.

    The example below differentiates the Delay and Truck Planning Index –

    For example,
    Free-flow travel time = 15 minutes
    Annual average travel time = 18 minutes
    Annual average delay = 18 – 15 = 3 minutes
    Planning time index = 1.60
    Planning time = 15 minutes × 1.60 = 24 minutes

    A planning time index of 1.60 means that for a trip that takes 15 minutes in light traffic, a traveler should budget 24 minutes to ensure on-time arrival 95 percent of the time.

3 Data Source

Variable Name	Source
ADT	TxDOT Roadway Inventory Annual Data, 2021 https://www.txdot.gov/data-maps/roadway-inventory.html
Truck %	
Heavy Truck %	
Truck Crash Rate	TxDOT Crash Records Information System, 2017 - 2021 https://cris.dot.state.tx.us/public/Query/app/home
Criticality/ Vulnerability	H-GAC Regional Resilience Tool, 2021 https://datalab.h-gac.com/resilience/
Bridge Condition	TxDOT Bridge Inventory, 2021 https://gis-txdot.opendata.arcgis.com/datasets/TXDOT::txdot-bridges/about
Bridge Clearance	
At Grade RR	U.S DOT Federal Rail Administration, 2021 https://railroads.dot.gov/safety-data/crossing-and-inventory-data/crossing-inventory-lookup
Vulnerable Pop Index	H-GAC Regional Equity Tool, 2017-2021 https://datalab.h-gac.com/equity/
Truck Planning Index*	Texas A&M Transportation Institute Analysis of INRIX Data, 2021 https://compat.tti.tamu.edu/?region_id=11&year=2021
Annual Truck Delay per Truck per Mile*	

Project Categorization Tool User Guide

H-GAC Regional Goods Movement Plan

Houston, TX

July 24, 2023

Project Categorization Tool User Guide

As part of the Regional Goods Movement Plan Update, a H-GAC Freight Network was developed as described in Section 6.1 of the main body of the report. The H-GAC's 2045 RTP projects located along the FHWA, TxDOT and H-GAC's freight networks were assumed freight-relevant and shortlisted for categorization using the process described in Section 6.3 of the body of the report. A spreadsheet-based reusable tool was developed for carrying out this categorization for future versions of H-GAC's RTP projects list. The following user guide describes the process and functioning of the tool.

To conduct future updates, H-GAC would need to update the project-level data for the nine relevant variables used in the analysis (eleven variables for corridor projects). The project-level inputs in the categorization tool can be updated in the 'Corridor Proj Input' sheet for corridor projects and in the 'Intersect Proj Input' for intersection projects.[1] A screenshot of the 'Intersect Proj Input' tab is provided below, using projects from the current categorization exercise.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	OBJECTID_1 *	CSJNumber	Street	FromLimit	ToLimit	ProjectDes	TOTALCOST	ADT	TR_%	HEAVY_TR_%	RASH_RAT	CRIT_VUL	BRIDGE_C
2	146		SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS	15250000	20599	14.0%	70.0%	0.2128	0.00	
3	41	0502-01-217	SH 225	AT SL 8		CONSTRUCT 5 DIRECT CONNECTORS: PHASE 1 (NBWB, SBEB, WBNB, NBEI	143820000	135450	17.0%	66.0%	0.1820	0.06	
4	124	2105-01-048	FM 2234	AT UPRR		CONSTRUCT GRADE SEPARATION (DOT# 447 968S)	20100000	30546	5.0%	27.0%	0.1794	0.00	
5	62	3510-07-006	SH 99	AT IH 69 N		SEG G: CONSTRUCT 2 DCS (TOLL) (EB-SB, SB-WB)	90020000	65044	15.0%	60.0%	0.1601	0.00	
6	66		SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK	16272396	14702	4.0%	40.0%	0.1491	0.25	
7	19	3510-04-039	SH 99	AT FM 1093/WPT	NULL	SEG D: CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (WB-NB, NB-EB)	38400000	100721	4.0%	23.0%	0.1360	0.00	
8	20	3510-04-058	SH 99	AT FM 1093 (WESTPARK TOLLWAY) INTERCHANGE		SEG D: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB,WB-SB,NB-WI	78800000	100721	4.0%	23.0%	0.1360	0.00	
9	21	1258-03-046	FM 1093	AT SH 99	NULL	WESTPARK TOLL ROAD EB-NB DIRECT CONNECTOR CONSTRUCTION	17000000	100721	4.0%	23.0%	0.1360	0.00	
10	77	0271-15-096	IH 610 E	AT SHIP CHANNEL (BUFFALO BAYOU)		RECONSTRUCT AND RAISE SHIP CHANNEL BRIDGE	2400000000	146956	9.0%	55.0%	0.1305	0.75	
11	50	3510-03-004	SH 99	AT IH 69 S		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)	104000000	131267	10.0%	61.0%	0.1211	0.00	
12	36	3510-06-021	SH 99	AT SH 249		SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB, SB-EB, \	76000000	74719	11.0%	33.0%	0.1173	0.00	
13	4	3510-07-005	SH 99	AT IH 69 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)	45200000	91972	13.0%	55.0%	0.1132	0.00	
14	15	3510-07-013	SH 99	AT US 59 N		SEG H: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EI	76000000	91972	13.0%	55.0%	0.1132	0.00	
15	104		PORT OF GALVESTON	51ST ST	HARBORSID	51ST ST FLYOVER TO HARBORSIDE DR	21240000	4865	11.0%	17.0%	0.1126	0.00	
16	59	0271-16-111	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PRC	206883263	330777	7.0%	55.0%	0.1060	0.31	
17	44	0188-03-022	SH 36	N OF CR 467/HOGG RANCH RD	SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2	11073302	5185	14.0%	44.0%	0.1057	0.00	
18	81	0500-03-597	IH 45 N	AT IH 610		RECONSTRUCT INTERCHANGE (NHHIP SEG 2)	623844000	382645	8.0%	50.0%	0.1045	0.50	
19	35	3510-06-007	SH 99	AT SH 249	NULL	SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-SB, NB-WB,	110000000	86986	12.0%	34.0%	0.1008	0.00	
20	18		HARDY TOLL RD	AT SL 8		CONSTRUCT EB-SB, SB-WB AND NB-WB DIRECT CONNECTORS	88025800	171950	10.0%	40.0%	0.0956	0.00	
21	94	0912-72-075	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE	30089913	125511	14.0%	55.0%	0.0917	0.50	
22	158		IH 10 E	AT FM 1406		OVERPASS REVERSAL	69522724	51254	30.0%	74.0%	0.0855	0.00	
23	7	1685-01-093	FM 1960	US 290	N OF ELDRIC	RECONSTRUCT US 290/FM 1960 INTERCHANGE	31792920	233820	6.0%	53.0%	0.0820	0.33	
24	140		IH 45	AT SH 242		CONSTRUCT NEW DIRECT CONNECTOR (NB - EB)	25850112	187078	10.0%	66.0%	0.0791	0.00	
25	13	0271-17-146	IH 610	IH 610 (NB)	AT IH 69 (ST	CONSTRUCT DIRECT CONNECTOR (IH 610 NB TO IH 69 SB)	62400000	471026	5.0%	50.0%	0.0710	0.50	
26	12	0271-17-145	IH 610	AT IH 69 S		CONSTRUCT DIRECT CONNECTOR (IH 610 SB TO IH 69 EB/NB) AND HOV /	67375000	471026	5.0%	50.0%	0.0710	0.31	
27	22	0271-17-157	IH 610	IH 69 S NB (W OF IH 610)	SB IH 610 (E	RECONSTRUCT IH 69 NB (EB) TO SB IH 610 CONNECTOR	34800000	471026	5.0%	50.0%	0.0710	0.31	
28	107	0271-17-160	IH 610	AT US 59		ROW AND UTILITIES FOR DIRECT CONNECTOR CONSTRUCTION (IH 610 S	5100000	471026	5.0%	50.0%	0.0710	0.31	
29	112	0271-17-161	IH 610	AT IH 69		RECONSTRUCTION OF IH 610 MAIN LANE BRIDGE WITHIN THE INTERCHA	54000000	471026	5.0%	50.0%	0.0710	0.31	
30	156		IH 10 E	AT JENKINS RD		OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPA	70602270	57327	30.0%	75.0%	0.0669	0.00	
31	78	0598-02-125	SH 288	AT CR 56	NULL	WIDEN CR 56 BRIDGE FROM 2 TO 4 LANES	12500000	41000	12.0%	62.0%	0.0668	0.00	
32	23	0598-01-096	SH 288	AT BW 8		CONSTRUCT 8 DCs AT BW 8 INTERCHANGE	169776540	185391	9.0%	48.0%	0.0650	0.00	
33	154		SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS	15250000	8493	17.0%	73.0%	0.0645	0.00	
34	61	0586-01-048	SH 332	AT FM 523		CONSTRUCT GRADE SEPARATION	24710000	26196	10.0%	47.0%	0.0628	0.38	
35	28	0508-02-120	IH 10 E	AT FM 3180		CONSTRUCT OVERPASS AND RECONFIGURE INTERCHANGE	34200000	89665	22.0%	73.0%	0.0611	0.00	
36	149	2105-01-034	FM 2234	N OF US 90A	S OF US 90A	CONSTRUCT INTERSECTION IMPROVEMENTS	30900000	92988	2.0%	23.0%	0.0589	0.00	

Once the inputs for both corridor and intersection projects are updated in the categorization tool, project-level scores for Safety, Movement of People and Goods, Economic Competitiveness, State of Good Repair and Protection of Natural Resources are automatically re-calculated, alongside the Total Score for each project. The updated scores for each individual goal and the total scores for the corridor projects are displayed in the 'Corridor Proj Calc' tab of the categorization tool. A screenshot of the scores for corridor projects is presented below.

[1] Note that any updated project-level inputs must be entered in the order specified in the columns for each corresponding project type (corridor or intersection).

AD2

	A	B	C	D	E	F	T	U	V	W	X	Y	Z
1	OBJECTID_12 *	CSJNumber	Street	FromLimit	ToLimit	ProjectDes		Safety	Move people and goods efficiently	Economic Competitiveness	State of good repair	Protect natural resources	Total Score
2	1		LOUETTA RD	CHAMPIO	STUEBNER	WIDEN FROM 4 TO 6		2.075577701	5.212999856	3.258658459	1.643826026	1.748163724	13.93922577
3	2		LOUETTA RD	OLD LOUE	CHAMPIO	WIDEN FROM 4 LANE		1.949677916	5.187453849	3.398793253	1.677153328	1.675569511	13.88864786
4	3	0739-01-039	IH 10 E	SH 73, EAS	JEFFERSOI	WIDEN EXISTING FOI		6.277366917	1.029450669	2.087609167	4.779648208	3.514994015	17.68906898
5	4	0978-02-053	FM 646	FM 3436	SH 146	WIDEN FROM 2 LANE		1.913089438	4.192808715	2.767336372	1.770236582	1.597972439	12.24144355
6	5	3049-01-023	FM 646	FM 1266	FM 3436	WIDEN FROM 2 LANE		1.655817179	2.816164476	2.309185704	1.877598789	1.323283325	9.982049474
7	6		SHOAL POINT	LP 197	SOUTHERI	CONSTRUCT NEW 4 L		2.685816103	1.332428232	1.226809005	2.093693306	1.658354244	8.99710089
8	7	0389-05-088	SH 146	RED BLUFF	NASA 1	WIDEN TO 8-LANES,		3.280568643	9.374493216	6.728304035	3.499894397	2.893389575	25.77664987
9	8	0389-06-095	SH 146	HARRIS/G.	FM 518	WIDEN TO 6-LANES A		2.917811688	11.29576932	6.888803914	2.034629773	2.757476393	25.89449109
10	9	0389-05-116	SH 146	NASA RD 1	HARRIS/G.	WIDEN TO 6-LANE AI		3.298395697	17.97187717	11.54349103	3.475395245	3.833021175	40.12218031
11	10	1258-02-034	FM 1093	JAMES LN	FM 1093/F	WIDEN TO 4 LANES A		3.620327945	2.775966946	2.618097333	3.338095044	2.579265828	14.9317531
12	11	0543-02-064	FM 359	W of Texa	W of FM 7	CONSTRUCT NEW 4-L		1.467863742	3.692191134	2.329435614	0.999449636	1.156127039	9.645067165
13	12	1258-03-045	FM 1093	FM 1463/F	W OF FM 1	CONSTRUCT 4 TOLL L		1.853530359	2.731967355	1.888850231	1.260506043	1.24307653	8.977930517
14	13	0912-31-305	CR 59	CR 48	KIRBY DR	RECONSTRUCT AND '		2.502718473	3.917556187	2.607875039	2.035289636	1.918233368	12.9816727
15	14	0188-01-016	SH 36	IH 69 S	FM 2218	RECONSTRUCT AND '		2.289555654	2.793792175	1.874308607	1.522923654	1.463645225	9.944225314
16	15	0188-04-035	SH 36	S OF SH 35	FM 522	RECONSTRUCT TO 4 L		2.663735504	1.218130377	1.202826871	2.52500164	1.918387186	9.528081578
17	16	0338-02-032	SH 105	GRIMES C/	FM 149	RECONSTRUCT AND '		2.993943439	1.898797136	1.859414199	2.8046657	2.141058027	11.6978785
18	17	0338-02-032	SH 105	GRIMES C/	FM 149	RECONSTRUCT AND '		2.916610252	3.912128212	2.997334671	2.560434081	2.1966819	14.58318912
19	18		LOUETTA RD	T. C. JESTE	KUYKENDA	WIDEN 5 LANE ASPH.		1.999877382	5.242545343	3.556842854	1.775529093	1.67901011	14.25380478
20	19		LOUETTA RD	STEUBNER	T.C. JESTEI	WIDEN 5 LANE ASPH.		1.928936459	5.036411191	3.105608957	1.419394942	1.621642061	13.11199361
21	20		LOUETTA RD	SH 249	MEMORIA	WIDEN 4-LANE BLVD		2.211475158	3.092218078	2.127678974	1.645354023	1.62038982	10.69711605
22	21	0050-08-087	US 290	E OF TELGI	W OF ELDI	RECONSTRUCT AND '		6.344982828	0.787979314	1.597911812	3.693395324	2.959533023	15.3838023
23	22		WEST RD	SH 249	VETERANS	CONSTRUCT NEW 4-L		1.650805213	5.478127609	3.193644608	1.818667618	1.803683219	13.94492827
24	23		VETERANS ME	SL 8	SH 249	WIDEN FROM 4 LANE		2.975614246	4.85600573	2.88462736	2.567003896	2.45533517	15.7385864
25	24		LITTLE YORK R	US 290	HOUSTON	WIDEN 4 TO 6-LANES		2.995728898	4.210508942	2.686527725	2.31429284	2.205696791	14.4127552
26	25		TANNER RD	CAMPBELI	TRIWAY LI	WIDEN TO 4-LANE DI		2.563273326	5.353079026	3.300158607	2.089023821	2.134508626	15.44004341
27	26		TANNER RD	TRIWAY LI	HEMPSTE/	WIDEN FROM 2 LANE		2.657329241	4.317373301	2.66305337	2.197886508	2.114963147	13.95060557
28	27		LITTLE YORK R	ELDRIDGE	BRITTMOF	WIDEN FROM 4 TO 6-		2.637796464	4.107846712	2.693329569	2.020294934	1.957064531	13.41633221
29	28		KUYKENDAHL	FM 1960	RANKIN R	WIDEN FROM 4 TO 6		2.634119439	4.848582457	3.301614661	2.743193149	2.215400501	15.74291021
30	29	0338-04-060	SH 105	10TH ST	SL 336	WIDEN FROM 2 TO 4		2.389428445	4.558227954	2.660136449	1.639972257	1.795203899	13.042969
31	30	0338-04-065	SH 105	LP 336	FM 1484	RECONSTRUCT AND '		2.553568413	5.795919367	3.642140748	1.919046736	2.061031694	15.97170696

Similarly, the scores for individual goals, the total scores and the Adjusted Total Scores for intersection projects are automatically updated after updating the project-level inputs for these types of projects.[2] . The updated scores for intersection projects are displayed in the 'Intersect Proj Calc' tab of the categorization tool. A screenshot of scores for this type of projects is presented below.

AD9

	A	B	C	D	E	F	Q	R	S	T	U	V	W	Y	Z
1	OBJECTID_1 *	CSJNumber	Street	FromLimit	ToLimit	ProjectDes		Safety	Move people and goods efficiently	Economic Competitiveness	State of good repair	Protect natural resources	Total Score		Adjusted Total Score
2	146		SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT		16.5882515	0.766887855	2.226128872	4.409530214	4.219145599	28.20994403		40.29992005
3	41	0502-01-217	SH 225	AT SL 8		CONSTRUCT 5 DIRECT		16.06599802	0.244969635	2.609649172	4.559316613	4.025494219	27.50542766		39.29346809
4	124	2105-01-048	FM 22:	AT UPRR		CONSTRUCT GRADE SI		12.23143773	0.973979133	1.147584661	1.330844371	2.426198335	18.11004423		25.87149176
5	62	3510-07-006	SH 99	AT IH 69 N		SEG G: CONSTRUCT 2 I		13.36472069	0.219395435	1.950822742	3.684541418	3.368896938	22.58837722		32.26911032
6	66		SPENC	AT MAINLI		CONSTRUCT GRADE SI		10.52681637	1.042644066	2.140018502	2.671256259	2.288795588	18.66953079		26.67075827
7	19	3510-04-039	SH 99	AT FM 109	NULL	SEG D: CONSTRUCT 2 I		9.698517354	0.113900045	1.00118478	0.992855452	1.477158683	13.28361631		18.97659473
8	20	3510-04-058	SH 99	AT FM 109		SEG D: CONSTRUCT 4 I		9.686154524	0.101537215	1.00118478	0.980492622	1.464795853	13.23416499		18.90594999
9	21	1258-03-046	FM 10!	AT SH 99	NULL	WESTPARK TOLL ROAI		9.61528717	0.030669861	1.00118478	0.909625268	1.393928499	12.95069558		18.50099368
10	77	0271-15-096	IH 610	AT SHIP CH		RECONSTRUCT AND R		14.91276775	4	4.72285642	11.02258449	4.832465971	39.49067463		56.41524947
11	50	3510-03-004	SH 99	AT IH 69 S		SEG C: CONSTRUCT 4 I		11.59128502	0.075718231	1.768430288	3.401803053	3.043729392	19.88096599		28.40137998
12	36	3510-06-021	SH 99	AT SH 249		SEG F-1/F-2: CONSTRU		9.325377815	0.065471391	1.230379313	1.950887218	1.974856695	14.54697243		20.78138919
13	4	3510-07-005	SH 99	AT IH 69 N	NULL	CONSTRUCT 2 DIRECT		10.70738772	0.219395435	1.648830338	3.381564914	2.985127821	18.94230623		27.06043747
14	15	3510-07-013	SH 99	AT US 59 N		SEG H: CONSTRUCT 4 I		10.70738772	0.219395435	1.648830338	3.381564914	2.985127821	18.94230623		27.06043747
15	104		PORT (	51ST ST	HARBOF	51ST ST FLYOVER TO H		7.883531715	0.674184297	0.812575431	1.522057399	1.770071279	12.66242012		18.0891716
16	59	0271-16-111	IH 610	AT SH 35		CONSTRUCT 4 DIRECT		14.28009796	1.597469266	3.188823928	5.636253413	4.560252576	29.26289715		41.80413878
17	44	0188-03-022	SH 36	N OF CR 46	SH 35	GRADE SEPARATION (		8.373355114	0.023773023	1.289731383	2.400420057	2.106635615	14.19391519		20.2770217
18	81	0500-03-597	IH 45 N	AT IH 610		RECONSTRUCT INTER(		15.06771773	2.078475831	3.997218928	6.452314544	4.915017962	32.510745		46.44392142
19	35	3510-06-007	SH 99	AT SH 249	NULL	SEG F-1/F-2: CONSTRU		9.026232639	0.375677098	1.22551799	2.453518157	2.353096387	15.43404227		22.04863182
20	18		HARD\	AT SL 8		CONSTRUCT EB-SB, SE		10.50439656	0.783755206	1.412834021	3.314794272	3.160185683	19.17596574		27.39423677
21	94	0912-72-075	CLINT(	PORT OF H	IH 610	RECONSTRUCT CLINT(		11.52933757	2.325005646	3.650767915	6.391189638	4.529057865	28.42535864		40.6076552
22	158		IH 10 E	AT FM 140		OVERPASS REVERSAL		11.0317365	0.243601245	2.255190758	5.702108935	4.35208431	23.58472175		33.69245964
23	7	1685-01-093	FM 19(	US 290	N OF ELI	RECONSTRUCT US 290		10.73172028	1.069096621	2.889805201	4.53447723	3.35217105	22.57727039		32.25324341
24	140		IH 45	AT SH 242		CONSTRUCT NEW DIR		10.59155182	0.375656909	1.767599069	4.171466785	3.539237839	20.44551242		29.20787489
25	13	0271-17-146	IH 610	IH 610 (NB	AT IH 69	CONSTRUCT DIRECT C		13.6451709	1.506044513	3.934897819	5.977038102	4.375717972	29.43886931		42.05552758

Once the results are combined, the Overall Score Ranking automatically updates, categorizing each project into either High, Medium, or Low. The categorization results for the combination of corridor and

[2] The Adjusted Total Scores are updated by normalizing the differences in maximum number of points between the two different project types.

intersection projects are displayed in the 'Combined Results' tab of the tool. A screenshot of these results is presented below.

	Project Type	OBJECTID*	CSJNumber	Street	FromLimit	ToLimit	ProjectDes	Adj. Score	Score Rank (Overall)
2	Intersection	146		SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS	40.29992	High
3	Intersection	41	0502-01-217	SH 225	AT SL 8		ISTRUCT 5 DIRECT CONNECTORS: PHASE 1 (NBWB, SBEB, WBNB, NBEB, SB	39.293468	High
4	Intersection	124	2105-01-048	FM 2234	AT UPRR		CONSTRUCT GRADE SEPARATION (DOT# 447 968S)	25.871492	High
5	Intersection	62	3510-07-006	SH 99	AT IH 69 N		SEG G: CONSTRUCT 2 DCS (TOLL) (EB-SB, SB-WB)	32.26911	High
6	Intersection	66		NCER H	IE DOUBLE-		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK	26.670758	High
7	Intersection	19	3510-04-039	SH 99	FM 1093/W	NULL	SEG D: CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (WB-NB, NB-EB)	18.976595	Medium
8	Intersection	20	3510-04-058	SH 99	ARK TOLLV		D: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB,WB-SB,NB-WB,EB	18.90595	Medium
9	Intersection	21	1258-03-046	FM 1093	AT SH 99	NULL	WESTPARK TOLL ROAD EB-NB DIRECT CONNECTOR CONSTRUCTION	18.500994	Medium
10	Intersection	77	0271-15-096	IH 610 E	NNEL (BUFI		RECONSTRUCT AND RAISE SHIP CHANNEL BRIDGE	56.415249	High
11	Intersection	50	3510-03-004	SH 99	AT IH 69 S		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)	28.40138	High
12	Intersection	36	3510-06-021	SH 99	AT SH 249		/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB, SB-EB, WB-NB,	20.781389	High
13	Intersection	4	3510-07-005	SH 99	AT IH 69 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)	27.060437	High
14	Intersection	15	3510-07-013	SH 99	AT US 59 N		H: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NE	27.060437	High
15	Intersection	104		F GALV	51ST ST	RBORSIDE	51ST ST FLYOVER TO HARBORSIDE DR	18.089172	Medium
16	Intersection	59	0271-16-111	IH 610	AT SH 35		DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SO	41.804139	High
17	Intersection	44	0188-03-022	SH 36	67/HOGG F	SH 35	E SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4	20.277022	High
18	Intersection	81	0500-03-597	IH 45 N	AT IH 610		RECONSTRUCT INTERCHANGE (NHHIP SEG 2)	46.443921	High
19	Intersection	35	3510-06-007	SH 99	AT SH 249	NULL	/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-SB, NB-WB, WB-SB,	22.048632	High
20	Intersection	18		DY TOL	AT SL 8		CONSTRUCT EB-SB, SB-WB AND NB-WB DIRECT CONNECTORS	27.394237	High
21	Intersection	94	0912-72-075	INTON F	HOUSTON	IH 610	RECONSTRUCT CLINTON DRIVE	40.607655	High
22	Intersection	158		IH 10 E	AT FM 1406		OVERPASS REVERSAL	33.69246	High
23	Intersection	7	1685-01-093	FM 1960	US 290	LDRIDGE	RECONSTRUCT US 290/FM 1960 INTERCHANGE	32.253243	High
24	Intersection	140		IH 45	AT SH 242		CONSTRUCT NEW DIRECT CONNECTOR (NB - EB)	29.207875	High
25	Intersection	13	0271-17-146	IH 610	IH 610 (NB)	69 (STR #	CONSTRUCT DIRECT CONNECTOR (IH 610 NB TO IH 69 SB)	42.055528	High
26	Intersection	12	0271-17-145	IH 610	AT IH 69 S		T CONNECTOR (IH 610 SB TO IH 69 EB/NB) AND HOV ACCESS TO UPTOWN	40.318956	High

If needed, the spreadsheet-based categorization tool allows to change the weights of the goals used as criteria in the categorization process (in the 'Weights Calc' tab), and to change the importance that each variable has in capturing the needs related to each goal (in the 'Data Align with Goals' tabs). To do this, update the numbers in the gray boxes, keeping in mind that the summation of each individual row under the "Corridor Project Evaluation" title (cells N45 to N49 in the 'Data Align with Goals' tab) should equal the "Rounded Weights" for each corresponding goal (cells F5 to F9 in the 'Weights Calc' tab).

Appendix E

Regional Goods Movement Plan Projects Justice 40 Analysis

Label	MPOID	CSJNumber	CIPID	CountyName	Sponsor	Street	FromLimit	ToLimit	ProjectDes	Project_Type	Score	Score_Ranking	Vulnerable Population Index (100= Highly Vulnerable 1= Not Vulnerable)	Project is part of Justice40 Disadvantaged Community?	Project Buffer
H86	60	0028-01-067		Harris	TXDOT HOUSTON DISTRICT	BU 90-U	IH 610 NE	E OF MESA RD	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES DIVIDED	Corridor	23.4589544	High	77	Yes	1 mile
H15	11179	0912-72-075	N-000787	Harris	HARRIS COUNTY	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE	Intersection	40.6076552	High	74	Yes	1 mile
H40	16334	0110-06-132		Harris	TXDOT HOUSTON DISTRICT	IH 45	S OF WEST RD	N OF SL 8	RECONSTRUCT 8 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES TRANSITIONING INTO TWO ENTERING AND EXITING LANES AT REVERSIBLE HOV LANE NORTH OF SL8, AND RECONSTRUCT AND WIDEN FROM TWO 2 AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3- LANES FRONTA	Corridor	32.314865	High	72	Yes	1 mile
H1	18710	0271-15-096	NULL	Harris	TXDOT HOUSTON DISTRICT	IH 610 E	AT SHIP CHANNEL (BUFFALO BAYOU)		RECONSTRUCT AND RAISE SHIP CHANNEL BRIDGE	Intersection	56.4152495	High	70	Yes	1 mile
H93	202	0178-09-018		Harris	TXDOT HOUSTON DISTRICT	SH 35 (Spur 5)	IH 45	GRIGGS RD	CONSTRUCT 8 LANE FREEWAY ON NEW LOCATION, OVERPASSES, AND SB RAMP TO OLD SPANISH TRAIL (US 90A)	Corridor	22.4092678	High	69	Yes	1 mile
H48	18048	0271-16-111		Harris	TXDOT HOUSTON DISTRICT	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (SB-EB; SB-WB; WB-NB; EB-NB) (PROPOSED DCs NORTH OF IH 610)	Intersection	29.8075097	High	69	Yes	1 mile
H26	16331	0500-03-446		Harris	TXDOT HOUSTON DISTRICT	IH 45 N	TIDWELL RD	S OF SHEPHERD DR	RECONSTRUCT MAIN LNS, CONSTRUCT 4 MANAGED LNS, AND RECONSTRUCT AND WIDEN FROM TWO 2-LN FRONTAGE RDS TO TWO 3-LN FRONTAGE RDS	Corridor	35.7735161	High	68	Yes	1 mile
H46	14544	0271-16-111		Harris	TXDOT HOUSTON DISTRICT	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)	Intersection	31.1015025	High	68	Yes	1 mile
H30	16335	0110-06-139		Harris	TXDOT HOUSTON DISTRICT	IH 45 N	S OF SHEPHERD DR	S OF WEST RD	RECONSTRUCT/WIDEN FROM 8 TO 10 MAINLANES, RECONSTRUCT/WIDEN FROM 1 TO 4 MANAGED LANES; RECONSTRUCT/WIDEN FROM TWO, 2- AND 3-LANE FRONTAGE ROADS TO TWO, 2- AND 3-LANE FRONTAGE ROADS. (NHHIP SEG 1C)	Corridor	35.1525827	High	67	Yes	1 mile
H60	16076			Harris	HCTRA	HARDY TOLL RD	AT SL 8		CONSTRUCT EB-SB, SB-WB AND NB-WB DIRECT CONNECTORS	Intersection	27.3942368	High	66	Yes	1 mile
H27	18712	NULL		Harris	TXDOT HOUSTON DISTRICT	IH 610 S	SH 35 (SS 5/MYKAWA RD)	SH 288	RECONSTRUCT FREEWAY INCLUDING TSM IMPROVEMENTS	Corridor	35.6289087	High	66	Yes	1 mile
H67	18711	0271-16-158		Harris	TXDOT HOUSTON DISTRICT	IH 610 S	AT BROADWAY		INTERSECTION IMPROVEMENTS	Corridor	26.5763566	High	65	Yes	1 mile
H9	16333	0500-03-596		Harris	TXDOT HOUSTON DISTRICT	IH 45 N	IH 610	TIDWELL RD	RECONSTRUCT AND WIDEN FROM 8 TO 12 MAIN LANES, RECONSTRUCT AND WIDEN FROM 1 TO 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LANES FRONTAGE ROADS TO TWO 2- AND 3-LANES FRONTAGE ROADS	Corridor	42.6497387	High	62	Yes	1 mile
H70	18187			Harris	HIGH CAPACITY TASK FORCE	IH 69 N	DOWNTOWN	KIINGWOOD DR	CONVERSION OF EXISTING ONE-WAY REVERSIBLE HOV LANE	Corridor	26.3329541	High	61	Yes	1 mile
H31	18511	0500-03-595		Harris	TXDOT HOUSTON DISTRICT	IH 45 S	AT BROADWAY		INTERSECTION IMPROVEMENTS	Intersection	35.0942892	High	60	Yes	1 mile
H13	18189			Harris	METRO	IH 45 N	SL 8	DOWNTOWN	Conversion of existing one-way reversible HOV lane on IH-45 North from downtown to BW 8 to two-way managed lane facility	Corridor	40.8737675	High	60	Yes	1 mile
H5	10268	0271-15099		Harris	TXDOT	IH 610	AT IH 10 E (NB - EB) DC RAMP		RECONSTRUCT AND WIDEN NB-EB DIRECT CONNECTOR RAMP FROM 1 LANE TO 2 LANES	Intersection	46.1282848	High	60	Yes	1 mile
H54	16025	0271-16-140		Harris	TXDOT HOUSTON DISTRICT	IH 610 S	W OF CAMBRIDGE ST	W OF SCOTT ST	RECONSTRUCT MAINLANES, FRONTAGE ROAD, AND CONSTRUCT OVERPASS AT CAMBRIDGE/ALMEDA/UPRR	Corridor	28.5043606	High	58	Yes	1 mile
H43	18183			Harris	HIGH CAPACITY TASK FORCE	IH 10 E	DOWNTOWN HOUSTON	GARTH RD	NEW 2-LANE HOV FACILITY ALONG IH 10 E	Corridor	32.0217884	High	56	Yes	1 mile
H57	17024	0089-09-083		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	W OF DORIS RD	E OF DORIS RD	CONSTRUCT 4 LANE GRADE SEPARATION, 2 LANE ACCESS ROAD AND RECONSTRUCT 2 LANE FRONTAGE ROADS	Intersection	28.1826483	High	52	Yes	1 mile
H11	14544	0271-16-111		Harris	TXDOT HOUSTON DISTRICT	IH 610	AT SH 35		CONSTRUCT 4 DIRECT CONNECTORS (EB-SB, WB-SB, NB-WB, NB-EB) (PROPOSED DCs SOUTH OF IH 610)	Intersection	41.8041388	High	51	Yes	1 mile
H6	16330	0500-08-001		Harris	TXDOT HOUSTON DISTRICT	IH 45	AT IH 69/IH 10		RECONSTRUCT IH45/IH10/IH69 INTERCHANGES. IH10 REALIGN/RECONSTRUCT 8 MAINLANES (ML) FROM W. OF MAIN ST. TO WACO ST.; CONSTRUCT 4 IH10 EXPRESS LANES FROM W. OF MAIN ST. TO W. OF WACO ST.; REALIGN/WIDEN IH45 FROM 6 TO 7 ML INCLUDING 3 LANES EB AND 4 LANES W	Corridor	44.5548904	High	51	Yes	1 mile
H96	18035	0912-72-575		Harris	TXDOT HOUSTON DISTRICT	SL 8	IH10 W	IH 69 S	VARIOUS ACCESS MANAGEMENT TREATMENTS ALONG THE FRONTAGE ROAD ALONG BELTWAY 8 BETWEEN IH 10 AND US 59 (IH 69).	Corridor	22.1012347	High	50	Yes	1 mile
H68	18186			Harris	HIGH CAPACITY TASK FORCE	IH 45 S	DOWNTOWN	BAY AREA BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE	Corridor	26.487119	High	50	Yes	1 mile
H111	8078			Harris	HARRIS COUNTY	VETERANS MEMORIAL DR	FM 1960	W GREENS RD	WIDEN FROM 4 LANE TO 6 LANE ROADWAY	Corridor	20.4574232	High	49	Yes	1 mile
H71	16026	0598-01-095		Harris	TXDOT HOUSTON DISTRICT	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES	Intersection	26.0844509	High	48	Yes	1 mile
H18	18031			Liberty	TXDOT HOUSTON DISTRICT	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS	Intersection	40.29992	High	48	Yes	1 mile
H4	16327	0500-03-597		Harris	TXDOT HOUSTON DISTRICT	IH 45 N	AT IH 610		RECONSTRUCT INTERCHANGE (NHHIP SEG 2)	Intersection	46.4439214	High	48	Yes	1 mile
H33	18042			Harris	HOUSTON TRANSTAR	IH 69	SPUR 527	SL 8 S	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON IH69 FROM SPUR 527 TO BELTWAY 8, INCLUDING CLOSE CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, RAMP METERS, WEATHER STATIONS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN HARRIS COUNTY, TX.	Corridor	34.8274902	High	46	Yes	1 mile
H34	18188			Harris	METRO	IH 69 S	SP 527	WEST BELLFORT BLVD	CONVERSION OF EXISTING 1-LANE REVERSIBLE HOV LANE TO 2-LANES (ONE LANE IN EACH DIRECTION) HOV FACILITY	Corridor	34.0973995	High	46	Yes	1 mile
H95	10950	0543-01-054		Waller	TXDOT HOUSTON DISTRICT	FM 359	IH 10	US 90	WIDEN FROM 2 TO 4 LANES DIVIDED	Corridor	22.163895	High	45	Yes	1 mile
H104	10532		2007-00208	Harris	PORT OF HOUSTON AUTHORITY	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK	Intersection	21.37365	High	45	Yes	1 mile

H94	18088			Galveston	CITY OF GALVESTON	GALVESTON TRAFFIC MANAGEMENT CENTER (TMC)	AT SH 275; SH 342; SH 87; AND FM 3005	VA	INSTALL TRAFFIC MANAGEMENT SYSTEMS THROUGHOUT GALVESTON COUNTY INCLUDING TRAFFIC SIGNAL SYNCHRONIZATION EQUIPMENT, CAMERAS, AND DYNAMIC SIGNS	Corridor	22.3695275	High	45	Yes	1 mile
H52	9403			Galveston	CITY OF GALVESTON	61ST ST	BROADWAY ST/SH 87	HARBORSIDE DR/SH 275	4 LANE EXTENSION TO HARBORSIDE DR	Corridor	29.0684707	High	44	Yes	1 mile
H29	15490			Galveston	CITY OF GALVESTON	IH 45 S	IH 45 S	61ST ST/SH 342	61ST STREET FLYOVER/DIRECT CONNECTOR-FLYOVER FINAL DESIGN & CONSTRUCTION INCLUDES ONE LANE FLYOVER WITH SHOULDERS FROM 61ST ST NB TO IH 45 WB AND ONE FREE-FLOWING LANE AT-GRADE FROM IH 45 EB TO 61ST ST SB.	Intersection	35.4949595	High	44	Yes	1 mile
H49	10568	0598-01-090		Harris	TXDOT HOUSTON DISTRICT	SH 288	S OF US 59	IH 610	CONSTRUCT 4 TOLL LANES AND RECONSTRUCT DIRECT CONNECTORS AT IH 610	Corridor	29.4517397	High	42	Yes	1 mile
H79	282	0500-01-119		Galveston	TXDOT HOUSTON DISTRICT	IH 45 S	S OF CAUSEWAY	61ST ST	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT BOTH, 2-LANE FRONTAGE ROADS	Corridor	25.2014823	High	42	Yes	1 mile
H39	16332	0500-03-560		Harris	TXDOT HOUSTON DISTRICT	IH 45 N	IH 610	IH 10	RECONSTRUCT AND WIDEN FROM 4 TO 5 MAIN LANES, CONSTRUCT 4 MANAGED LANES AND RECONSTRUCT AND WIDEN FROM TWO 2- AND 3-LN FRS TO TWO 3-LN FRS (NHHIP SEG 2)	Corridor	32.3626649	High	42	Yes	1 mile
H91	534	0111-01-067		Harris	TXDOT HOUSTON DISTRICT	FM 521	SL 8	FORT BEND C/L	WIDEN TO 4-LANE DIVIDED SECTION AND CONSTRUCT GRADE SEPARATION AT UPRR (DOT# 447 969Y)	Corridor	22.7791673	High	42	Yes	1 mile
H7	7510		2.1	Harris	PORT OF HOUSTON AUTHORITY	BROADWAY ST	BARBOURS CUT BLVD	L ST N	WIDEN FROM 2 TO 4-LANES ROADWAY	Corridor	44.1633032	High	41	Yes	1 mile
H32	16324	0508-01-345		Harris	TXDOT HOUSTON DISTRICT	IH 10 E	SPUR 330	THOMPSON RD	CONSTRUCT EAST BOUND ENTRANCE RAMP	Intersection	34.851379	High	40	Yes	1 mile
H24	16329	0500-03-601		Harris	TXDOT HOUSTON DISTRICT	IH 45	AT IH 69 S		RECONSTRUCT IH45/IH69 INTERCHANGE. IH45 REALIGN/WIDEN FROM 6 TO 7 MAINLANES (ML)INCLUDING 3 ML NB AND 4 ML SB FROM SAUER ST. TO RUNNELS ST.; IH69 RECONSTRUCT FROM 8 TO 8 ML FROM W. OF PIERCE ST. TO S. OF RUNNEL ST. W/ 2, 3-LANE CONTINUOUS FRONTAGE ROADS.	Corridor	39.0418451	High	40	Yes	1 mile
H92	17088	1685-01-108		Harris	TXDOT HOUSTON DISTRICT	FM 1960	SH 249	IH 45 N	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE WHERE NO ITS EQUIPMENT CURRENTLY EXISTS	Corridor	22.562502	High	40	Yes	1 mile
H44	11375	0271-14-218		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD/IH 610	W OF MANGUM/18TH ST ON HEMPSTEAD	S OF OLD KATY RD ON IH 610	CONSTRUCT INTERCHANGE WITH MANAGED LANES AND 2 DIRECT CONNECTORS (EB - SB, WB - NB)	Corridor	31.7706414	High	38	Yes	1 mile
H75	247	0586-01-048		Brazoria	TXDOT HOUSTON DISTRICT	SH 332	AT FM 523		CONSTRUCT GRADE SEPARATION	Intersection	25.6740635	High	37	Yes	1 mile
H12	18707	0508-01-379	NULL	Harris	TXDOT HOUSTON DISTRICT	IH 10 E	East of Monmouth St	East of SS 330	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES AND CONSTRUCT 4 NEW NON-TOLLED MANAGED LANES	Intersection	41.1028151	High	37	Yes	1 mile
H45	16026	0598-01-095		Harris	TXDOT HOUSTON DISTRICT	SH 288	AT HOLCOMBE BLVD		CONSTRUCT NB-WB AND EB-SB CONNECTORS TO SH 288 TOLL LANES	Intersection	31.7436189	High	36	Yes	1 mile
H101	916	0271-04-071		Waller	TXDOT HOUSTON DISTRICT	IH 10 W	BRAZOS RIVER	FM 359	CONSTRUCT 1 ADDITIONAL MAIN LANE IN EACH DIRECTION	Corridor	21.4650792	High	36	Yes	1 mile
H73	14224	2105-01-048		Fort Bend	TXDOT HOUSTON DISTRICT	FM 2234	AT UPRR		CONSTRUCT GRADE SEPARATION (DOT# 447 968S)	Intersection	25.8714918	High	35	Yes	1 mile
H59	18106			Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	AT FM 1724		OVERPASS REVERSAL	Intersection	27.5011633	High	35	No	1 mile
H22	16337	0027-13-221		Harris	TXDOT HOUSTON DISTRICT	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)	Intersection	39.2848555	High	34	Yes	1 mile
H112	536	0389-13-039		Harris	CITY OF BAYTOWN	SH 146	AT BS 146E	FERRY RD	CONSTRUCT 4 MAINLANES AND GRADE SEPARATION	Corridor	20.3851215	High	34	Yes	1 mile
H8	16328	0500-03-599		Harris	TXDOT HOUSTON DISTRICT	IH 45 N	AT IH 10		RECONSTRUCT IH45/IH10 INTERCHANGE. IH10 REALIGN/WIDEN FROM 6 TO 8 MAINLANES (ML) FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; CONSTRUCT 4 IH10 EXPRESS LANES FROM WEST OF HOUSTON STREET TO WEST OF MAIN STREET; IH45 REALIGN FROM 6 TO 6 ML INCLUDING	Corridor	43.6931381	High	33	Yes	1 mile
H21	16340	0502-01-217		Harris	TXDOT HOUSTON DISTRICT	SH 225	AT SL 8		CONSTRUCT 5 DIRECT CONNECTORS: PHASE 1 (NBWB, SBEB, WBNB, NBEB, SBWB)	Intersection	39.2934681	High	33	Yes	1 mile
H28	16337	0027-13-221		Harris	TXDOT HOUSTON DISTRICT	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)	Intersection	35.6093331	High	33	Yes	1 mile
H23	16337	0027-13-221		Harris	TXDOT HOUSTON DISTRICT	MCGOWEN, TUAM AND ELGIN ST	AT IH 69		RECONSTRUCT 3 BRIDGES (NHHIP SEG 3B)	Intersection	39.0893047	High	32	Yes	1 mile
H3	7428	0027-13-200		Harris	TXDOT HOUSTON DISTRICT	IH 69 S	IH 45	SH 288	RECONSTRUCT AND WIDEN FROM 8 TO 10 MAIN LANES AND RECONSTRUCT IH 69/SH 288 INTERCHANGE (NHHIP SEG 3B)	Corridor	51.6553639	High	32	Yes	1 mile
H61	18713	0598-02-127		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	SH 99 (CR 60)	FM 1462	UPGRADE ROADWAY TO FREEWAY FACILITY BY ADDING OVERPASSES AND UNDERPASSES	Intersection	27.1709197	High	31	No	1 mile
H77	9637	0027-07-032		Fort Bend	TXDOT HOUSTON DISTRICT	US 90A	0.21 MI W OF LANE DR	FM 3155	REPLACE RAILROAD UNDERPASS	Intersection	25.4334995	High	31	Yes	1 mile
H100	17220	0500-03-618		Harris	TXDOT HOUSTON DISTRICT	IH 45	AT NASA 1 BYPASS INTERCHANGE		CONSTRUCT 2 DIRECT CONNECTORS (WB - SB, NB - EB)	Intersection	21.7006218	High	31	Yes	1 mile
H76	18031			Liberty	TXDOT HOUSTON DISTRICT	SH 105	SH 321 W	SH 321 E	INCREASE PAVEMENT WIDTH AND ADD LEFT TURN BAYS AND SHOULDERS	Intersection	25.4941063	High	30	Yes	1 mile
H35	18108			Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	AT JENKINS RD		OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH-10 BRIDGE.	Intersection	33.9658328	High	30	No	1 mile
H25	16336	0500-03-598		Harris	TXDOT HOUSTON DISTRICT	IH 45 S	IH 69	IH 10	CONSTRUCT PARKWAY CONNECTORS INTO DOWNTOWN HOUSTON AND REMOVE EXISTING PIERCE ELEVATED (NHHIP SEG 3D)	Corridor	37.4295697	High	30	Yes	1 mile
H109	6065	1685-05-081		Harris	TXDOT HOUSTON DISTRICT	SH 6	MEMORIAL DR	PIPING ROCK LN	RECONSTRUCT AND WIDEN FROM 6 LANES TO 8 LANES DIVIDED	Corridor	20.7595696	High	29	Yes	1 mile
H87	16033	0598-01-096		Harris	TXDOT HOUSTON DISTRICT	SH 288	AT BW 8		CONSTRUCT 8 DCs AT BW 8 INTERCHANGE	Intersection	23.43321	High	29	Yes	1 mile
H10	11226	0271-17-146		Harris	TXDOT HOUSTON DISTRICT	IH 610	IH 610 (NB)	AT IH 69 (STR #104)	CONSTRUCT DIRECT CONNECTOR (IH 610 NB TO IH 69 SB)	Intersection	42.0555276	High	27	Yes	1 mile
H2	155	0027-13-201		Harris	TXDOT HOUSTON DISTRICT	IH 69 S	SH 288	SP 527	RECONSTRUCT AND WIDEN FROM 6 TO 10 MAIN LANES (NHHIP SEG 3A)	Corridor	52.2063297	High	25	Yes	1 mile
H83	13841	0389-05-129		Harris	TXDOT HOUSTON DISTRICT	SH 146	N OF FAIRMONT PKWY	S OF SPENCER HWY	WIDEN FROM 4 TO 6 LANES TO REMOVE BOTTLE NECK	Corridor	24.4428531	High	25	Yes	1 mile
H14	17034	0271-17-161		Harris	TXDOT HOUSTON DISTRICT	IH 610	AT IH 69		RECONSTRUCTION OF IH 610 MAIN LANE BRIDGE WITHIN THE INTERCHANGE	Intersection	40.6269561	High	25	Yes	1 mile

H63	14244	3510-07-005		Montgomery	TXDOT HOUSTON DISTRICT	SH 99	AT IH 69 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)	Intersection	27.0604375	High	24	Yes	1 mile
H64	15592	3510-07-013		Montgomery	TXDOT HOUSTON DISTRICT	SH 99	AT US 59 N		SEG H: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)	Intersection	27.0604375	High	24	Yes	1 mile
H41	17232	3510-07-006		Harris	TXDOT HOUSTON DISTRICT	SH 99	AT IH 69 N		SEG G: CONSTRUCT 2 DCS (TOLL) (EB-SB, SB-WB)	Intersection	32.2691103	High	24	Yes	1 mile
H42	11383	1685-01-093		Harris	TXDOT HOUSTON DISTRICT	FM 1960	US 290	N OF ELDRIDGE PKWY	RECONSTRUCT US 290/FM 1960 INTERCHANGE	Intersection	32.2532434	High	24	No	1 mile
H103	18021	3510-05-041		Harris	TXDOT HOUSTON DISTRICT	SH 99	N OF KINGSLAND BLVD	FORT BEND COUNTY LINE	SEG D: WIDEN FROM 4 LANES TO 6 LANES	Corridor	21.4011886	High	23	No	1 mile
H16	11225	0271-17-145		Harris	TXDOT HOUSTON DISTRICT	IH 610	AT IH 69 S		CONSTRUCT DIRECT CONNECTOR (IH 610 SB TO IH 69 EB/NB) AND HOV ACCESS TO UPTOWN TRANSIT CENTER	Intersection	40.3189565	High	22	Yes	1 mile
H50	17035	0027-13-210		Harris	TXDOT HOUSTON DISTRICT	IH 69 S	IH 69 SW FWY SB	IH 610 SB	RECONSTRUCT DIRECT CONNECTOR	Intersection	29.233546	High	22	Yes	1 mile
H17	16183	0271-17-160		Harris	TXDOT HOUSTON DISTRICT	IH 610	AT US 59		ROW AND UTILITIES FOR DIRECT CONNECTOR CONSTRUCTION (IH 610 SB TO US 59 EB/NB)	Intersection	40.3189565	High	22	Yes	1 mile
H106	13864	0271-06-117		Harris	TXDOT HOUSTON DISTRICT	IH 10 W	FORT BEND C/L	MASON RD	RESTRIPE AND WIDEN FROM 10 MAIN LANES TO 10 MAIN AND 2 MANAGED LANES	Corridor	20.9751772	High	22	No	1 mile
H88	87	0912-37-232		Montgomery	LAKE HOUSTON REDEVELOPMENT AUTHORITY	NORTHPARK DR	IH 69	RUSSELL PALMER RD	WIDEN FROM 4 TO 6 LANES BOULEVARD SECTION INCLUDING DRAINAGE, GRADE SEPARATION AT UPRR/SL 494, AND INTERSECTION IMPROVEMENTS	Corridor	23.2642871	High	20	No	1 mile
H51	18028			Montgomery	TXDOT HOUSTON DISTRICT	IH 45	AT SH 242		CONSTRUCT NEW DIRECT CONNECTOR (NB - EB)	Intersection	29.2078749	High	20	No	1 mile
H110	18037	0598-02-114		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	AT CR 64	NULL	CONSTRUCT GRADE SEPARATION	Intersection	20.5908883	High	20	No	1 mile
H98	18716	0598-02-125	NULL	Brazoria	TXDOT HOUSTON DISTRICT	SH 288	AT CR 56	NULL	WIDEN CR 56 BRIDGE FROM 2 TO 4 LANES	Intersection	21.8852292	High	20	No	1 mile
H20	15577	0271-17-157		Harris	TXDOT HOUSTON DISTRICT	IH 610	IH 69 S NB (W OF IH 610)	SB IH 610 (BISSONNET RD)	RECONSTRUCT IH 69 NB (EB) TO SB IH 610 CONNECTOR	Intersection	40.0109561	High	19	Yes	1 mile
H66	10532		2007-00208	Harris	PORT OF HOUSTON AUTHORITY	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK	Intersection	26.6707583	High	19	Yes	1 mile
H47	18109			Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	AT FM 1410		OVERPASS REVERSAL	Intersection	30.5473927	High	19	No	1 mile
H53	18107			Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	AT OAK ISLAND RD		OVERPASS REVERSAL	Intersection	28.7599005	High	19	No	1 mile
H65	17218	0110-04-191		Montgomery	TXDOT HOUSTON DISTRICT	IH 45	HARRIS C/L	RAYFORD-SAWDUST RD	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING	Corridor	26.6730985	High	19	Yes	1 mile
H62	18111			Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	AT SH 73		ENTRANCE RAMP OVERPASS REVERSAL; ASSUME 1/2 MILE ON EITHER SIDE OF GRADE SEPARATION FOR EITHER SIDE OF PROPOSED IH 10 BRIDGE. SH 73 AT GRADE AND BRIDGE TO BE DEMOED	Intersection	27.0883195	High	19	No	1 mile
H36	18110			Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	AT FM 1406		OVERPASS REVERSAL	Intersection	33.6924596	High	19	No	1 mile
H102	15382			Fort Bend	FORT BEND COUNTY	FM 2759/FM 762	1000' N OF BNSF RR TO 1000' S		PHASE 2: CONSTRUCT ELEVATED INTERSECTION OF CRABB RIVER ROAD AND THOMPSON'S HIGHWAY OVER BNSF RR	Intersection	21.4431053	High	18	No	1 mile
H105	17219	0110-05-123		Harris	TXDOT HOUSTON DISTRICT	IH 45	FM 2920	MONTGOMERY C/L	RAMP MODIFICATION, ADDITION OF AUXILIARY LANES AND STRIPING	Corridor	21.2534582	High	18	No	1 mile
H19	14632	0389-05-116		Harris	TXDOT HOUSTON DISTRICT	SH 146	NASA RD 1	HARRIS/GALVESTON C/L	WIDEN TO 6-LANE ARTERIAL WITH 4-LANE EXPRESS LANES	Corridor	40.1221803	High	17	No	1 mile
H78	17036	0027-13-211		Harris	TXDOT HOUSTON DISTRICT	IH 69 S	IH 69 SW FWY NB	IH 610 NB	RECONSTRUCT DIRECT CONNECTOR	Intersection	25.4116914	High	17	Yes	1 mile
H55	6047	0500-04-103		Galveston	TXDOT HOUSTON DISTRICT	IH 45 S	N OF TEXAS CITY WYE	S OF TEXAS CITY WYE	RECONSTRUCT IH 45/SH 146/SH 6 INTERCHANGE AND WIDEN IH 45 MAIN LANES FROM 6 TO 8	Intersection	28.4856701	High	17	Yes	1 mile
H89	10612	0500-04-112		Galveston	TXDOT HOUSTON DISTRICT	IH 45 S	TEXAS CITY WYE C/L	NULL	CONSTRUCT 2 DCS (SB-EB AND WB-NB)	Intersection	23.0673242	High	17	Yes	1 mile
H107	17046	0389-05-127		Harris	TXDOT HOUSTON DISTRICT	SH 146	FAIRMONT PKWY W	NASA 1	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	20.9484203	High	17	Yes	1 mile
H81	451	3510-04-055		Fort Bend	FORT BEND COUNTY	SH 99	CINCO RANCH BLVD	WESTHEIMER PKWY	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD	Corridor	24.7738409	High	17	No	1 mile
H114	8051			Harris	HARRIS COUNTY	LOUETTA RD	E OF KUYKENDAHL RD	IH 45	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT	Corridor	20.3034572	High	16	No	1 mile
H99	14249	3510-01-003		Galveston	GALVESTON COUNTY	SH 99	AT IH 45 S		SEG B: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-NB, SB-WB, NB-WB, EB-SB)	Intersection	21.7970819	High	16	No	1 mile
H90	17113	1024-01-077		Chambers	TXDOT BEAUMONT DISTRICT	FM 565	SH 146	SH 99	WIDEN FROM 2 TO 4 LANES WITH CONTINUOUS CENTER LEFT TURN LANE AND RAILROAD OVERPASS	Corridor	22.9498527	High	16	No	1 mile
H74	139	0389-05-088		Harris	TXDOT HOUSTON DISTRICT	SH 146	RED BLUFF RD	NASA 1	WIDEN TO 8-LANES, GS AT MAJOR INTERSECTIONS AND 2 2-LANE FRONTAGE ROADS	Corridor	25.7766499	High	15	No	1 mile
H80	15454	0110-04-198		Montgomery	MONTGOMERY COUNTY	IH 45	AT WOODLANDS PKWY		CONSTRUCT SINGLE POINT URBAN INTERCHANGE	Intersection	25.1191969	High	14	Yes	1 mile
H72	13842	0389-06-095		Galveston	TXDOT HOUSTON DISTRICT	SH 146	HARRIS/GALVESTON C/L	FM 518	WIDEN TO 6-LANES ARTERIAL WITH 4-LANE EXPRESS LANES	Corridor	25.8944911	High	14	No	1 mile
H116	137	0389-05-087		Harris	TXDOT HOUSTON DISTRICT	SH 146	N OF FAIRMONT PARKWAY	S OF RED BLUFF RD	RECONSTRUCT AND WIDEN FROM 4 TO 6-LANES WITH TWO 2-LANE FRONTAGE ROADS	Corridor	20.2149303	High	13	Yes	1 mile
H56	14247	3510-03-004		Fort Bend	FBCTRA	SH 99	AT IH 69 S		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)	Intersection	28.40138	High	12	No	1 mile
H84	14248	3187-02-010		Chambers	TXDOT BEAUMONT DISTRICT	SH 99	AT IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)	Intersection	24.4032722	High	11	No	1 mile
H85	15593	3187-02-902		Chambers	TXDOT HOUSTON DISTRICT	SH 99	IH 10 E		SEG I-1/I-2: CONSTRUCT 4 DCS (TOLL)	Intersection	24.4032722	High	11	No	1 mile
H113	455	3510-04-054		Fort Bend	FORT BEND COUNTY	SH 99	S FRY ROAD	FM 1093	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD	Corridor	20.3582131	High	11	No	1 mile

H69	18105			Chambers	TXDOT BEAUMONT DISTRICT	IH 10 OVERPASS	FM 1409	NULL	CONSTRUCT OVERPASS ON IH 10 FOR FUTURE FM 1409; GRADE SEPARATION ONLY AT IH 10	Intersection	26.4224739	High	11	No	1 mile
H82	10452	0912-72-179	3.11B	Harris	PORT OF HOUSTON AUTHORITY	PORT RD	SH 146	CRUISE ST	WIDEN FROM 4 LANE TO 6 LANE DIVIDED	Corridor	24.5134707	High	10	Yes	1 mile
H58	107	0762-03-021		Chambers	CHAMBERS COUNTY	FM 1409	at IH 10		CONSTRUCT A 2 LANE BRIDGE & APPROACHES	Intersection	27.8227229	High	9	No	1 mile
H97	14242	3510-06-007		Harris	HCTRA	SH 99	AT SH 249	NULL	SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (EB-SB, NB-WB, WB-SB, NB-EB)	Intersection	22.0486318	High	9	Yes	1 mile
H108	15590	3510-06-021		Harris	TXDOT HOUSTON DISTRICT	SH 99	AT SH 249		SEG F-1/F-2: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB, SB-EB, WB-NB, EB-NB)	Intersection	20.7813892	High	9	Yes	1 mile
H38	14243	3510-06-008		Harris	TXDOT HOUSTON DISTRICT	SH 99	AT IH 45 N	NULL	CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (EB - SB, NB - WB)	Intersection	32.533261	High	8	No	1 mile
H37	15591	3510-06-022		Harris	TXDOT HOUSTON DISTRICT	SH 99	AT IH 45 N		SEG G: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (WB-NB, WB-SB, SB-EB, NB-EB)	Intersection	32.972588	High	8	No	1 mile
H115	14712	0188-03-022		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	N OF CR 467/HOGG RANCH RD	SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4 LANES	Intersection	20.2770217	High	2	No	1 mile
L54	18085			Galveston	GALVESTON COUNTY	PELICAN ISLAND BRIDGE	SH 275	SEAWOLF PKWY	CONSTRUCT BRIDGE AT NEW LOCATION	Corridor	11.2732781	Low	63	Yes	1 mile
L18	11372	0912-72-568		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	GESSNER RD	43RD ST/CLAY RD	CONSTRUCT 4 MANAGED LANES (TOLL)	Corridor	13.3793179	Low	54	Yes	1 mile
L12	18504	0028-02-097		Fort Bend	TXDOT HOUSTON DISTRICT	US 90	W OF GREENS BAYOU	E OF GREENS BAYOU	CONSTRUCT 6 MAIN LANES ON NEW LOCATION	Corridor	13.506027	Low	54	Yes	1 mile
L30	17234	0114-11-083		Waller	TXDOT HOUSTON DISTRICT	US 290	WASHINGTON C/L	SH 6	RECONSTRUCT AND WIDEN FROM 4 LANES TO 6 LANES	Corridor	12.7951268	Low	53	Yes	1 mile
L13	11565	0912-72-567		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	MANGUM	43RD ST/CLAY RD	CONSTRUCT 4 MANAGED LANES WITH DC (NB - EB) TO SL 8 (TOLL)	Corridor	13.4536022	Low	52	Yes	1 mile
L11	17214	0912-72-567		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	MANGUM	43RD ST/CLAY RD	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)	Corridor	13.5389662	Low	52	Yes	1 mile
L90	18505	0587-01-067		Brazoria	TXDOT HOUSTON DISTRICT	FM 1495	FM 523	N OF BRAZOS RIVER BRIDGE	WIDEN FROM 2 TO 4 LANES	Corridor	9.22336701	Low	51	Yes	1 mile
L19	10268	0028-02-074		Harris	TXDOT HOUSTON DISTRICT	US 90	W OF PURPLE SAGE	E OF PURPLE SAGE	CONSTRUCT 6 MAIN LANES ON NEW LOCATION	Intersection	13.3733161	Low	51	Yes	1 mile
L27	17222	0389-06-110		Galveston	TXDOT HOUSTON DISTRICT	SH 146	FM 1764	FM 1765	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES	Corridor	12.9320441	Low	50	Yes	1 mile
L21	17213	0912-72-568		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	43RD ST/CLAY RD	W OF SL 8	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)	Corridor	13.2657975	Low	49	Yes	1 mile
L1	512	1003-01-061		Brazoria	TXDOT HOUSTON DISTRICT	FM 523	SH 332	S OF FM 1495	WIDEN FROM 2 TO 4 LANE DIVIDED URBAN	Corridor	13.7686575	Low	48	Yes	1 mile
L6	5030	0912-71-836	N-000664	Harris	CITY OF HOUSTON	GREENS RD	JFK BLVD	IH 69	RECONSTRUCT AND WIDEN FROM 2 LANE TO 4-LANES DIVIDED	Corridor	13.6067603	Low	47	Yes	1 mile
L17	18116			Harris	HARRIS COUNTY	SHELDON RD	MARKET ST	JACINTO PORT BLVD	CONSTRUCT 5 LANE DIVIDED ROADWAY AND WIDEN TO 5 LANE ROADWAY IN SECTIONS.	Corridor	13.3913169	Low	47	Yes	1 mile
L60	254	0188-06-046		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	S OF JONES CREEK BRIDGE	N OF BRAZOS RIVER DIVERSION CHANNEL	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES	Corridor	10.7254638	Low	40	Yes	1 mile
L32	16344	3256-03-096		Harris	TXDOT HOUSTON DISTRICT	SL 8	N OF US 90	WOODFORE ST BLVD	WIDEN FROM 4 TO 8 LANES	Corridor	12.6517841	Low	40	Yes	1 mile
L25	504	0338-04-060		Montgomery	TXDOT HOUSTON DISTRICT	SH 105	10TH ST	SL 336	WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	13.042969	Low	39	Yes	1 mile
L10	172	0028-04-077		Liberty	TXDOT BEAUMONT DISTRICT	US 90	FM 563	FM 160	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY	Corridor	13.5650614	Low	38	Yes	1 mile
L8	17061	0051-02-101		Multiple	CITY OF WEBSTER	SH 3	RICHEY ST S	FM 518	MILL AND ASPHALT OVERLAY OF SHOULDERS, SHOULDER WIDENING, PAVEMENT MARKINGS, STRIPING AND SIGNAGE FOR BIKE FACILITY	Corridor	13.5748433	Low	38	Yes	1 mile
L14	53			Harris	TXDOT HOUSTON DISTRICT	BF 1960A	FM 1960 W OF LEE RD	FM 1960 E OF HUMBLE CITY LIMITS	WIDEN FROM 2 TO 4 LANES DIVIDED	Corridor	13.4313983	Low	37	Yes	1 mile
L20	17233	0114-11-077		Waller	TXDOT HOUSTON DISTRICT	US 290	SH 6	HARRIS C/L (FM 2920/FM 362)	WIDEN FROM 4 LANES TO 6 LANES	Corridor	13.3201574	Low	35	Yes	1 mile
L28	18154			Fort Bend	TXDOT HOUSTON DISTRICT	US 90A	BAMORE RD	HARLEM RD	ACCESS MANAGEMENT TREATMENTS INCLUDE CONSTRUCTION OF NEW INTERSECTION, INSTALLATION OF RAISED MEDIANS, DRIVEWAY MODIFICATIONS, ADDITION, EXTENSION AND CLOSURE OF TURN LANES, TRAFFIC SIGNAL INSTALLATION AND TRAFFIC SIGNAL TIMING OPTIMIZATION.	Corridor	12.9086661	Low	35	Yes	1 mile
L42	255	0188-05-027		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	S OF CITY OF BRAZORIA	S OF JONES CREEK BRIDGE	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY AND GRADE SEPARATION AT FM 2004	Corridor	12.0414229	Low	35	Yes	1 mile
L36	10144	0978-02-053		Galveston	TXDOT HOUSTON DISTRICT	FM 646	FM 3436	SH 146	WIDEN FROM 2 LANE TO 4 LANE DIVIDED	Corridor	12.2414436	Low	32	Yes	1 mile
L81	11562	0188-02-036		Fort Bend	TXDOT HOUSTON DISTRICT	SH 36	S OF NEEDVILLE FAIRCHILDS RD	BRAZORIA C/L	WIDEN FROM 2 LANE TO 4 LANE DIVIDED	Corridor	9.71612169	Low	31	No	1 mile
L66	18233			Harris	HOUSTON TRANSTAR	US 90	SL 8 E	RUNNEBURG	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON US 90 FROM BELTWAY 8 TO RUNNEBURG ROAD, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN HARRIS COUNTY.	Corridor	10.5946265	Low	31	Yes	1 mile
L38	7750	0187-05-049		Fort Bend	TXDOT HOUSTON DISTRICT	SH 36	AUSTIN C/L	SP 529 IN ROSENBERG	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	12.1718362	Low	31	Yes	1 mile
L68	16347	0028-04-069		Liberty	TXDOT BEAUMONT DISTRICT	US 90	FM 160	SH 61	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY	Corridor	10.4578318	Low	30	Yes	1 mile

L84	520	0178-03-100		Brazoria	TXDOT HOUSTON DISTRICT	SH 35	BS 35C S	FM 2403	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	9.53679079	Low	30	Yes	1 mile
L64	16297			Harris	HCTRA	SL 8	IH 69	US 90	WIDEN FROM 6 TO 8-LANES	Corridor	10.646808	Low	30	Yes	1 mile
L15	7792			Harris	HARRIS COUNTY	LITTLE YORK RD W	ELDRIDGE PKWY N	BRITTMORE RD	WIDEN FROM 4 TO 6-LANES	Corridor	13.4163322	Low	30	Yes	1 mile
L7	15480			Montgomery	CITY OF CONROE	SH 105	LP 336 W	IH 45 N	ACCESS MANAGEMENT TREATMENTS	Corridor	13.5797381	Low	30	Yes	1 mile
L77	263	0188-01-016		Fort Bend	TXDOT HOUSTON DISTRICT	SH 36	IH 69 S	FM 2218	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED	Corridor	9.94422531	Low	29	Yes	1 mile
L111	18076			Fort Bend	FORT BEND COUNTY	SH 99	AIRPORT BLVD W	FM 1464	WIDEN SH 99 FROM 2 TO 4 LANES	Corridor	6.9024887	Low	29	Yes	1 mile
L65	252	0188-04-025		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	SH 35	N OF SH 332	WIDEN FROM 2 TO 4 LANES DIVIDED	Corridor	10.6039534	Low	29	Yes	1 mile
L4	13590			Fort Bend	CITY OF SUGAR LAND	ELDRIDGE RD	AT US 90A		UNDERPASS AT US 90A AND ELDRIDGE RD	Intersection	13.6259624	Low	29	No	1 mile
L109	17226	0178-03-136		Brazoria	TXDOT HOUSTON DISTRICT	SH 35	FM 2403	FM 523	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	7.20878235	Low	28	Yes	1 mile
L56	18182			Harris	METRO	SH 249	BOUDREAUX DR	HOLLISTER DR	CONSTRUCT NEW TWO-WAY, ALL-DAY HOV FACILITY	Corridor	11.1049203	Low	28	Yes	1 mile
L16	223	0177-03-096		Liberty	TXDOT BEAUMONT DISTRICT	US 59	S END OF CLEVELAND BY-PASS	MONTGOMERY C/L	RECONSTRUCT AND WIDEN TO 6 MAIN LANES WITH FRONTAGE ROADS	Corridor	13.4075993	Low	27	Yes	1 mile
L93	262	0188-02-029		Fort Bend	TXDOT HOUSTON DISTRICT	SH 36	FM 2218	S OF NEEDVILLE FAIRCHILDS RD	WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY WITH INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS	Corridor	9.08009112	Low	26	No	1 mile
L3	18721	1685-05-105	NULL	Harris	TXDOT HOUSTON DISTRICT	SH 6	AT FM 529		INTERSECTION IMPROVEMENTS	Intersection	13.6469608	Low	26	Yes	1 mile
L108	18039			Liberty	TXDOT BEAUMONT DISTRICT	FM 1960	SH 321	SH 99	WIDEN ROADWAY FROM 2 LANES TO 4 LANES	Corridor	7.21209663	Low	26	No	1 mile
L102	18032			Fort Bend	FORT BEND COUNTY	SH 99	AT PEEK RD		RECONSTRUCTION OF OVERPASS. INSTALL TRAFFIC SIGNALS FOR AT-GRADE PORTION OF INTERSECTION AND RECONFIGURE EXISTING ENTRANCE AND EXIT RAMPS FOR SH 99	Intersection	8.11472379	Low	26	No	1 mile
L96	7615			Galveston	CITY OF TEXAS CITY	SHOAL POINT ACCESS RD	LP 197	SOUTHERN END TERMINAL SITE	CONSTRUCT NEW 4 LANE ROADWAY	Corridor	8.99710089	Low	26	Yes	1 mile
L87	18502	0111-04-037		Brazoria	TXDOT HOUSTON DISTRICT	FM 521	FM 1462	FORT BEND C/L	WIDEN FROM 2 LANES TO 4 LANES DIVIDED	Corridor	9.48288377	Low	26	No	1 mile
L91	11196			Fort Bend	CITY OF SUGAR LAND	UNIVERSITY BLVD	IH 69 S New Territory Blvd	SH 6 1,000 ft. south of Lexington Blvd (Wentorth Ave)	WIDEN FROM 4-LANE TO 6-LANE, INTERSECTION IMPROVEMENTS AND SIGNAL MODIFICATIONS	Corridor	9.17145665	Low	25	No	1 mile
L75	7867	0178-03-137		Brazoria	TXDOT HOUSTON DISTRICT	SH 35	SH 99	BS 35C SOUTH	CONSTRUCT 4 LANE FREEWAY ON NEW LOCATION	Corridor	10.0493739	Low	25	Yes	1 mile
L85	914	0720-02-074		Montgomery	MONTGOMERY COUNTY	SH 249	FM 1774/FM 149 IN PINEHURST	SPRING CREEK/HARRIS C/L	CONSTRUCT 4 LANE TOLLWAY WITH GRADE SEPARATIONS AT STAGECOACH RD AND WOODLANDS PARKWAY	Corridor	9.53538623	Low	24	Yes	1 mile
L88	16349			Montgomery	MONTGOMERY COUNTY	SH 249	FM 1774/FM 149 IN PINEHURST	HARRIS CL	WIDEN FROM 4-LANE TO 6-LANE TOLLWAY	Corridor	9.47751777	Low	24	Yes	1 mile
L35	16338	0338-05-028		Liberty	TXDOT BEAUMONT DISTRICT	SH 105	MONTGOMERY C/L	BS 105	WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	12.4397037	Low	24	Yes	1 mile
L86	256	0188-04-035		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	S OF SH 35	FM 522	RECONSTRUCT TO 4 LANE DIVIDED WITH CLTL, INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS	Corridor	9.52808158	Low	24	Yes	1 mile
L63	39			Galveston	GALVESTON COUNTY	FM 517	FM 3436	SH 146	WIDEN FROM 2 TO 4 LANES DIVIDED WITH CURB AND GUTTER	Corridor	10.6652436	Low	24	Yes	1 mile
L95	13	2093-01-010		Fort Bend	TXDOT HOUSTON DISTRICT	FM 2218	US 59	SH 36	WIDEN FROM 2 LANES TO 4-LANE DIVIDED	Corridor	9.004536	Low	24	Yes	1 mile
L61	14710	0543-03-067		Fort Bend	TXDOT HOUSTON DISTRICT	FM 762	FM 762/FM 2759	S OF LCISD SCHOOL ON CRABB RIVER RD	WIDEN TO 4-LANES DIVIDED (SEGMENT 2)	Corridor	10.7070496	Low	23	No	1 mile
L79	18501	0111-03-064		Fort Bend	TXDOT HOUSTON DISTRICT	FM 521	BRAZORIA C/L	SH 6	WIDEN FROM 2 LANES TO 4 LANES DIVIDED	Corridor	9.89693897	Low	23	No	1 mile
L9	17098	0027-12-152		Fort Bend	TXDOT HOUSTON DISTRICT	IH 69 S	E of SS 529	SH 99	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	13.5653283	Low	23	Yes	1 mile
L80	18724	3510-05-047		Harris	TXDOT HOUSTON DISTRICT	SH 99 SEG E	WEST RD	IH 10 W	SEG E: WIDEN EXISTING 4 LANE TOLL FACILITY TO 6 LANE TOLL FACILITY TO MITIGATE CONGESTION AND SUPPORT OPERATIONAL EFFICIENCY	Corridor	9.74301315	Low	23	No	1 mile
L34	10124	0338-04-066		Montgomery	TXDOT HOUSTON DISTRICT	SH 105	FM 1484	SAN JACINTO C/L	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	12.5011423	Low	23	Yes	1 mile
L44	14258	0188-04-050		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	SH 35	S OF SH 35	GRADE SEPARATION OVER NEW SH 35 AND RESTRIPE PAVEMENT FROM 2 TO 4 LANES	Corridor	11.9803328	Low	22	No	1 mile
L22	204	1685-03-058		Harris	TXDOT HOUSTON DISTRICT	FM 1960	BF 1960A	E OF TWIGSWORTH LN	WIDEN FROM 4-LANE TO 6-LANE DIVIDED WITH RAISED MEDIAN, CHANNELIZED TURN LANES	Corridor	13.2608668	Low	22	Yes	1 mile
L51	18056			Harris	HOUSTON TRANSTAR	BS 90, FM 1942, FM 2100	VA	VA	INSTALLATION OF FIBER OPTIC CABLE IN HARRIS COUNTY ON BUSINESS 90, FM 1942, AND FM 2100 IN THE FOLLOWING LOCATIONS: BUSINESS 90 FROM SHELDON RD TO FM 2100; FM 1942 FROM US 90 TO INDIAN SHORES RD; FM 2100 FROM US 90 TO BOHEMIAN HALL RD.	Corridor	11.4362961	Low	22	Yes	1 mile
L104	11373	0912-72-570		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	W OF HUFFMEISTER	JONES RD	CONSTRUCT 4 MANAGED LANES	Corridor	7.92365326	Low	22	Yes	1 mile
L69	257	3510-02-001		Brazoria	TXDOT HOUSTON DISTRICT	SH 99	S OF FM 1462	GALVESTON C/L	SEG B: CONSTRUCT 4 LANE TOLLWAY WITH INTERCHANGES AND TWO NON-CONTINUOUS 2 LANE FRONTAGE ROADS	Corridor	10.2612842	Low	22	Yes	1 mile
L2	6048	0027-12-097		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	0.42 MI W OF FM 762	0.31 MI W OF FM 2759	WIDEN TO 8 MAINLANES WITH HOV LANES, FRONTAGE ROADS, ITS & TMS	Corridor	13.7275067	Low	21	Yes	1 mile

L92	17209	1414-02-008		Brazoria	TXDOT HOUSTON DISTRICT	FM 528	BS 35	SH 35 BYPASS	WIDEN FROM 2 TO 4 LANES	Corridor	9.13499168	Low	21	Yes	1 mile
L55	18063			Liberty	CITY OF DAYTON	WACO ST	SH 321	FM 1960	CONSTRUCT 3 LANE ROADWAY WITH CLTL, SIDEWALK ON EAST SIDE AND STORM SEWER IMPROVEMENTS	Corridor	11.13652	Low	21	No	1 mile
L49	18229			Fort Bend	HOUSTON TRANSTAR	SS 10	IH 69	SH 36 S	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SPUR 10 FROM US 59 (IH-69) TO SH 36, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN FORT BEND COUNTY.	Corridor	11.4937438	Low	21	No	1 mile
L99	7706	0338-07-019		Montgomery	TXDOT HOUSTON DISTRICT	SH 105	SAN JACINTO C/L	LIBERTY C/L	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	8.74958647	Low	21	Yes	1 mile
L33	17049	1062-04-058		Harris	TXDOT HOUSTON DISTRICT	FM 2100	FM 1960	S OF ANTELOPE DR	WIDEN FROM 2 TO 4-LANES DIVIDED	Corridor	12.528818	Low	21	No	1 mile
L47	18328	0271-09-025		Waller	TXDOT HOUSTON DISTRICT	US 90	IH 10	FM 2855	WIDEN FROM 2 LANES TO 4 LANES	Corridor	11.6664172	Low	20	Yes	1 mile
L101	18029	0027-08-147		Fort Bend	TXDOT HOUSTON DISTRICT	US 90A	FM 359	SH 99	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES DIVIDED (PHASE 2 OF 3)	Corridor	8.49592189	Low	20	Yes	1 mile
L98	261	0187-05-036		Fort Bend	TXDOT HOUSTON DISTRICT	SS 10	IH 69/US 59	SH 36	WIDEN FROM 2- LANES TO 4-LANES DIVIDED	Corridor	8.89036828	Low	20	Yes	1 mile
L53	16348	0027-08-180		Fort Bend	TXDOT HOUSTON DISTRICT	US 90A	AT SH 99		CONSTRUCT GRADE SEPARATION AND INTERSECTION IMPROVEMENTS	Intersection	11.2788226	Low	20	Yes	1 mile
L57	17044	0192-01-099		Fort Bend	TXDOT HOUSTON DISTRICT	SH 6	FORT BEND PARKWAY TOLLWAY	BRAZORIA C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	11.0642877	Low	20	No	1 mile
L58	14711	1415-03-010		Fort Bend	TXDOT HOUSTON DISTRICT	FM 2759	S OF SANBURY BLVD	FM 762/FM 2759 ON CRABB RIVER RD	WIDEN TO 4-LANES DIVIDED (SEGMENT 2)	Corridor	10.8227776	Low	20	No	1 mile
L37	18232			Galveston	HOUSTON TRANSTAR	SH 6	GALVESTON C/L	IH 45	INSTALL TRAFFIC MANAGEMENT SYSTEM INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS	Corridor	12.2271373	Low	19	Yes	1 mile
L115	16318	3050-02-034		Montgomery	TXDOT HOUSTON DISTRICT	FM 2978	AT SPRING CREEK		REPLACE BRIDGE AND APPROACHES	Intersection	5.03964161	Low	19	Yes	1 mile
L100	18230			Brazoria	HOUSTON TRANSTAR	SH 6	SH 288	GALVESTON C/L	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SH 6 FROM SH 288 TO GALVESTON COUNTY LINE, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN BRAZORIA COUNTY.	Corridor	8.68538795	Low	19	Yes	1 mile
L31	12234	0508-03-098		Chambers	TXDOT BEAUMONT DISTRICT	SH 73	FM 1663, EAST	W OF JEFFERSON C/L	REHAB AND EXTEND EXISTING FRONTAGE ROADS	Corridor	12.7003843	Low	19	No	1 mile
L24	8037			Harris	HARRIS COUNTY	LOUETTA RD	STEUBNER AIRLINE RD	T.C. JESTER BLVD	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT W/DITCHES	Corridor	13.1119936	Low	18	No	1 mile
L89	253	0188-03-019		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	FORT BEND C/L	N OF SH 35	WIDEN FROM 2 TO 4 LANE DIVIDED ROADWAY WITH INTERSECTION IMPROVEMENTS AND BICYCLE ACCOMMODATIONS	Corridor	9.42253292	Low	18	No	1 mile
L50	13767	0598-02-093		Brazoria	BRAZORIA COUNTY	SH 288	CR 58	SH 99	CONSTRUCT 4 TOLL LANES WITH GRADE SEPARATIONS	Corridor	11.46606	Low	18	No	1 mile
L40	18329			Montgomery	HOUSTON TRANSTAR	SH 105	IH 45	FM 1486	INSTALLATION OF FIBER OPTIC CABLE IN MONTGOMERY COUNTY ON SH 105 FROM FOSTORIA ROAD TO FM 1486.	Corridor	12.0909267	Low	18	Yes	1 mile
L112	7705	0338-06-011		San Jacinto	TXDOT HOUSTON DISTRICT	SH 105	MONTGOMERY C/L	MONTGOMERY C/L	*INFORMATION ONLY* WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	6.73509563	Low	17	Yes	1 mile
L52	10532		2007-00208	Harris	PORT OF HOUSTON AUTHORITY	SPENCER HWY	AT MAINLINE DOUBLE-RAILTRACK		CONSTRUCT GRADE SEPARATION OVER MAINLINE DOUBLE-RAIL TRACK	Corridor	11.3589002	Low	17	Yes	1 mile
L71	12831	0178-02-082		Brazoria	TXDOT HOUSTON DISTRICT	SH 35	BS 35C NORTH	SH 99	CONSTRUCT 4 LANE FREEWAY ON NEW LOCATION	Corridor	10.159843	Low	17	Yes	1 mile
L73	18027	0178-02-092		Brazoria	TXDOT HOUSTON DISTRICT	SH 35	BS 35 C N (NORTH GORDON ST)	STEELE RD	CONSTRUCT 4 MAIN LANES AND OVERPASSES	Corridor	10.0819871	Low	17	Yes	1 mile
L105	11374	0050-08-095		Harris	TXDOT HOUSTON DISTRICT	US 290	S OF TELGE	S OF SH 6	CONSTRUCT TWO 2-LANES DIRECT CONNECTORS (EB US 290 TO EB HEMPSTEAD MANAGED LANES AND WB HEMPSTEAD MANAGED LANES) TO WB US 290) (THESE ARE TWO PARALLEL FACILITIES)	Intersection	7.85948135	Low	17	No	1 mile
L29	18712	NULL		Harris	TXDOT HOUSTON DISTRICT	IH 610 S	SH 35 (SS 5/MYKAWA RD)	SH 288	RECONSTRUCT FREEWAY INCLUDING TSM IMPROVEMENTS	Corridor	12.8830206	Low	17	No	1 mile
L62	8061			Harris	HARRIS COUNTY	LOUETTA RD	SH 249	MEMORIAL CHASE	WIDEN 4-LANE BLVD TO 6-LANE BLVD	Corridor	10.6971161	Low	16	No	1 mile
L70	18728	0178-02-081		Brazoria	TXDOT HOUSTON DISTRICT	SH 35	FM 518	S OF SH 6	WIDEN FROM 4 TO 6 LANE DIVIDED	Corridor	10.2405808	Low	16	Yes	1 mile
L82	18646	0192-02-053		Brazoria	TXDOT HOUSTON DISTRICT	SH 6	FORT BEND C/L	SH 288	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	9.68181047	Low	16	No	1 mile
L76	10920	3049-01-023		Galveston	TXDOT HOUSTON DISTRICT	FM 646	FM 1266	FM 3436	WIDEN FROM 2 LANE TO 4 LANE DIVIDED	Corridor	9.98204947	Low	16	Yes	1 mile
L114	8088	3510-02-003		Brazoria	TXDOT HOUSTON DISTRICT	SH 99	SH 35		CONSTRUCT 2 DIRECT CONNECTORS (TOLL)	Intersection	5.91099253	Low	15	Yes	1 mile
L26	12760	0912-31-305	TR1304	Brazoria	BRAZORIA COUNTY	CR 59	CR 48	KIRBY DR	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED.	Corridor	12.9816727	Low	15	No	1 mile
L74	15315			Brazoria	BRAZORIA COUNTY	CR 220	SH 288	FM 523	WIDEN EXISTING ROADWAY TO 4 LANES (PHASE 2)	Corridor	10.0508721	Low	15	No	1 mile
L106	16342	0720-03-133		Harris	TXDOT HOUSTON DISTRICT	SH 249	S OF CHASEWOOD PARK DR	N OF GREGSON RD	RESTRIPE EXISTING PAVEMENT FROM 6 TO 8 LANES	Corridor	7.61060709	Low	14	No	1 mile
L5	18252			Brazoria	TXDOT HOUSTON DISTRICT	SH 288	CR 59	SH 6	WIDEN FROM 4 TO 6 MAIN LANES	Corridor	13.6233514	Low	14	No	1 mile
L39	538	1062-04-022		Harris	TXDOT HOUSTON DISTRICT	FM 2100	N OF HARE COOK RD	S DIAMONDHEAD BLVD	WIDEN TO 4-LANE DIVIDED	Corridor	12.1415665	Low	14	Yes	1 mile
L78	16320	1002-01-006		Brazoria	TXDOT HOUSTON DISTRICT	FM 517	GALVESTON C/L	SH 35	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES	Corridor	9.93453701	Low	13	Yes	1 mile

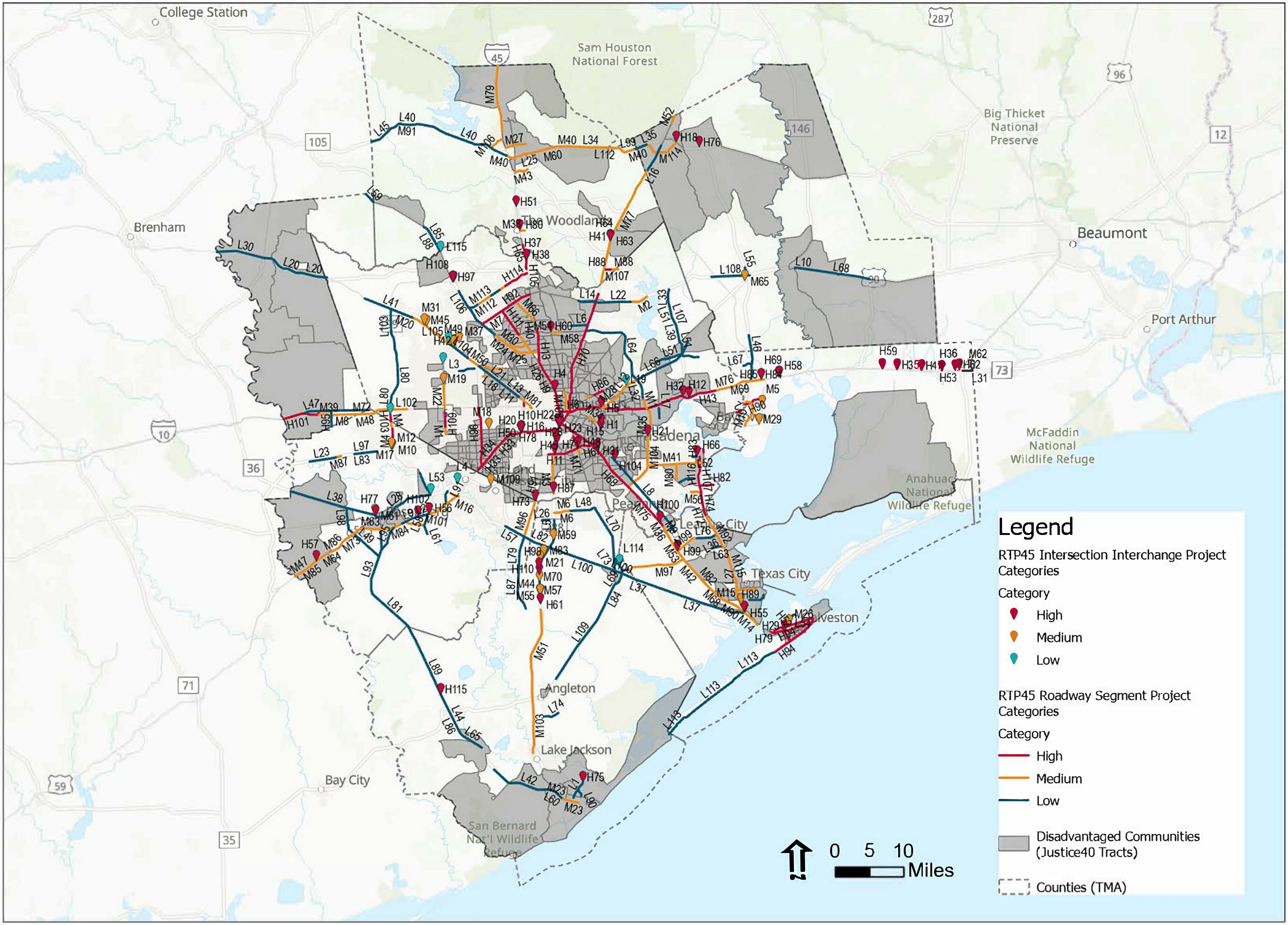
L48	10133	0976-02-086		Brazoria	TXDOT HOUSTON DISTRICT	FM 518	FM 865	SH 35	WIDEN FROM 4 LANE TO 6 LANE	Corridor	11.5978922	Low	13	No	1 mile
L43	241			Waller	WALLER COUNTY	WOODS RD	US 90	IH 10	WIDEN FROM 2 TO 4 LANES	Corridor	12.0003294	Low	13	Yes	1 mile
L107	17048	1062-04-057		Harris	TXDOT HOUSTON DISTRICT	FM 2100	S OF ANTELOPE DR	N OF HARE COOK RD	WIDEN TO 4-LANE DIVIDED	Corridor	7.55012483	Low	13	No	1 mile
L67	18159			Chambers	TXDOT BEAUMONT DISTRICT	FM 1942	HATCHERVILLE RD	SH 146	INSTALLATION OF FIBER OPTIC COMMUNICATIONS CABLE FOR REAL TIME TRAFFIC MONITORING, SIGNAL ADJUSTMENTS, AND CONGESTION MANAGEMENT	Corridor	10.5031113	Low	12	No	1 mile
L94	11040			Harris	CITY OF PASADENA	CHOATE RD	RED BLUFF RD	BAY AREA BLVD	DESIGN, ACQUIRE ROW & CONSTRUCT 4-LANE DIVIDED ROADWAY INCLUDING DRAINAGE AND SIGNALS	Corridor	9.03724726	Low	12	Yes	1 mile
L46	18083			Chambers	TXDOT BEAUMONT DISTRICT	SH 146	IH 10 E	LYNCHBURG CANAL	RECONSTRUCT SH 146 FROM IH 10 TO LYNCHBURG CANAL IN CHAMBERS COUNTY. ACCESS MANAGEMENT TREATMENTS INCLUDE RAISED MEDIANS WITH TURN LANES, SIDEWALK, AND STREETSCAPE IMPROVEMENTS.	Corridor	11.6747828	Low	11	No	1 mile
L41	17099	0050-06-089		Harris	TXDOT HOUSTON DISTRICT	US 290	MUESCHKE RD TO WASHINGTON C/L	AND SH 6 FROM US 290 TO GRIMES C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	12.0580871	Low	11	No	1 mile
L45	965	0338-02-032		Montgomery	TXDOT HOUSTON DISTRICT	SH 105	GRIMES C/L	FM 149	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES DIVIDED	Corridor	11.6978785	Low	11	No	1 mile
L59	7407	1400-03-006		Waller	TXDOT HOUSTON DISTRICT	FM 1774	GRIMES C/L	MONTGOMERY C/ L	WIDEN TO 4-LANE DIVIDED RURAL	Corridor	10.8156712	Low	10	Yes	1 mile
L110	18114	0271-09-026		Waller	TXDOT HOUSTON DISTRICT	US 90	FM 2855	FORT BEND C/L	WIDEN FROM 2 LANES TO 4 LANES	Corridor	7.18975387	Low	10	Yes	1 mile
L23	17200	1258-02-039		Fort Bend	TXDOT HOUSTON DISTRICT	FM 1093	FM 1489	FM 359 IN FULSHEAR	RECONSTRUCT AND WIDEN EXISTING PAVEMENT FROM 2-LANE TO 4-LANE DIVIDED	Corridor	13.210058	Low	9	No	1 mile
L113	15051	0051-09-024		Galveston	TXDOT HOUSTON DISTRICT	FM 3005	SAN LUIS PASS	W END OF GALVESTON SEAWALL	INSTALL CROSS CULVERTS, DRIVEWAY ADJUSTMENTS, OVERLAY AND STRIPING (PHASE 2)	Corridor	5.97673219	Low	8	Yes	1 mile
L83	8014	0543-02-064		Fort Bend	FORT BEND COUNTY	FM 359	W of Texas Heritage Pkwy	W of FM 723	CONSTRUCT NEW 4-LANES TOLLWAY	Corridor	9.64506717	Low	8	No	1 mile
L97	16192	1258-03-045		Fort Bend	FORT BEND COUNTY	FM 1093	FM 1463/FM 359	W OF FM 723	CONSTRUCT 4 TOLL LANES	Corridor	8.97793052	Low	7	No	1 mile
L72	18403	0271-10-011		Fort Bend	TXDOT HOUSTON DISTRICT	US 90	Waller C/L	FM 1463	WIDEN FROM A 2 LANES TO 4 LANES	Corridor	10.0857166	Low	7	No	1 mile
L103	18725	3510-05-048		Harris	TXDOT HOUSTON DISTRICT	SH 99 SEG E	US 290	WEST RD	SEG E: WIDEN EXISTING 4 LANE TOLL FACILITY TO 6 LANE TOLL FACILITY TO MITIGATE CONGESTION AND SUPPORT OPERATIONAL EFFICIENCY	Corridor	7.94948547	Low	6	No	1 mile
M13	14186			Harris	CITY OF HOUSTON	CALVALCADE RD	HOMESTEAD RD	LIBERTY RD	ROADWAY EXTENSION OF 4-LANES	Corridor	18.8657403	Medium	71	Yes	1 mile
M34	11179	0912-72-075	N-000787	Harris	HARRIS COUNTY	CLINTON DR	PORT OF HOUSTON GATE 8	IH 610	RECONSTRUCT CLINTON DRIVE	Corridor	17.6788938	Medium	70	Yes	1 mile
M54	18727	3256-02-093		Harris	TXDOT HOUSTON DISTRICT	SL 8	E OF HARDY TOLL ROAD	E OF ALDINE-WESTFIELD RD	RECONSTRUCT AND WIDEN EB AND WB FRONTAGE ROADS FROM 4 TO 6 LANES	Corridor	16.3977928	Medium	65	Yes	1 mile
M58	18503	0912-72-574		Harris	TXDOT HOUSTON DISTRICT	SL 8	W OF ALDINE WESTFIELD RD	E OF ALDINE WESTFIELD RD	RESTRIPE WESTBOUND MAIN LANES FROM 3 TO 4 LANES	Corridor	16.0734041	Medium	65	Yes	1 mile
M71	209	0178-09-020		Harris	TXDOT HOUSTON DISTRICT	SH 35 (Spur 5)	DIXIE DR	N of GRIGGS RD	CONSTRUCT 8 LANE FREEWAY ON NEW LOCATION	Corridor	15.5908954	Medium	63	Yes	1 mile
M108	15208			Harris	HCTRA	HARDY TOLL RD	IH 610	IH 69	CONSTRUCT 4-LANE TOLL ROAD TO COMPLETE HARDY TOLL"" ROAD""	Corridor	14.0132158	Medium	63	Yes	1 mile
M26	15492			Galveston	CITY OF GALVESTON	PORT OF GALVESTON	51ST ST	HARBORSIDE DR	51ST ST FLYOVER TO HARBORSIDE DR	Intersection	18.0891716	Medium	63	Yes	1 mile
M32	210	0178-09-019		Harris	TXDOT HOUSTON DISTRICT	SH 35	DIXIE DR	LONG DR	CONSTRUCT 2 TWO LANE FRONTAGE ROADS ON NEW LOCATION	Corridor	17.7430956	Medium	63	Yes	1 mile
M111	8006			Harris	HARRIS COUNTY	WEST RD	SH 249	VETERANS MEMORIAL	CONSTRUCT NEW 4-LANE DIVIDED	Corridor	13.9449283	Medium	58	Yes	1 mile
M67	8077			Harris	HARRIS COUNTY	VETERANS MEMORIAL DR	SL 8	SH 249	WIDEN FROM 4 LANE TO 6 LANE ROADWAY	Corridor	15.7385864	Medium	56	Yes	1 mile
M30	17224	0720-03-131		Harris	TXDOT HOUSTON DISTRICT	SH 249	SL 8	IH 45 N	RECONSTRUCT AND WIDEN FROM 6 TO 8 LANES DIVIDED	Corridor	17.8166475	Medium	54	Yes	1 mile
M25	17063	0720-03-134		Harris	TXDOT HOUSTON DISTRICT	SH 249	SL 8	IH 45 N	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)	Corridor	18.1161142	Medium	54	Yes	1 mile
M24	18060			Harris	TXDOT HOUSTON DISTRICT	SH 249	SL 8	IH 45 N	ACCESS MANAGEMENT TREATMENTS	Corridor	18.1224478	Medium	54	Yes	1 mile
M89	18130			Galveston	CITY OF TEXAS CITY	5TH/4TH AVE	SH 146	LP 197	RECONSTRUCT TWO WAY ROADWAY TO A ONE WAY EASTBOUND FACILITY	Corridor	14.7439504	Medium	54	Yes	1 mile
M66	8052			Harris	HARRIS COUNTY	KUYKENDAHL RD	FM 1960	RANKIN RD	WIDEN FROM 4 TO 6 LANE BLVD	Corridor	15.7429102	Medium	52	Yes	1 mile
M35	16296			Harris	HCTRA	SL 8	IH 10	SH 225	WIDEN FROM 4 TO 8-LANES INCLUDING BRIDGE ACROSS HOUSTON SHIP CHANNEL	Corridor	17.5982525	Medium	49	Yes	1 mile
M11	16344	3256-03-096		Harris	TXDOT HOUSTON DISTRICT	SL 8	WOODFOREST BLVD	S OF IH 10 E	WIDEN FROM 6 TO 8 LANES (RE-STRIPE EXISTING PAVEMENT)	Corridor	18.9614604	Medium	49	Yes	1 mile
M28	17043	0028-02-092		Harris	TXDOT HOUSTON DISTRICT	US 90	IH 610 E	SL 8	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)	Corridor	17.8924717	Medium	49	Yes	1 mile
M110	5007		N-000589	Harris	CITY OF HOUSTON	TANNER RD	TRIWAY LN	HEMPSTEAD	WIDEN FROM 2 LANES TO 4-LANE DIVIDED	Corridor	13.9506056	Medium	48	Yes	1 mile
M74	11864		N-000589	Harris	CITY OF HOUSTON	TANNER RD	CAMPBELL RD	TRIWAY LN	WIDEN TO 4-LANE DIVIDED ROAD WITH CURBS AND SIDEWALKS AND NECESSARY UNDERGROUND UTILITIES	Corridor	15.4400434	Medium	45	Yes	1 mile
M3	7748	0598-01-906	0598-01-906 (old)	Harris	TXDOT HOUSTON DISTRICT	SH 288	IH 610	SL 8	RECONSTRUCT AND WIDEN FROM 6 MAIN LANES TO 8 MAIN LANES	Corridor	20.0432978	Medium	45	Yes	1 mile
M95	17215			Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	IH 610	MANGUM	RECONSTRUCT AS DIVIDED 4 LANE ROADWAY (FUTURE HEMPSTEAD HIGHWAY FRONTAGE ROADS)	Corridor	14.3958717	Medium	44	Yes	1 mile
M114	12007			Liberty	TXDOT BEAUMONT DISTRICT	SH 105 BYPASS	SH 105 W OF CLEVELAND	SH 321 E OF CLEVELAND	WIDEN FROM 2 TO 4 LANES	Corridor	13.8729031	Medium	43	Yes	1 mile

M7	14173	1685-01-090		Harris	TXDOT HOUSTON DISTRICT	FM 1960	SH 249	CUTTEN RD	INTERSECTION IMPROVEMENTS (RECONSTRUCT ROADWAY TO ADD TURNING LANES AND PEDESTRIAN AND BICYCLE ACCOMMODATIONS)	Corridor	19.540777	Medium	41	Yes	1 mile
M98	17223	0389-07-029		Galveston	TXDOT HOUSTON DISTRICT	SH 146	FM 1765	GALVESTON WYE	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES	Corridor	14.2909476	Medium	41	Yes	1 mile
M52	16346	0177-03-099		Liberty	TXDOT BEAUMONT DISTRICT	US 59 N	SAN JACINTO C/L	0.65 MI S OF SL 573	CONVERT MAINLANES TO FREEWAY AND CONSTRUCT TWO 2 LANE FRONTAGE ROADS	Corridor	16.4210342	Medium	41	Yes	1 mile
M94	111			Harris	HARRIS COUNTY	LITTLE YORK RD W	US 290	HOUSTON CITY LIMITS	WIDEN 4 TO 6-LANES	Corridor	14.4127552	Medium	41	Yes	1 mile
M47	6063	0089-09-067		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	WHARTON COUNTY LINE	W OF DARST RD	WIDEN TO 6-MAIN LANES, W/ 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS	Corridor	16.5310799	Medium	40	Yes	1 mile
M18	17112	0912-72-384		Harris	CITY OF HOUSTON	GESSNER DR S	AT WESTHEIMER RD		CONSTRUCT GRADE SEPARATION OVER WESTHEIMER RD	Intersection	18.4492266	Medium	39	Yes	1 mile
M19	18509	1685-05-107		Harris	TXDOT HOUSTON DISTRICT	SH 6	AT CLAY RD		GRADE SEPARATION AND INTERSECTION IMPROVEMENTS	Intersection	18.4285309	Medium	38	Yes	1 mile
M115	18231			Galveston	HOUSTON TRANSTAR	SH 146	IH 45	SH 96	INSTALLATION OF AN ACTIVE TRAFFIC MANAGEMENT SYSTEM ON SH 146 FROM IH-45 TO SH 96, INCLUDING FIBER OPTIC CABLE, CLOSED CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS, VEHICLE SENSING DEVICES, AND TRAVEL TIME READERS IN GALVESTON COUNTY.	Corridor	13.7714977	Medium	38	Yes	1 mile
M68	6045	0500-04-105		Galveston	TXDOT HOUSTON DISTRICT	IH 45	S OF FM 1764	N OF FM 519	WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT BOTH 2 LANE FRONTAGE ROADS	Corridor	15.7024509	Medium	38	Yes	1 mile
M43	16343	0338-11-056		Montgomery	TXDOT HOUSTON DISTRICT	SL 336	FM 1314	IH 45	WIDEN FROM 2-LANES TO 4-LANES DIVIDED ROADWAY	Corridor	16.9541149	Medium	37	Yes	1 mile
M90	6046	0500-04-104		Galveston	TXDOT HOUSTON DISTRICT	IH 45 S	N OF FM 519	N OF TEXAS CITY WYE	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES AND RECONSTRUCT TWO 2 LANE FRONTAGE ROADS	Corridor	14.6771211	Medium	37	Yes	1 mile
M1	17227	1685-05-100		Harris	TXDOT HOUSTON DISTRICT	SH 6	PIPING ROCK LN	RICHMOND AVE	WIDEN FROM 6 LANES TO 8 LANES	Corridor	20.1407123	Medium	36	Yes	1 mile
M23	251	0111-08-100		Brazoria	TXDOT HOUSTON DISTRICT	SH 36	S OF BRAZOS RIVER	FM 1495	WIDEN FROM 2 TO 4 LANES (SEG 15)	Corridor	18.1243682	Medium	35	Yes	1 mile
M105	10114	0027-08-146		Fort Bend	TXDOT HOUSTON DISTRICT	US 90A	LP 762	FM 359	WIDEN FROM 4 TO 6-LANES DIVIDED (PHASE 3 OF 3)	Corridor	14.1289423	Medium	35	Yes	1 mile
M40	18064			Montgomery	HOUSTON TRANSTAR	SH 105	FOSTORIA ROAD	FM 1486	INSTALLATION OF FIBER OPTIC CABLE IN MONTGOMERY COUNTY ON SH 105 FROM FOSTORIA ROAD TO FM 1486.	Corridor	17.2154658	Medium	34	Yes	1 mile
M22	18722	1685-05-111		Harris	TXDOT HOUSTON DISTRICT	SH 6	CLAY RD	IH 10 W	CORRIDOR FEASIBILITY STUDY	Corridor	18.1720445	Medium	33	Yes	1 mile
M104	14229	3256-04-070		Harris	HCTRA	BW 8	SH 225	IH 45	WIDEN FROM 4 TO 8-MAIN LANES IN SECTIONS	Corridor	14.1356398	Medium	33	Yes	1 mile
M63	6050	0027-12-106		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	SP 10	W OF SH 36	WIDEN TO 6-LANE RURAL FREEWAY, FRONTAGE ROADS, ITS & TMS	Corridor	15.9046429	Medium	32	Yes	1 mile
M64	18731	0089-09-088	NULL	Fort Bend	TXDOT HOUSTON DISTRICT	US 59	Wharton C/L	E of SS 529	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	15.8160127	Medium	30	Yes	1 mile
M61	9430	0187-05-045		Fort Bend	TXDOT HOUSTON DISTRICT	SH 36	AT UP RR IN ROSENBERG		REPLACE RAILROAD UNDERPASS	Intersection	15.9178624	Medium	30	Yes	1 mile
M27	187	0338-11-028		Montgomery	TXDOT HOUSTON DISTRICT	LP 336	E OF IH 45	FM 3083	WIDEN FROM 4 TO 6 LANES	Corridor	18.0470544	Medium	30	Yes	1 mile
M86	6052	0089-09-065		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	FM 360	W OF HAMLINK RD	WIDEN TO 6 MAIN LANES, W/ 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS	Corridor	14.9758733	Medium	30	Yes	1 mile
M85	6053	0089-09-066		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	W OF DARST RD	FM 360	WIDEN TO 6 MAIN LANE FREEWAY WITH 2-LANE FRONTAGE ROADS, GRADE SEPARATIONS, ITS & TMS	Corridor	14.9908553	Medium	30	Yes	1 mile
M75	14709	0500-03-042		Harris	TXDOT HOUSTON DISTRICT	IH 45 S	0.4808 MI S OF ELDORADO BLVD	S OF MEDICAL CENTER BLVD	WIDEN AND RECONSTRUCT TO 10 MAIN LANES, TWO 3-LANE FRONTAGE ROADS AND 1 HOV REVERSIBLE LANE	Corridor	15.4272305	Medium	29	Yes	1 mile
M51	18714	0598-03-061		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	FM 1462	SH 35	WIDEN FROM 4 TO 6 LANES	Corridor	16.4363806	Medium	29	No	1 mile
M109	9419	2105-01-034		Fort Bend	TXDOT HOUSTON DISTRICT	FM 2234	N OF US 90A	S OF US 90A	CONSTRUCT INTERSECTION IMPROVEMENTS	Intersection	13.9626719	Medium	29	Yes	1 mile
M84	6049	0027-12-105		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	W OF SH 36	W OF FM 762	WIDEN TO 6-LANE RURAL FREEWAY, FRONTAGE ROADS, ITS & TMS WITH GRADE SEPARATION	Corridor	15.120372	Medium	28	Yes	1 mile
M50	11547	0912-72-569		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	JONES RD	GESSNER RD	CONSTRUCT 4 MANAGED LANES WITH DC (NB - EB) TO SL 8 (TOLL)	Corridor	16.4428826	Medium	28	Yes	1 mile
M102	18126			Chambers	TXDOT BEAUMONT DISTRICT	FM 1405	SH 146	SH 99	WIDEN FROM 2 TO 4 LANES DIVIDED WITH MEDIAN OPENINGS FOR TURNAROUNDS	Corridor	14.1966822	Medium	27	No	1 mile
M37	17051	1685-01-092		Harris	TXDOT HOUSTON DISTRICT	FM 1960	AT ELDRIDGE PKWY	NULL	INTERSECTION IMPROVEMENTS AND APPROACHES TO ADD RAISED MEDIAN, DUAL LEFT AND RIGHT TURN LANES AND BICYCLE/PEDESTRIAN ACCOMMODATIONS	Intersection	17.5048641	Medium	27	No	1 mile
M96	17110	0111-03-059		Fort Bend	FORT BEND COUNTY	FM 521	SH 6	FM 2234	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES WITH RAISED MEDIANS, INTERSECTION IMPROVEMENTS, SIGNAL IMPROVEMENTS AND PEDESTRIAN ACCESS	Corridor	14.3654261	Medium	26	Yes	1 mile
M15	467	0389-07-025		Galveston	TXDOT HOUSTON DISTRICT	SH 146	FM 519	SL 197	RECONSTRUCT SH 146 RR OVERPASS AND WIDEN FROM 2 TO 4 LANES	Intersection	18.7670235	Medium	26	Yes	1 mile
M16	15383	0192-01-093		Fort Bend	CITY OF SUGAR LAND	SH 6	N OF BROOKS ST	LEXINGTON BLVD	WIDEN FROM 6 TO 8-LANES	Corridor	18.7475182	Medium	26	No	1 mile
M79	17064	0675-08-111		Montgomery	TXDOT HOUSTON DISTRICT	IH 45	WALKER C/L	LEAGUE LINE RD	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	15.3081332	Medium	26	Yes	1 mile
M82	18185			Multiple	HIGH CAPACITY TASK FORCE	IH 45 S	NASA 1 BYPASS	S OF SH 146	CONSTRUCT TWO-WAY DIAMOND LANES	Corridor	15.2286139	Medium	26	Yes	1 mile
M92	468	0389-06-088		Galveston	TXDOT HOUSTON DISTRICT	SH 146	FM 518	DICKINSON BAYOU	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES WITH GRADE SEPARATION AT SH 96	Corridor	14.5582436	Medium	26	Yes	1 mile
M9	6042	0500-03-107		Harris	TXDOT HOUSTON DISTRICT	IH 45 S	S OF NASA 1 BYPASS	GALVESTON C/L	WIDEN TO 10 MAIN LANES, TWO 3-LANE FRONTAGE ROADS AND ACCESS INTO TWO DIAMOND LANES	Corridor	19.2474037	Medium	24	Yes	1 mile
M41	17027	0912-72-366		Harris	HARRIS COUNTY	FAIRMONT PKWY	SL 8	7TH ST	CONSTRUCT GEOMETRIC IMPROVEMENTS AND ITS/TRAFFIC SIGNAL IMPROVEMENTS (VEHICLE DETECTION, REAL TIME TRAFFIC MONITORING, BATTERY BACKUP AND INTERCONNECT) AT 14 INTERSECTIONS	Corridor	17.0259783	Medium	24	Yes	1 mile
M101	803			Fort Bend	TXDOT HOUSTON DISTRICT	FM 762	US 59	CRABB RIVER RD	WIDEN 2-LANE TO 4-LANE DIVIDED	Corridor	14.2491942	Medium	24	Yes	1 mile

M60	10125	0338-04-065		Montgomery	TXDOT HOUSTON DISTRICT	SH 105	LP 336	FM 1484	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANE DIVIDED	Corridor	15.971707	Medium	24	Yes	1 mile
M65	18036			Liberty	TXDOT BEAUMONT DISTRICT	US 90	AT UP RAILROAD		CONSTRUCT GRADE SEPARATIONS AT UP RAILROAD TRACKS	Intersection	15.7978351	Medium	23	No	1 mile
M57	15589	3510-02-007		Brazoria	TXDOT HOUSTON DISTRICT	SH 99	SH 288		SEG C: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)	Intersection	16.09776	Medium	23	No	1 mile
M44	14246	3510-02-004		Brazoria	BRAZORIA COUNTY	SH 99			SEG B: CONSTRUCT 4 DIRECT CONNECTORS (TOLL)	Intersection	16.7038986	Medium	23	No	1 mile
M55	18046	0598-02-116		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	CR 60	NULL	CONSTRUCT GRADE SEPARATION	Intersection	16.3970493	Medium	23	No	1 mile
M42	6044	0500-04-106		Galveston	TXDOT HOUSTON DISTRICT	IH 45	S OF FM 1764	N OF FM 517	RECONSTRUCT AND WIDEN TO 8 MAIN LANES AND TWO 2-LANE FRONTAGE ROADS	Corridor	16.9846653	Medium	22	Yes	1 mile
M8	18184			Harris	METRO	IH 10 W	WESTGREEN	FM 359	EXTENSION OF 2-LANE HOV FACILITY	Corridor	19.5315625	Medium	22	Yes	1 mile
M78	11577	0050-08-087		Harris	TXDOT HOUSTON DISTRICT	US 290	E OF TELGE RD	W OF ELDRIDGE PKWY	RECONSTRUCT AND WIDEN TO 8 MAIN LANES WITH 3 REVERSIBLE MANAGED LANES AND TWO 2-LANE FRONTAGE ROADS (SEGMENT 8)	Corridor	15.3838023	Medium	21	Yes	1 mile
M36	13836	0500-04-117		Galveston	TXDOT HOUSTON DISTRICT	IH 45 S	HARRIS C/L	S OF FM 518	WIDEN TO 10 MAIN LANES AND TWO 3-LANE FRONTAGE ROADS	Corridor	17.509358	Medium	21	Yes	1 mile
M77	17089	0177-05-112		Montgomery	TXDOT HOUSTON DISTRICT	IH 69 N	LIBERTY C/L	HARRIS C/L	INSTALL NEW ITS EQUIPMENT AND INFRASTRUCTURE	Corridor	15.4002788	Medium	21	Yes	1 mile
M73	6051	0089-09-058		Fort Bend	TXDOT HOUSTON DISTRICT	US 59 S	W OF SP 10	W OF HAMLINK RD	WIDEN TO 6-MAIN LANES, GRADE SEPARATIONS, 2-LANE FRONTAGE ROADS, ITS & TMS	Corridor	15.4428841	Medium	21	No	1 mile
M81	83	8170-12-001		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD & WASHINGTON AVE	W OF 12TH ST	E OF WASHINGTON AVE/KATY RD SPLIT	CONSTRUCT 6-LANE DIVIDED URBAN ST FACILITY W/ AUTOMATIC PUMP STATION AND RR LINE W/ UNDERPASS (PHASE 2)	Corridor	15.2622838	Medium	21	Yes	1 mile
M49	14252	1685-05-098		Harris	TXDOT HOUSTON DISTRICT	SH 6	S OF HEMPSTEAD TOLL ROAD	US 290	RECONSTRUCT US 290/SH 6 INTERCHANGE	Intersection	16.4481118	Medium	21	No	1 mile
M46	17236	0027-08-137	0027-08-137	Fort Bend	TXDOT HOUSTON DISTRICT	US 90A	SH 99	W OF SH 6	WIDEN FROM 6 LANES TO 8 LANES DIVIDED	Corridor	16.5963004	Medium	20	No	1 mile
M106	10160	3158-01-040		Montgomery	TXDOT HOUSTON DISTRICT	FM 3083	SH 105	IH 45	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES	Corridor	14.1029509	Medium	20	Yes	1 mile
M83	18023	0598-02-112		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	AT CR 48	NULL	CONSTRUCT GRADE SEPARATION	Intersection	15.1708434	Medium	20	No	1 mile
M70	18015	0598-02-115		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	CR 63	NULL	CONSTRUCT GRADE SEPARATION	Intersection	15.6050196	Medium	20	No	1 mile
M21	18014	0598-02-113		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	AT CR 57	NULL	CONSTRUCT GRADE SEPARATION	Intersection	18.368253	Medium	20	No	1 mile
M29	15493	3510-10-016		Chambers	TXDOT BEAUMONT DISTRICT	SH 99	0.66 MI N OF FISHER RD	0.62 MI W OF FISHER RD	SEG I-2: CONSTRUCT 4 LANE TOLLWAY OVERPASS (TOLL)	Intersection	17.8519323	Medium	19	No	1 mile
M33	201	0739-01-039		Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	SH 73, EAST	JEFFERSON C/L	WIDEN EXISTING FOUR LANE TO SIX LANE	Corridor	17.689069	Medium	19	No	1 mile
M80	147			Harris	HARRIS COUNTY	UNDERWOOD RD	FAIRMONT PKWY	RED BLUFF	DESIGN, ACQUIRE ROW AND CONSTRUCT 6-LANE ROADWAY, INCLUDING DRAINAGE AND SIGNALS AT UNDERWOOD	Corridor	15.3042655	Medium	19	Yes	1 mile
M62	12235	0508-03-099		Chambers	TXDOT BEAUMONT DISTRICT	SH 73	W OF JEFFERSON C/L	JEFFERSON C/L	GRADE SEPARATION AND CLOSE CROSSOVER	Intersection	15.9176061	Medium	18	No	1 mile
M4	18022	3510-04-019		Fort Bend	TXDOT HOUSTON DISTRICT	SH 99	HARRIS COUNTY LINE	TO FM 1093	RECONSTRUCT AND WIDEN FROM 4 TO 6 LANES (SEG D)	Corridor	19.9315659	Medium	18	No	1 mile
M112	8004			Harris	HARRIS COUNTY	LOUETTA RD	CHAMPION FOREST	STUEBNER AIRLINE	WIDEN FROM 4 TO 6 LANE ASPHALT, DITCHES, W/ CENTER TURN LANE	Corridor	13.9392258	Medium	18	No	1 mile
M76	17042	0508-01-356		Harris	TXDOT HOUSTON DISTRICT	IH 10 E	GARTH RD	CHAMBERS CO LINE	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)	Corridor	15.4170946	Medium	18	Yes	1 mile
M103	18715	0598-04-029		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	SH 35	SH 332	WIDEN FROM 4 TO 6 LANES	Corridor	14.190088	Medium	18	No	1 mile
M6	10132	3416-01-012		Brazoria	TXDOT HOUSTON DISTRICT	FM 518	SH 288	FM 865	RECONSTRUCT AND WIDEN FROM 4 AND 6 LANES TO 6 LANES DIVIDED	Corridor	19.5472626	Medium	18	No	1 mile
M48	10334	0271-05-025		Fort Bend	TXDOT HOUSTON DISTRICT	IH 10 W	W OF SNAKE CREEK	FORT BEND / HARRIS COUNTY LINE	RECONSTRUCT AND WIDEN FROM 6 TO 10 LANES (ADD 2 MANAGED LANES AND 2 GENERAL PURPOSE LANES)	Corridor	16.4679158	Medium	18	No	1 mile
M113	8003			Harris	HARRIS COUNTY	LOUETTA RD	OLD LOUETTA RD	CHAMPION FOREST	WIDEN FROM 4 LANE TO 6-LANE ASPHALT, DITCHES, W/ CENTER TURN LANE	Corridor	13.8886479	Medium	17	No	1 mile
M100	8049			Harris	HARRIS COUNTY	LOUETTA RD	T. C. JESTER	KUYKENDAHL	WIDEN 5 LANE ASPHALT W/ DITCHES, TO 7-LANE ASPHALT	Corridor	14.2538048	Medium	17	No	1 mile
M53	6043	0500-04-096		Galveston	TXDOT HOUSTON DISTRICT	IH 45 S	S OF FM 518	N OF FM 517	WIDEN TO 8 MAIN LANES AND RECONSTRUCT EXISTING 2-LANE FRONTAGE ROADS	Corridor	16.3994296	Medium	17	Yes	1 mile
M2	16316	1685-03-098		Harris	TXDOT HOUSTON DISTRICT	FM 1960	E OF TWIGSWORTH LN	W OF SAN JACINTO RIVER BRIDGE	WIDEN FROM 4 TO 6 LANES AND CONSTRUCT 4 LANE OVERPASS AT THE WEST LAKE HOUSTON PKWY	Corridor	20.0703627	Medium	16	No	1 mile
M88	18033			Harris	LAKE HOUSTON REDEVELOPMENT AUTHORITY	NORTHPARK DR	RUSSELL PALMER RD	HARRIS C/L	WIDEN FROM 4 TO 6 LANE BOULEVARD SECTION INCLUDING DRAINAGE, RECONSTRUCTION OF THE BRIDGE AT KINGWOOD DIVERSION DITCH AND SIGNALIZED INTERSECTION AT RUSSELL PALMER DRIVE	Corridor	14.8451717	Medium	16	No	1 mile
M107	18732	0912-72-618	NULL	Harris	LAKE HOUSTON REDEVELOPMENT AUTHORITY	NORTHPARK DR	MONTGOMERY C/L	WOODLANDS HILL DR	WIDEN FROM 4 TO 6 LANE BOULEVARD SECTION INCLUDING DRAINAGE, RECONSTRUCTION OF THE BRIDGE AT BEN'S BRANCH, A PEDESTRIAN TUNNEL AT GLADE VALLEY DRIVE AND A SIGNALIZED INTERSECTION AT WOODLANDS HILL DRIVE	Corridor	14.0635422	Medium	16	No	1 mile
M38	3094			Montgomery	CITY OF OAK RIDGE NORTH	ROBINSON RD	IH 45	EASTERN CITY LIMIT	WIDEN TO 4-LANE UNDIVIDED WITH REALIGNMENT	Corridor	17.4530692	Medium	15	Yes	1 mile
M99	514	3049-01-022		Galveston	TXDOT HOUSTON DISTRICT	FM 646	EDMUNDS WAY	FM 1266	RECONSTRUCT AND WIDEN FROM 2 TO 4 LANES DIVIDED ROADWAY WITH RAISED MEDIAN AND RAILROAD OVERPASS	Corridor	14.2850251	Medium	15	Yes	1 mile

M14	280	0500-01-107		Galveston	TXDOT HOUSTON DISTRICT	IH 45	S OF TEXAS CITY WYE	N OF CAUSEWAY	RECONSTRUCT AND WIDEN FROM 6 TO 8 MAIN LANES, RECONSTRUCT TWO 2-LANE FRONTAGE ROADS (FROM S OF TEXAS CITY WYE TO N OF BNSF RR) AND CONSTRUCT FRONTAGE ROADS (FROM N OF BNSF RR TO N OF CAUSEEWAY)	Corridor	18.8526682	Medium	15	Yes	1 mile
M97	38	1002-02-016		Galveston	TXDOT HOUSTON DISTRICT	FM 517	FM 646	BRAZORIA C/L	RECONSTRUCT AND WIDEN FROM 2 LANES TO 4 LANES AND ACCESS MANAGEMENT TREATMENTS	Corridor	14.3090093	Medium	14	Yes	1 mile
M5	15594			Chambers	TXDOT HOUSTON DISTRICT	SH 99	AT FUTURE THOROUGHFARE A		SEG I-2: RECONSTRUCT 4 MAIN LANES (TOLL) AS OVERPASS AT FUTURE THOROUGHFARE A (EW4) AND ASSOCIATED APPROACHES	Intersection	19.925687	Medium	13	No	1 mile
M59	18401	0598-02-111		Brazoria	TXDOT HOUSTON DISTRICT	SH 288	RODEO PALMS PKWY	SH 6	CONSTRUCT GRADE SEPARATION AND NEW 2-LANE FRONTAGE ROADS.	Intersection	16.0193192	Medium	13	No	1 mile
M39	6056	0271-04-070		Waller	TXDOT HOUSTON DISTRICT	IH 10 W	FM 359	FORT BEND C/L	WIDEN FROM 6 TO 8 MAINLANES AND RECONSTRUCT BOTH 2-LANE FRONTAGE ROADS	Corridor	17.2208924	Medium	12	Yes	1 mile
M93	455	3510-04-054		Fort Bend	FORT BEND COUNTY	SH 99	S FRY ROAD	FM 1093	CONSTRUCT NEW 2 LANE SOUTH BOUND FRONTAGE ROAD	Corridor	14.4504342	Medium	12	No	1 mile
M69	17155	0508-02-122		Chambers	TXDOT BEAUMONT DISTRICT	IH 10 E	HARRIS COUNTY LINE	SH 99	INSTALL ITS EQUIPMENT AND INFRASTRUCTURE (144-STRAND FIBER TRUNK LINE, CLOSED-CIRCUIT CAMERAS, DYNAMIC MESSAGE SIGNS RADAR-BASED VEHICLES SENSING DEVICES AND TRAVEL TIME READERS)	Corridor	15.683571	Medium	11	No	1 mile
M20	13829	0912-72-571		Harris	TXDOT HOUSTON DISTRICT	HEMPSTEAD RD	SH 99	W OF HUFFMEISTER RD	CONSTRUCT 4 MANAGED LANES	Corridor	18.4176065	Medium	11	No	1 mile
M10	14239	3510-04-039		Fort Bend	FBCTRA	SH 99	AT FM 1093/WPT	NULL	SEG D: CONSTRUCT 2 DIRECT CONNECTORS (TOLL) (WB-NB, NB-EB)	Intersection	18.9765947	Medium	10	No	1 mile
M17	16080	1258-03-046		Fort Bend	FBCTRA	FM 1093	AT SH 99	NULL	WESTPARK TOLL ROAD EB-NB DIRECT CONNECTOR CONSTRUCTION	Intersection	18.5009937	Medium	10	No	1 mile
M87	14738	1258-02-034		Fort Bend	TXDOT HOUSTON DISTRICT	FM 1093	JAMES LN	FM 1093/FM 359	WIDEN TO 4 LANES ARTERIAL, NON-TOLL	Corridor	14.9317531	Medium	10	No	1 mile
M12	11378	3510-04-058		Fort Bend	FBCTRA	SH 99	AT FM 1093 (WESTPARK TOLLWAY) INTERCHANGE		SEG D: CONSTRUCT 4 DIRECT CONNECTORS (TOLL) (SB-WB,WB-SB,NB-WB,EB-SB)	Intersection	18.90595	Medium	10	No	1 mile
M56	17066	0912-72-340		Harris	HARRIS COUNTY	RED BLUFF RD	KIRBY BLVD	SH 146	WIDEN FROM 2 TO 4-LANE DIVIDED ROADWAY INCLUDING BRIDGE ACROSS TAYLOR LAKE AND PEDESTRIAN AND BICYCLE ACCOMMODATIONS.	Corridor	16.2924676	Medium	10	Yes	1 mile
M91	965	0338-02-032		Montgomery	TXDOT HOUSTON DISTRICT	SH 105	GRIMES C/L	FM 149	RECONSTRUCT AND WIDEN FROM 2 TO 4-LANES DIVIDED	Corridor	14.5831891	Medium	9	No	1 mile
M31	18052	0050-06-092		Harris	HARRIS COUNTY MUD #500	GREENHOUSE RD	MOUND RD	SKINNER RD AT US 290	CONSTRUCT 6-LANE UNDERPASS WITH PEDESTRIAN AND BIKEWAYS WITHIN THE ROW EXTENDING UNDER US 290 AND THE UPRR CONNECTING TO SKINNER RD ON THE NORTH.	Intersection	17.8132361	Medium	7	No	1 mile
M45	17041	0050-06-093		Harris	TXDOT HOUSTON DISTRICT	US 290	AT CYPRESS P&R		CONSTRUCT RAMP PROVIDING ACCESS TO THE US 290 HOV/HOT FACILITY	Intersection	16.6626499	Medium	6	No	1 mile
M72	18402	0271-05-049		Fort Bend	TXDOT HOUSTON DISTRICT	IH 10 W	WALLER C/L	W OF SNAKE CREEK	RECONSTRUCT AND WIDEN FROM 6 TO 10 LANE (ADD 2 MANAGED LANES AND 2 GENERAL PURPOSE LANES)	Corridor	15.448424	Medium	5	No	1 mile

Regional Goods Movements Plan: Disadvantaged Communities (Justice40 Tracts)



Appendix F

Regional Economic Analysis Memorandum

Regional Goods Movement Plan

Regional Economic Analysis

Prepared for:

Houston-Galveston Area Council

January 20, 2023

Submitted by

HDR

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1 Introduction

The Houston-Galveston Area Council (H-GAC) region is one of the nation's largest freight economies, with a large and diverse set of freight-consuming and producing industries, a large regional consuming population base, and extensive freight transportation infrastructure including seaports and airports, highways, railroads, and pipelines. The region trades commodities within its own counties and with the rest of Texas, the US, Mexico and Canada, and other countries.

This Analysis describes the region's freight economy along three primary dimensions.

- The locations and characteristics of critical industries that produce, consume, and distribute freight for end users, relative to land use and transportation infrastructure;
- The freight transportation movements (or "commodity flows") by origin, destination, and mode generated by these industries, for estimated recent and future conditions, including both domestic and import/export moves; and
- The supply chain characteristics of these movements – how different industries move different commodities through combinations of modes and origin-destination patterns.

2 Freight Industry Locations & Characteristics

2.1 Definition of Freight Industries

The H-GAC regional economy includes both freight-associated and non-freight-associated industries. Freight-associated industries produce goods, provide value-added functions (storage, processing, distribution, etc.), physically transport goods, and/or substantially depend on the receipt of goods for their business function. Freight-associated industries are listed in Table 1.

Table 1. Definition of Freight-Associated Industries by 2022 NAICS Code

NAICS Code	Industry Group and Selected Subgroup Detail
11	Agriculture, Forestry, Fishing and Hunting • 111 Crop Production • 112 Animal Production and Aquaculture • 113 Forestry and Logging • 114 Fishing, Hunting and Trapping • 115 Support Activities for Agriculture and Forestry
21	Mining, Quarrying, and Oil and Gas Extraction
22	Utilities
23	Construction
31-33	Manufacturing • 311 Food Manufacturing • 312 Beverage and Tobacco Product Manufacturing • 313 Textile Mills • 314 Textile Product Mills • 315 Apparel Manufacturing • 316 Leather and Allied Product Manufacturing • 321 Wood Product Manufacturing • 322 Paper Manufacturing • 323 Printing and Related Support Activities • 324 Petroleum and Coal Products Manufacturing • 325 Chemical Manufacturing • 326 Plastics and Rubber Products Manufacturing • 327 Nonmetallic Mineral Product Manufacturing • 331 Primary Metal Manufacturing • 332 Fabricated Metal Product Manufacturing • 333 Machinery Manufacturing • 334 Computer and Electronic Product Manufacturing • 335 Electrical Equipment, Appliance, and Component Manufacturing • 336 Transportation Equipment Manufacturing • 337 Furniture and Related Product Manufacturing • 339 Miscellaneous Manufacturing

42	Wholesale Trade • 423 Merchant Wholesalers, Durable Goods • 424 Merchant Wholesalers, Nondurable Goods • 425 Wholesale Trade Agents and Brokers
44-45	Retail Trade • 441 Motor Vehicle and Parts Dealers • 444 Building Materials and Garden Equipment and Supplies Dealers • 445 Food and Beverage Retailers • 449 Furniture, Home Furnishings, Electronics, and Appliance Retailers • 455 General Merchandise Retailers • 456 Health and Personal Care Retailers • 457 Gasoline Stations and Fuel Dealers • 458 Clothing, Clothing Accessories, Shoe, and Jewelry Retailers • 459 Sporting Goods, Hobbies, Musical Instrument, Book, and Misc.
48-49	Transportation and Warehousing • 481112 Scheduled Freight Air Transportation • 481212 Nonscheduled Chartered Freight Air Transportation • 482111 Line-Haul Railroads • 482112 Short-Haul Railroads • 483111 Deep Sea Freight Transportation • 483113 Coastal and Great Lakes Freight Transportation • 483211 Inland Water Freight Transportation • 484 Truck Transportation • 486 Pipeline Transportation • 488 Support Activities for Transportation • 491 Postal Service • 492 Couriers and Messengers • 493 Warehousing and Storage

Note: "NAICS" is the North American Industry Classification System, a standard grouping and labeling system established by the United States, Canada and Mexico. See https://www.census.gov/naics/. The NAICS coding system is a hierarchy with two-digit codes representing broad industry groupings and six-digit codes representing the most specific industry definitions. When certain types of data such as labor statistics are published for a given region, six-digit detail suppressed for reasons of confidentiality may still be reported at the more generalized two-digit level.

Note that while "Warehousing" appears as a different NAICS code, it refers primarily to third-party warehouse operators related to transportation services, and may not include data associated with warehouses or distribution centers that are tightly integrated with the supply chain functions of larger companies. Attributes of warehouses and distribution centers for manufacturers like Toyota, retailers like Walmart, or direct-to-consumer fulfillment companies like Amazon may be tabulated in the NAICS codes for those industries, rather than Warehouse, or in some cases may appear in Wholesale Trade.

2.2 Freight Industries in the Regional Economy

As shown in Table 2, for data covering the second quarter of calendar year 2022, freight-associated industries in the 13-county H-GAC service area (referred to in this document as the H-GAC Region) directly accounted for an estimated 1,162,514 jobs (26 percent of all Texas freight-associated employment). Freight-associated industries accounted for 37 percent of all H-GAC employment, ranging from 23 percent in Walker County to 59 percent in Waller County. The region's freight-associated employment was most heavily concentrated in Harris County (74 percent of all H-GAC freight-associated employment), and shares greater than 1 percent were also reported for Fort Bend (7 percent), Montgomery (6 percent), Brazoria (5 percent), and Galveston (3 percent).

Table 2. Total and Freight-Associated Employment in the H-GAC Region

County	Total Employment	Freight-Associated Employment	Share of County Employment in Freight	Share of H-GAC Region Freight Employment	Share of Texas Freight Employment
HARRIS	2,334,147	860,415	37%	74%	19%
FORT BEND	228,973	80,659	35%	7%	2%
MONTGOMERY	208,632	72,538	35%	6%	2%
BRAZORIA	117,383	53,254	45%	5%	1%
GALVESTON	119,644	34,172	29%	3%	1%
WALLER	22,938	13,641	59%	1%	0%
CHAMBERS	19,437	11,182	58%	1%	0%
WHARTON	15,838	8,105	51%	1%	0%
LIBERTY	18,508	7,538	41%	1%	0%
AUSTIN	12,428	6,401	52%	1%	0%
WALKER	24,861	5,598	23%	0%	0%
MATAGORDA	10,993	5,194	47%	0%	0%
COLORADO	7,404	3,817	52%	0%	0%
H-GAC Total	**3,141,186**	**1,162,514**	**37%**	**100%**	**26%**
TEXAS Total	**12,627,879**	**4,425,424**			

Source: Consultant analysis of Quarterly Census of Employment and Workforce (QCEW) estimates for Q2 2022, downloaded from the Texas Labor Market Information portal (https://texaslmi.com/Home/PopularDownloads). Note that data was provided at the two-digit level and freight estimates may include a small amount of non-freight activity.

As shown in Table 3, more than half (56 percent) of the region's freight-associated employment is in the Trade, Transportation, and Utilities cluster, which includes NAICS groups 22, 42, 44-45, and 48-49. Almost one-fifth (19 percent) is in the Manufacturing Cluster, which includes NAICS groups 31-33, and another one-fifth (19 percent) is Construction, which is NAICS group 23. The remaining 6 percent is in the Natural Resources and Mining cluster, which includes NAICS groups 11 and 21. The data highlights the critical role trade and transportation activities play in the H-GAC region, and points to the importance of having appropriate transportation infrastructure to accommodate current and future needs.

Table 3. Types of Freight-Associated Employment in the H-GAC Region

County	Freight-Associated Employment	Natural Resources and Mining (11, 21)	Construction (23)	Manufacturing (31-33)	Trade, Transportation, and Utilities (22, 42, 44-45, 48-49)
HARRIS	860,415	54,204	160,385	166,578	479,248
FORT BEND	80,659	2,669	11,027	14,159	52,804
MONTGOMERY	72,538	4,367	14,251	11,761	42,159
BRAZORIA	53,254	1,779	17,808	12,020	21,647
GALVESTON	34,172	744	7,469	5,580	20,379
WALLER	13,641	470	1,488	3,734	7,949
CHAMBERS	11,182	544	2,660	2,888	5,090
WHARTON	8,105	2,150	575	1,436	3,944
LIBERTY	7,538	535	2,011	1,173	3,819
AUSTIN	6,401	185	989	1,718	3,509
WALKER	5,598	185	861	1,285	3,267
MATAGORDA	5,194	514	459	1,505	2,716
COLORADO	3,817	559	527	1,214	1,517
H-GAC Total	**1,162,514**	**68,905**	**220,510**	**225,051**	**648,048**
Share of H-GAC	**100%**	**6%**	**19%**	**19%**	**56%**

Source: Consultant analysis of Quarterly Census of Employment and Workforce (QCEW) estimates for Q2 2022, downloaded from the Texas Labor Market Information portal (https://texaslmi.com/Home/PopularDownloads). Note that data was provided at the two-digit level and freight estimates may include a small amount of non-freight activity.

2.3 Freight Industry Locations and Clusters

The physical locations of H-GAC freight industries and their relationships to the region's transportation infrastructure can be depicted using several different kinds of data, each telling a different aspect of the story.

- County Business Patterns (CBP) data from the US Census Bureau
- InfoUSA/Data Axle, a commercial product
- Land use mapping from H-GAC

2.3.1 County Business Patterns

County Business Patterns (CBP) data provides estimates of the number of business establishments associated with particular NAICS codes, at the county and zip code level. CBP data at the zip code level is useful for identifying the general geographic distribution of different industry establishment types, although some data is suppressed due to confidentiality issues. Note that within any given NAICS code, some establishments may be associated with transporting or storing freight, while others may be "headquarters" functions related to the management of freight. The analysis in this document is based on the most recent available (year 2020) data from https://www.census.gov/data/datasets/2020/econ/cbp/2020-cbp.html. For the freight-associated NAICS codes listed in Table 1, CBP data reports a total of 55,532 unique business establishment locations within the H-GAC region.

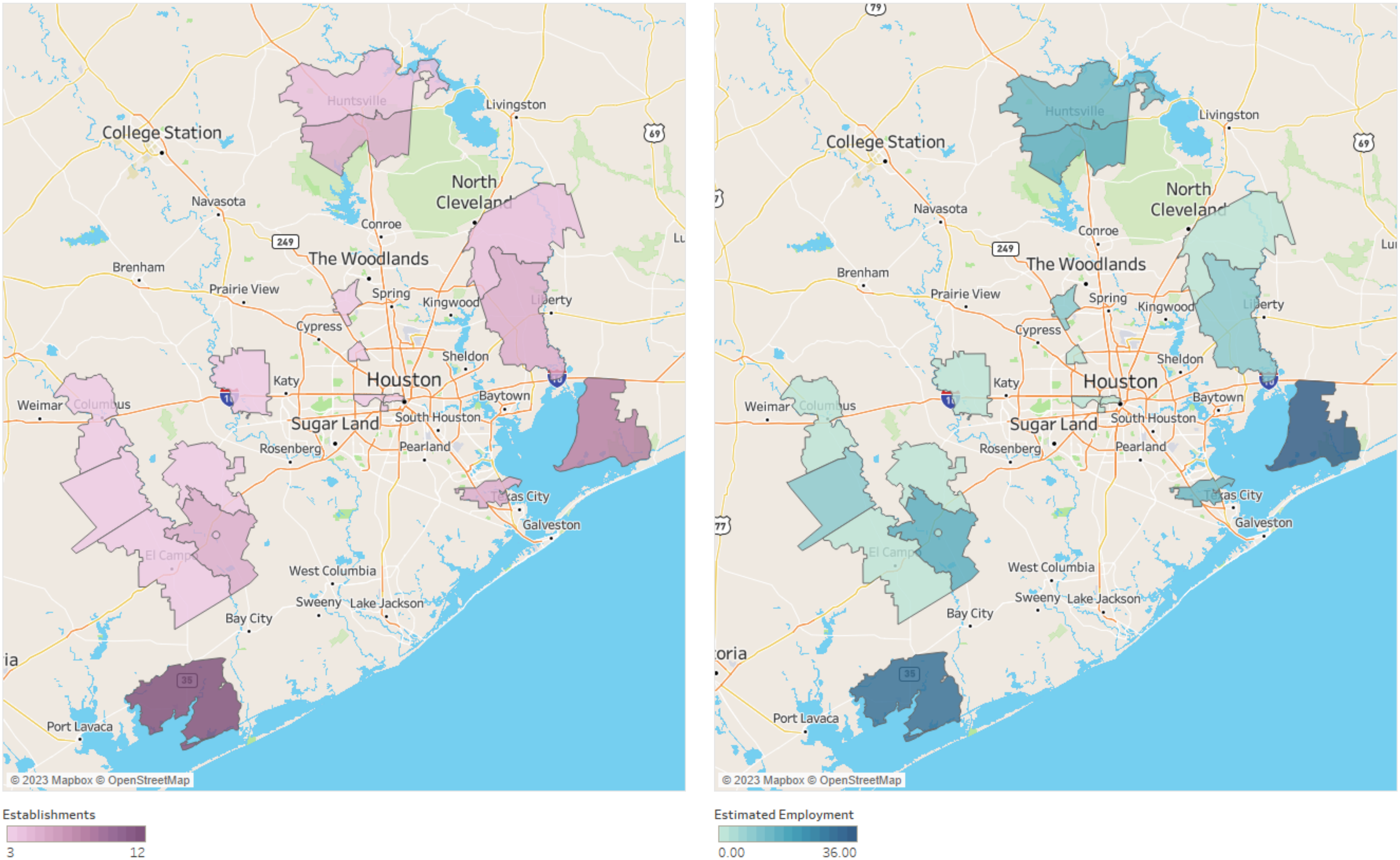
Table 4. Number of Freight-Associated Establishments in the H-GAC Region

County	Natural Resources and Mining (11, 21)	Construction (23)	Manufacturing (31-33)	Trade, Transportation, and Utilities (22, 42, 44-45, 48-49)	Total
Harris	850	7,316	4,099	24,324	**36,589**
Fort Bend	96	1,138	410	3,911	**5,555**
Montgomery	170	1,315	452	2,709	**4,646**
Galveston	32	571	213	1,775	**2,591**
Brazoria	30	508	245	1,406	**2,189**
Waller	14	266	121	343	**744**
Chambers	28	103	38	430	**599**
Liberty	33	151	45	324	**553**
Wharton	48	94	41	312	**495**
Walker	14	126	47	283	**470**
Austin	9	112	48	165	**334**
Matagorda	23	35	32	220	**310**
Colorado	27	66	37	147	**277**
Grand Total	**1,374**	**11,801**	**5,828**	**36,349**	**55,352**

Source: Consultant analysis of County Business Patterns zip code level data for year 2020. See https://www.census.gov/data/datasets/2020/econ/cbp/2020-cbp.html.

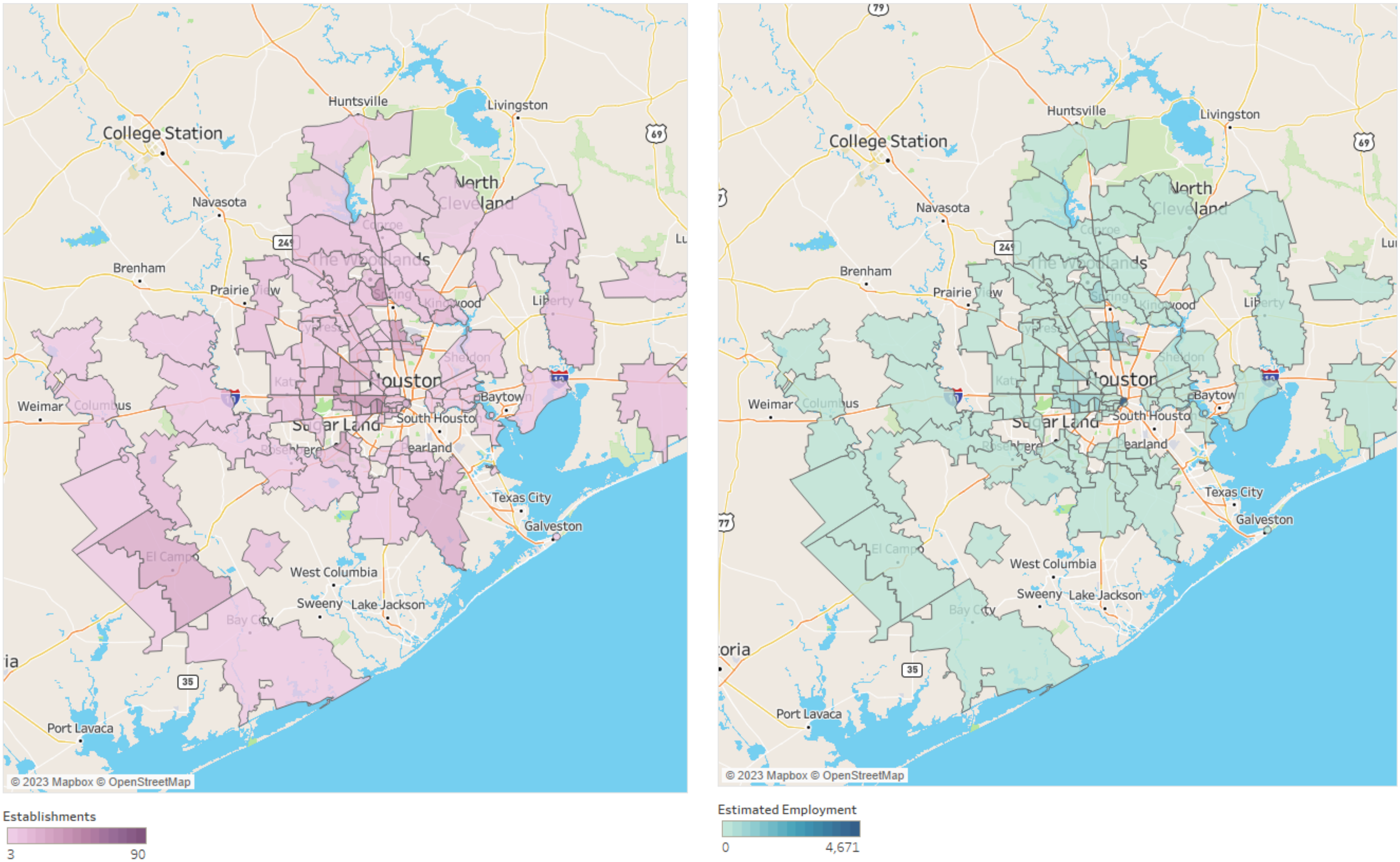
The spatial distribution of these establishments by zip code and in relation to the regional transportation network is depicted on Figure 1 through Figure 11. Order-of-magnitude estimates of associated employmentare based on the number of establishments within different employment ranges are also shown.

Figure 1. Establishments and Employment, NAICS 11 (Agriculture, Forestry, Fishing and Hunting)



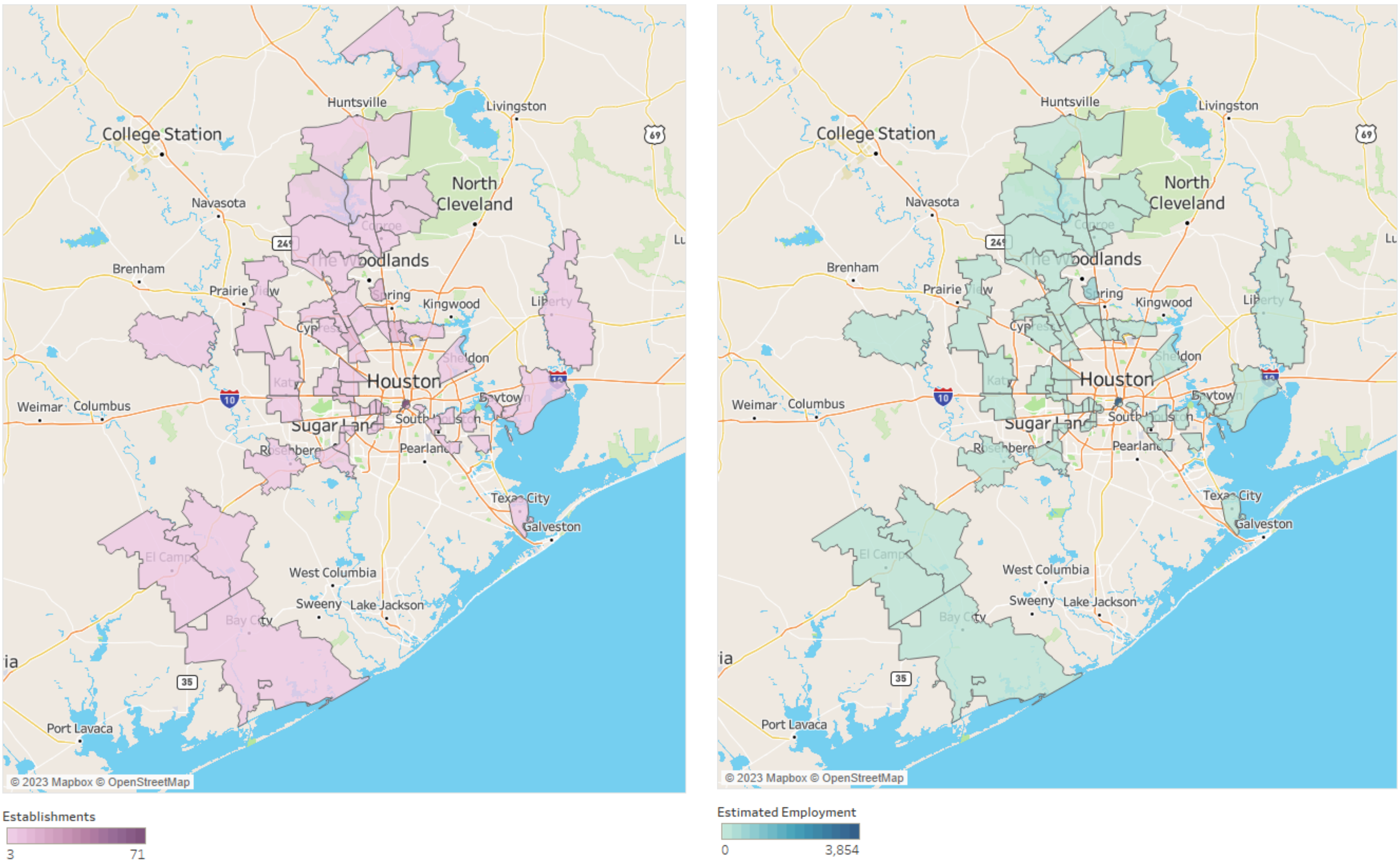
The region has a limited number of NAICS 11 establishments. Establishments and employment are most significant on the Chambers and Matagorda county waterfronts and in Liberty, Walker, Colorado, and Wharton counties. Source: County Business Patterns.

Figure 2. Establishments and Employment, NAICS 21 (Mining, Quarrying, Oil and Gas Extraction)



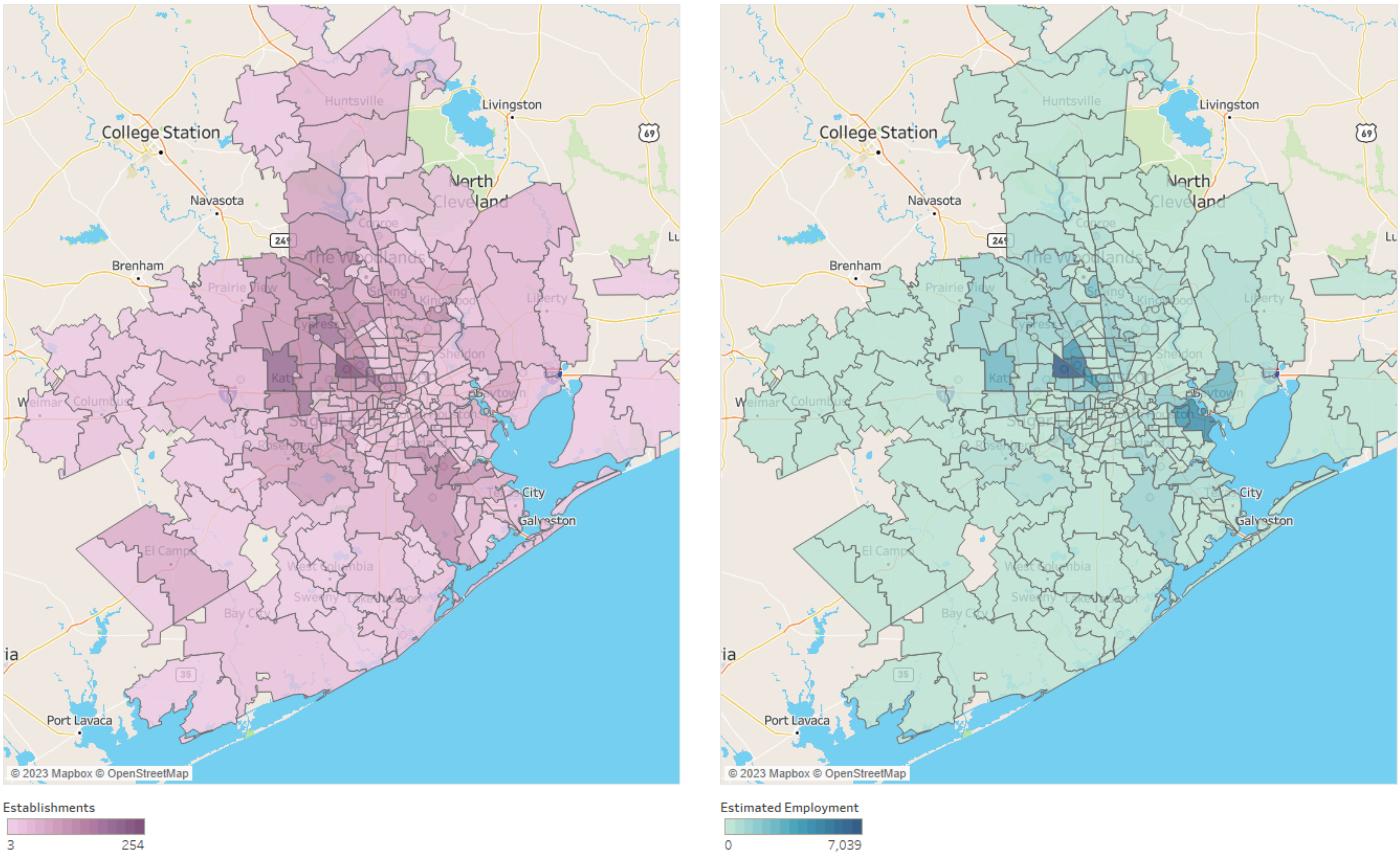
The region has a substantial number of NAICS 21 establishments distributed across many counties. However, employment is heavily concentrated in downtown Houston, where one zip code (shown in dark blue on the center of the map to the right) accounts for the majority of employment in company headquarters. Source: County Business Patterns.

Figure 3. Establishments and Employment, NAICS 22 (Utilities)



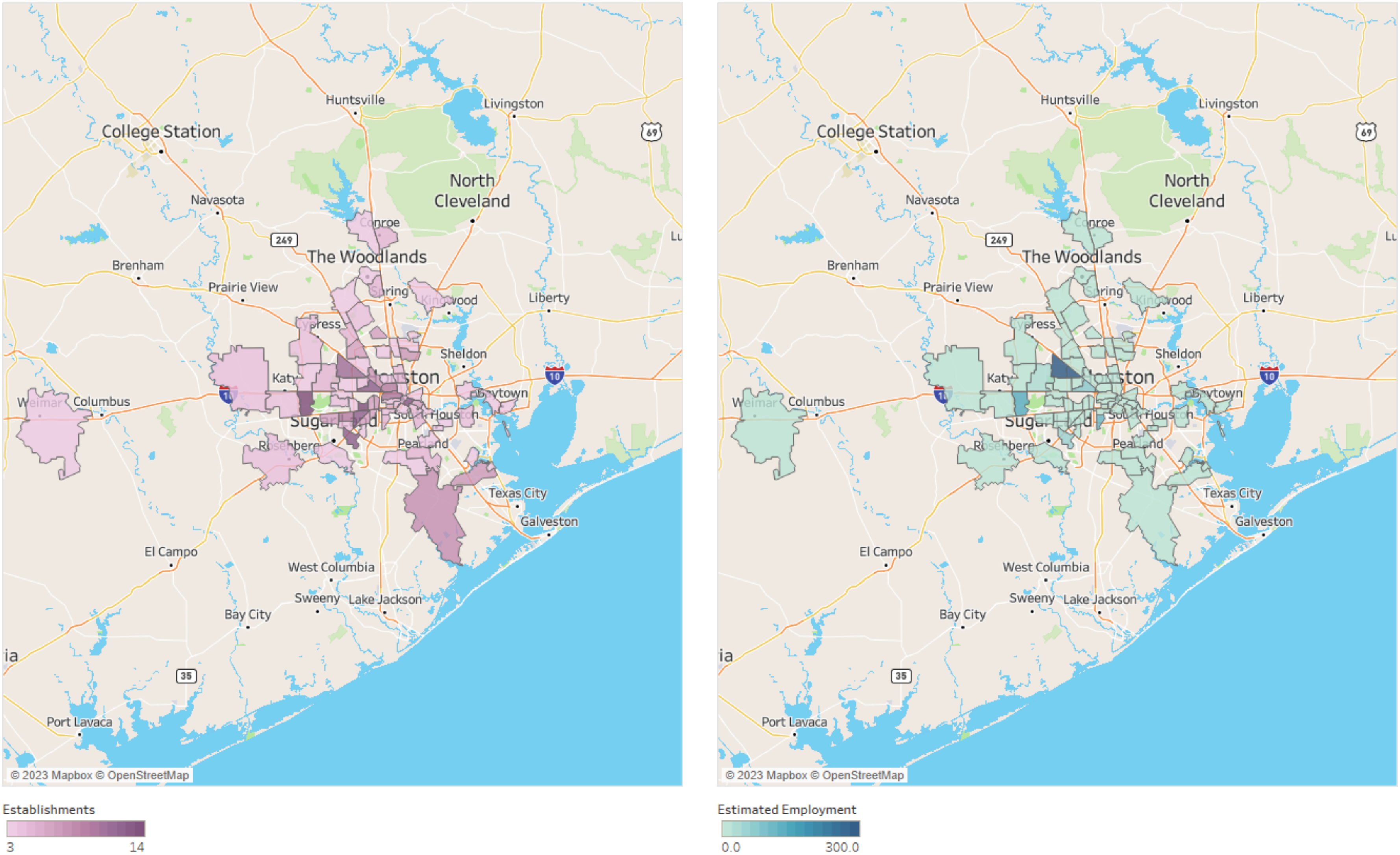
Similar to NAICS 21, the region has a substantial number of NAICS 22 establishments distributed across many counties, with employment heavily concentrated in downtown Houston, where one zip code (shown in dark blue on the center of the map to the right) accounts for the majority of employment in company headquarters. Source: County Business Patterns.

Figure 4. Establishments and Employment, NAICS 23 (Construction)



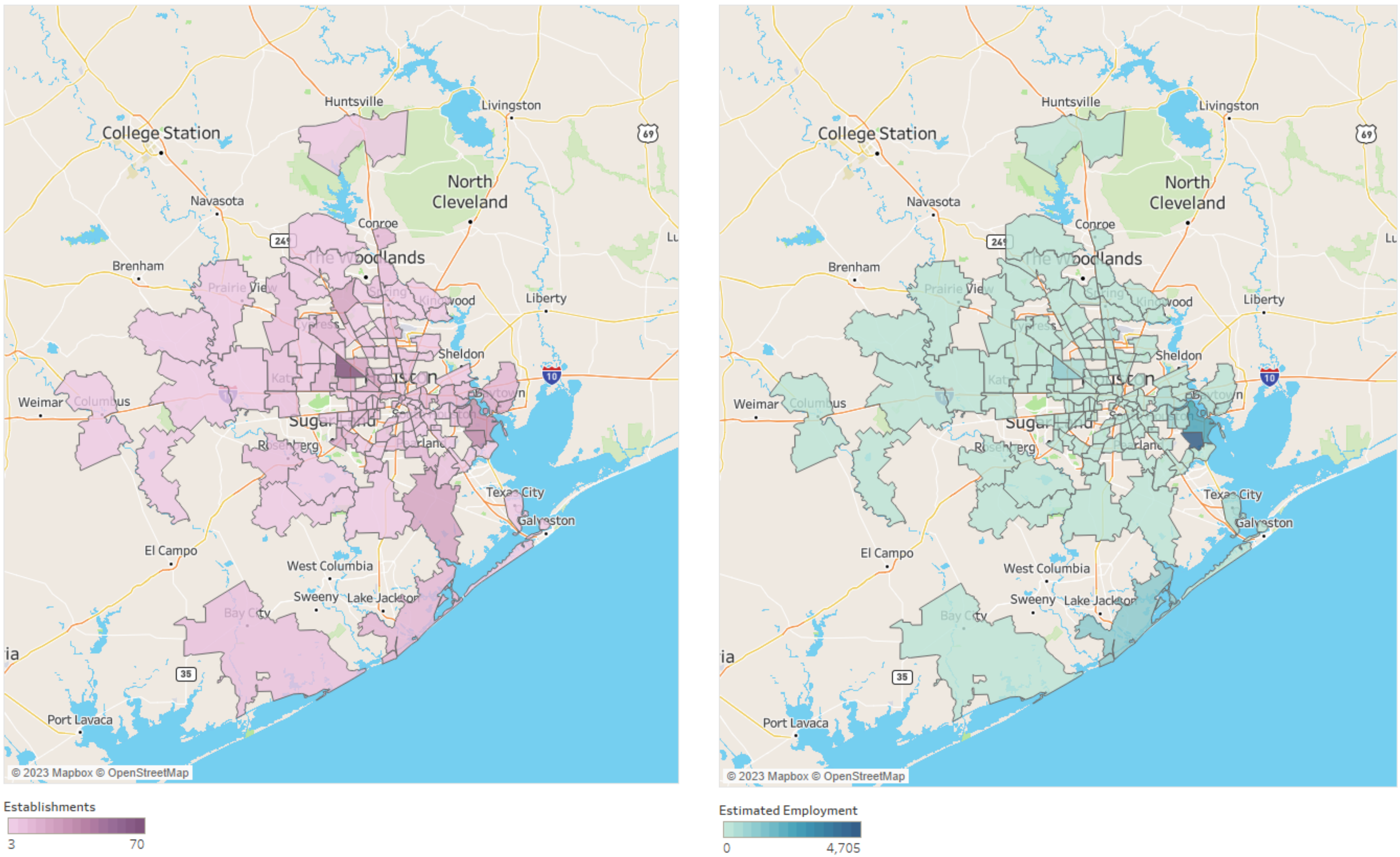
NAICS 23 establishments are present throughout the entire H-GAC region, with the greatest density to the northwest, west, southwest, and south of Houston. Employment is somewhat more concentrated and is heaviest in Jersey Village (Sam Houston Tollway & Northwest Freeway) and LaPorte/Morgan's Point/Port of Houston (SR 146 and SR 225. Source: County Business Patterns.

Figure 5. Establishments and Employment, NAICS 31 (Food, Beverage Textile Manufacturing)



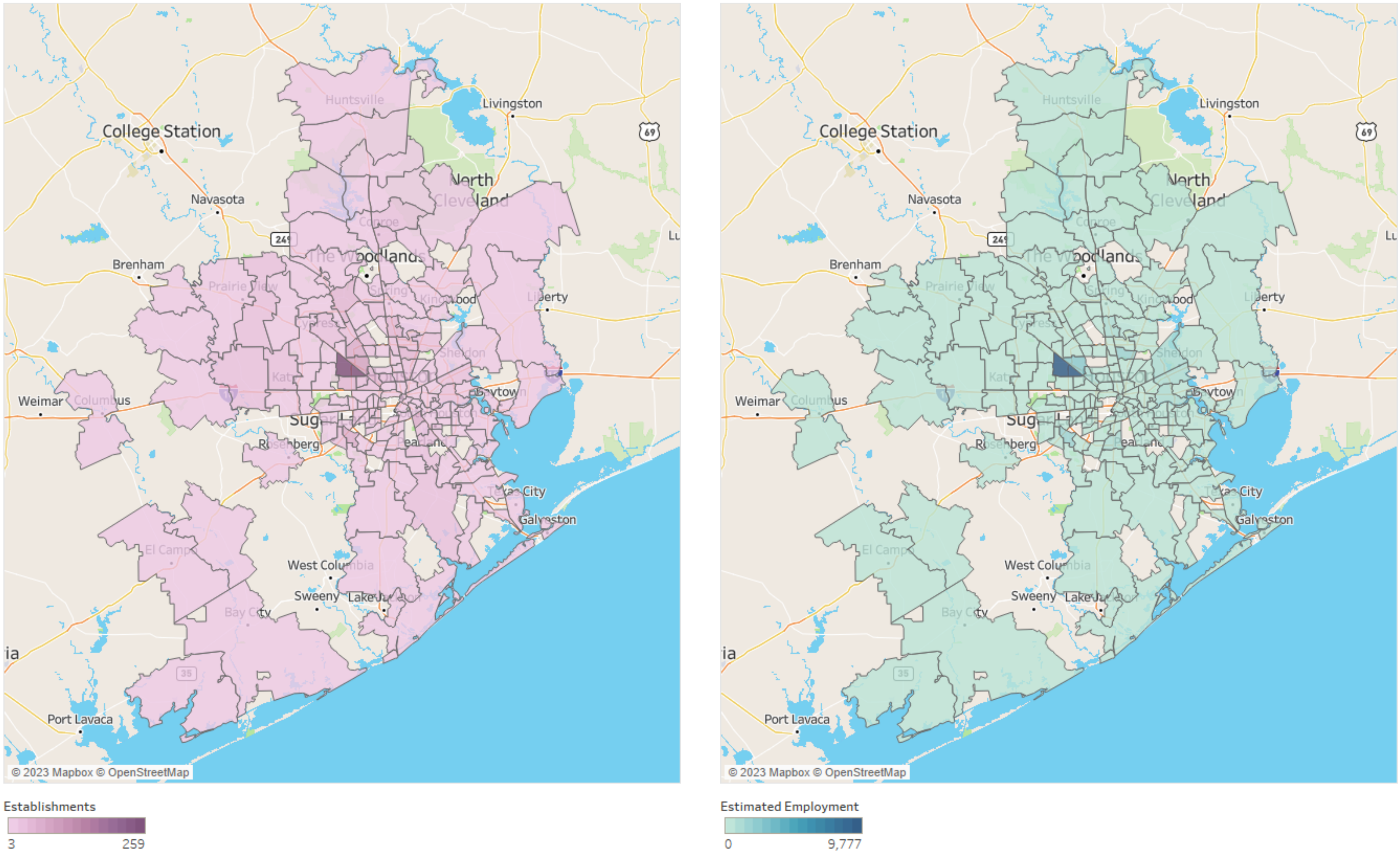
NAICS 31 establishments are present in limited numbers and tend to be located west and south of downtown Houston. Employment is most concentrated in the Jersey Village area (Sam Houston Tollway & Northwest Freeway). Source: County Business Patterns.

Figure 6. Establishments and Employment, NAICS 32 (Wood, Petroleum, Chemical, Mineral Manufacturing)



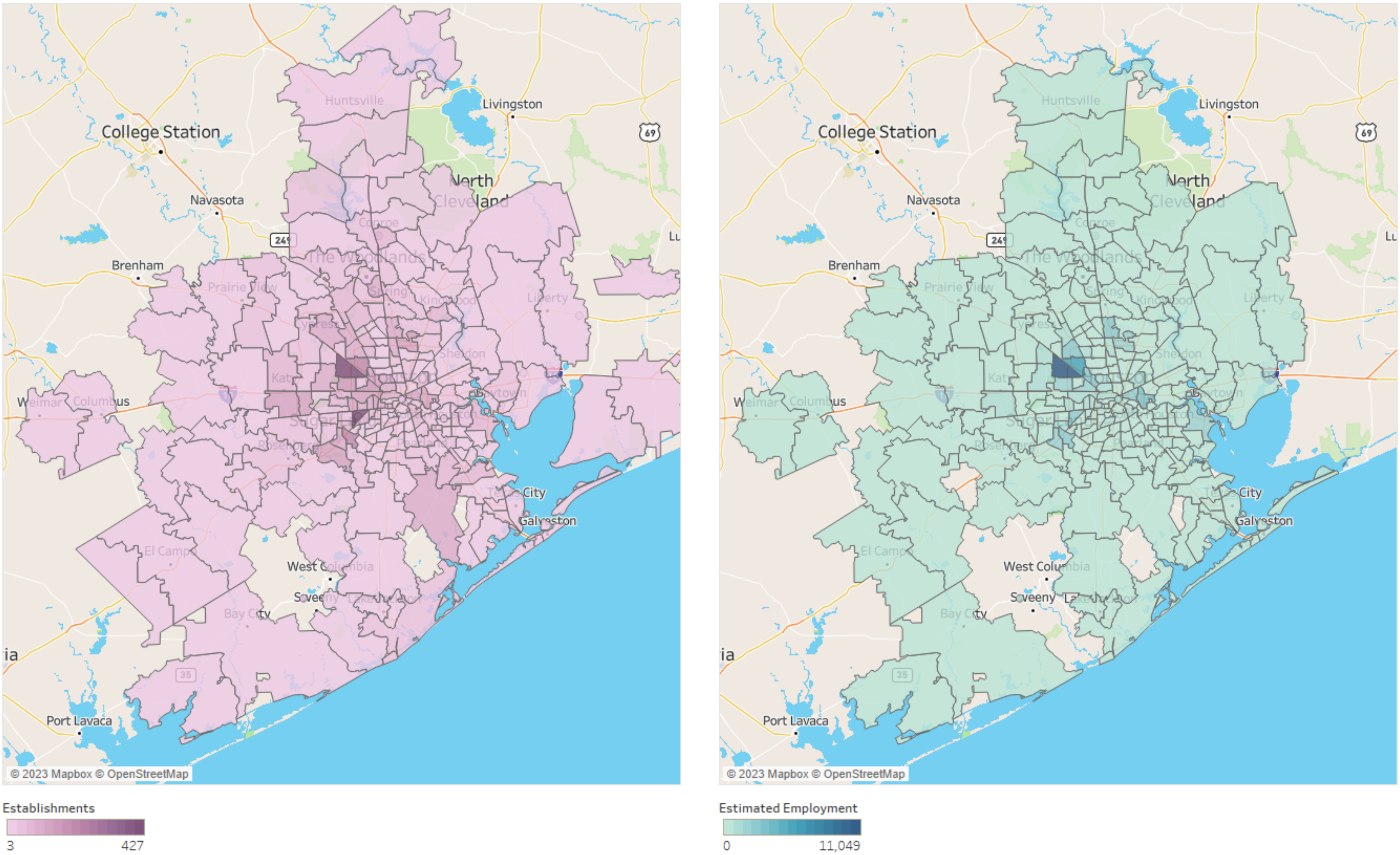
NAICS 32 establishments are more numerous than NAICS 31 and are distributed more broadly throughout the H-GAC region. Employment is most concentrated in the LaPorte area and Port of Houston, with other significant concentrations around the Port of Freeport (SR 288 and SR 36). Source: County Business Patterns.

Figure 7. Establishments and Employment, NAICS 33 (Industrial, Transportation, Consumer Goods Manufacturing)



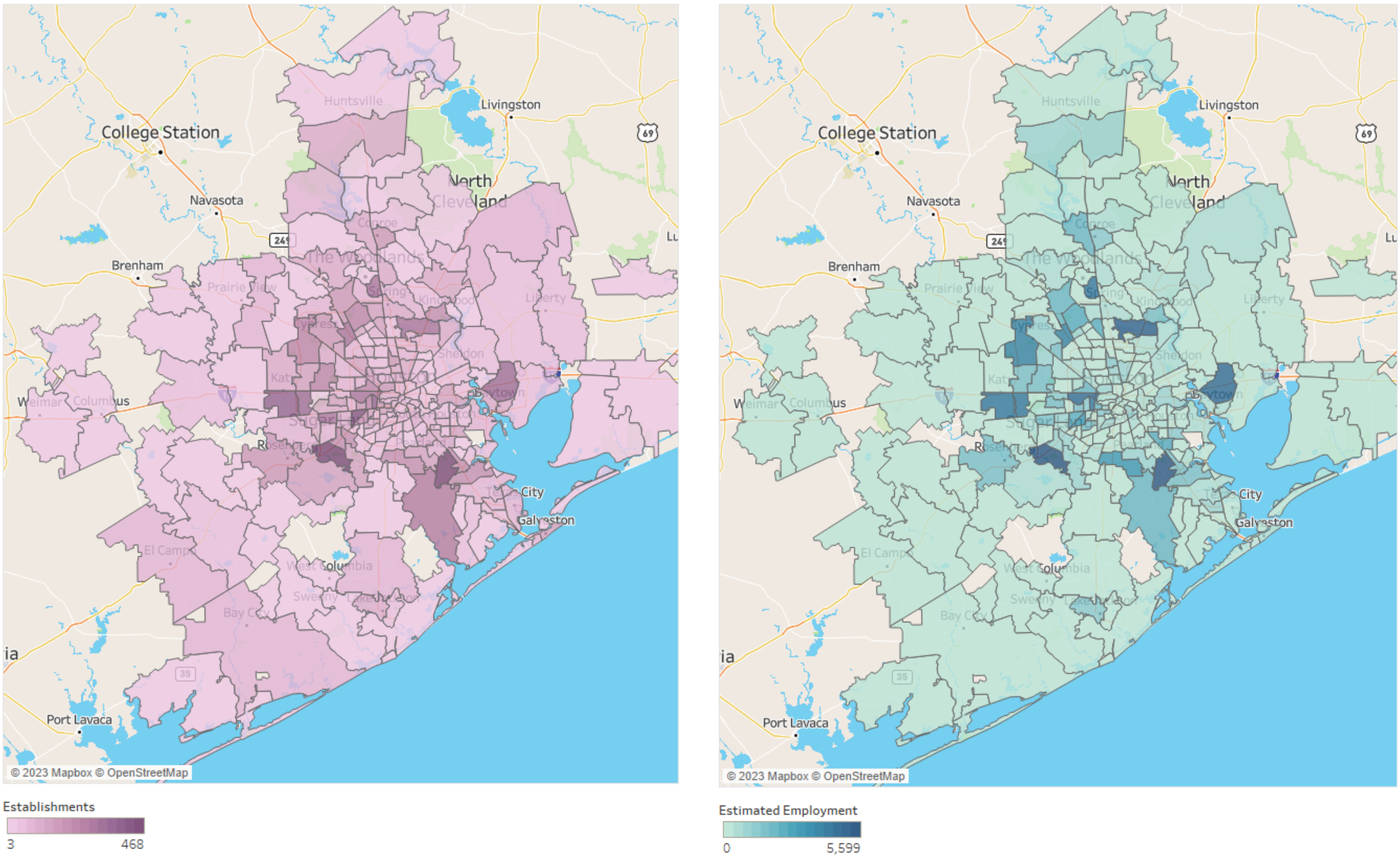
NAICS 33 establishments are the most numerous and broadly-distributed types of manufacturing establishments, and are present throughout much of the region. Number of establishments and employment is most concentrated around the Jersey Village area. Source: County Business Patterns.

Figure 8. Establishments and Employment, NAICS 42 (Wholesale Trade)



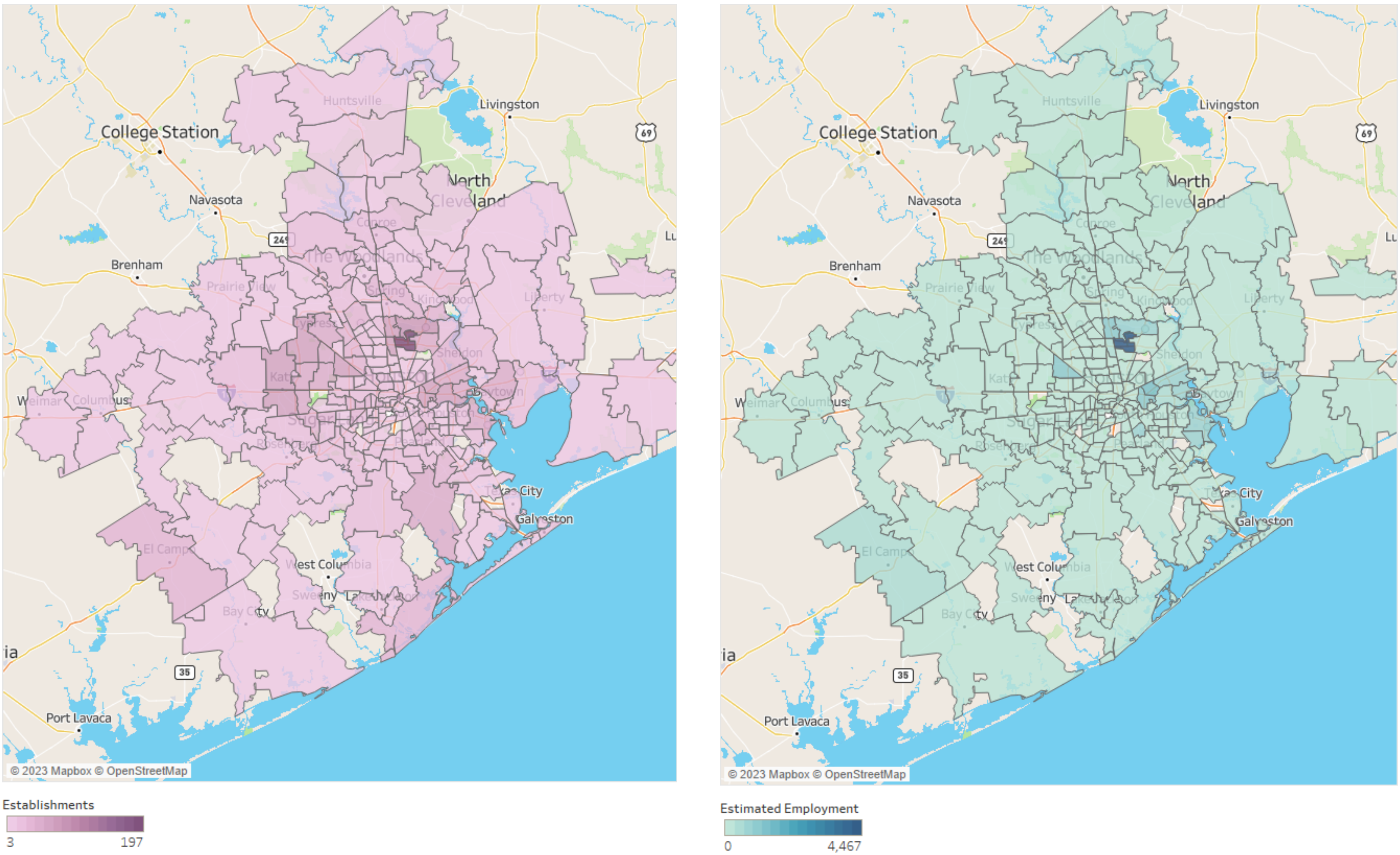
NAICS 42 establishments show distribution patterns similar to NAICS 31-33, with broad distribution throughout the region and the highest concentrations in the Jersey Village area and generally northwest, west, and south of downtown Houston. Source: County Business Patterns.

Figure 9. Establishments and Estimated Employment, NAICS 44-45 (Retail Trade)



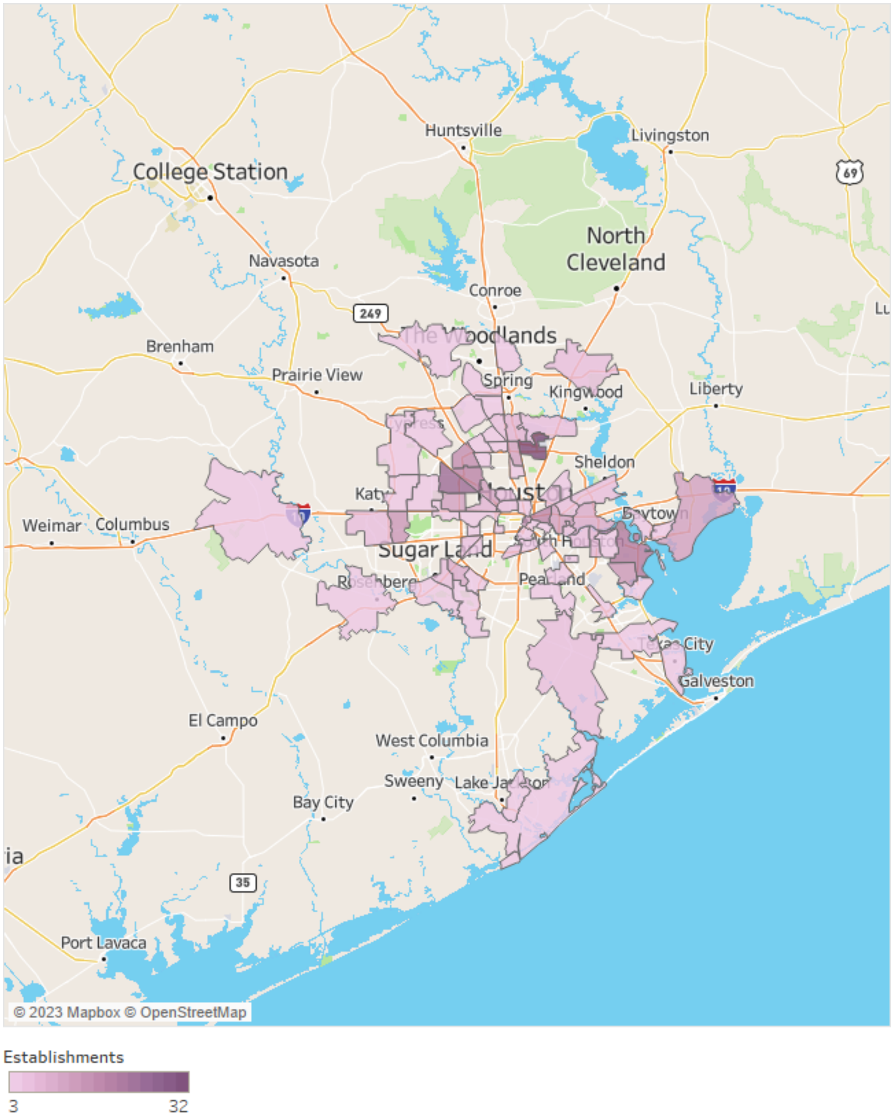
NAICS 44-45 establishments show a very different pattern than other freight-associated uses discussed previously. The highest concentrations are located west of downtown Houston on I-610 and then further out in a roughly circular ring generally corresponding to locations where radial highways intersect with circumferential highways, providing access for both trucks and automobiles. Source: County Business Patterns.

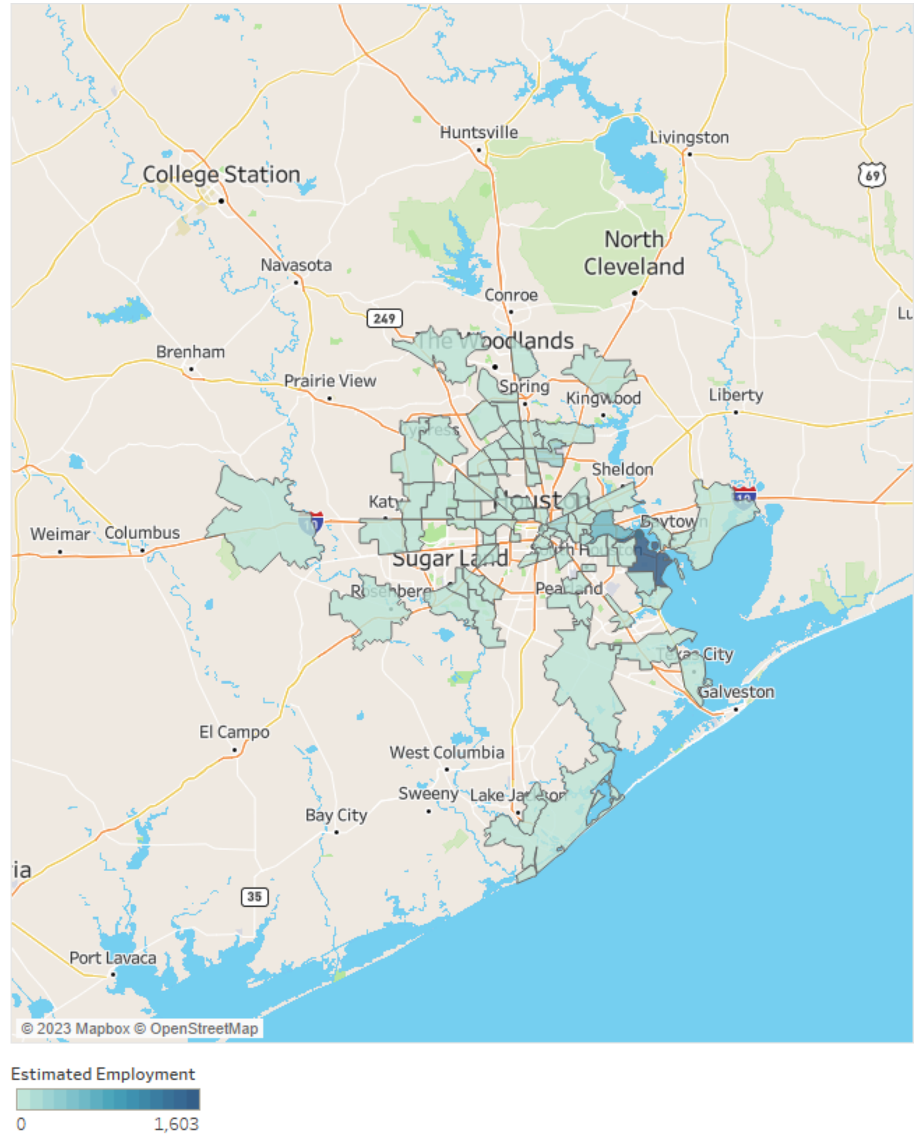
Figure 10. Establishments and Employment, NAICS 48 (Transportation)



NAICS 48 establishments are located throughout the region, but establishments and employment are most concentrated around George Bush Intercontinental Airport, with other significant concentrations from Texas City to Morgan's Point and the Port of Houston. Source: County Business Patterns.

Figure 11. Establishments and Employment, NAICS 49 (Warehousing)



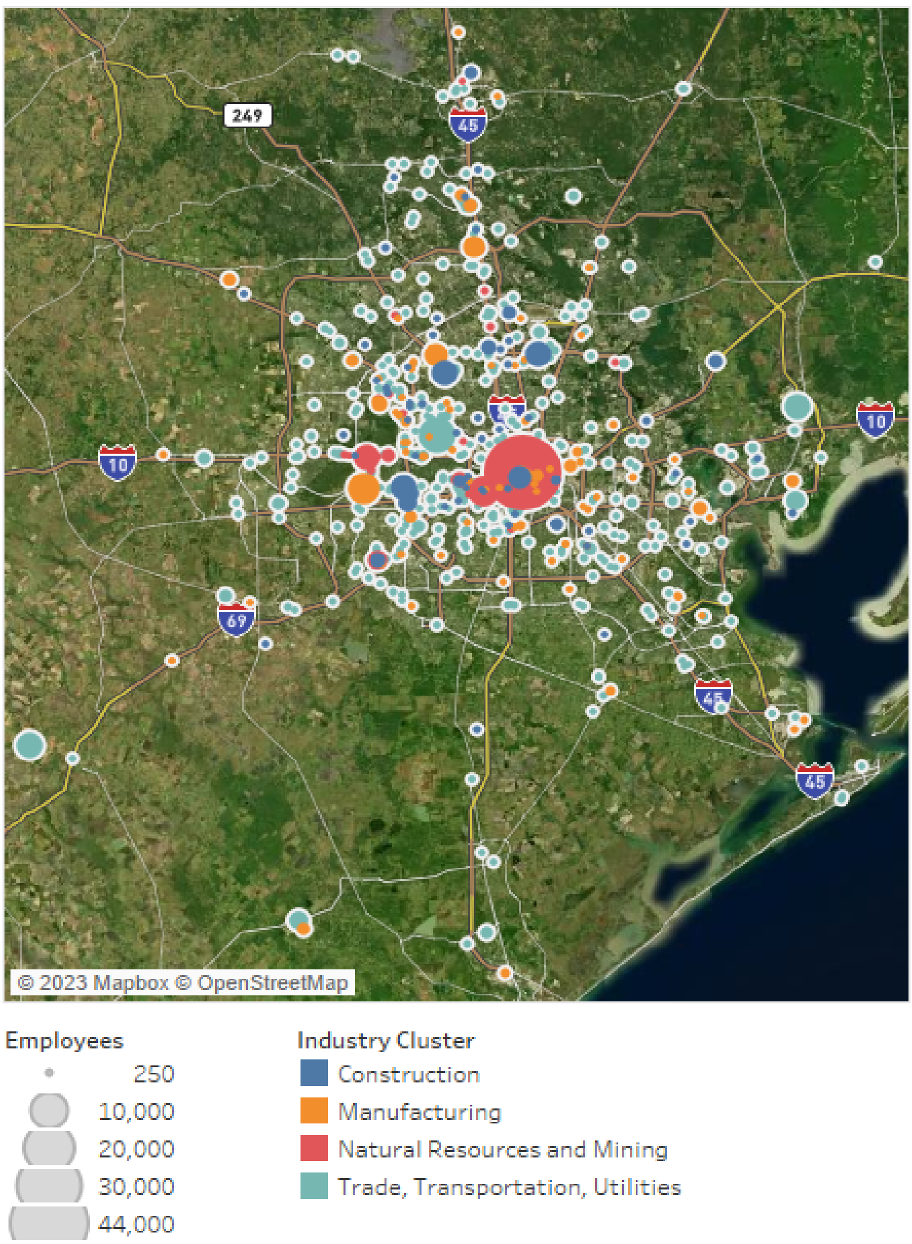


NAICS 49 establishment data captures some, but by no means all, of the warehouse locations in the H-GAC region. Establishments are most concentrated around George Bush Intercontinental Airport, the Jersey Village area, and the La Porte / Baytown / Port of Houston area. Employment is most concentrated in the La Porte / Port of Houston area. Source: County Business Patterns.

2.3.2 Establishment Location Mapping

Representative address locations for larger establishments were obtained from InfoUSA/Data Axle analyses performed as part of the Texas Freight Mobility Plan 2023 Update. InfoUSA is a commercial data product providing business size, type, and location information; the data is known to be incomplete, but is considered representative. As shown in Figure 12, the largest freight-associated businesses are located in and around downtown Houston (primarily headquarters), but large freight-associated businesses are distributed throughout Harris County, at port locations (Houston/Bayport, Texas City, Galveston, Freeport), and along major interstate corridors.

Figure 12. Selected Freight-Associated Establishments > 250 Employees, 2020

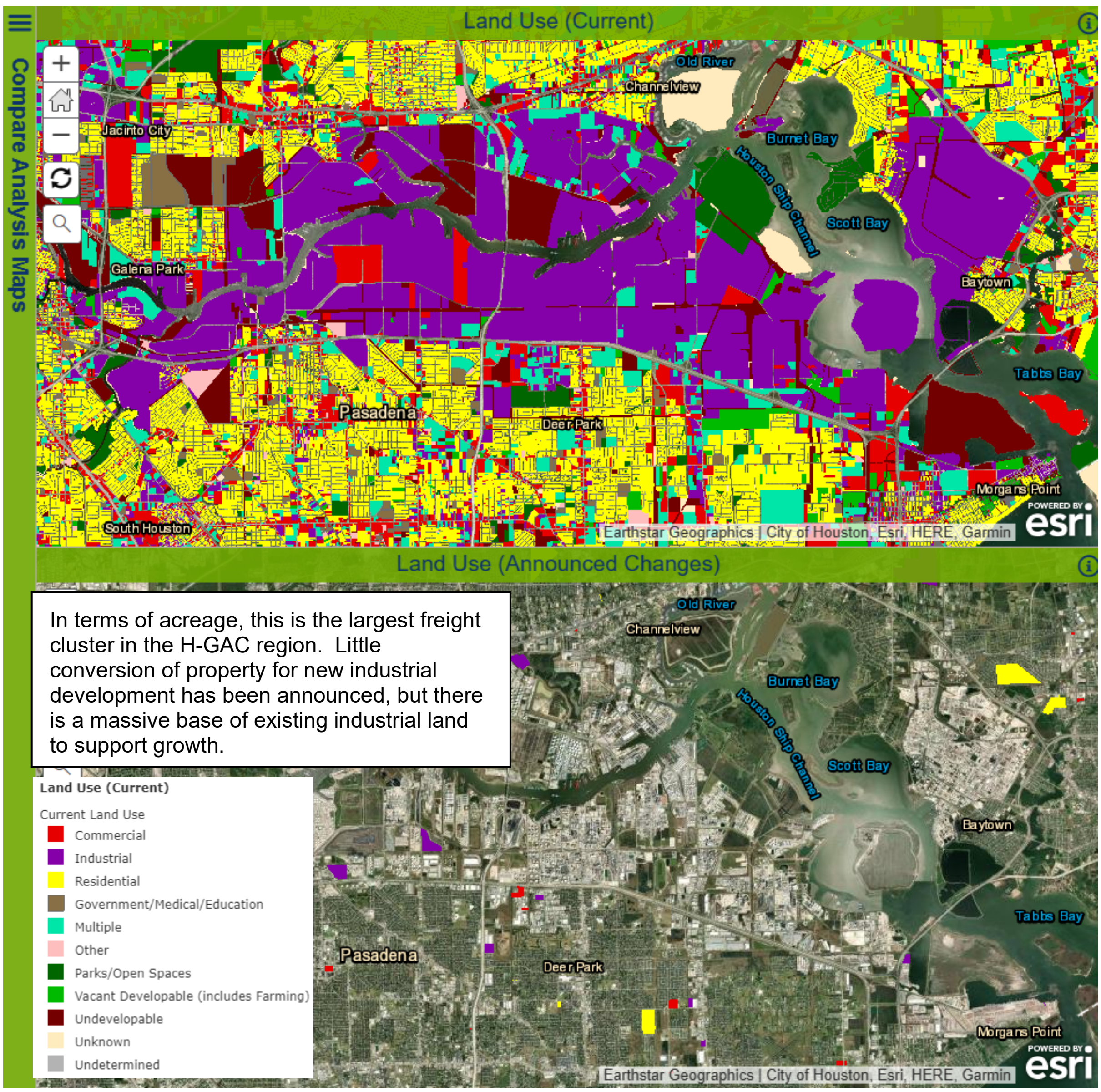


Source: analysis of InfoUSA/Data Axle data for Texas Freight Mobility Plan Update 2022

2.3.3 Land Use Mapping

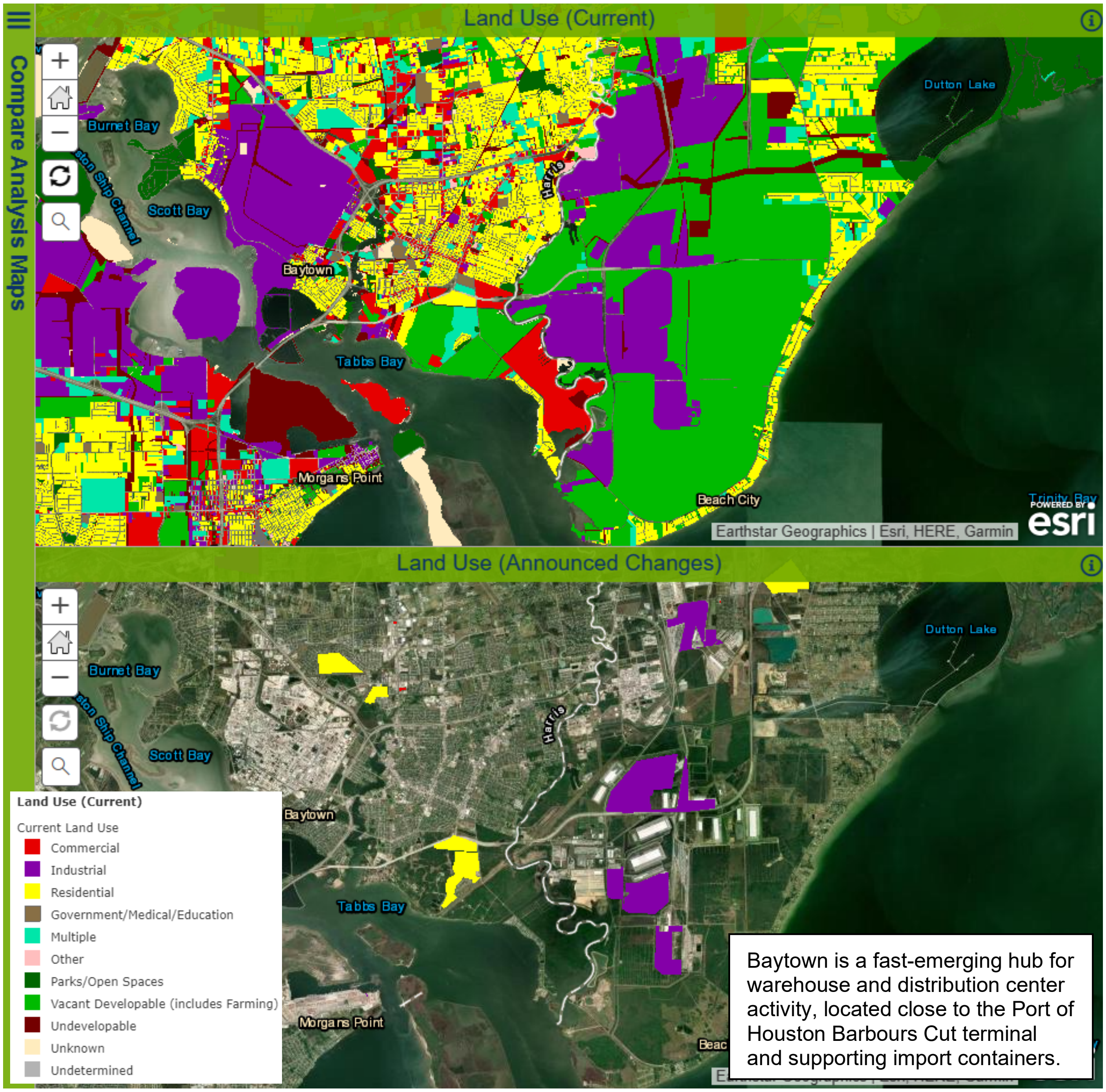
H-GAC's Regional Land Use Information System (https://datalab.h-gac.com/RLUIS/) provides additional insight into the land use characteristics of current and emerging industrial clusters. Freight-associated uses appear variously in tightly-defined or loosely-defined clusters, corridors organized around highway/rail/marine channel infrastructure, or more isolated nodes. As discussed in Section 3 following, substantial growth in freight tonnage and value is projected for the region through 2050, which will be generated from (1) intensification of activity on existing industrial and commercial lands and (2) conversion and development of new industrial lands. Land uses and announced land use changes for important regional industry locations are illustrated in Figure 13 through Figure 19 following.

Figure 13. Barbours Cut / Houston Ship Channel / Buffalo Bayou



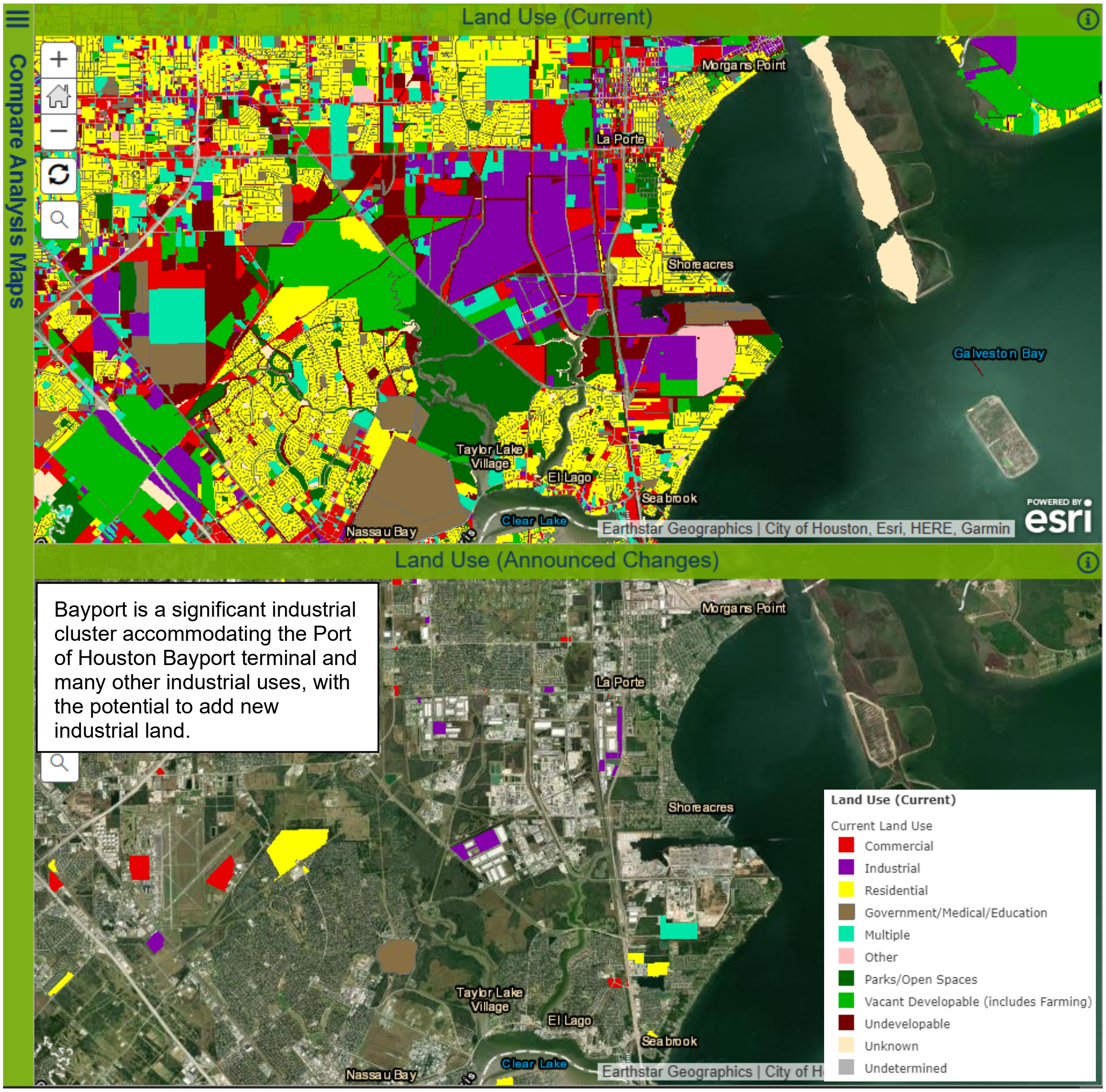
Source: H-GAC's Regional Land Use Information System (https:/ /datalab.h-gac.com/RLUIS/)

Figure 14. Baytown



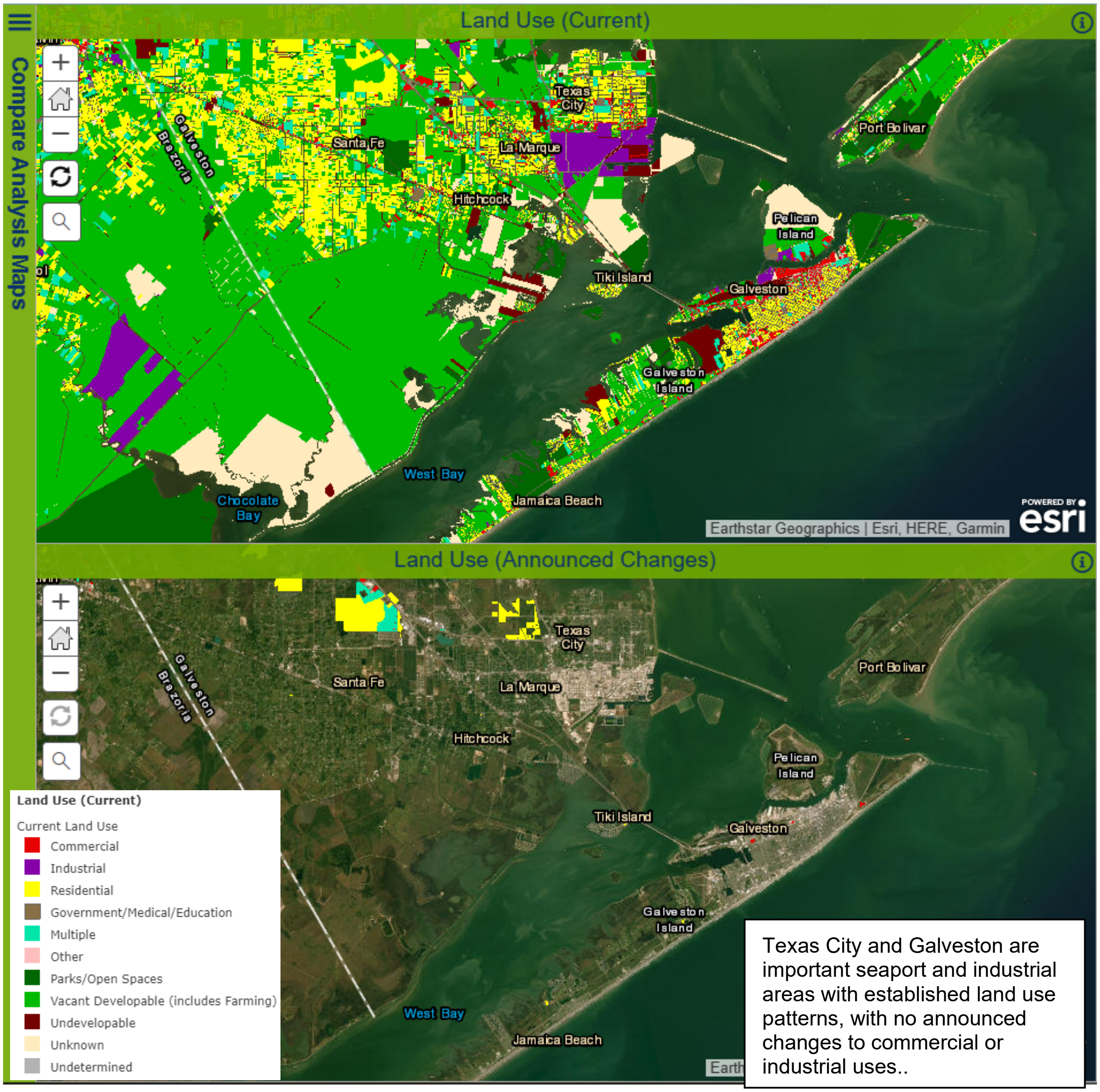
Source: H-GAC's Regional Land Use Information System (https://datalab.h-gac.com/RLUIS/)

Figure 15. Bayport



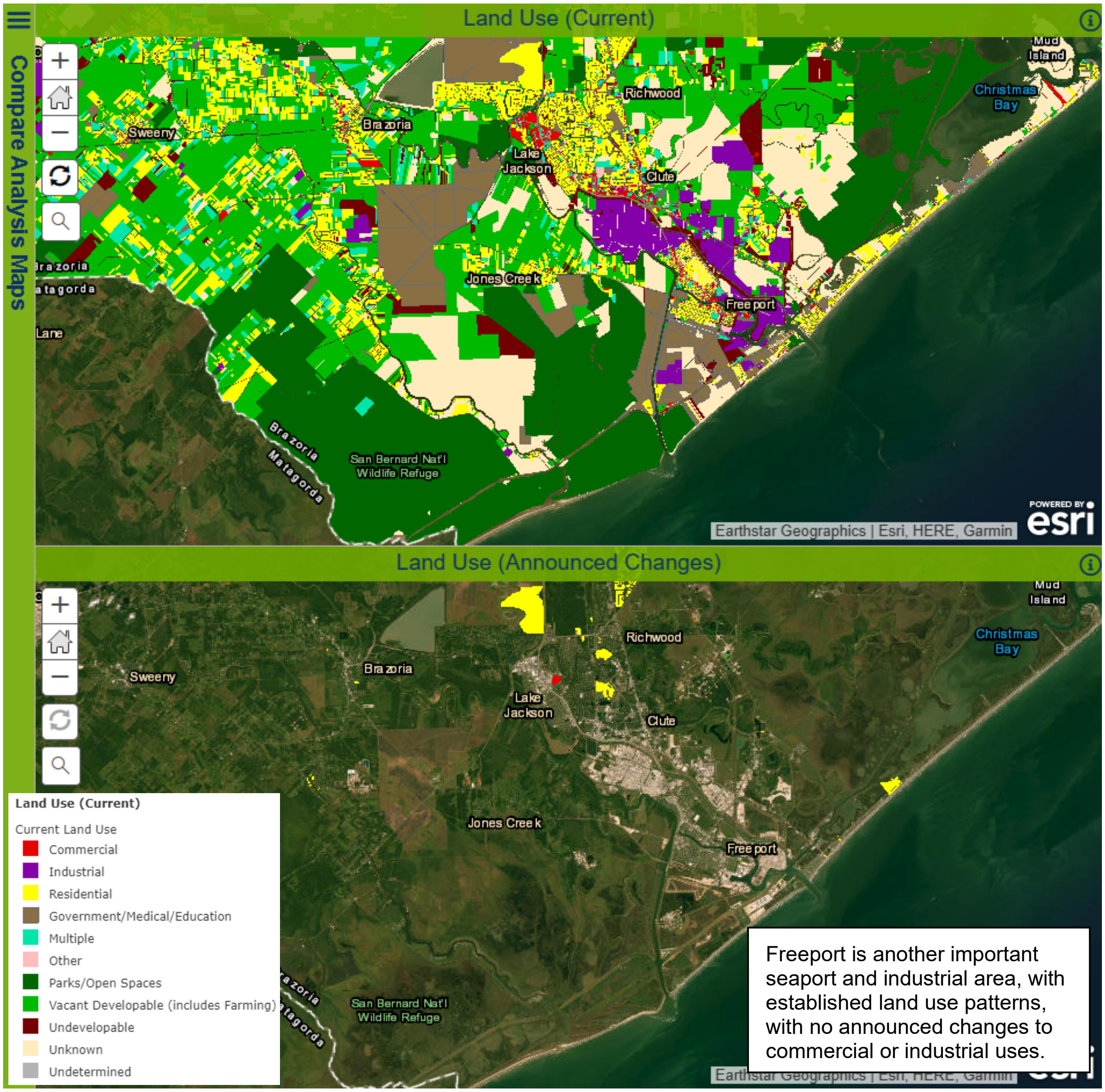
Source: H-GAC's Regional Land Use Information System (https://datalab.h-gac.com/RLUIS/)

Figure 16. Texas City and Galveston



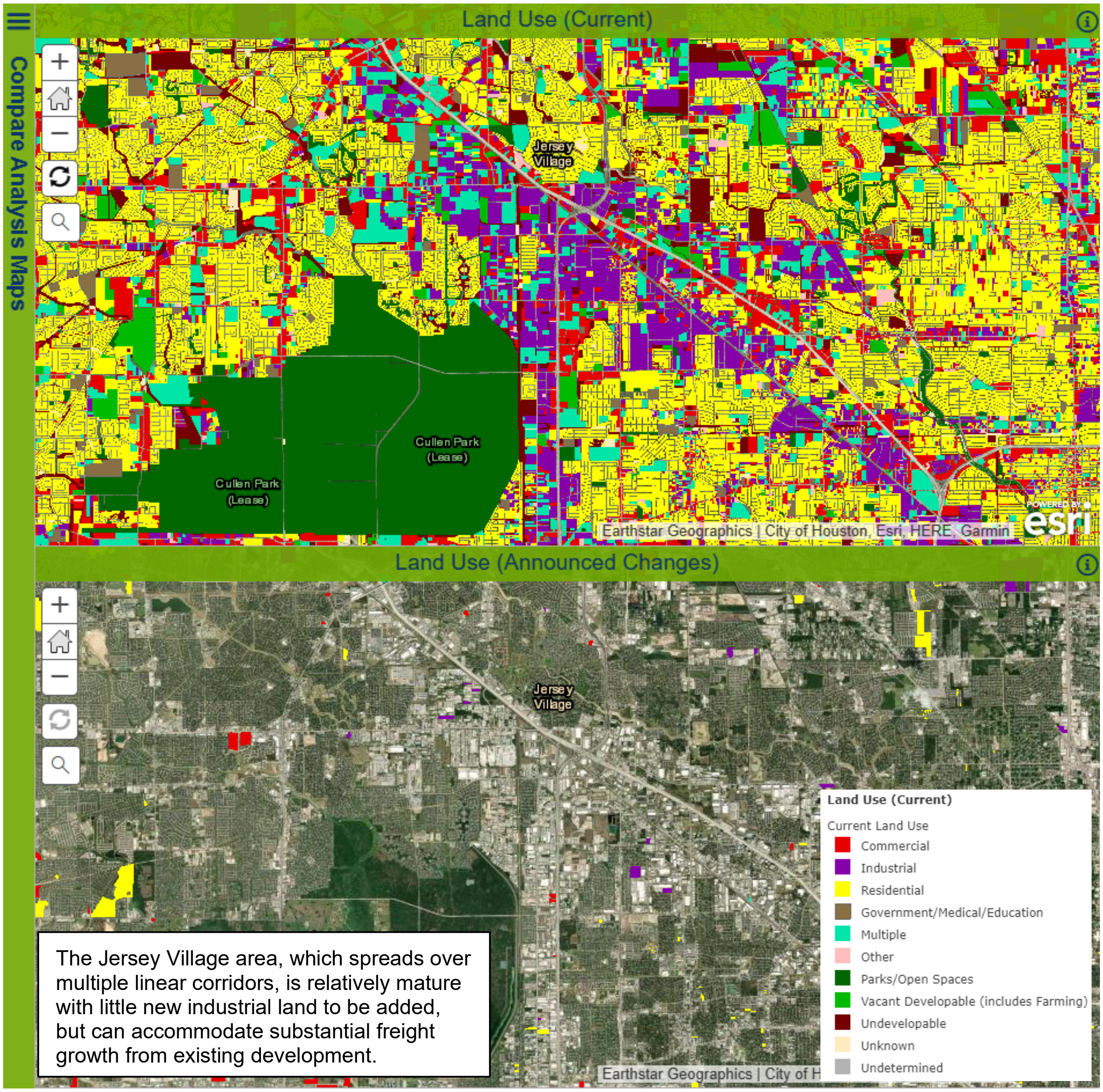
Source: H-GAC's Regional Land Use Information System (https://datalab.h-gac.com/RLUIS/)

Figure 17. Freeport



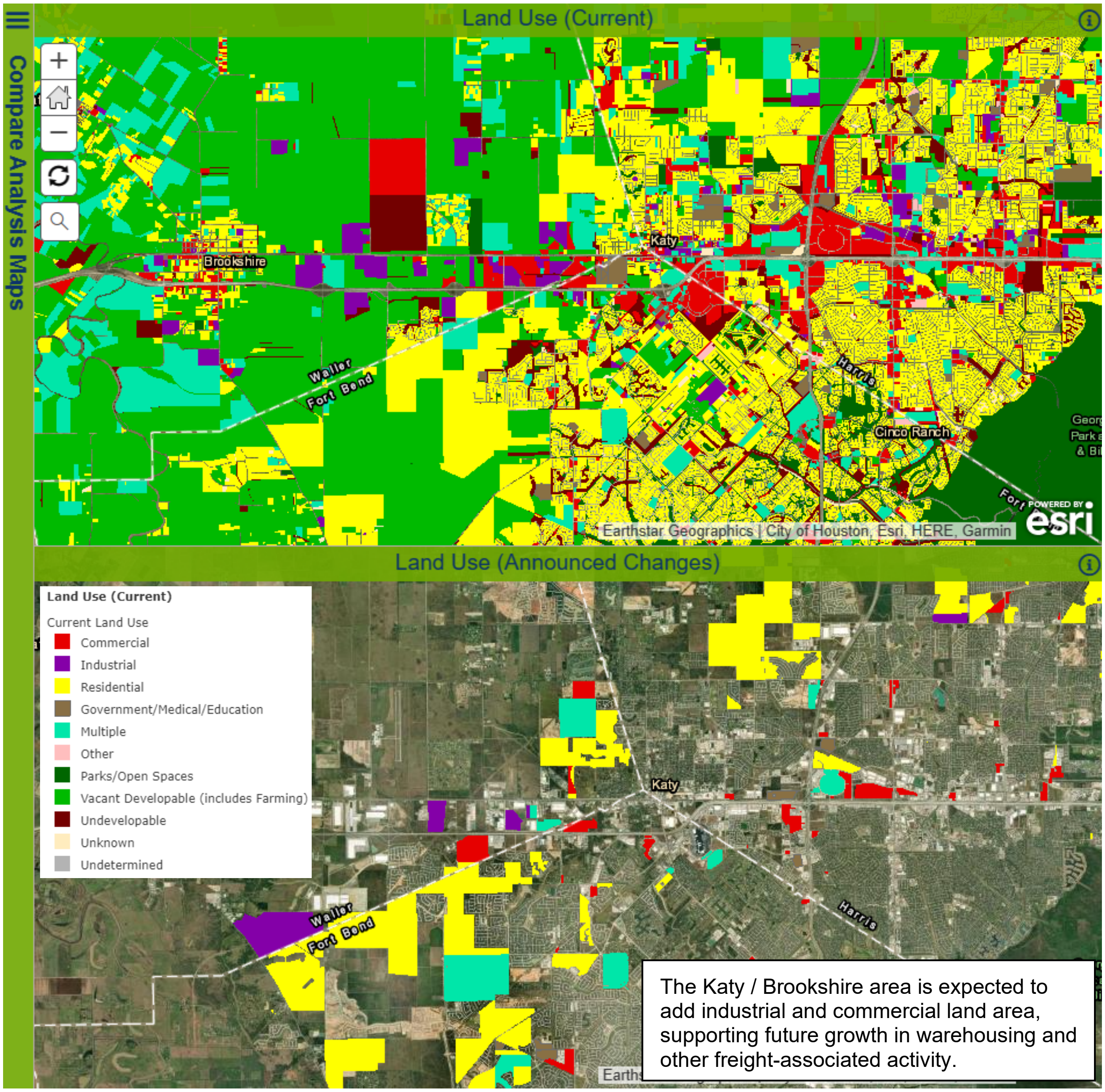
Source: H-GAC's Regional Land Use Information System (https://datalab.h-gac.com/RLUIS/)

Figure 18. Jersey Village



Source: H-GAC's Regional Land Use Information System (https://datalab.h-gac.com/RLUIS/)

Figure 19. Katy / Brookshire



Source: H-GAC's Regional Land Use Information System (https://datalab.h-gac.com/RLUIS/)

3 Commodity Flows

“Commodity flows” are the movements of goods, typically measured in tons or equivalent values. Commodity flows can be tabulated according to:

- Direction of trade (into, out of, within, or through a given area)
- Type of trade (international import or export vs. domestic)
- Transportation mode (truck, rail, water, air, pipeline)
- Commodity type
- Origin and destination

With five descriptive dimensions and two primary measures, there are many different ways to report freight data. This analysis focuses on high-level descriptors, but the underlying data sources support much deeper analysis as appropriate for continuing H-GAC freight planning activities.

The primary data sources used in this analysis are:

- The Transearch model, a commercial product of Standard & Poor’s. Transearch provides estimates of tonnage and value of goods and commodities moved by truck, rail, water, and air for current year 2019 and forecast year 2050. The Texas Department of Transportation acquired Transearch for the state of Texas to support the Texas Freight Mobility Plan 2023 Update. With enhancements implemented for the TFMP, this model was made available to H-GAC for use through data-sharing provisions of its use license. Summaries and representations of the model, which itself is confidential, are presented in the following section.
- The Freight Analysis Framework version 5, a product of the US Department of Transportation, which provides non-confidential estimates of tons and value of cargo moved by truck, rail, air, water, pipeline, and multiple modes. It offers less geographic and commodity-level detail than Transearch, but includes pipelines and is available for the entire country at no cost.

3.1 Transearch Analysis

Transearch is the most comprehensive and widely used commercial model of commodity flows. Originally developed by Reebie Associates, a trucking firm, its development team has gone through several owners, and it is now made available through Standard & Poor’s. Through the years, the model has been consistently improved to include the best available Federally-sourced data, enhanced by proprietary data collection and modeling methods.

Transearch is a modally-oriented model. It can report estimates of tons, value, or truck units, and can do so by origin or destination (at the county, business economic area, or state level), commodity type (at highly aggregated or very specific levels of detail), mode (truck, rail, air, water, pipeline, other/unknown), and trade type (domestic, international). Typically, Transearch includes domestic and NAFTA trade volumes and not other international volumes, but the Texas DOT version of Transearch was modified by the Texas Freight Mobility Plan 2023 Update consultant team to include complete international trade information, along with improved coverage of the movement of fracking materials to and from Texas. Also note that Transearch does not include domestic pipeline data.

3.1.1 Overall Activity

The tables in this section present summaries of tonnage and value flows extracted from the Transearch model for years 2019 and 2050.

Section 2 of this document described the many different kinds of freight producing, consuming, and distribution industries in the H-GAC region. Each is associated with a particular set of commodities, so the Transearch analysis starts with a commodity-level view. As shown in Table 5, the data can be aggregated to 13 high-level commodity groups.

- Looking at tonnage, Energy Products (currently the leading tonnage group by far) are expected to decline through 2050; natural gas is projected to be relatively constant, and the declines will from coal, coal products, and crude petroleum. Meanwhile, other commodity group tonnages (aggregates, chemicals, waste and scrap, warehouse and secondary movements, and others) are projected to increase rapidly. The H-GAC region is one of the largest freight hubs in the country, with a tonnage output larger than many states. Over the next 30 years, growth in non-energy commodities is projected to drive growth from 882 million tons in 2019 to 1,667 million tons in 2050. In other words, freight tonnage moving over the H-GAC transportation network is forecast to roughly double over the next 30 years.
- Looking at value, the picture is similar. Energy Products is the number one commodity group by value and is expected to decline somewhat. The second group – Chemicals, Pharmaceuticals, Plastics, and Rubber – which is only slightly behind Energy Products, is projected to triple in value. Significant growth is also projected for Warehouse & Secondary Movements, Machinery, Motor Vehicles & Transportation Equipment, Food Products, Mixed Freight, and other groups. Overall value of freight moved is projected to grow from $821 billion in 2019 to $1,988 billion in 2050.

As shown in Table 6, trucking has the largest share (45 percent) of tonnage in 2019 (401 million tons, including domestic and NAFTA moves) and is projected to more than double in tonnage and value by 2050. Water has the second largest share (340 million tons, including domestic, NAFTA, and other international moves), and is projected to add 106 million tons by 2050. Rail has the third largest share (113 million tons, including domestic and NAFTA moves), and is projected to more than double in tonnage. Air has a limited amount of tonnage (less than one million tons) but substantial value (almost 53 billion) in 2019, and is forecast to more than double in both tons and value. Pipeline data is included only for NAFTA trade and does not include domestic moves so that no conclusions can be drawn, other than NAFTA trade is expected to grow.

Table 5. H-GAC Tons and Value by Commodity Group, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Energy Products	415,190,106	330,876,441	177,372,910,709	130,995,249,942
Aggregates	141,417,816	305,473,136	10,842,393,233	22,210,891,567
Chemicals, Pharmaceuticals, Plastics & Rubber	126,999,459	396,299,757	174,579,733,985	519,911,872,073
Waste and Scrap	41,324,198	143,528,215	26,342,925,924	65,919,901,261
Warehouse & Secondary Movements	35,167,947	201,583,185	66,085,989,631	291,622,972,102
Metals	30,849,110	68,788,352	69,692,356,776	159,369,817,306
Crops, Livestock, and Farm Products	30,698,290	63,725,824	15,449,708,251	35,742,385,632
Food Products	23,350,605	67,834,541	30,896,788,339	93,387,648,711
Wood and Paper Products	13,600,863	25,772,400	15,179,664,386	32,014,347,351
Machinery, Electrical & Precision Instruments	9,215,471	23,079,001	126,651,797,339	316,582,872,821
Motor Vehicles & Transportation Equipment	7,154,189	23,263,888	60,343,165,864	220,227,962,144
Mixed Freight	5,677,390	13,929,087	38,317,265,386	84,826,170,154
Clothing, Leather & Textiles	1,262,335	2,405,946	8,754,820,941	15,409,782,196
Grand Total	**881,907,779**	**1,666,559,775**	**820,509,520,763**	**1,988,221,873,260**

Source: analysis of Texas DOT Transearch model

Table 6. H-GAC Tons and Value by Mode, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Truck	400,542,226	932,551,793	382,464,117,344	1,062,531,483,122
Water	340,125,064	446,296,963	235,845,271,596	385,315,306,496
Rail	112,932,749	243,899,770	144,561,151,791	392,343,995,810
Pipeline*	27,753,051	42,459,697	4,019,297,768	5,788,580,582
Air	501,858	1,215,923	52,950,798,528	140,263,971,936
Other	52,830	135,630	668,883,735	1,978,535,313
Grand Total	**881,907,779**	**1,666,559,775**	**820,509,520,763**	**1,988,221,873,260**

Source: analysis of Texas DOT Transearch model. Note that domestic pipeline tonnage is not included in the Transearch totals.

As shown in Table 7, domestic moves (which are moves within Texas and between US states) represent the highest share of tons (476 million) and value ($473 billion) in 2019, and both are projected to more than double by 2050. Combined exports (NAFTA and non-NAFTA) total 290 million tons in 2019 and are projected to grow to 452 million tons in 2050; combined imports total 116 million tons in 2019 and are projected to grow to 238 million tons in 2050. (Note: NAFTA refers to the North American Free Trade Agreement and covers trade with Canada and Mexico. NAFTA's terms have been updated with the USCMA, or US-Canada-Mexico Agreement.)

Table 7. H-GAC Tons and Value by Trade Type, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Domestic	475,689,871	975,546,359	472,964,949,582	1,167,853,385,949
Export ex. NAFTA	224,288,623	340,763,172	145,910,380,661	312,714,616,259
Import ex. NAFTA	83,966,894	186,916,410	127,032,183,265	324,520,530,973
Export NAFTA	65,912,972	111,457,835	36,127,789,473	71,421,227,585
Import NAFTA	32,049,418	51,875,998	38,474,217,782	111,712,112,493
Grand Total	**881,907,779**	**1,666,559,775**	**820,509,520,763**	**1,988,221,873,260**

Source: analysis of Texas DOT Transearch model.

Commodity flows can be defined in terms of their direction with respect to a defined target region. In this analysis, the target region is the set of H-GAC counties. Flows can be outbound from the H-GAC region, inbound to the H-GAC region, within individual H-GAC counties, or between different H-GAC counties. As shown in Table 8, outbound moves comprise the largest shares of tonnage (43 percent) and value (41 percent), followed by inbound moves, then by within-county moves, and finally by between-county moves. Moves in all directions are projected to grow substantially between 2019 and 2050. Note: "pass through" moves (which have neither an origin nor a destination in the H-GAC region) are not included in the Transearch totals.

Table 8. H-GAC Tons and Value by Flow Direction, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Outbound from H-GAC Region	376,493,296	661,784,146	336,473,967,416	799,560,329,925
Inbound to H-GAC Region	293,851,337	581,067,753	316,046,517,746	768,796,408,219
Within H-GAC Counties	125,697,025	242,898,426	112,540,543,427	279,728,514,049
Between H-GAC Counties	85,866,122	180,809,449	55,448,492,174	140,136,621,065
Grand Total	**881,907,779**	**1,666,559,775**	**820,509,520,763**	**1,988,221,873,260**

Source: analysis of Texas DOT Transearch model

After determining the directions of flows, the next step is to identify the leading origins and destinations of these flows. For inbound flows, the origin will be external to H-GAC and the destination will be internal; for outbound flows, the origin will be H-GAC counties and the destination will be external; for between-county flows, the origin and destination will be different H-GAC counties; and for within-county flows, the origin and destination will be the same H-GAC county. Origin-destination information is presented in Table 9 through Table 15 following.

As shown in Table 9, outbound flows in 2019 total 376 million tons and $336 billion, and are projected to grow to 662 million tons and $800 billion. Harris County originates 77 percent of outbound tonnage and 81 percent of outbound value. The next highest ranked counties are Galveston and Brazoria.

Table 9. Outbound Flow Origin Counties, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Harris	290,321,401	519,673,352	271,559,072,724	675,004,624,103
Galveston	34,472,779	49,698,827	21,159,128,038	34,509,809,951
Brazoria	31,395,126	49,339,400	22,458,056,121	40,459,148,881
Liberty	6,153,376	12,222,635	7,752,923,235	14,479,824,611
Montgomery	3,618,224	9,257,717	2,616,704,567	6,933,914,554
Fort Bend	1,988,679	4,845,622	5,426,948,305	13,645,996,747
Colorado	1,853,253	3,284,345	424,111,607	954,724,229
Matagorda	1,704,114	4,260,952	2,030,742,450	6,740,273,844
Chambers	1,508,867	4,154,116	1,149,559,495	2,803,231,023
Waller	1,306,414	1,928,390	918,130,064	2,207,311,002
Wharton	1,267,400	1,336,472	481,022,819	855,911,876
Austin	467,931	1,137,925	245,884,327	606,452,407
Walker	435,732	644,394	251,683,663	359,106,697
Grand Total	**376,493,296**	**661,784,146**	**336,473,967,416**	**799,560,329,925**

Source: analysis of Texas DOT Transearch model

As shown in Table 10, these H-GAC outbound flows have destinations throughout the U.S. and the world. The Remainder of Texas (all Texas counties outside the H-GAC region) receives 20 percent of tons and 24 percent of value. Other leading tonnage destinations include Louisiana, Distrito Federal MX, Brazil, Veracruz Mexico, Japan, India, South Korea, Netherlands, Illinois, Tamaulipas MX, United Kingdom, Florida, California, and China. Together these 15 leading destinations account for 65 percent of 2019 outbound tons and 33 percent of 2019 outbound value.

Table 10. Outbound Flow Destination States and Countries, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Remainder of Texas	74,702,050	182,009,725	79,889,633,944	240,314,951,750
Louisiana	28,347,134	50,931,127	27,194,212,932	62,536,610,286
Distrito Federal, Mexico	20,802,402	33,470,112	3,844,161,120	7,280,226,708
Brazil	15,391,805	19,759,841	9,227,947,886	13,807,272,513
Veracruz, Mexico	14,020,271	25,777,688	7,169,974,778	12,788,061,695
Japan	13,839,935	13,299,308	6,005,722,653	6,522,384,643
India	11,775,678	17,238,738	5,093,043,010	8,302,182,784
South Korea	10,549,509	11,409,628	5,237,026,015	6,641,216,094
Netherlands	8,958,799	9,763,889	7,375,413,429	14,343,548,314
Illinois	9,071,144	22,593,298	16,258,903,451	44,255,835,224
Tamaulipas, Mexico	8,735,525	15,720,899	4,483,111,199	8,988,910,556
United Kingdom	8,257,132	8,988,716	4,744,388,604	7,119,050,655
Florida	7,415,995	7,934,989	7,230,836,264	13,536,175,222
California	7,277,493	15,940,823	18,271,718,597	46,830,183,665
China	6,291,581	8,988,745	3,905,041,884	6,720,157,938
All Other	131,056,842	217,956,620	130,542,831,649	299,573,561,879
Grand Total	**376,493,296**	**661,784,146**	**336,473,967,416**	**799,560,329,925**

Source: analysis of Texas DOT Transearch model

Flows inbound to the H-GAC region are shown in Table 11, with 294 million tons and $316 billion in 2019, projected to grow to 581 million tons and $769 billion in 2050. the Remainder of Texas originates 38 percent of inbound tonnage and 22 percent of inbound value. Other leading origins include Louisiana, Wyoming, Tabasco MX, Russia, Oklahoma, Columbia, Kansas, Missouri, Illinois, Arkansas, Campeche MX, Veracruz MX, Alberta CN, Quintana Roo MX, Brazil, China, Alabama, California, and Turkey. Together they account for 75 percent of 2019 inbound tons and 53 percent of 2019 inbound value.

Table 11. Inbound Flow Origin States and Countries, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Remainder of Texas	110,326,796	249,791,670	68,325,218,208	175,594,078,722
Louisiana	30,273,734	55,818,034	25,267,653,220	53,088,824,225
Wyoming	9,301,243	2,570,832	501,405,936	746,800,412
Tabasco, Mexico	7,522,044	3,871,013	2,701,521,171	1,476,022,194
Russia	6,121,651	5,709,377	2,578,579,220	2,841,576,205
Oklahoma	5,332,834	9,150,870	2,997,172,329	6,441,833,607
Colombia	5,225,276	4,344,787	2,161,002,236	2,240,873,940
Kansas	4,508,806	8,070,836	2,627,960,433	5,525,037,082
Missouri	3,878,950	7,391,518	3,101,106,244	7,297,773,605
Illinois	3,837,397	9,030,662	13,106,772,482	33,270,972,752
Arkansas	3,767,985	8,526,086	4,294,882,942	10,774,107,179
Campeche, Mexico	3,627,630	1,876,192	1,321,936,047	775,092,121
Veracruz, Mexico	3,575,156	2,289,316	1,699,789,347	1,708,242,444
Alberta, Canada	3,315,669	3,704,293	1,953,195,680	2,772,662,433
Quintana Roo, Mexico	3,262,856	14,149,331	23,882,230	96,118,033
Brazil	3,156,981	6,169,055	3,492,491,092	7,824,663,738
China	3,085,599	7,200,552	9,473,467,197	22,955,460,466
Alabama	3,060,490	6,433,342	5,301,370,730	11,305,617,189
California	3,006,717	8,628,533	16,834,459,937	45,312,643,533
Turkey	2,972,070	3,088,944	929,016,743	1,604,878,978
All Other	74,691,453	163,252,512	147,353,634,321	375,143,129,361
Grand Total	**293,851,337**	**581,067,753**	**316,046,517,746**	**768,796,408,219**

Source: analysis of Texas DOT Transearch model

As shown in Table 12, the majority of inbound flows are received by Harris County (72 percent of 2019 tons and 82 percent of 2019 value). The next highest ranked counties are Galveston, Brazoria, and Fort Bend.

Table 12. Inbound Flow Destination Counties, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Harris	210,683,524	406,570,443	257,956,873,310	612,970,030,254
Galveston	20,541,824	49,192,660	14,361,210,692	34,401,229,876
Brazoria	19,819,056	45,096,004	15,516,240,063	44,238,094,862
Fort Bend	17,342,855	23,998,799	11,406,225,686	30,394,097,187
Montgomery	8,901,743	20,756,991	7,361,891,302	20,317,851,777
Chambers	6,114,825	11,977,774	3,032,588,353	7,162,391,096
Liberty	3,424,777	10,286,677	4,248,174,205	14,037,647,260
Waller	1,588,345	3,143,161	514,748,165	1,284,989,778
Walker	1,275,216	2,062,710	307,272,561	730,093,528
Colorado	1,233,088	2,324,017	240,460,982	667,288,409
Austin	1,047,028	2,288,038	281,547,616	806,880,279
Matagorda	979,394	1,327,772	446,319,014	795,624,509
Wharton	899,663	2,042,706	372,965,796	990,189,405
Grand Total	**293,851,337**	**581,067,753**	**316,046,517,746**	**768,796,408,219**

Source: analysis of Texas DOT Transearch model

Flows between different H-GAC counties total 86 million tons and $55 billion in 2019, growing to 181 million tons and $140 billion in 2050. Harris, Brazoria, Montgomery, Galveston, and Liberty are the leaders for originated between-county tonnage (see Table 13) and Harris, Brazoria, Galveston, Fort Bend, and Montgomery are the leaders for received between-county tonnage (see Table 14).

Table 13. Between H-GAC County Flow Origins, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Harris	32,694,015	62,656,226	27,458,075,492	71,549,907,148
Brazoria	13,426,163	29,811,284	8,341,500,901	20,965,632,437
Montgomery	8,323,271	26,275,481	1,540,225,053	4,810,471,728
Galveston	8,096,648	10,688,530	6,453,065,116	10,341,631,430
Liberty	7,863,697	20,108,792	2,660,915,236	4,655,522,689
Colorado	4,378,440	5,542,179	251,366,888	620,347,763
Fort Bend	3,753,553	8,882,417	2,904,549,050	10,017,269,098
Chambers	2,658,508	7,885,124	3,561,893,895	10,154,487,370
Waller	1,955,620	2,320,856	501,068,071	1,313,274,101
Austin	979,157	2,335,656	258,475,563	631,743,676
Matagorda	865,398	2,769,903	1,105,398,079	4,312,117,887
Wharton	678,835	1,040,688	317,935,863	546,002,904
Walker	192,817	492,313	94,022,966	218,212,834
Grand Total	**85,866,122**	**180,809,449**	**55,448,492,174**	**140,136,621,065**

Source: analysis of Texas DOT Transearch model

Table 14. Between H-GAC County Flow Destinations, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Harris	40,888,287	92,910,283	22,752,338,681	56,110,494,143
Brazoria	10,176,208	23,862,774	6,282,684,110	17,606,093,672
Galveston	9,490,908	12,536,858	6,283,245,769	10,890,612,349
Fort Bend	7,736,206	18,126,778	6,090,708,651	17,070,493,821
Montgomery	5,412,381	10,122,435	4,116,653,212	11,143,324,754
Chambers	3,531,248	5,522,128	2,268,882,031	4,931,751,569
Liberty	3,308,002	9,496,380	5,945,773,059	18,885,654,675
Matagorda	1,890,223	1,658,009	726,334,820	855,309,413
Waller	1,095,238	2,283,519	298,211,115	773,322,402
Austin	856,533	1,467,291	149,242,751	375,860,629
Wharton	578,020	1,053,217	242,458,802	602,385,222
Colorado	479,577	950,217	125,369,545	348,865,522
Walker	423,290	819,560	166,589,628	542,452,896
Grand Total	**85,866,122**	**180,809,449**	**55,448,492,174**	**140,136,621,065**

Source: analysis of Texas DOT Transearch model

Finally, flows entirely within each H-GAC county total 126 million tons and $113 billion in 2019, growing to 243 million tons and $280 billion in 2050. Harris County accounts for 107 million tons in 2019 (85 percent), followed by Brazoria and the other H-GAC counties.

Table 15. Within H-GAC County Flow Destinations, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Harris	107,352,351	205,381,507	103,145,499,421	262,244,189,273
Brazoria	11,040,286	27,543,193	6,545,649,503	13,336,851,258
Galveston	3,019,060	3,428,228	1,470,554,018	2,046,585,144
Chambers	1,755,698	498,769	598,937,630	199,535,064
Montgomery	1,422,988	3,820,854	466,849,646	985,108,242
Liberty	535,616	1,189,817	34,763,620	78,614,324
Fort Bend	277,104	754,395	216,292,060	729,456,108
Colorado	155,995	139,314	11,219,523	15,893,783
Waller	99,624	75,098	27,100,086	53,131,935
Wharton	14,932	14,015	11,649,713	18,911,012
Austin	11,567	28,034	2,605,517	5,201,580
Walker	9,364	20,727	5,862,493	8,539,043
Matagorda	2,439	4,475	3,560,196	6,497,283
Grand Total	**125,697,025**	**242,898,426**	**112,540,543,427**	**279,728,514,049**

Source: analysis of Texas DOT Transearch model

The summed totals of inbound, outbound, between-county, and within-county tonnage for each H-GAC county is shown in Table 16 following.

Table 16. Combined H-GAC County Tons and Value, 2019 and 2050

	Tons 2019	Tons 2050	Value ($) 2019	Value ($) 2050
Harris	645,148,427	1,209,408,557	657,766,652,541	1,614,049,044,276
Brazoria	74,055,653	148,815,626	51,832,038,192	117,319,958,056
Galveston	66,827,441	113,932,409	43,359,048,191	81,573,746,860
Fort Bend	25,353,517	43,103,414	21,547,094,902	58,313,431,501
Montgomery	20,810,781	52,034,520	13,273,884,647	36,213,772,814
Liberty	15,699,618	38,501,715	16,339,205,208	40,366,674,877
Chambers	12,474,268	23,334,285	7,696,473,441	17,708,276,652
Colorado	5,671,345	8,993,874	864,160,329	2,122,513,064
Waller	4,519,812	7,448,837	1,859,617,908	4,588,730,967
Matagorda	4,063,757	7,807,155	3,396,488,109	10,126,109,286
Wharton	2,810,423	4,440,145	1,145,835,660	2,439,206,356
Austin	2,444,371	5,355,470	733,896,617	1,922,336,419
Walker	2,028,366	3,383,768	695,125,014	1,478,072,133
Grand Total	**881,907,779**	**1,666,559,775**	**820,509,520,763**	**1,988,221,873,260**

Source: analysis of Texas DOT Transearch model. Note: the combined totals represent the sum of (1) inbound flows to destination counties, (2) outbound flows from origin counties, (3) within county flows, and (4) half of between H-GAC county origins plus half of between H-GAC county destinations. This avoids double counting the between H-GAC county data, and allows the grand totals to align with other tables in this section.

3.1.2 Current Activity by Mode

Another useful way to analyze Transearch data is to look at the characteristics of each mode. This allows for a finer-grained view of specific attributes that collectively produce the summary totals reported in the previous section. The tables in this section look at 2019 tonnage for each individual mode (truck, water, rail, air, and pipeline) based on: general commodity group (13 possible classifications); type of trade (domestic, export, import); and direction of flow (inbound, outbound, between-county, within-county). Given the wealth of detail, there are many stories on each table. Some important high-level observations are presented on the following pages[1].

Note that combining different data dimensions produces some interesting effects. For example, the region has export traffic that is both inbound to and outbound from the region. Export traffic outbound from the region is typically leaving the US via a port or airport in the H-GAC region, or beginning an over-the-road border crossing trip, or departing the region to reach an international gateway elsewhere in Texas or the US.; export traffic inbound to the region is typically freight that is arriving from elsewhere in the US or Texas in order to use one of H-GAC's international gateway facilities. The same relationship applies to import traffic.

Truck tons (see Table 17) total 401 million in 2019, of which 315 million are domestic, 53 million are export, and 32 million are import. Leading domestic commodity groups include aggregates, energy products, warehouse and secondary traffic, waste and scrap, and food products; leading exports include energy products and chemicals, pharmaceuticals, plastics, and rubber; and leading imports include aggregates and metals. Trucking plays a critical role in all directional movements: 133 million tons are inbound, 96 million are outbound, and 172 million are between or within counties.

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[1] Although not presented in this document, a comparable analysis based on value rather than tonnage would highlight the important contributions of commodities with lower weights (and therefore less per-unit transportation system impact) but higher values (and therefore more per-unit importance to the region's economy).

Table 17. H-GAC Truck Tons by Trade, Flow, and Commodity, 2019

Commodity Group	Inbound to HGAC Region	Outbound from HGAC Region	Between & Within HGAC Counties	Grand Total
Domestic				
Aggregates	46,996,457	10,820,328	47,275,329	105,092,113
Energy Products	4,722,819	35,608,873	40,362,017	80,693,709
Warehouse & Secondary Movements	11,643,921	15,897,238	7,626,788	35,167,947
Chemicals, Pharmaceuticals, Plastics & Rubber	10,183,882	5,454,244	13,840,557	29,478,683
Waste and Scrap	8,913,124	2,318,328	9,907,809	21,139,261
Food Products	7,311,532	2,047,667	2,669,687	12,028,886
Crops, Livestock, and Farm Products	7,204,278	1,118,467	605,938	8,928,684
Metals	2,962,074	3,250,009	2,357,632	8,569,715
Wood and Paper Products	6,408,071	830,705	969,432	8,208,208
Machinery, Electrical & Precision Instruments	1,318,218	1,195,244	926,877	3,440,340
Motor Vehicles & Transportation Equipment	819,300	497,770	530,361	1,847,431
Mixed Freight	254,589	62,937	127,344	444,871
Clothing, Leather & Textiles	146,035	8,843	13,490	168,367
Subtotal	**108,884,300**	**79,110,653**	**127,213,260**	**315,208,214**
Export				
Energy Products	4,053,638	3,365,570	25,800,394	33,219,603
Chemicals, Pharmaceuticals, Plastics & Rubber	3,886,851	1,528,305	3,534,806	8,949,962
Crops, Livestock, and Farm Products	4,337,140	277,029	588,089	5,202,259
Food Products	1,001,442	185,873	192,716	1,380,031
Metals	115,166	793,252	306,925	1,215,343
Waste and Scrap	440,473	279,889	455,622	1,175,984
Machinery, Electrical & Precision Instruments	265,045	470,321	254,614	989,980
Wood and Paper Products	321,027	112,056	40,099	473,182
Aggregates	179,849	106,974	133,888	420,711

Motor Vehicles & Transportation Equipment	70,493	71,953	102,867	245,314
Mixed Freight	15,076	34,508	12,632	62,216
Clothing, Leather & Textiles	7,684	17,222	6,298	31,204
Subtotal	**14,693,885**	**7,242,953**	**31,428,950**	**53,365,789**
Import				
Aggregates	3,090,383	1,874,615	5,611,600	10,576,597
Metals	1,057,893	3,907,677	3,035,235	8,000,804
Chemicals, Pharmaceuticals, Plastics & Rubber	798,083	600,153	1,361,559	2,759,796
Food Products	692,007	643,956	1,151,658	2,487,620
Machinery, Electrical & Precision Instruments	1,063,652	592,864	802,457	2,458,972
Crops, Livestock, and Farm Products	842,338	557,791	389,714	1,789,843
Wood and Paper Products	287,204	452,102	447,107	1,186,413
Mixed Freight	400,493	221,937	433,016	1,055,445
Motor Vehicles & Transportation Equipment	565,236	162,127	186,774	914,137
Clothing, Leather & Textiles	86,390	101,036	142,852	330,278
Waste and Scrap	95,590	45,183	92,331	233,104
Energy Products	54,655	49,758	70,802	175,215
Subtotal	**9,033,923**	**9,209,198**	**13,725,103**	**31,968,224**
Grand Total	**132,612,108**	**95,562,805**	**172,367,313**	**400,542,226**

Source: analysis of Texas DOT Transearch model

Water tons (see Table 18) total 340 million in 2019, of which 72 million are domestic, 192 million are export, and 76 million are import. The leading domestic commodity group is energy products and other products (particularly chemicals, pharmaceuticals, plastics, and rubber) are also represented the leading export group by a wide margin is energy products; and the leading import group by a significant although smaller margin is energy products. Water plays a critical role in outbound moves (214 million tons) and inbound moves (100 million tons), and a smaller but meaningful role in between and within-county moves (26 million tons).

Table 18. H-GAC Water Tons by Trade, Flow, and Commodity, 2019

Commodity Group	Inbound to HGAC Region	Outbound from HGAC Region	Between & Within HGAC Counties	Grand Total
Domestic				
Energy Products	20,784,295	23,287,103	17,990,323	62,061,722
Chemicals, Pharmaceuticals, Plastics & Rubber	1,905,784	2,028,095	2,430,397	6,364,276
Aggregates	1,104,779	139,460	308,847	1,553,086
Metals	1,076,538	24,071	61,858	1,162,468
Waste and Scrap	21,400	940,490	1,451	963,342
Food Products	112,398	37,260	55,246	204,903
Crops, Livestock, and Farm Products	19,235	40,179		59,414
Machinery, Electrical & Precision Instruments	6,149	17,889	1,120	25,159
Motor Vehicles & Transportation Equipment	6,622	956	15,186	22,764
Mixed Freight	416	8,955	3,919	13,291
Wood and Paper Products	42		1,137	1,179
Subtotal	**25,037,659**	**26,524,459**	**20,869,485**	**72,431,604**
Export				
Energy Products	838,356	141,828,119	406,250	143,072,726
Chemicals, Pharmaceuticals, Plastics & Rubber	1,228,768	16,183,992	2,576,398	19,989,159
Waste and Scrap	1,432	14,427,543	540	14,429,515
Crops, Livestock, and Farm Products	4,716	7,443,999		7,448,715
Food Products	85	3,081,713	11,054	3,092,852
Aggregates	14,774	961,208	141,999	1,117,982
Wood and Paper Products		948,246	0	948,246
Metals	4,779	582,835	11,011	598,625
Machinery, Electrical & Precision Instruments	603	530,919	173	531,695
Motor Vehicles & Transportation Equipment	235	343,169	7,353	350,757
Mixed Freight		194,301		194,301

Clothing, Leather & Textiles		70,865		70,865
Subtotal	**2,093,748**	**186,596,910**	**3,154,779**	**191,845,438**
Import				
Energy Products	43,265,224	1,141	1,254	43,267,620
Metals	8,061,756	22,694	242,867	8,327,317
Chemicals, Pharmaceuticals, Plastics & Rubber	5,069,751	772,332	1,645,386	7,487,469
Aggregates	5,903,746	1,717	178,788	6,084,250
Waste and Scrap	2,565,536	11	1	2,565,548
Food Products	2,035,895	1,946	3	2,037,843
Wood and Paper Products	1,806,343		26	1,806,369
Machinery, Electrical & Precision Instruments	1,390,000	4,680	234	1,394,913
Crops, Livestock, and Farm Products	1,371,439			1,371,439
Mixed Freight	693,992			693,992
Clothing, Leather & Textiles	543,196			543,196
Motor Vehicles & Transportation Equipment	260,475	18	7,574	268,066
Subtotal	**72,967,354**	**804,538**	**2,076,131**	**75,848,023**
Grand Total	**100,098,761**	**213,925,907**	**26,100,396**	**340,125,064**

Source: analysis of Texas DOT Transearch model

Rail tons (see Table 19) total 113 million in 2019, of which 88 million are domestic, 17 million are export, and 8 million are import. Leading domestic commodity groups include chemicals, pharmaceuticals, plastics, and rubber, aggregates, and energy products; leading exports include energy products, and crops, livestock, and farm products; and leading imports include energy products and chemicals, pharmaceuticals, plastics, and rubber. Rail is most important in the inbound direction with 61 million tons; outbound tons total 39 million; and just 13 million are between or within counties.

Table 19. H-GAC Rail Tons by Trade, Flow, and Commodity, 2019

Commodity Group	Inbound to HGAC Region	Outbound from HGAC Region	Between & Within HGAC Counties	Grand Total
Domestic				
Chemicals, Pharmaceuticals, Plastics & Rubber	12,759,304	22,384,706	9,706,925	44,850,935
Aggregates	15,174,638	363,853	672,543	16,211,035
Energy Products	10,448,198	3,891,585	1,029,254	15,369,037
Motor Vehicles & Transportation Equipment	1,696,865	703,809	481,335	2,882,010
Mixed Freight	1,121,721	1,364,747		2,486,469
Metals	1,537,441	325,328		1,862,768
Food Products	1,175,780	597,751	2,395	1,775,926
Crops, Livestock, and Farm Products	946,950	29,756	3,880	980,586
Waste and Scrap	282,690	266,075		548,764
Wood and Paper Products	472,172	71,467	3,840	547,479
Machinery, Electrical & Precision Instruments	25,234	155,469		180,704
Clothing, Leather & Textiles	72,724	10,898		83,622
Subtotal	**45,713,718**	**30,165,445**	**11,900,173**	**87,779,336**
Export				
Energy Products	2,354,719	3,285,496	642,679	6,282,894
Chemicals, Pharmaceuticals, Plastics & Rubber	928,021	3,628,723	413,811	4,970,556
Crops, Livestock, and Farm Products	4,875,869	12,573		4,888,442
Motor Vehicles & Transportation Equipment	205,484	57,029	569	263,081
Metals	123,664	118,527		242,190
Waste and Scrap	610	237,001		237,611
Food Products	137,988	71,965	5,445	215,398
Mixed Freight	29,484	97,584		127,068
Aggregates	13,211	38,797	1,623	53,631
Wood and Paper Products	9,769	31,794		41,563

Machinery, Electrical & Precision Instruments	637	19,873		20,510
Clothing, Leather & Textiles	48	407		455
Subtotal	**8,679,504**	**7,599,768**	**1,064,126**	**17,343,398**
Import				
Energy Products	3,264,130	6,582	1,975	3,272,687
Chemicals, Pharmaceuticals, Plastics & Rubber	994,539	1,010,811	90,152	2,095,502
Metals	482,908	305,678		788,587
Mixed Freight	405,891	75,123		481,014
Wood and Paper Products	368,730	5,974		374,704
Motor Vehicles & Transportation Equipment	314,554	20,856	9,810	345,221
Aggregates	234,731	34,658	29,200	298,589
Food Products	97,822	6,686		104,509
Crops, Livestock, and Farm Products	15,813	171		15,983
Waste and Scrap	10,928	4,679		15,607
Clothing, Leather & Textiles	8,366	1,619		9,985
Machinery, Electrical & Precision Instruments	7,125	504		7,628
Subtotal	**6,205,537**	**1,473,341**	**131,138**	**7,810,015**
Grand Total	**60,598,758**	**39,238,554**	**13,095,437**	**112,932,749**

Source: analysis of Texas DOT Transearch model

Air tons (see Table 20) total 502,000 tons in 2019, of which roughly half are domestic, and half international. Leading commodity groups include mixed freight, machinery, pharmaceuticals, and high value metals. Air cargo service is essential for time-sensitive freight deliveries of low-weight, high-value goods, but may also be pressed into service for just-in-time delivery of heavy components or machinery. Air cargo tonnage is relatively evenly split between inbound and outbound directions, and is not used for between-county or within-county moves.

Table 20. H-GAC Air Tons by Trade, Flow, and Commodity, 2019

Commodity Group	Inbound to HGAC Region	Outbound from HGAC Region	Between & Within HGAC Counties	Grand Total
Domestic				
Mixed Freight	51,083	43,852		94,935
Machinery, Electrical & Precision Instruments	40,962	39,544		80,506
Chemicals, Pharmaceuticals, Plastics & Rubber	21,650	9,598		31,249
Metals	8,258	9,041		17,299
Clothing, Leather & Textiles	9,728	3,729		13,457
Motor Vehicles & Transportation Equipment	6,573	3,325		9,898
Food Products	4,213	3,055		7,267
Wood and Paper Products	3,771	2,773		6,544
Crops, Livestock, and Farm Products	3,264	2,874		6,138
Aggregates	2,003	1,102		3,105
Energy Products	154	168		322
Subtotal	**151,659**	**119,059**		**270,718**
Export				
Machinery, Electrical & Precision Instruments		45,817		45,817
Metals		37,217		37,217
Chemicals, Pharmaceuticals, Plastics & Rubber		13,551		13,551
Waste and Scrap		11,158		11,158
Energy Products		4,096		4,096
Wood and Paper Products		3,658		3,658
Aggregates		3,278		3,278
Food Products		3,268		3,268
Motor Vehicles & Transportation Equipment		2,654		2,654
Mixed Freight		2,400		2,400
Clothing, Leather & Textiles		2,285		2,285

Crops, Livestock, and Farm Products		1,545		1,545
Subtotal		**130,927**		**130,927**
Import				
Machinery, Electrical & Precision Instruments	29,140			29,140
Metals	25,347			25,347
Food Products	11,056			11,056
Clothing, Leather & Textiles	8,246			8,246
Mixed Freight	6,882			6,882
Chemicals, Pharmaceuticals, Plastics & Rubber	5,626			5,626
Waste and Scrap	3,650			3,650
Aggregates	3,233			3,233
Wood and Paper Products	3,159			3,159
Crops, Livestock, and Farm Products	1,861			1,861
Motor Vehicles & Transportation Equipment	1,815			1,815
Energy Products	197			197
Subtotal	**100,213**			**100,213**
Grand Total	**251,872**	**249,986**		**501,858**

Source: analysis of Texas DOT Transearch model

Transearch estimates for Pipeline tons (see Table 21) are available only for NAFTA flows, and do not include domestic movements. Analysis of US Department of Transportation Freight Analysis Framework data for years 2017, 2019, and 2022 suggests that total pipeline tonnage for the Houston area may exceed 300 million tons (see Table 22 later in this document).

Table 21. H-GAC Pipeline Tons by Trade, Flow, and Commodity, 2019

Commodity Group	Inbound to HGAC Region	Outbound from HGAC Region	Between & Within HGAC Counties	Grand Total
Domestic				
Subtotal				**0**
Export				
Energy Products		27,490,682		27,490,682
Subtotal		**27,490,682**		**27,490,682**
Import				
Energy Products	262,369			262,369
Subtotal	**262,369**			**262,369**
Grand Total	**262,369**	**27,490,682**		**27,753,051**

Source: analysis of Texas DOT Transearch model

3.2 Freight Analysis Framework

The Freight Analysis Framework (FAF) is produced by the US Department of Transportation (USDOT) -- Federal Highway Administration (FHWA). It provides estimates of tonnage and value moving to, from, and within each state and the nation as a whole. Data is tabulated by trade type (domestic or international), domestic mode, foreign mode, origin/destination state or country, and general commodity group. Current documentation is available at https://ops.fhwa.dot.gov/freight/freight_analysis/faf/.

FAF is available to the general public at no cost, with no use restrictions, and is therefore valuable to planners and interested stakeholders. Before obtaining Transearch data, the H-GAC team downloaded the most current available version of FAF (version 5.2) and created a visualization and analysis package using a software package called Tableau.

Table 22 compares Transearch 2019 tonnage with FAF tonnage for 2017 (the FAF 5 base year), 2019 (an adjusted year), and 2022 (a projected year). FAF tonnage is very consistent across its three analysis years, but differs in significant ways from Transearch.

- FAF analysis is based on totals for the Houston-The Woodlands Census Statistical Area (CSA), which is not identical to the H-GAC region geography. The CSA is comprised of 14 counties. It includes two counties that are not part of the 13-county H-GAC region (Washington and Trinity) and excludes one that is part of the H-GAC region (Colorado). The different geographies lead to some differences in tonnage.

- FAF includes domestic plus international pipeline tonnage, while Transearch includes only NAFTA pipeline tonnage. FAF 2019 pipeline tonnage exceeds Transearch 2019 pipeline tonnage by nearly 322 million tons.
- FAF reports more truck tonnage than Transearch. Analysis of Transearch and FAF for H-GAC, Texas, and other states suggests that Transearch and FAF generally agree on long-haul inbound and outbound tonnage, but FAF often reports more short-haul within region tonnage.
- FAF reports significantly lower water, rail, and air totals than Transearch, for several reasons. First, while Transearch normally reports only domestic mode and NAFTA mode tonnage, the Texas DOT version was enhanced to include other international mode tonnage, so (for example) a 20-ton container moving by truck to a seaport for export counts as 20 tons by truck and 20 tons by water. In contrast, FAF totals are tabulated based on the goods moved and not the modal volumes, so that container appears in the dataset as a single 20-ton record, flagged as both a domestic truck move and an international water move. FAF totals are normally tabulated based on domestic mode volumes, and in doing so, the international components of modal movements are under-reported. Second, where water, rail, and air tonnage may be part of linked multimodal trips, FAF may report some or all of that tonnage as "Multiple Modes and Mail."
- Overall, the net effect of these difference is that FAF 2019 total tonnage exceeds Transearch 2019 total tonnage by nearly 276 million tons. However, excluding pipeline tonnage, Transearch 2019 total tonnage is relatively close to FAF tonnage in 2017, 2019, and 2022.

Transearch and FAF are both exceptional products, but it is important to understand differences in how they report information when interpreting and utilizing their results. For example, Transearch users may look to obtain alternative-source data on domestic pipeline movements, possibly from FAF. FAF users may elect to manually adjust the data so international moves are once for the domestic mode and once for the international mode, or conversely Transearch users may elect to count tons associated with international moves only once, either as domestic or international mode flows. There are many ways to perform such adjustments, based on data availability and analysis needs. For the current purpose of reporting basic performance metrics and setting benchmarks for other analysts, no adjustments have been made.

Table 22. Comparison of Transearch and FAF-5 Tonnage Totals

	Transearch 2019, H-GAC Counties, Int'l & Domestic Modes Counted, No Domestic Pipeline	FAF 2017, Houston CSA Counties, Only Domestic Modes Counted	FAF 2019, Houston CSA Counties, Only Domestic Modes Counted	FAF 2022, Houston CSA Counties, Only Domestic Modes Counted
Truck	400,542,226	481,911,367	452,415,648	496,404,905
Water	340,125,064	170,820,343	164,001,532	174,529,245
Rail	112,932,749	71,304,727	93,561,334	68,906,059
Pipeline	27,753,051	286,197,996	349,374,808	312,586,016
Air	501,858	188,522	208,081	197,795
Transearch Other	52,830			
FAF Other (Multiple Modes, Other & Unknown, No Domestic Mode)		110,727,014	97,984,276	107.718,799
Grand Total	**881,907,779**	**1,121,149,969**	**1,157,545,679**	**1,160,342,819**
Total Excluding Pipeline	854,154,728	834,951,973	808,170,871	847,756,803

Source: analysis of Texas DOT Transearch model and USDOT Freight Analysis Framework

4 Supply Chains

Supply chain analysis looks at how particular industries receive and ship the commodities necessary for them to conduct their business. In a full supply chain analysis, “make-use” tables – that is, tables that summarize the types and amounts of different commodities typically consumed or produced by different industries – may be used to isolate sets of input and output commodities associated with different industry groups. High-level statewide analyses using this approach were developed for the Texas Freight Mobility Plan 2023 Update. A comparable level of detail was not possible in this analysis, so a compatible method – looking at the key characteristics of each major commodity group, recognizing that different industries may use the same commodity differently – was utilized.

4.1 Supply Chain Characteristics of Commodity Groups

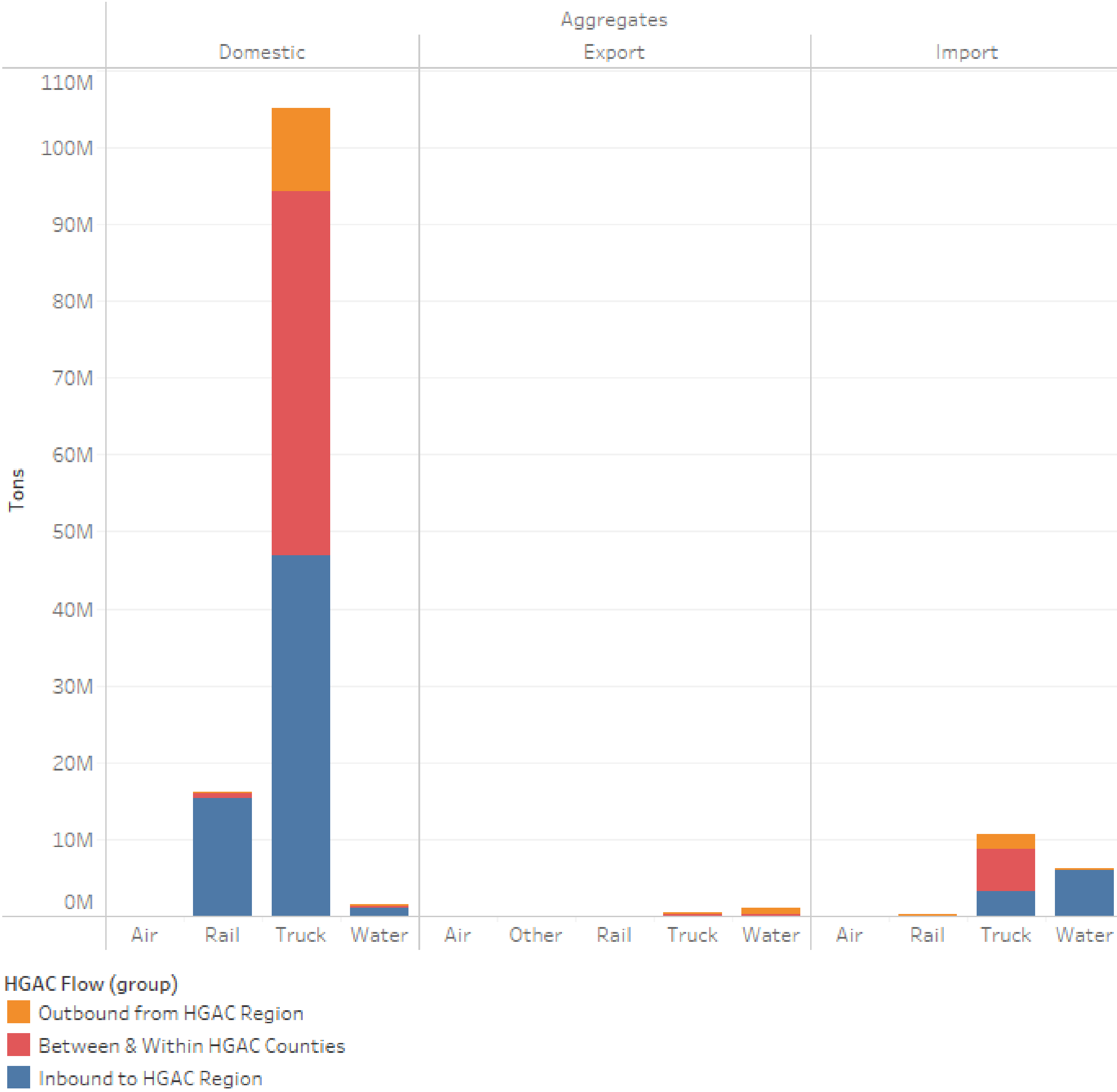
Detailed analyses of 13 major supply chain-involved commodity groups were performed using the Tableau software package to analyze and visualize Transearch data. Compared to other analysis tools, Tableau provided a fairly clear way to display complex data with multiple dimensions in the form of “dashboard” level depictions.

The results are presented in Figure 20 through Figure 45. There are two figures associated with each of the 13 major commodity groups.

- The first figure in the sequence graphically illustrates 2019 tons by mode, trade type, and flow direction. Different modes are displayed on the X-axis; the modes are repeated in three groups, one each for domestic, export, or import moves; tonnage is shown as the height of the bar against the Y-axis; and bars are divided into up to three colors based on how many tons are inbound to, outbound from, or moving between and within the H-GAC region counties.
- The second figure in the sequence graphically illustrates 2019 tons by flow direction (outbound, inbound, or between & within). Each flow type has two associated bar graphs, one listing the top origin locations for the flow and one listing the top destinations. Each bar graph shows tons by the length of the bar, and each bar can have up to six colors, representing the tons associated with different transportation modes.

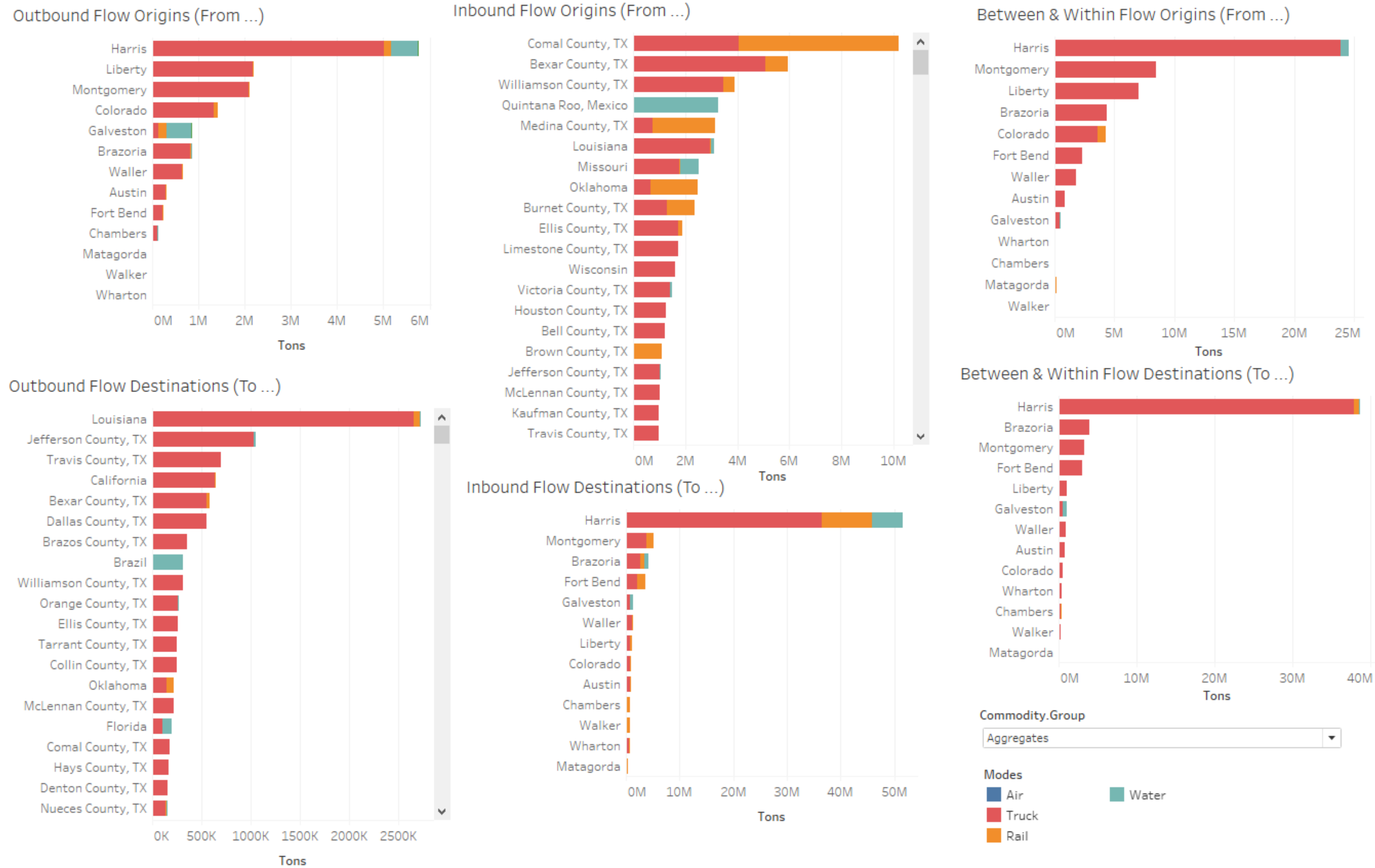
For example, looking at Aggregates, Figure 20 clearly shows: the majority of tonnage is domestic but there are some imports; the majority of moves are by truck although there are some rail and water moves; and the majority of moves are inbound to or between & within H-GAC counties. Figure 21 shows outbound flows are generated primarily from Harris and other counties by truck, but also from Harris by water, and are received primarily by other counties in Texas via truck but also by foreign countries via water. Inbound flows arrive primarily from other Texas counties via truck and rail but also from Mexico via water, and are received primarily in Harris County via all three modes. Moves between and within H-GAC counties are primarily by truck but there are contributions from water and rail, and while Harris County has the largest share of tonnage, other H-GAC counties also have significant shares. Comparable information for other commodity groups is displayed following the same format.

Figure 20. Tons by Mode, Trade Type, and Flow Direction – Aggregates (2019)



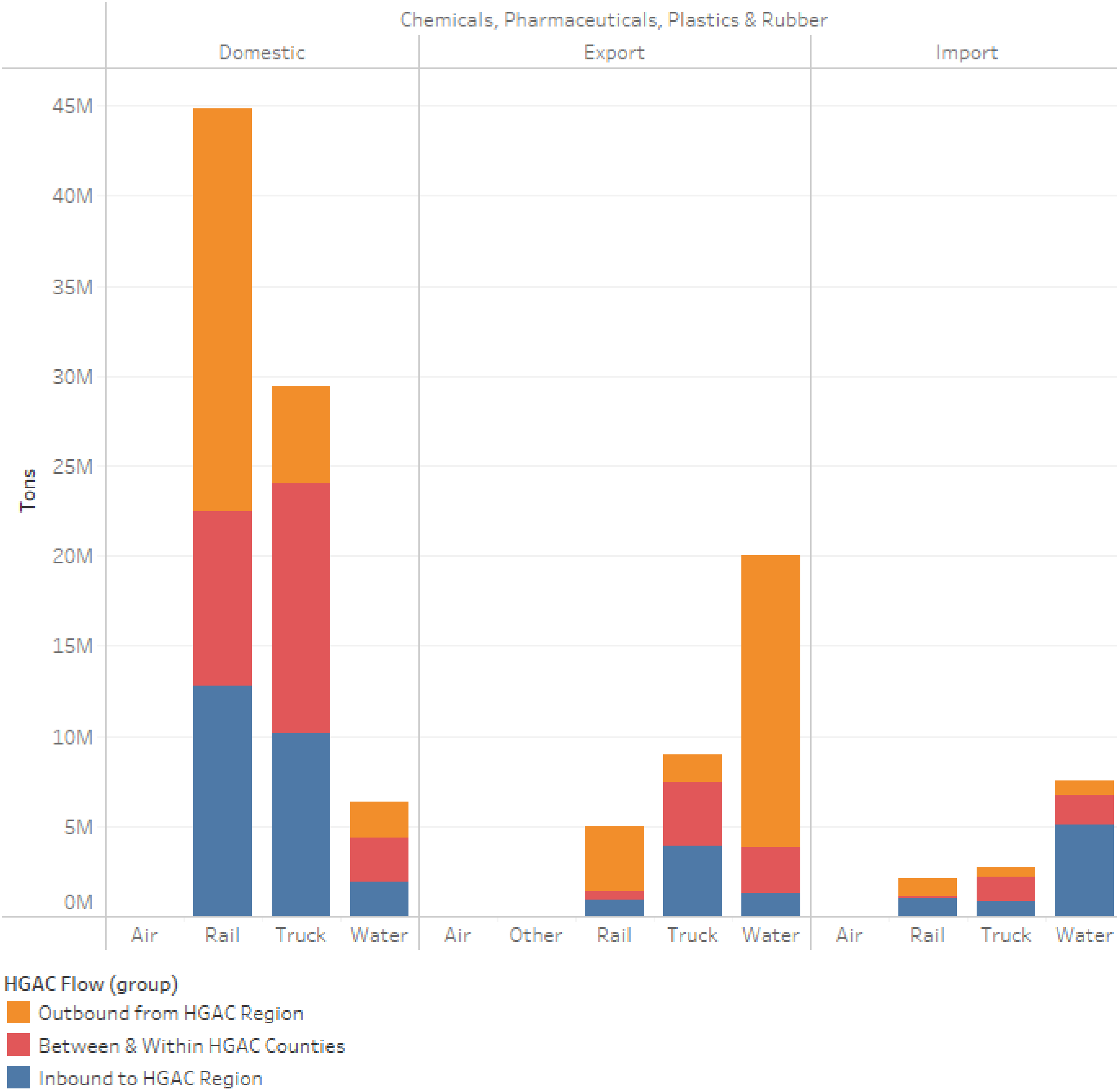
Source: analysis of Texas DOT Transearch model

Figure 21. Tons by Flow, Origin, and Destination – Aggregates (2019)



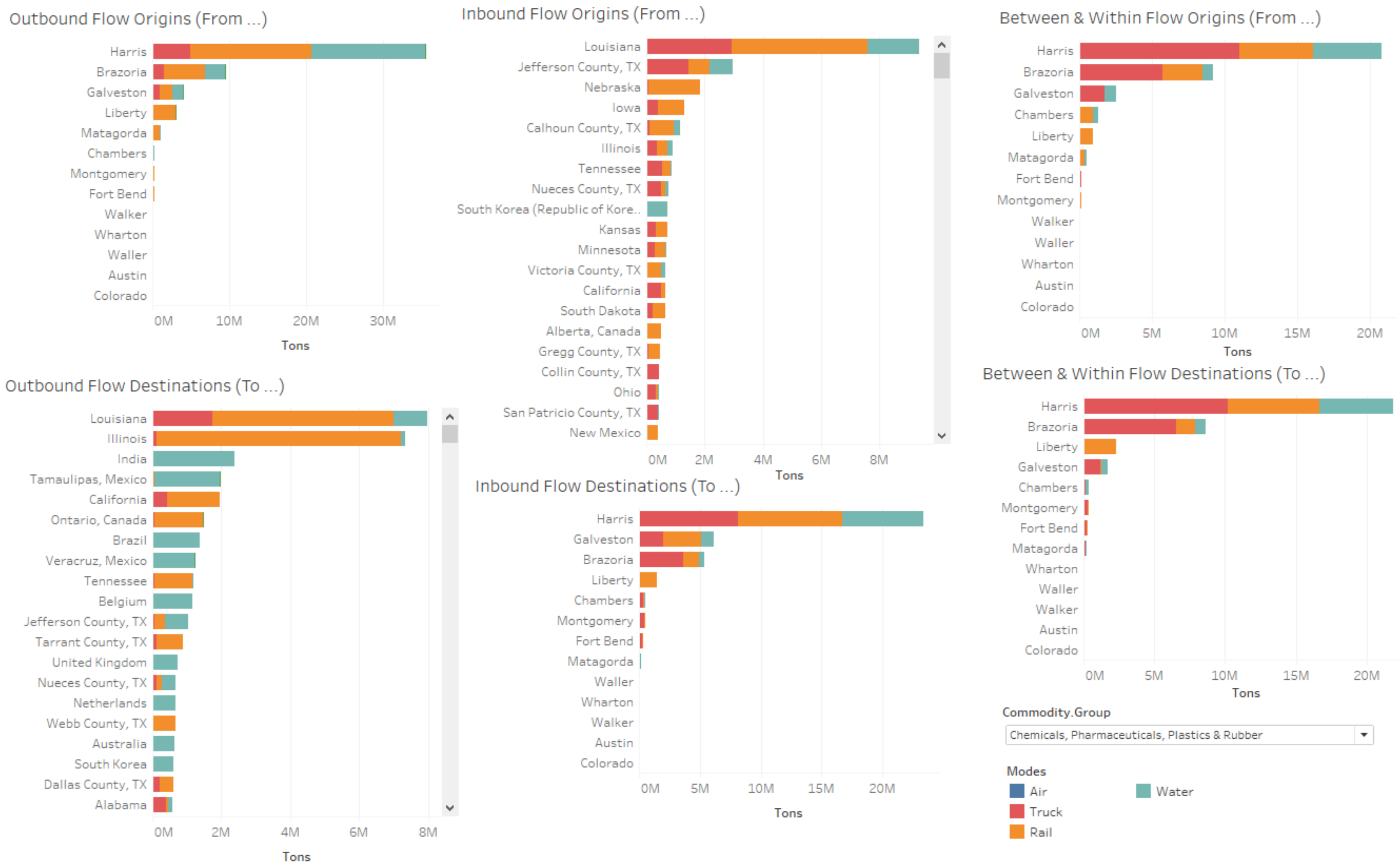
Source: analysis of Texas DOT Transearch model

Figure 22. Tons by Mode, Trade Type, and Flow Direction – Chemicals, Pharmaceuticals, Plastics, and Rubber (2019)



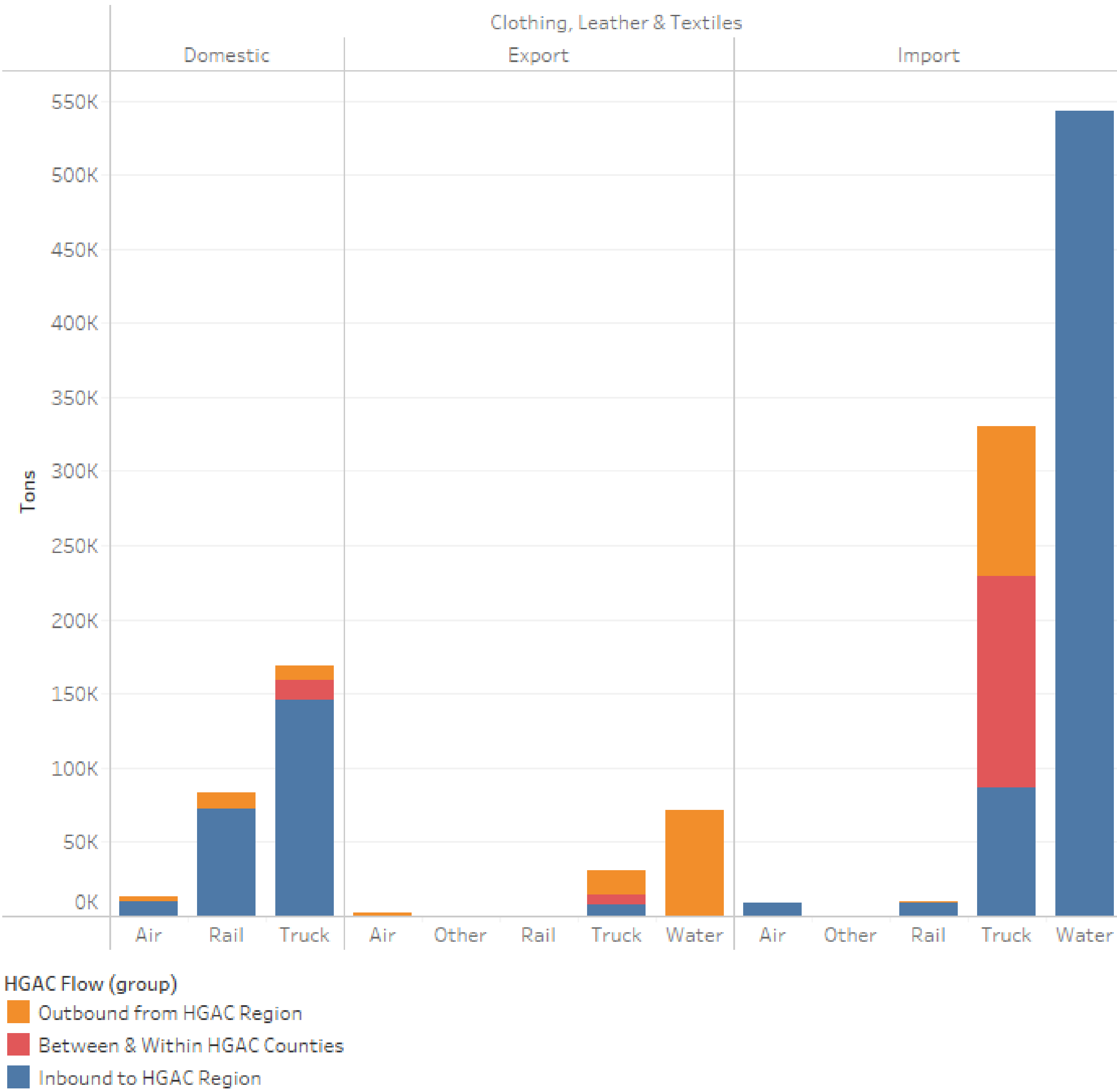
Source: analysis of Texas DOT Transearch model

Figure 23. Tons by Flow, Origin, and Destination – Chemicals, Pharmaceuticals, Plastics, and Rubber (2019)



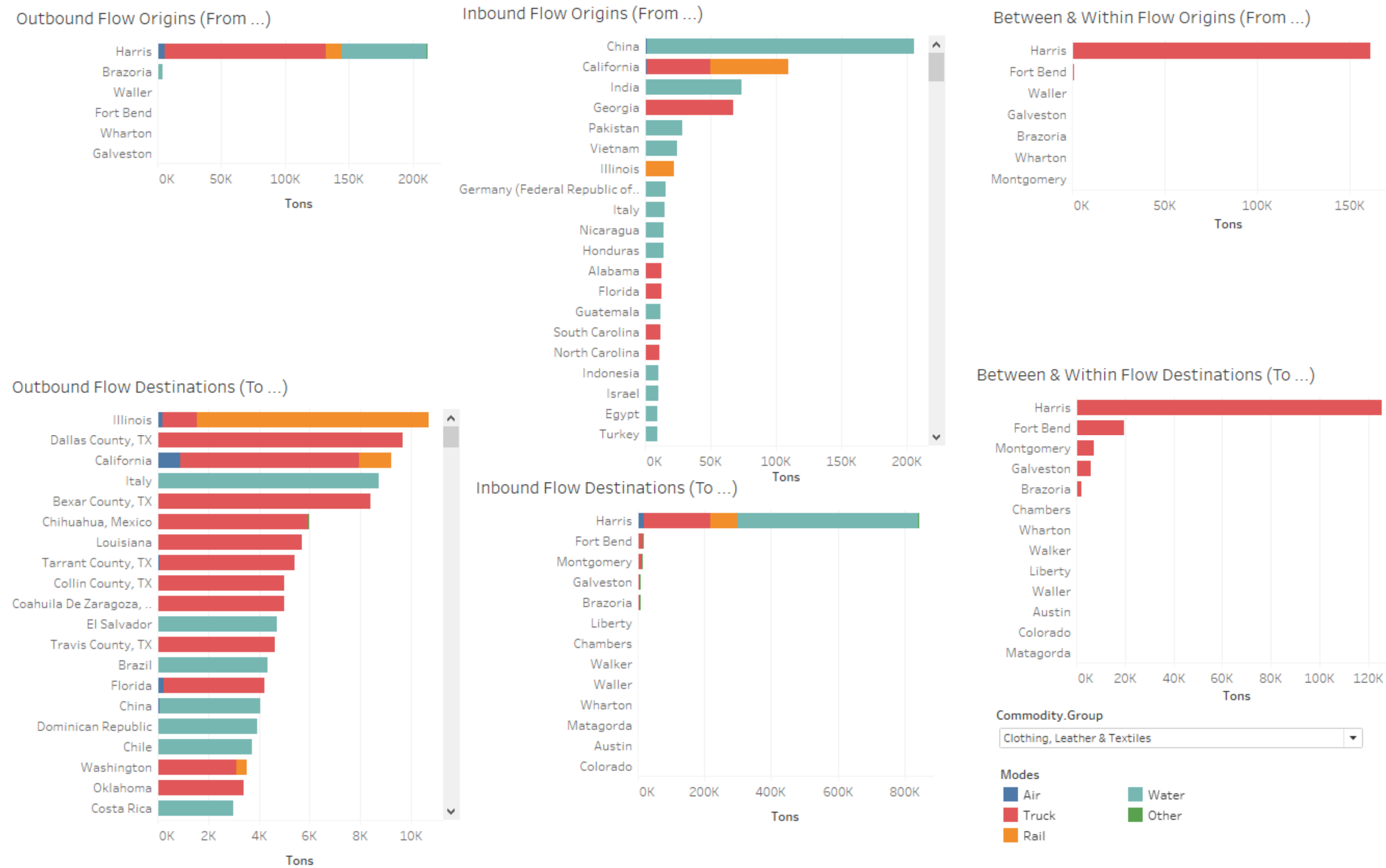
Source: analysis of Texas DOT Transearch model

Figure 24. Tons by Mode, Trade Type, and Flow Direction – Clothing, Leather & Textiles (2019)



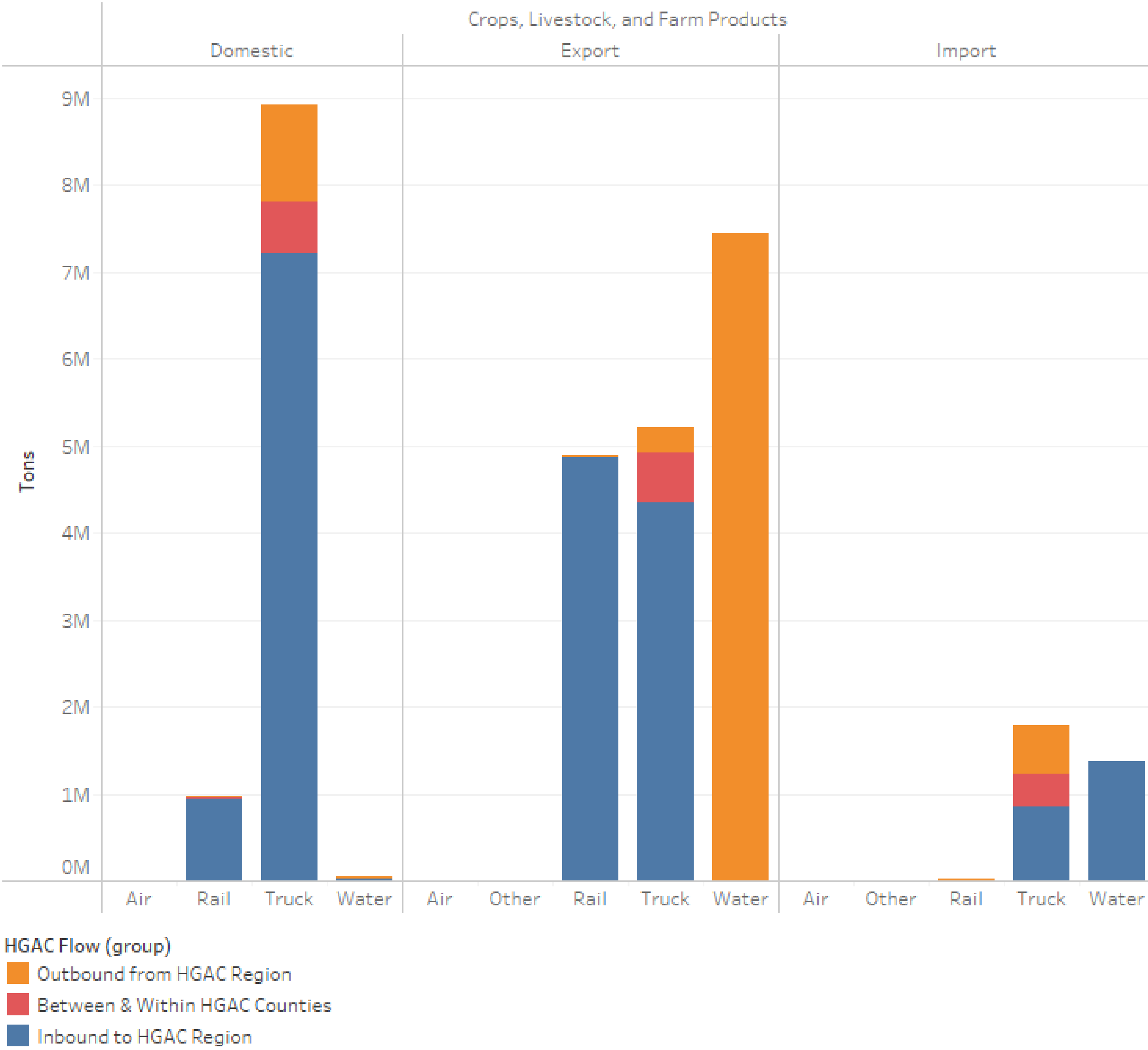
Source: analysis of Texas DOT Transearch model

Figure 25. Tons by Flow, Origin, and Destination – Clothing, Leather & Textiles (2019)



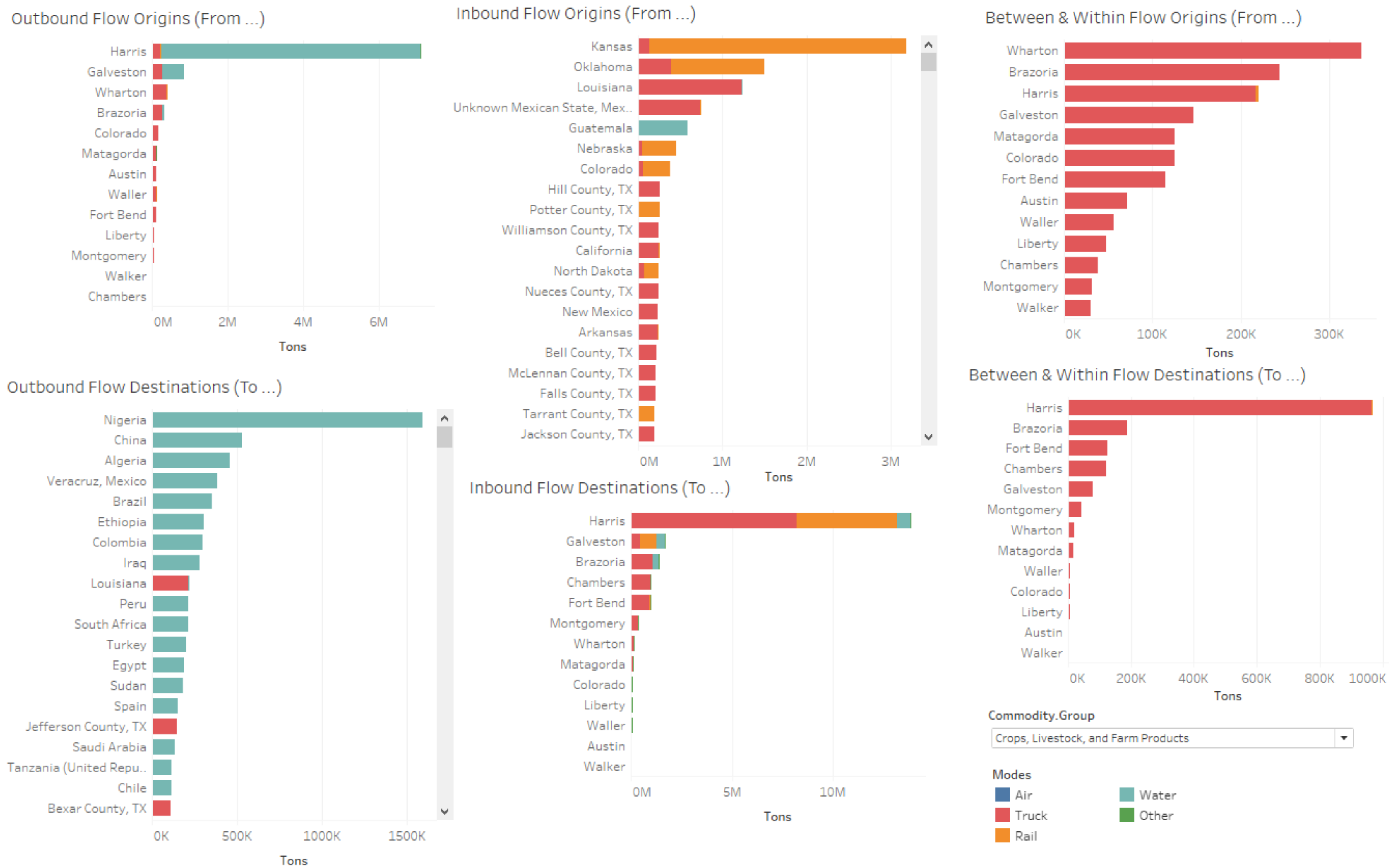
Source: analysis of Texas DOT Transearch model

Figure 26. Tons by Mode, Trade Type, and Flow Direction – Crops, Livestock, and Farm Products (2019)



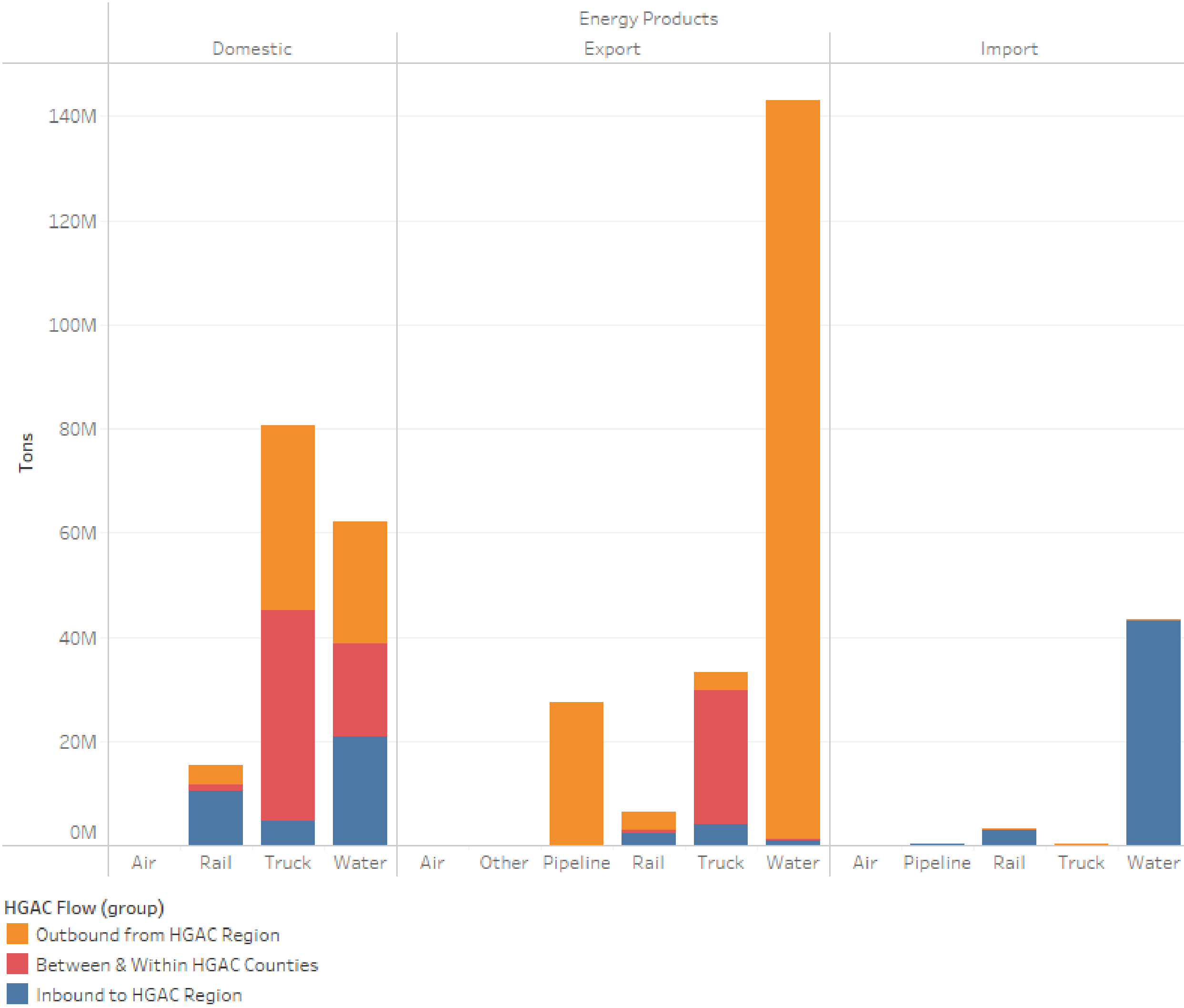
Source: analysis of Texas DOT Transearch model

Figure 27. Tons by Flow, Origin, and Destination – Crops, Livestock, and Farm Products (2019)



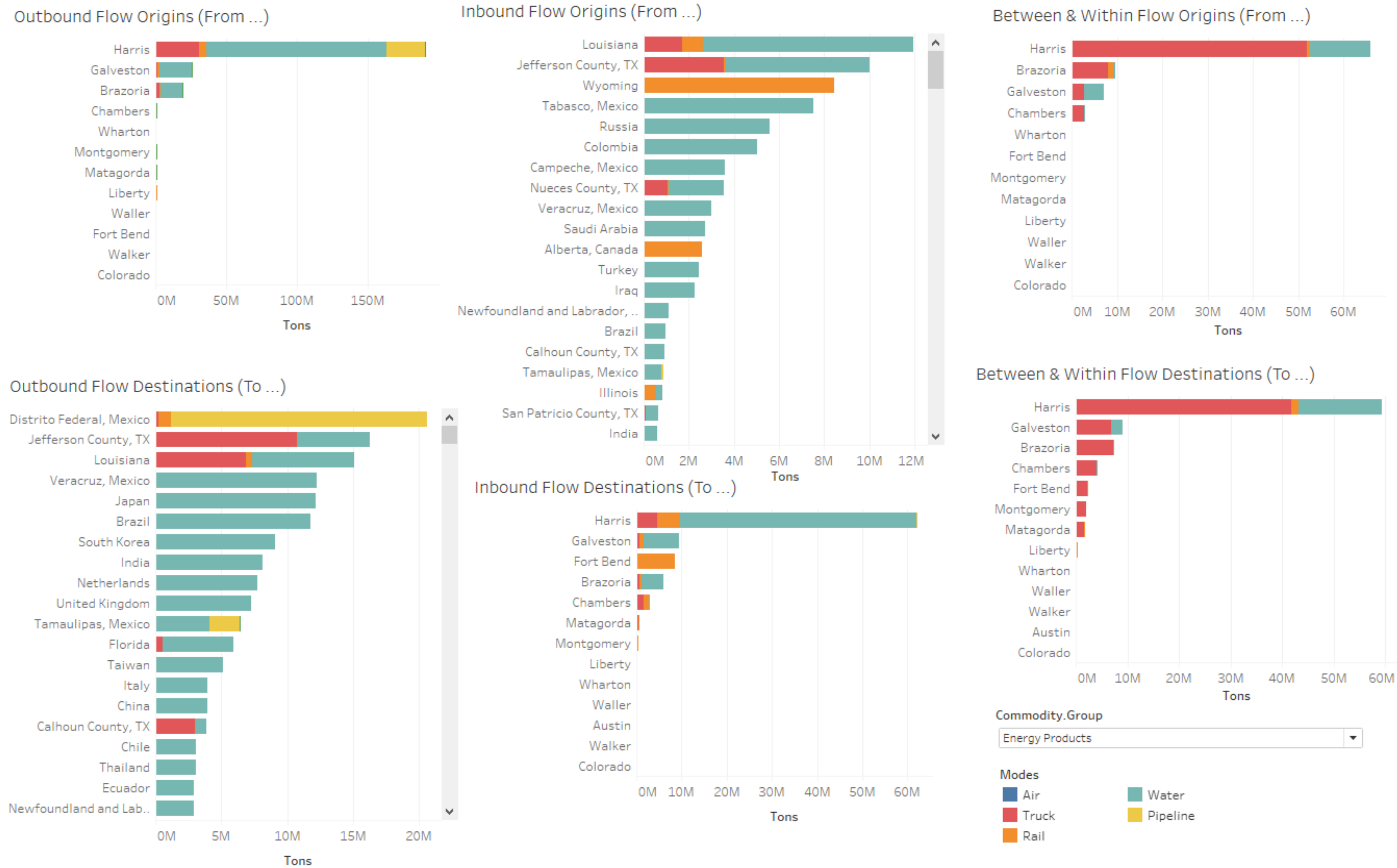
Source: analysis of Texas DOT Transearch model

Figure 28. Tons by Mode, Trade Type, and Flow Direction – Energy Products (2019)



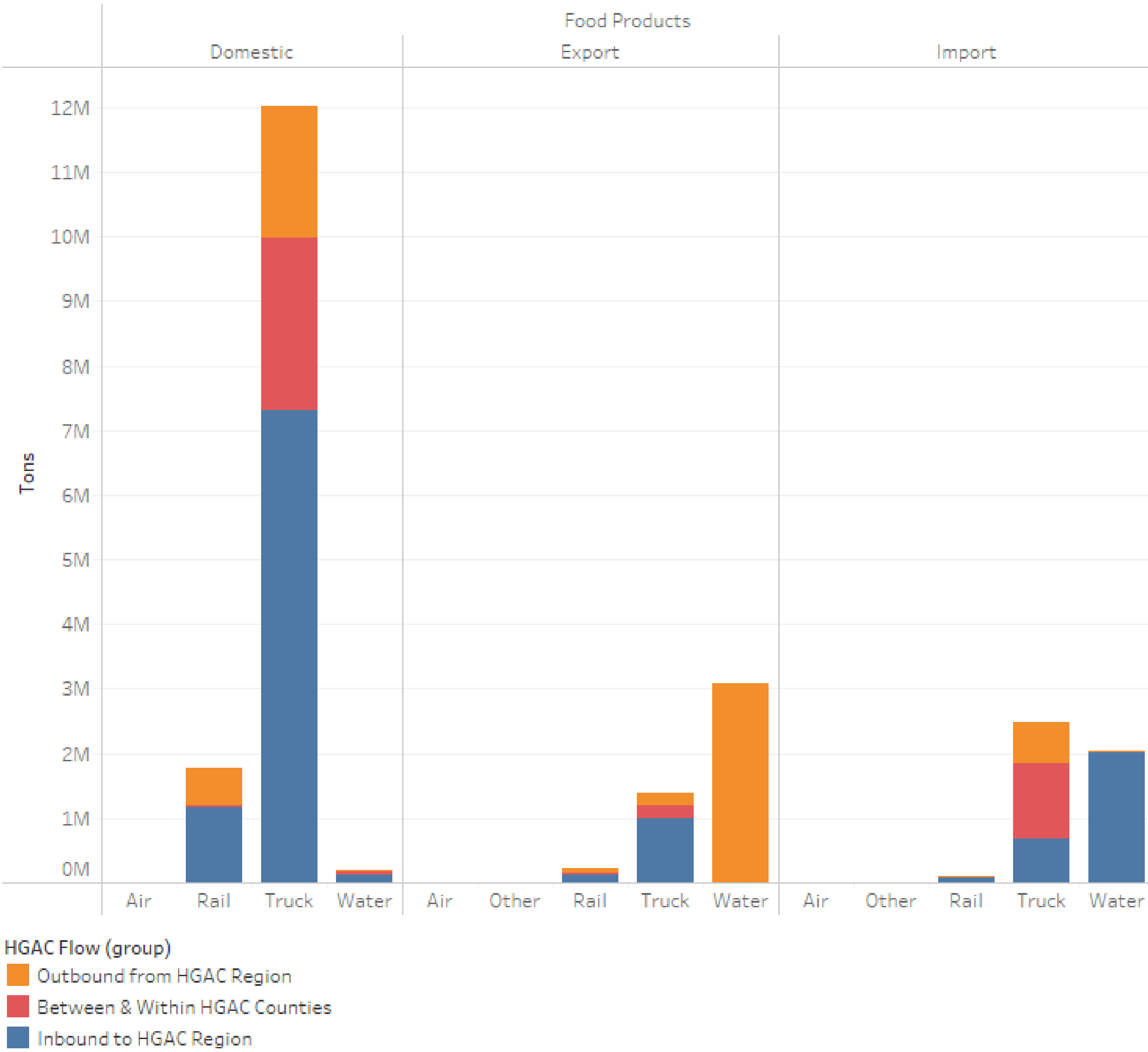
Source: analysis of Texas DOT Transearch model

Figure 29. Tons by Flow, Origin, and Destination – Energy Products (2019)



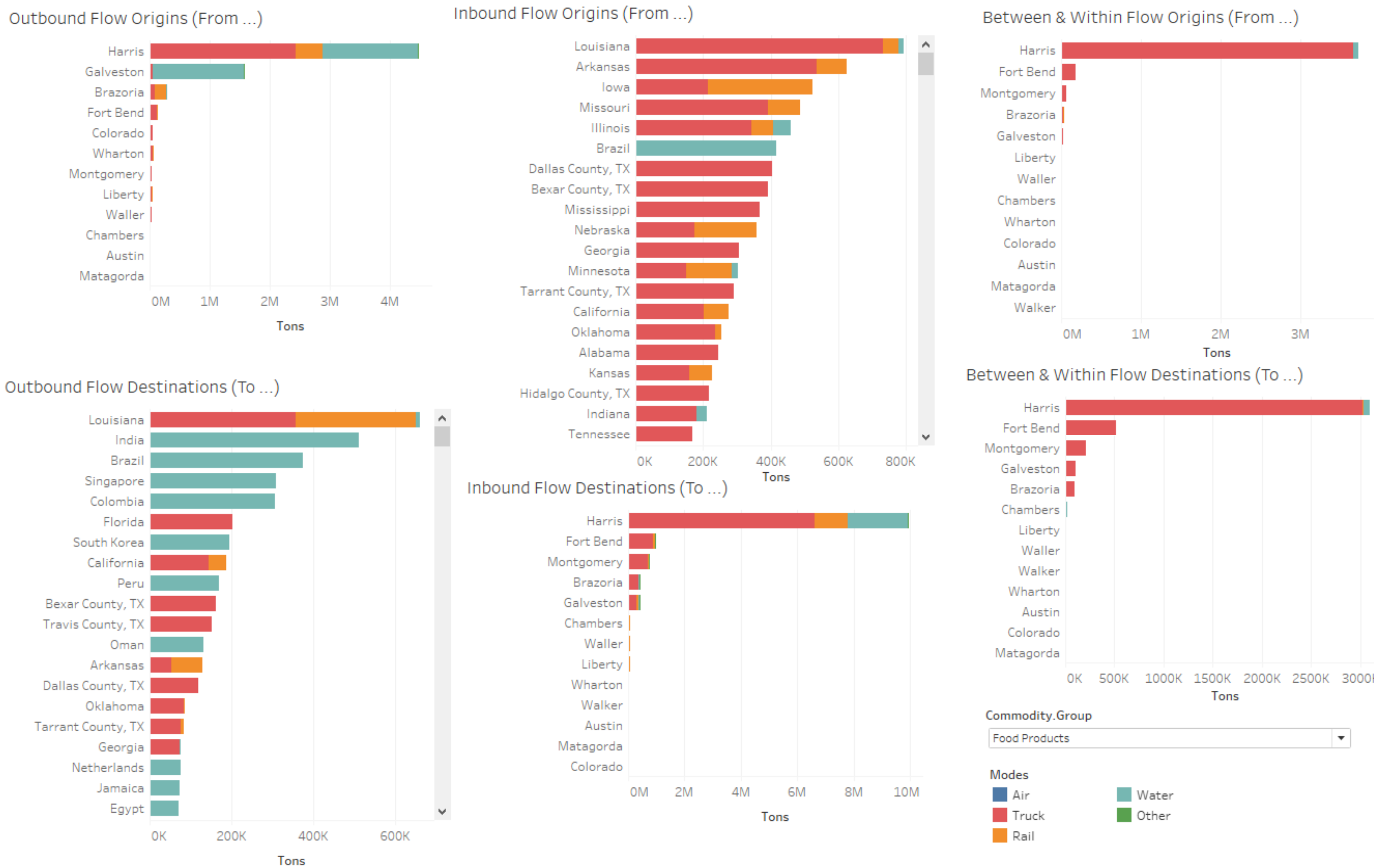
Source: analysis of Texas DOT Transearch model

Figure 30. Tons by Mode, Trade Type, and Flow Direction – Food Products (2019)



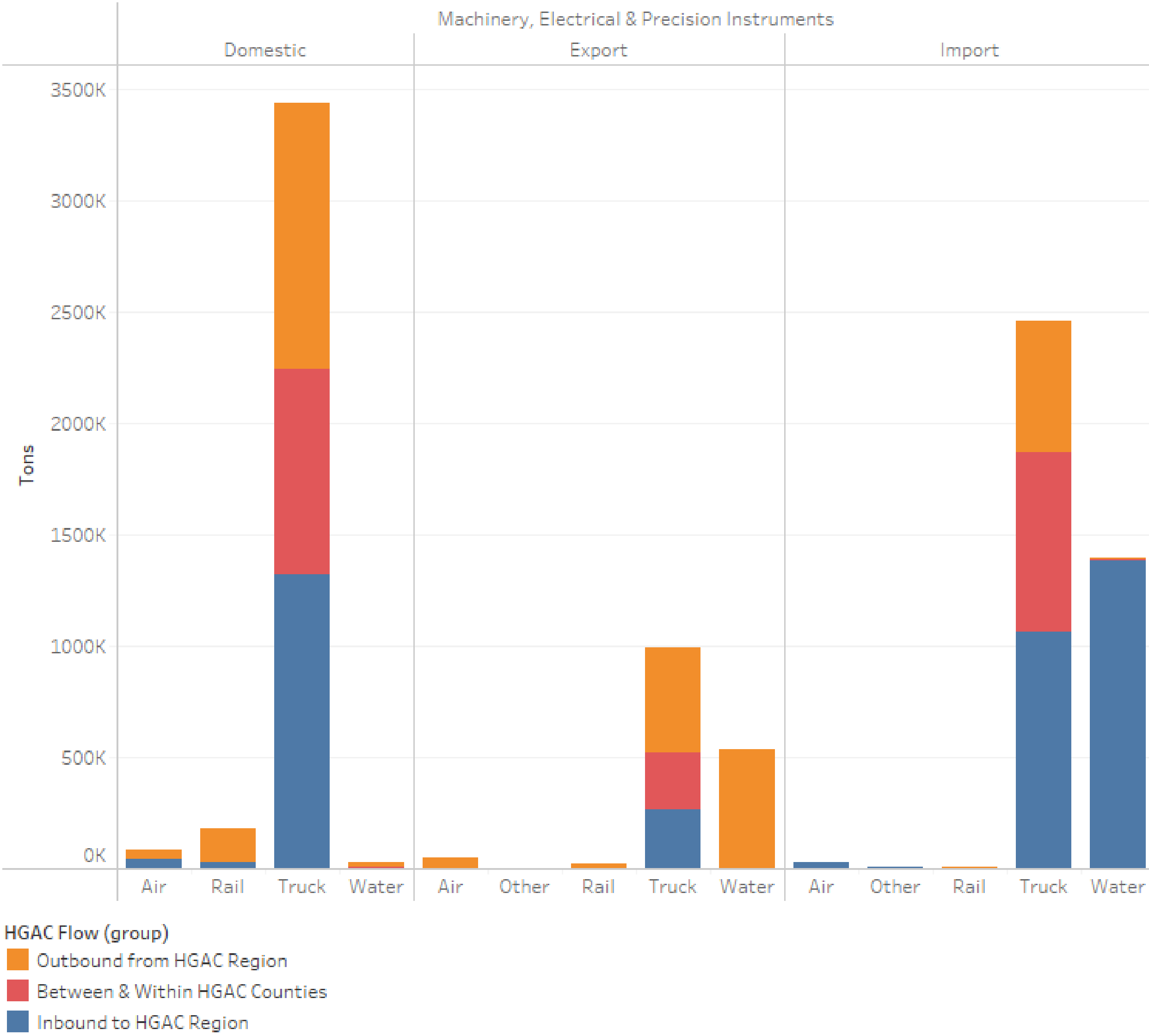
Source: analysis of Texas DOT Transearch model

Figure 31. Tons by Flow, Origin, and Destination – Food Products (2019)



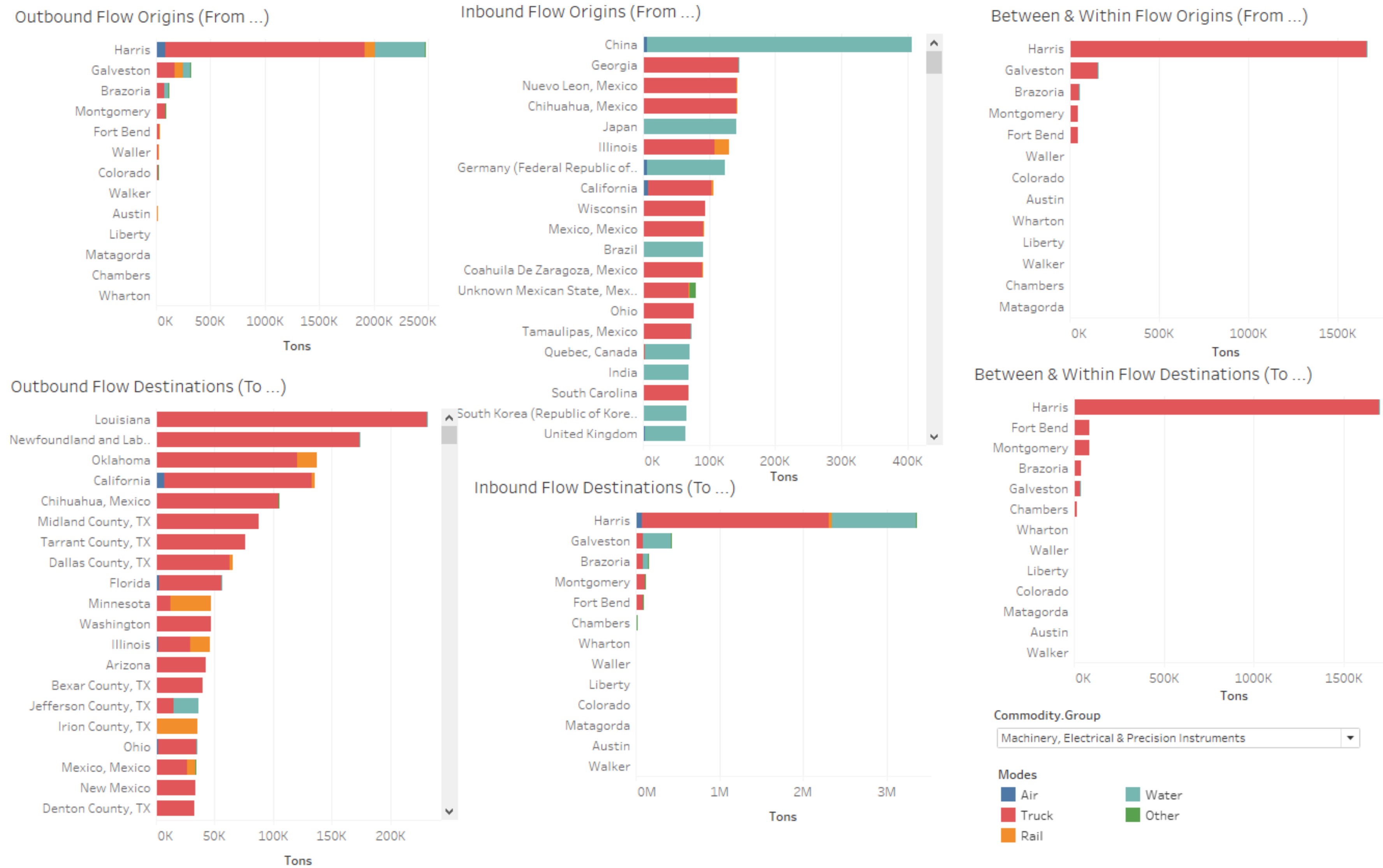
Source: analysis of Texas DOT Transearch model

Figure 32. Tons by Mode, Trade Type, and Flow Direction – Machinery, Electrical & Precision Instruments (2019)



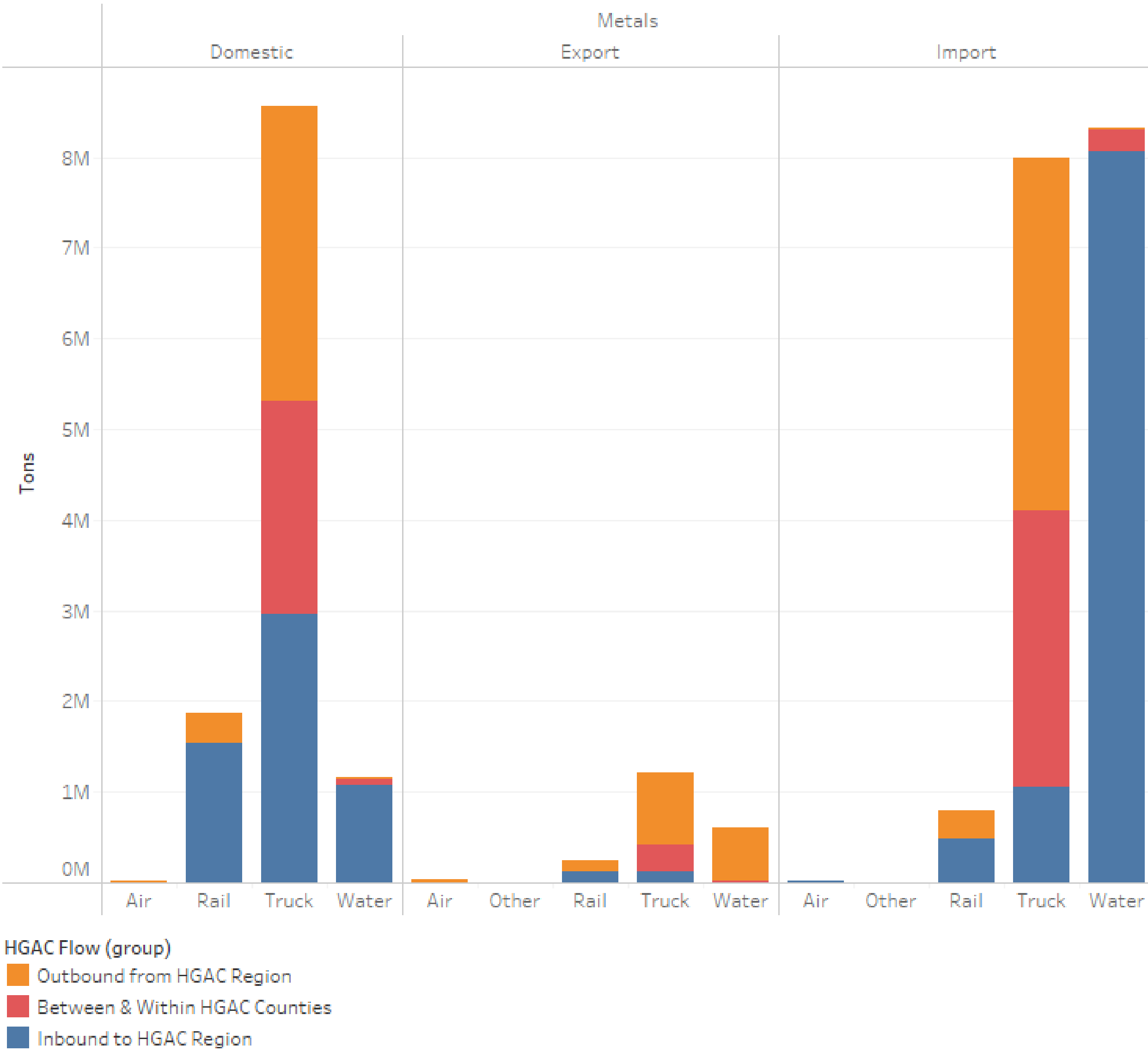
Source: analysis of Texas DOT Transearch model

Figure 33. Tons by Flow, Origin, and Destination – Machinery, Electrical & Precision Instruments (2019)



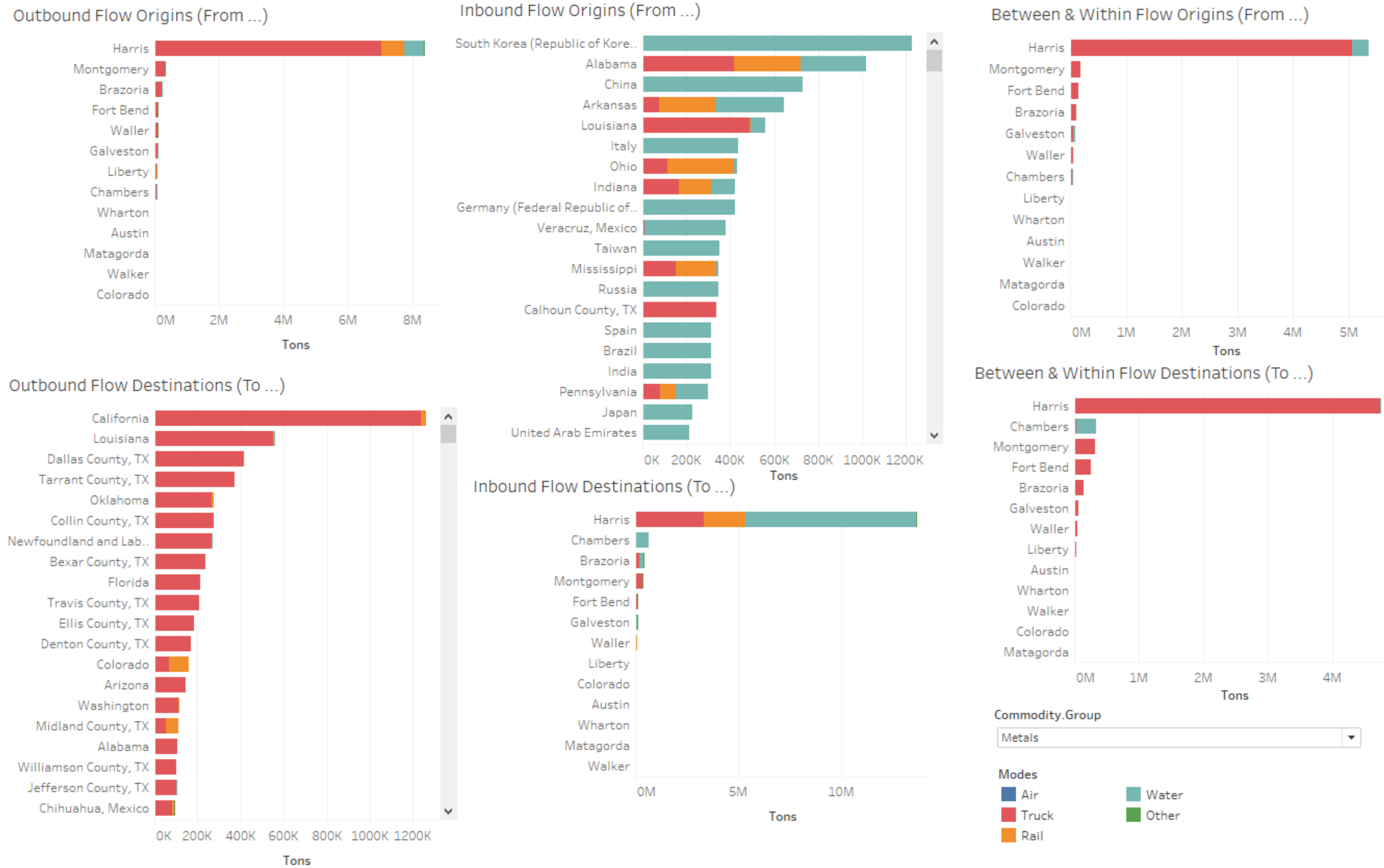
Source: analysis of Texas DOT Transearch model

Figure 34. Tons by Mode, Trade Type, and Flow Direction – Metals (2019)



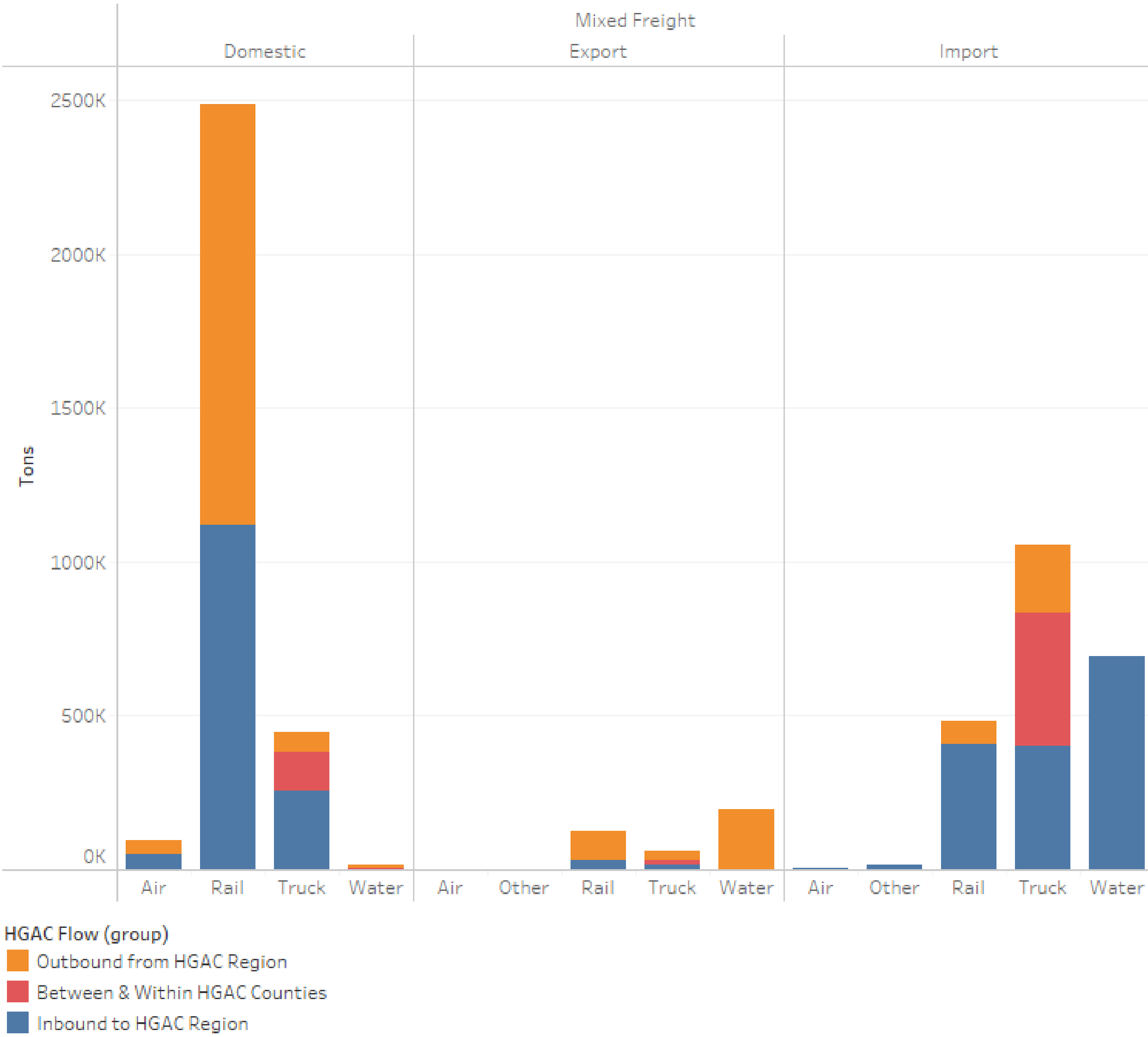
Source: analysis of Texas DOT Transearch model

Figure 35. Tons by Flow Direction, Origin, and Destination – Metals (2019)



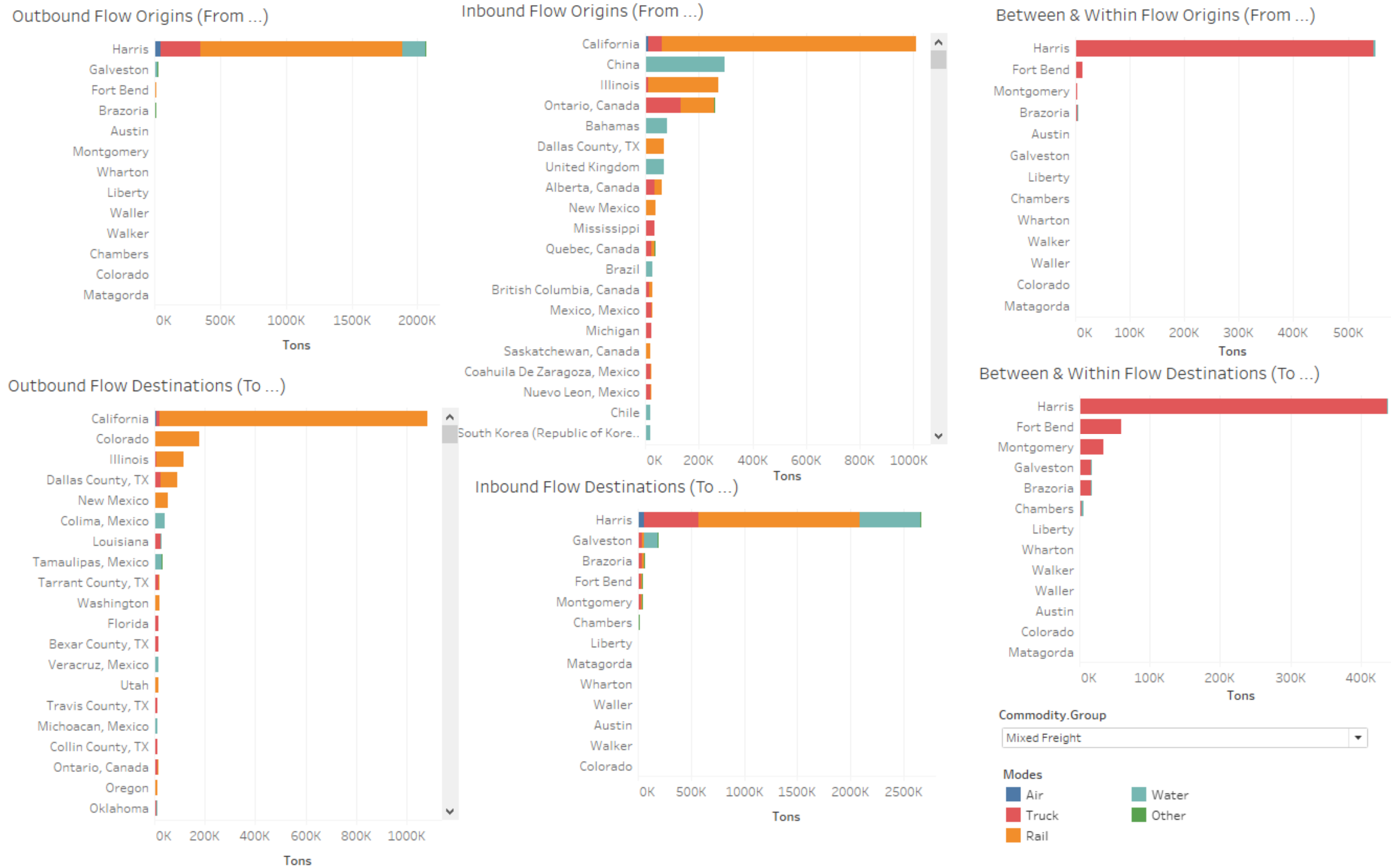
Source: analysis of Texas DOT Transearch model

Figure 36. Tons by Mode, Trade Type, and Flow Direction – Mixed Freight (2019)



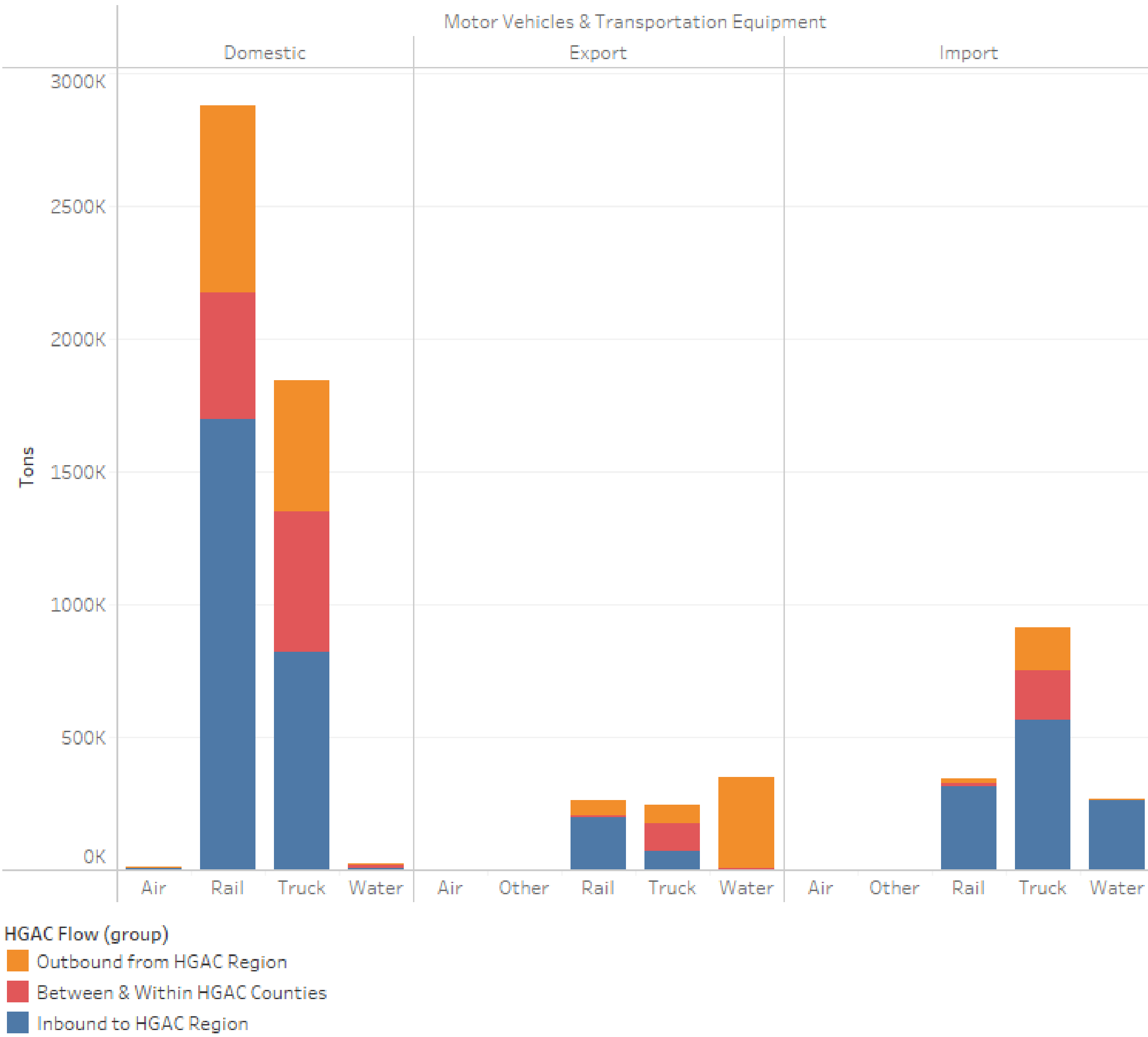
Source: analysis of Texas DOT Transearch model

Figure 37. Tons by Flow, Origin, and Destination – Mixed Freight (2019)



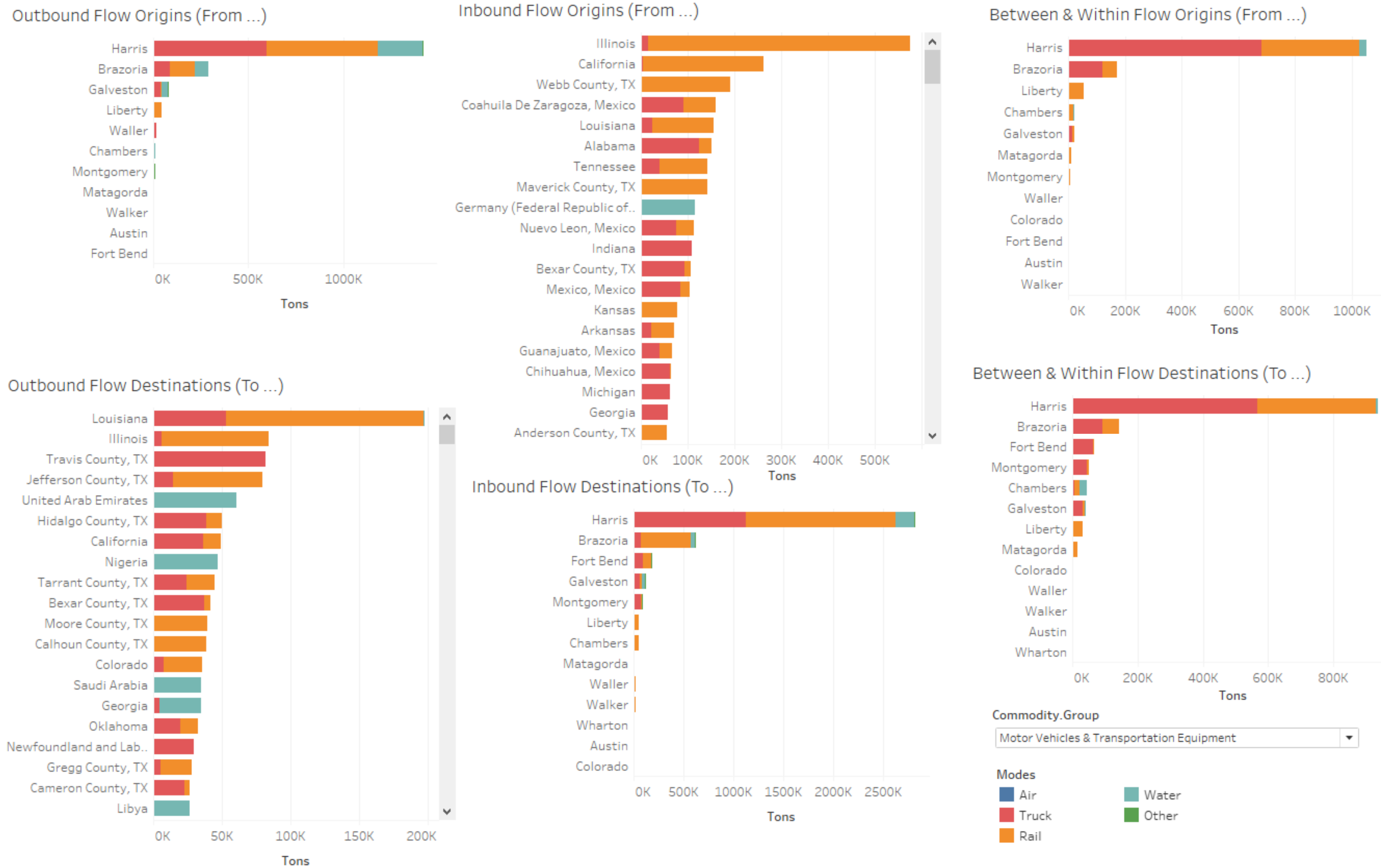
Source: analysis of Texas DOT Transearch model

Figure 38. Tons by Mode, Trade Type, and Flow Direction – Motor Vehicles & Transportation Equipment (2019)



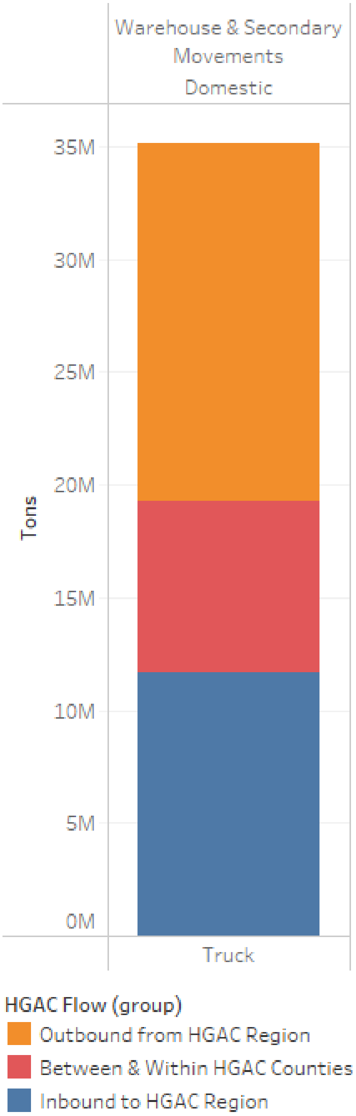
Source: analysis of Texas DOT Transearch model

Figure 39. Tons by Flow, Origin, and Destination – Motor Vehicles & Transportation Equipment (2019)



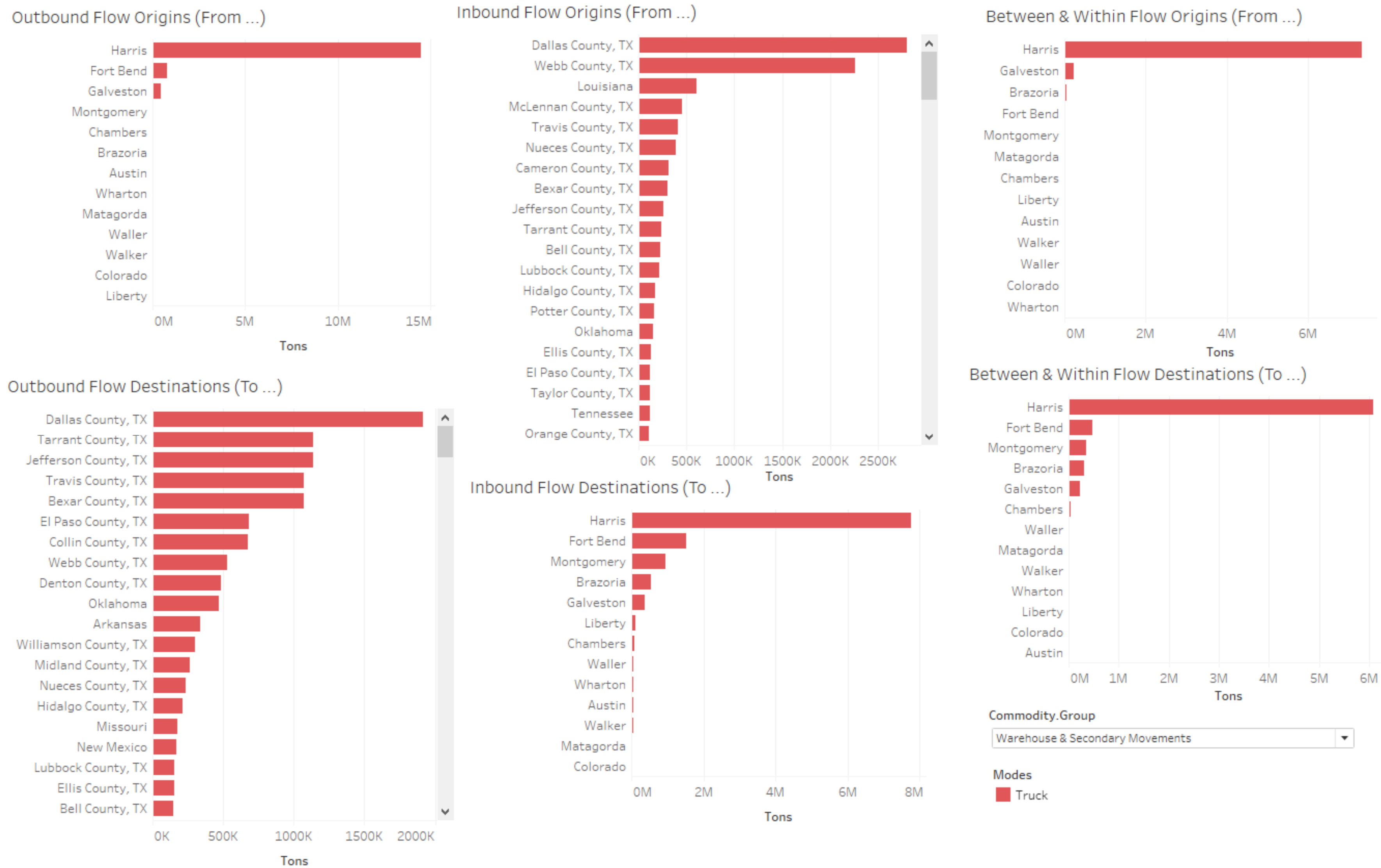
Source: analysis of Texas DOT Transearch model

Figure 40. Tons by Mode, Trade Type, and Flow Direction – Warehouse & Secondary Movements (2019)



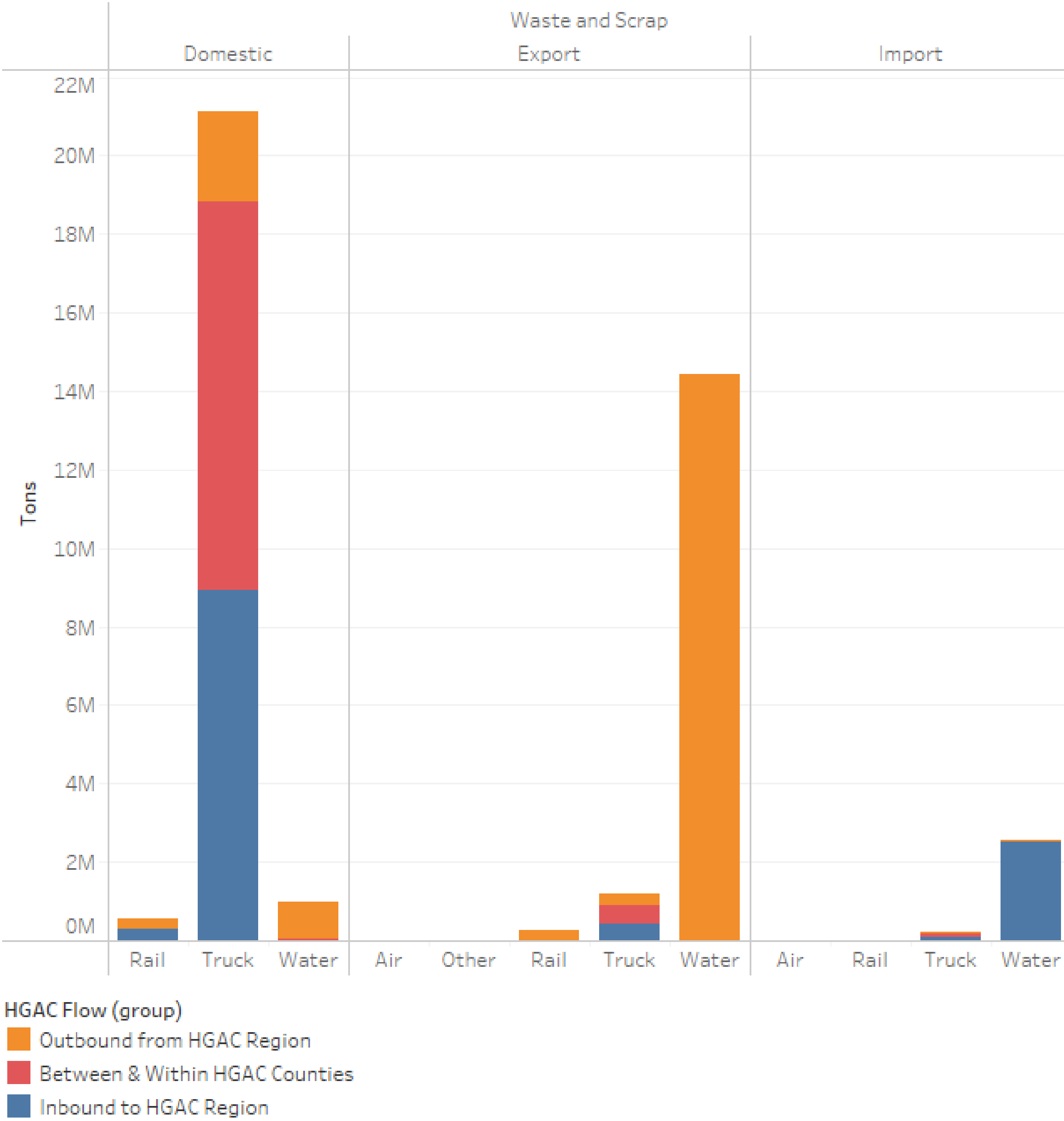
Source: analysis of Texas DOT Transearch model

Figure 41. Tons by Flow, Origin, and Destination – Warehouse & Secondary Movements (2019)



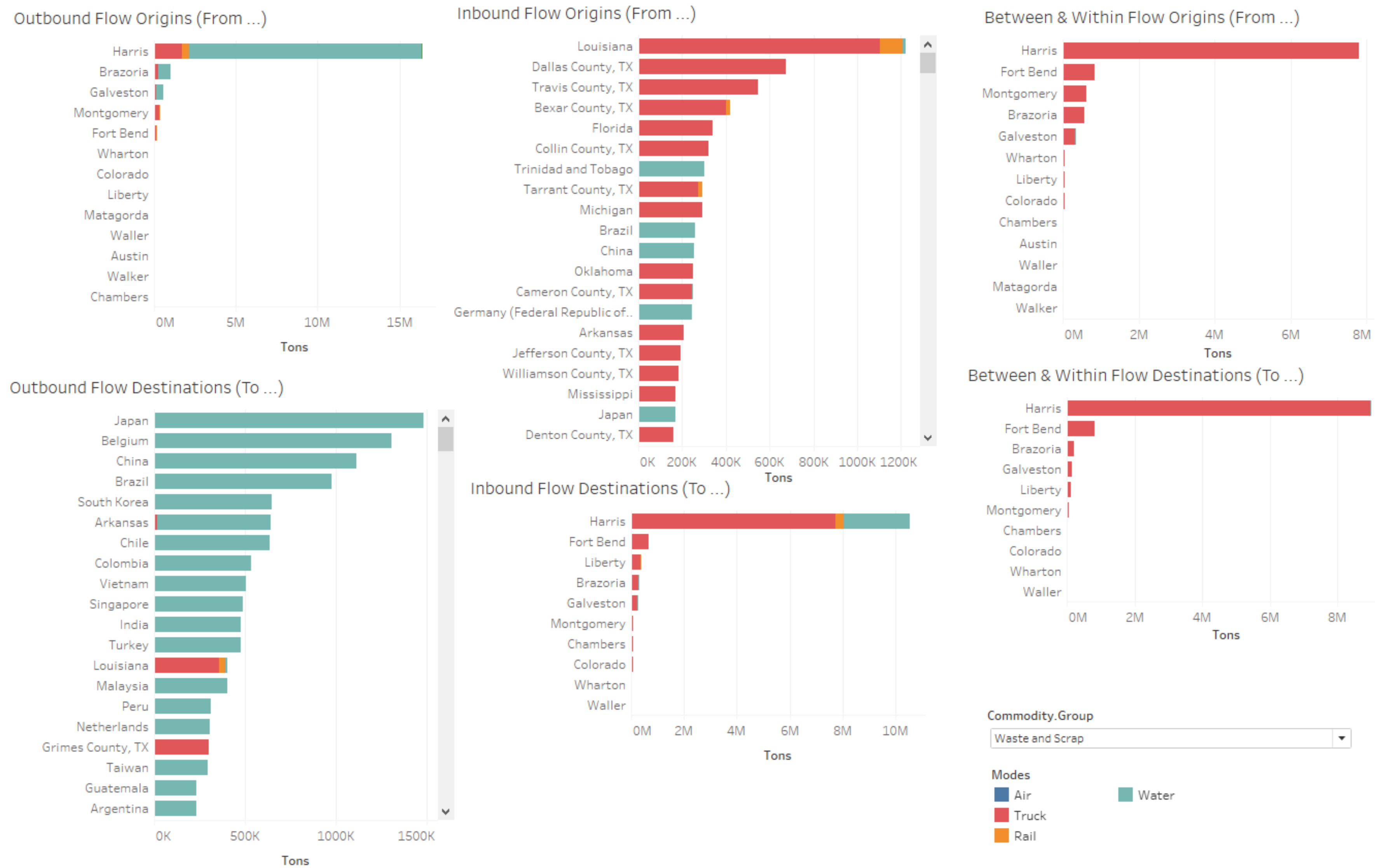
Source: analysis of Texas DOT Transearch model

Figure 42. Tons by Mode, Trade Type, and Flow Direction – Waste and Scrap (2019)



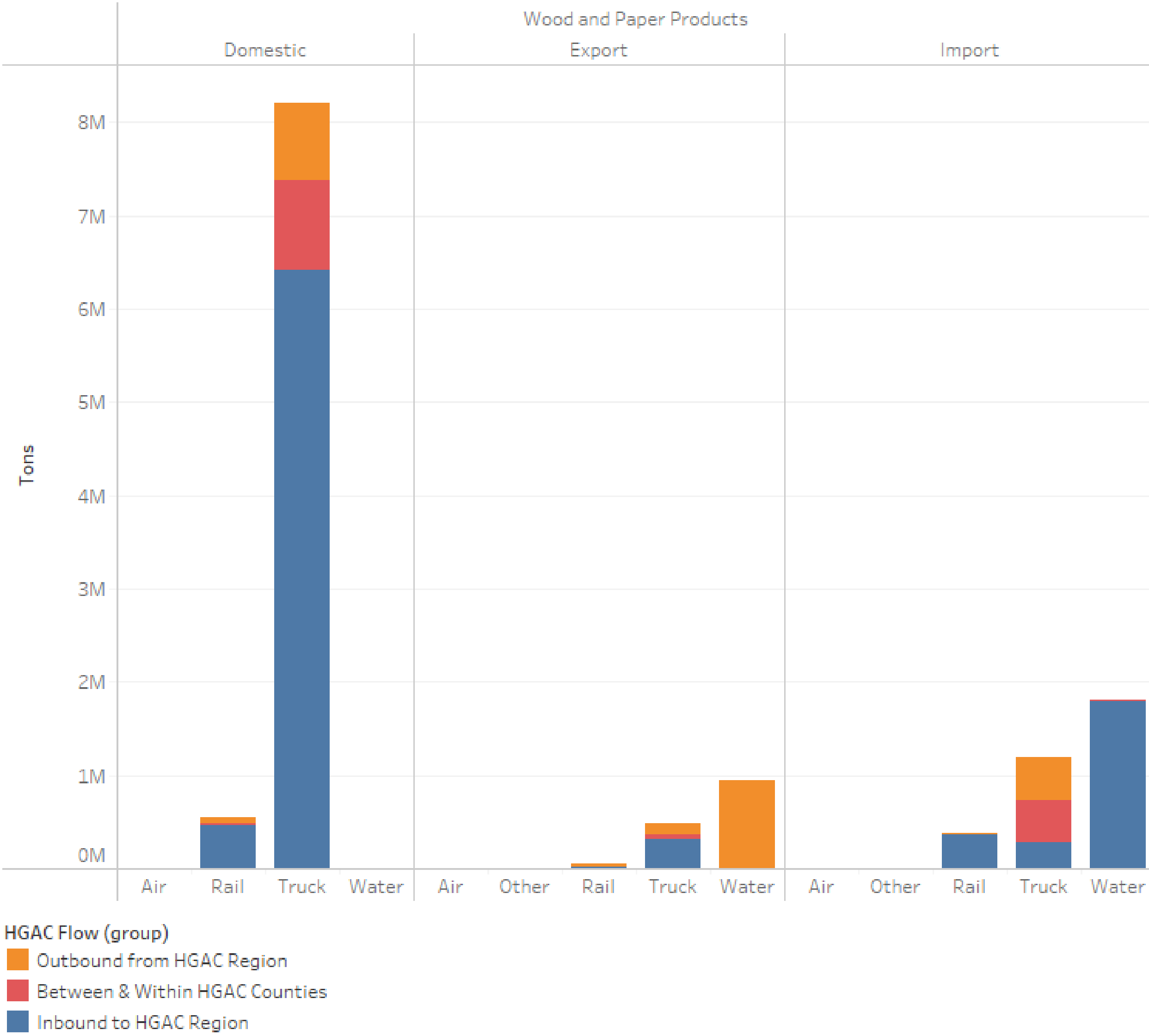
Source: analysis of Texas DOT Transearch model

Figure 43. Tons by Flow, Origin, and Destination – Waste and Scrap (2019)



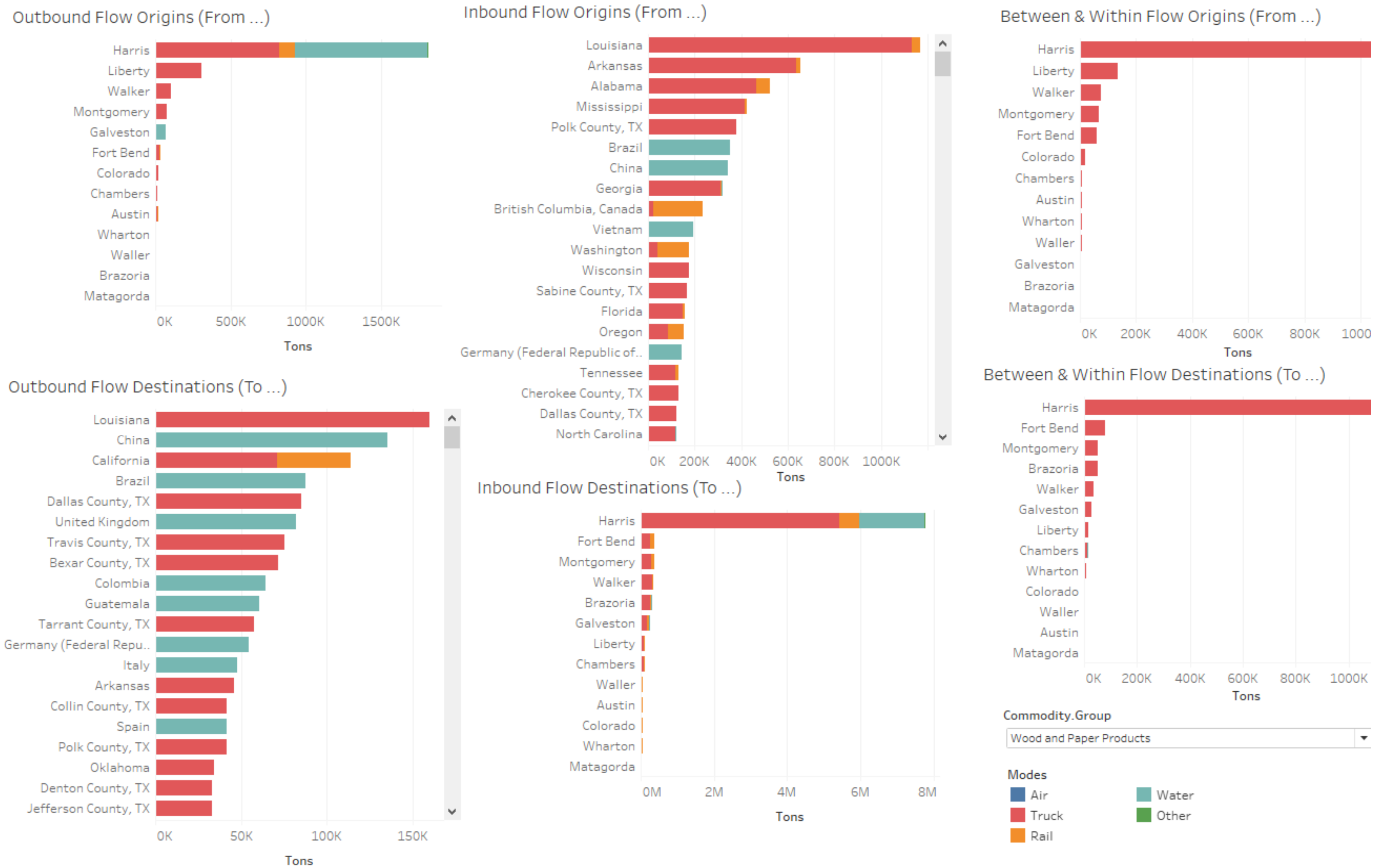
Source: analysis of Texas DOT Transearch model

Figure 44. Tons by Mode, Trade Type, and Flow Direction – Wood and Paper Products (2019)



Source: analysis of Texas DOT Transearch model

Figure 45. Tons by Flow, Origin, and Destination – Wood and Paper Products (2019)



Source: analysis of Texas DOT Transearch model

4.2 End Note

In concluding this analysis, it should be noted the material presented is intended as a high-level orientation and summary. Much more detail is available from the public data cited in this document (County Business Patterns, Freight Analysis Framework) and other public sources, as well as from confidential sources (like Transearch) which are available through license agreements.

Appendix G

ITS and TSMO Solutions for Freight Applications

OCTOBER 2022

Houston-Galveston Area Council

REGIONAL GOODS MOVEMENT PLAN

Intelligent Transportation Systems for Freight Applications

HDR

Contents

1. Introduction

The Houston-Galveston Area Council (H-GAC) has a critical role in planning of a multi-modal freight system that is responsible for one of the largest metropolitan economies in the world, and with a direct impact on national and international supply chains. As part of the numerous Freight Planning initiatives championed by H-GAC, this Intelligent Transportation System (ITS) for Freight Applications outlines best practice opportunities, innovative strategies, and responsibilities that ITS technologies provide for meeting regional economic goals, addressing mobility challenges, mitigating impacts on the environment, and contributing to quality of life. These advanced technology solutions supplement findings from the Regional Goods Movement Plan, Ports Area Mobility Study, H-GAC Critical Regional Freight Corridors, and other locally led studies to establish a comprehensive Transportation System Management and Operations (TSMO) Program of integrated strategies to optimize efficiency, safety, and reliability of the region's transportation infrastructure.

There is a broad range of existing and emerging ITS technologies for Freight Applications that will have interest for H-GAC, other government entities, and private-sector freight companies. Many of these technologies are already in various levels of discovery, development, or deployment stages within the H-GAC region and can be broadly categorized in the following focus areas:

Advanced Traffic Management Systems

- Roadside Surveillance Cameras
- Roadside Data Sensors
- Roadside Dynamic Message Signs
- Intersection Control Devices

Freight Traveler Information System

- Digital Mapping of Freight Routes
- Advanced Safety Warning System
- Truck Parking Availability

Private and Crowdsourced Data Applications

- Navigation and Mapping Services
- Connected Vehicle Movement Data
- Connector Traveler Data
- Freight Terminal Data

Traffic Management and Operation Centers

- Roadway Conditional Reporting
- Incident Management and Response
- Work Zone Warning
- Management of Roadside ITS Devices

Private Freight Company Industry Trends

- Truck Platooning
- Autonomous Trucks
- Electrification
- Automatic Cargo Identification

2. Overview of State and National Efforts

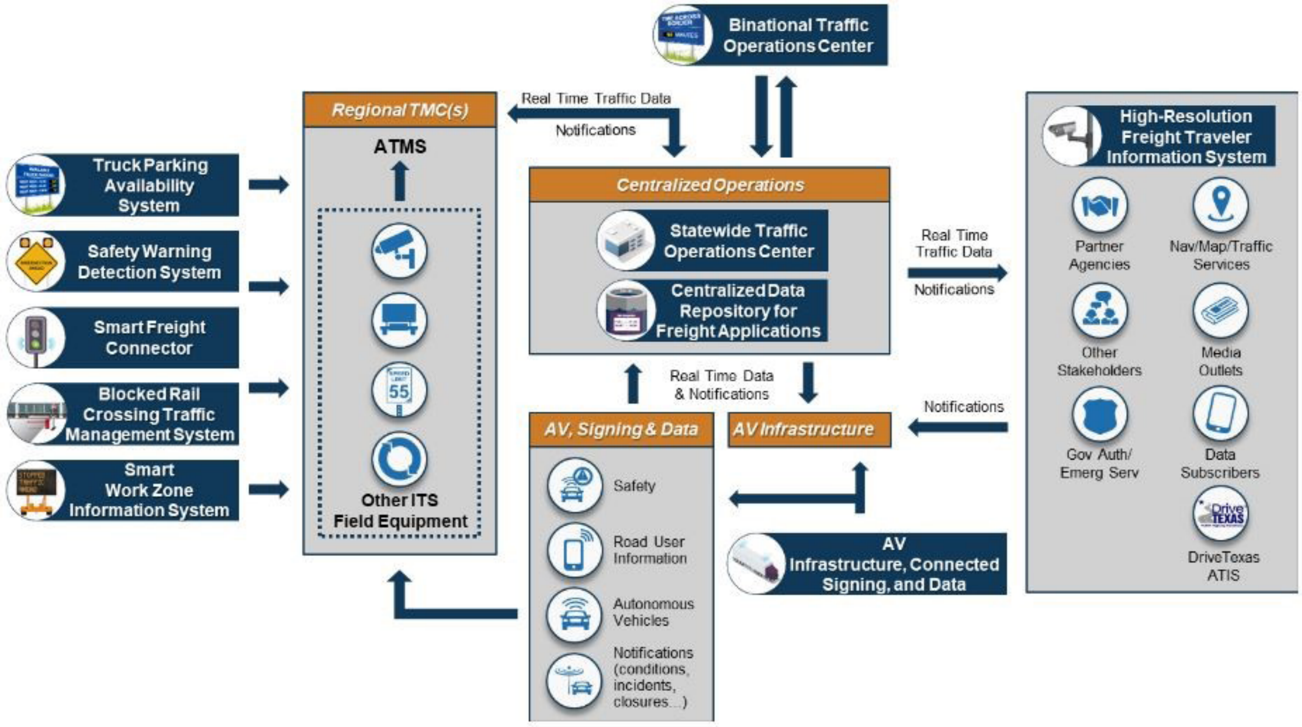
Texas Department of Transportation (TxDOT) completed a Texas Freight Network Technology and Operations Plan (FNTOP) in 2020 which included an assessment of current domestic and international practices, inventory of existing conditions in Texas, an assessment of Stakeholder needs, identification of freight technology strategies with supporting concept of operations, and an implementation plan. The FNTOP is a comprehensive statewide tool to assist public agencies, similar to those within the H-GAC region, and the private sector to effectively plan and partner on future deployments of freight technologies.

While the FNTOP has ten strategies that will generally impact the development of corridors in the H-GAC region, one broad strategy that could have significant impact is the Statewide Traffic Operations Center (STOC). The purpose and need of the STOC is to coordinate local Traffic Management Center incidents and events that have significant impact on freight movements and supply chains.

When operational, the operators and dispatches at Houston TranStar will coordinate with the STOC during these events to further disseminate roadway conditions to Truckers, Trucking Companies, TxDPS, and other Emergency Responders.

There are several strategies and technologies identified in State and National plans that will require planning for safe and effective deployment within the H-GAC corridors. The resiliency of communication systems (wired fiber optics and wireless radios) and electrification networks (Power to the Port, Charging Stations, Dynamic Wireless in Pavement) are critical elements to consider for accommodation of freight during Hurricanes, Flooding Events, Dense Fog, and National Security Threats (physical and cyber).

Figure 1. FNTOP Conceptual Technology Framework

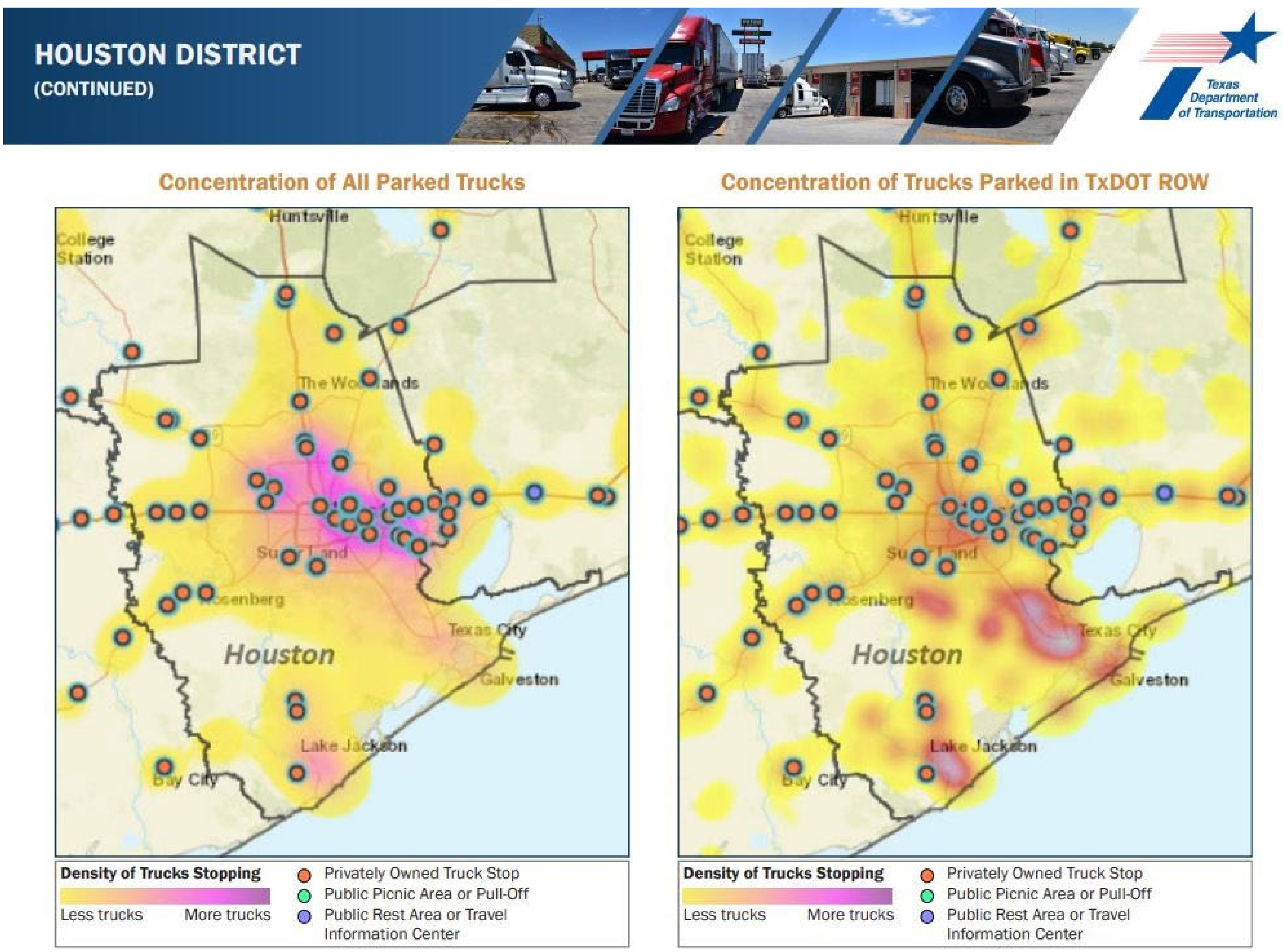


Source: Texas Department of Transportation

TxDOT was awarded federal funding to collaborate public and private freight technologies through the Texas Connected Freight Corridor (TCFC) Project. The project will deploy roadside vehicle to infrastructure equipment along the interstate corridors comprising of the "Texas Triangle" which includes I-10 and I-45 in the Houston Region. These interstate corridors within H-GAC will be equipped with roadside units to broadcast basic safety messages, work zone information, and roadway conditions/ traveler information to on-board units within freight vehicles. The concept of operations, standardization of installations, and implementation best practices will help H-GAC in developing requirements for future roadway projects to accommodate freight technology.

TxDOT's Planning Division, Freight Planning Section, has also completed a Statewide Truck Parking Study (April 2020) that inventoried existing public and private truck stops, utilized American Transportation Research Institute and INRIX data to document parking hotspots, and identified locations to develop and install dedicated public truck parking facilities to mitigate the significant shortage in parking availability for truckers. While the Truck Mobility Study lead by Houston district indicated most truck travel to/from gateway port terminals starts/end within the region, the availability of truck parking is a critical need for the ancillary areas of the H-GAC region. The Houston region does not have any publicly owned truck parking facilities and H-GAC should continue coordination with TxDOT on the expanding and upgrading recommendations of the Truck Parking Study (TxDOT Houston District Truck Parking Summary) to address the parking concentration as shown below.

Figure 2. Houston District Truck Parking Study



Source: Texas Department of Transportation

As required by the Infrastructure Investment and Jobs Act (IIJA), TxDOT along with other state agency partners developed the Texas Electric Vehicle Infrastructure Plan in July 2022. While this plan outlines the strategies for implementing a robust Electric Vehicle Charging Network throughout Texas, it does not address locations and standardization for heavy-duty freight trucks or trailers. The program, as required by FHWA and the IIJA, accommodates charging for up to light duty panel trucks or delivery vans through charge port standardization and pull-through capability. FHWA will publish guidance related to electrification of heavy-duty freight trucks and trailers by the end of 2022. There are some startup companies and state agencies that are piloting development of wireless dynamic charging roadways, but there have not been any successful long-term deployments that accommodate commercial vehicle needs or address agency operational and maintenance concerns.

The current operating environment on controlled access roadways in Texas often restricts trucks to the left most lane and within managed lane (high-occupancy vehicle or high-occupancy toll). There are no dedicated truck facilities on Texas roadways and prioritized freight transportation is mostly constrained to railroad operations. TxDOT Houston District and H-GAC have several long-range corridor studies under development, and accommodation of freight/trucking industry needs through lane management are important criteria within the evaluation process of alternatives. As part of these studies, Truck Only Lane alternatives should be evaluated and consider the freight technology application focus areas for optimized operations.

There are several TxDOT Districts and Divisions that have deployed in-pavement weigh-in-motion sensors along critical corridors to support enforcement of overweight vehicles, preserve pavement and bridge conditions, reduce operating costs, and eliminate delays over static weigh stations. As of April 2020, TxDOT has 41 weigh-in-motion sites which are predominately on I-35 from Laredo to Oklahoma. These weigh-in-motion technologies are opportunities for the H-GAC region to better support automated management and enforcement of overweight vehicles. Similarly, there are automated camera systems that detect hazardous cargo placards on freight trailers which could help support compliance of roadways designated as hazardous material routes.

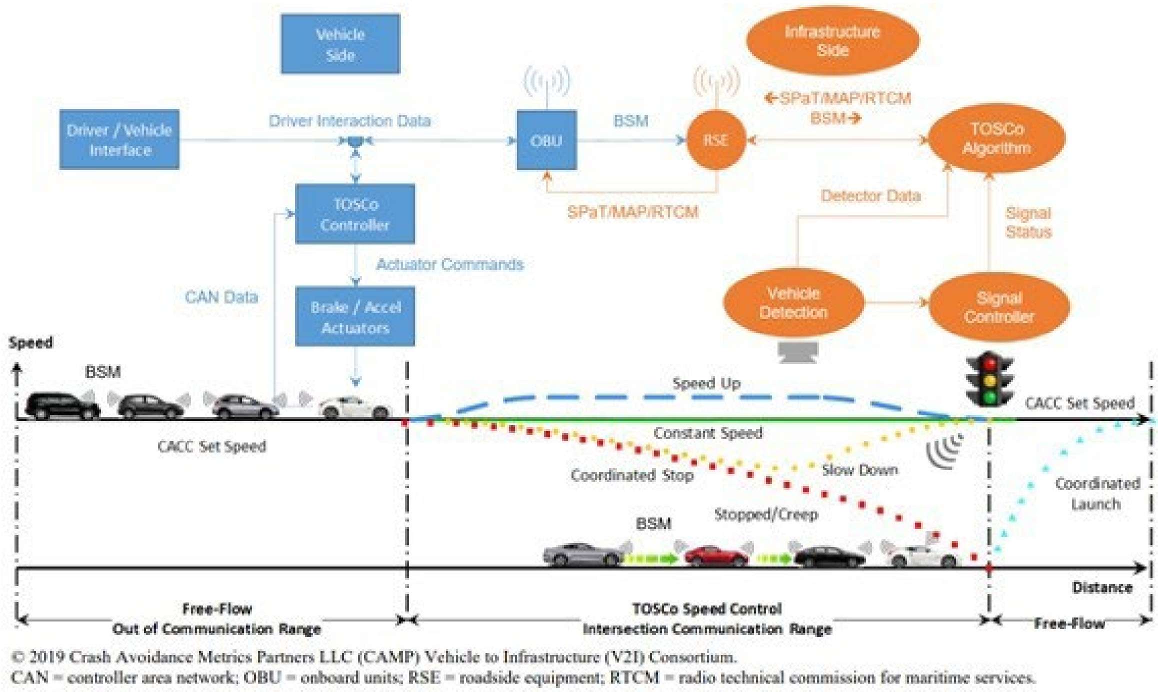
3. Houston ITS State of Practice

The Greater Houston Region has a long-standing history of ITS deployments dating back to the first roadside cameras and control room built in the 1960s. TxDOT and many local municipalities already have an established system of fiber optic and wireless radio communications, connected traffic signals, ramp metering, dynamic message signs, closed circuit television cameras, road weather and flood warning systems, truck rollover and over-height detection systems, wrong way driving systems, and centralized traffic management systems. Houston TranStar, the traffic management center partnership between the City of Houston, Harris County, TxDOT, and METRO, has been globally recognized as a top tier congestion mitigation and incident management center.

H-GAC has established a Transportation System Maintenance and Operations Subcommittee (H-GAC TSMO Subcommittee) and in 2021, the TxDOT Houston District developed a TSMO Program Plan (TxDOT Houston TSMO Program Plan) as part of a statewide initiative to incorporate TSMO oriented-strategies and performance measures throughout their transportation development projects. These plans and committees establish the framework for the existing ITS infrastructure network as well as planning and development of future projects to ensure system/network reliability, redundancy of communication, installation of devices to support roadway operation and incident management, and deployment of technologies for future connected/automated vehicles.

In 2019, Federal Highway Administration demonstrated a vehicle to infrastructure project for Traffic Optimization of Signalized Corridors (TOSCo) on SH 105 in Conroe. This demonstration, as shown in the Figure below, used real world cooperative adaptive cruise control and traffic simulation to harmonize traffic flow along the high-speed urban arterial. TxDOT Houston District has also piloted roadway to vehicle communications to broadcast Signal Phase and Timing Data from traffic signal controllers to on-board units. These innovative Connected Intersections projects should continue to be scaled across the region to provide trucks with real time signal situation awareness, and expand to evaluate the needs for truck signal priority and variable speed harmonization along critical freight routes.

Figure 3. FHWA Traffic Optimization for Signalized Corridors Illustration



Source: United States Department of Transportation, Federal Highway Administration

The Regional ITS Architecture is managed by H-GAC and was previously updated in 2018. The regional architecture is typically updated at regular intervals no less than every five years, and the H-GAC TSMO Subcommittee has on-going discussions about updating the ITS Regional Architecture and soliciting information from government agencies on their ITS architecture accomplishments and experience in implementation.

TxDOT Houston District has recently launched ConnectSmart, an advanced technology platform that provides end users with personalized travel mode options, transportation system information, predictive travel times, and several other features to improve the transportation experience throughout the region. The region has also developed on-the-fly routing through TranStar route builder service by utilizing real time traffic information to construct the quickest route to a given destination.

These platforms along with 3rd party private software create a framework to optimize freight logistics, specifically longer haul routes, by providing trucking companies with optimal route information for their destinations.

Within the HGAC region, there have been several on-going pilots focused on autonomous truck hauls between other metropolitans and Houston (Aurora, Kodiak, Torc Robotics, TuSimple, Waymo). The State of Texas has passed legislation to allow truck platooning through connected braking systems and level 4 automated vehicle operation to pilot operations on key interstate corridors. The autonomous trucking companies are still accompanied by a human safety pilot, but these pilot efforts are crucial steps in progressing the readiness for H-GAC transportation network to support autonomous freight operation.

4. H-GAC Role and Responsibility

H-GAC will play a significant role in the planning of corridors for successful accommodation of freight technology solutions, securing federal and state funding for dedicated technology projects, and ensuring technologies are included on all MPO projects through the systems engineering process. The Houston Region already has several technology deployments and projects under development, and H-GAC should continue to support and expand these projects in addition to discovering new projects or programs. The recommendations below are opportunities for H-GAC to lead programs, pilot projects, and planning efforts to continue progressing freight technologies on transportation networks.

(1) Identify a Freight Technology Representative within the H-GAC TSMO Subcommittee.

(2) Identify projects and programs to submit for federal grants through various existing programs and new/upcoming IIJA opportunities.

- Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program
- Advanced Transportation Technologies and Innovative Mobility Deployment (ATTIMD) Program, also known as Advanced Transportation Technologies and Innovation (ATTAIN)
- Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)

(3) Ensure Freight Technology Service Packages during the Regional ITS Architecture update reflect emerging needs of the private industry.

(4) Develop plan to provide Freight Industry with real time information from Houston Regional Traffic Signal Map (Houston TranStar - Traffic Signal Map).

- Standardize Connected Intersections plan so that regional traffic signals can disseminate real time signal phasing and timing information.

(5) Evaluate H-GAC Critical Regional Freight Corridors Map and prioritize locations for early-stage deployments of Smart Freight Connector strategies within the statewide FNTOP.

- Coordinate with Private Sector Autonomous Trucking Companies that have piloted hauls within the Greater Houston Region, and identify specific Corridor Needs to enhance operations.

(6) Coordinate with TxDOT once FHWA issues guidance for Heavy-Duty Freight Truck Electric Vehicle Charging Network (Anticipated Fall 2022).

(7) Coordinate H-GAC freight project technology needs with TxDOT on the current update of the Texas Freight Mobility Plan (Texas Delivers 2050).

(8) Coordinate Freight and Connected Vehicle Technologies during Planning and Environmental Linkages Studies currently led by TxDOT Houston District.

- I-45 South from US 59/I-69 to Beltway 8 South in Harris County
- I-10 from I-69/US 59 to SH 99 in Harris and Chambers Counties
- I-45 from Beltway 8 North to Loop 336 South in Harris and Montgomery Counties
- I-69 from Spur 527 to BW 8 in Harris County
- SH 225 from I-610 to SH 146 in Harris County
- I-610 East from Broadway Street to Clinton Drive in Harris County

(9) Update Regional Project Call Scoring Criteria for Freight Technology Projects.

(10) Develop Resource Plan for Regional Operation, Management, and Maintenance of Technologies for Freight Applications.

Table 4-1 Recommended H-GAC Opportunities for Freight Technology Advancement and Target Timeline

RECOMMENDED H-GAC OPPORTUNITY FOR FREIGHT TECHNOLOGY ADVANCEMENT	TARGET TIMELINE
1. Identify a Freight Technology Representative within the H-GAC TSMO Subcommittee.	1 Month
2. Identify projects and programs to submit for federal grants through various existing programs and new/upcoming IIJA opportunities.	On-Going
• Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program	2 Months
• Advanced Transportation Technologies and Innovative Mobility Deployment (ATTIMD) Program, also known as Advanced Transportation Technologies and Innovation (ATTAIN)	2 Months
• Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)	1-2 Years
3. Ensure Freight Technology Service Packages during the Regional ITS Architecture update reflect emerging needs of the private industry.	1 Year
4. Develop plan to provide Freight Industry with real time information from Houston Regional Traffic Signal Map (Houston TranStar - Traffic Signal Map).	4-5 Years
• Standardize Connected Intersections plan so that regional traffic signals can disseminate real-time signal phasing and timing information.	2-3 Years
5. Evaluate H-GAC Critical Regional Freight Corridors Map and prioritize locations for early-stage deployments of Smart Freight Connector strategies within the statewide FNTOP.	2-3 Years
• Coordinate with Private Sector Autonomous Trucking Companies that have piloted hauls within the Greater Houston Region, and identify specific Corridor Needs to enhance operations.	6 Months
6. Coordinate with TxDOT once FHWA issues guidance for Heavy-Duty Freight Truck Electric Vehicle Charging Network (Anticipated Fall 2022).	1-2 Years
7. Coordinate H-GAC freight project technology needs with TxDOT on the current update of the Texas Freight Mobility Plan (Texas Delivers 2050).	1-2 Years
8. Coordinate Freight and Connected Vehicle Technologies during Planning and Environmental Linkages Studies currently led by TxDOT Houston District.	On-Going
• I-45 South from US 59 / I-69 to Beltway 8 South in Harris County	-
• I-10 from I-69/US 59 to SH 99 in Harris and Chambers Counties	-
• I-45 from Beltway 8 North to Loop 336 South in Harris and Montgomery Counties	-
• I-69 from Spur 527 to BW 8 in Harris County	-
• SH 225 from I-610 to SH 146 in Harris County	-
• I-610 East from Broadway Street to Clinton Drive in Harris County	-
9. Update Regional Project Call Scoring Criteria for Freight Technology Projects.	1-2 Years
10. Develop Resource Plan for Regional Operation, Management, and Maintenance of Technologies for Freight Applications.	4-5 Years

Appendix H

Key Issues Needs and Challenges Memorandum

OCTOBER 2022

Houston-Galveston
Area Council

REGIONAL GOODS MOVEMENT PLAN

Key Issues, Needs, Problems and Challenges

HDR

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1. Introduction

The Houston-Galveston Area Council (H-GAC) region's freight infrastructure is a key enabler for supporting the needs of many different shippers, goods receivers, freight operators, consumers, and producers across the state and the nation.

This infrastructure facilitates many different freight movements. Some freight passes through the region while many tons of goods and commodities are processed and stored here. The region serves as a key gateway for dispatching and receiving goods to and from global markets, especially energy related markets, while warehouses and distribution centers serve local and regional markets, businesses, and residents. The region has an extensive ecosystem of intermodal facilities with connectivity between ports, railways, pipelines, airports, and highways. These components come together to support the flow of goods.

Key issues, needs, and challenges to the existing freight goods movement system are described in the following sections.

2. Capacity

Freight systems and supply chains are constantly evolving and reacting to multiple changes that influence how, when, and where goods are moved. Notable examples of significant changes include:

- The increase in domestic crude oil and natural gas production and subsequent relaxation of crude oil export controls means that the U.S. is now a net exporter of crude oil and the world's largest exporter of liquified natural gas. This has largely been facilitated by new pipeline construction and reversal of existing pipelines to bring products to new and existing export facilities along the Gulf Coast. A related impact has been the significant expansion of facilities using natural gas to produce plastic resins that are transported by the domestic rail network, packaged for export, and then flow through the region's ports.
- The rise of e-commerce for purchases of consumer goods has transformed many companies and their retail operations and led to a growth in package delivery operations.
- Importers seeking to avoid bottlenecks in west coast U.S. ports are now importing through regional ports such as Port Houston to get product closer to end markets.

These changes necessitate growth and expansion of freight goods movement infrastructure in order to efficiently meet demand and customer expectations. This section identifies key needs and issues associated with the capacity of the region's freight infrastructure.

2.1 Air

The current air cargo ecosystem must expand to accommodate forecasted cargo demand. Facilities include stands or aprons for freighter aircraft and facilities for handling and processing air cargo, including customs and security checks and loading/unloading air cargo to and from trucks. Most other airport components such as the runways, taxiways, and fueling infrastructure are shared between cargo and passenger operations.

George Bush Intercontinental Airport (IAH)

In the 2015 George Bush Intercontinental Airport (IAH) Master Plan, the following needs were identified to accommodate projected cargo demand:

- The East Cargo Area will need to be expanded by 20 acres
- The Central Cargo Area will require 2 acres for expansion
- Integrated operators: FedEx and UPS will each require one acre of expansion to accommodate additional aircraft parking.

William P. Hobby Airport (HOU)

According to the William P. Hobby 2014 Master Plan, cargo aircraft/freighter operations will be primarily focused at IAH. Hobby Airport processes a significant volume of air cargo, largely carried by the dominant passenger carrier at the airport, Southwest Airlines; however, due to the fact that the volume is accommodated by Southwest Airlines, there is no requirement for dedicated freighter aircraft stands at the airport. The 2014 Master Plan identified the need to demolish the existing air cargo facility and construct a new cargo building on a site in the east quadrant of the airport.

Ellington Airport (EFD)

Ellington Airport handles very small volumes of air cargo and does not have any frequent or regular air cargo services, despite it having a 9,000 foot long runway that can accommodate most freighter aircraft. In 2013, a real estate company began developing a 37-acre area adjacent to the airport on privately owned land for air cargo purposes.

2.2 Maritime

2.2.1 Channels

Regional ports rely on approach channels, such as the Houston Ship Channel and the Freeport Harbor Channel to link port terminals with the seas and oceans.

> *A key challenge with the region's ports is that vessel sizes have increased, including container and dry and liquid bulk vessels.*

Ensuring shipping channel widths and depths are keeping pace with increasing vessel sizes is vital in ensuring ports can grow and meet the needs of their various customers while maintaining safe and efficient navigation. Both the Houston Ship Channel and the Freeport Harbor Channel require expansion, and projects are already underway to address these constraints.

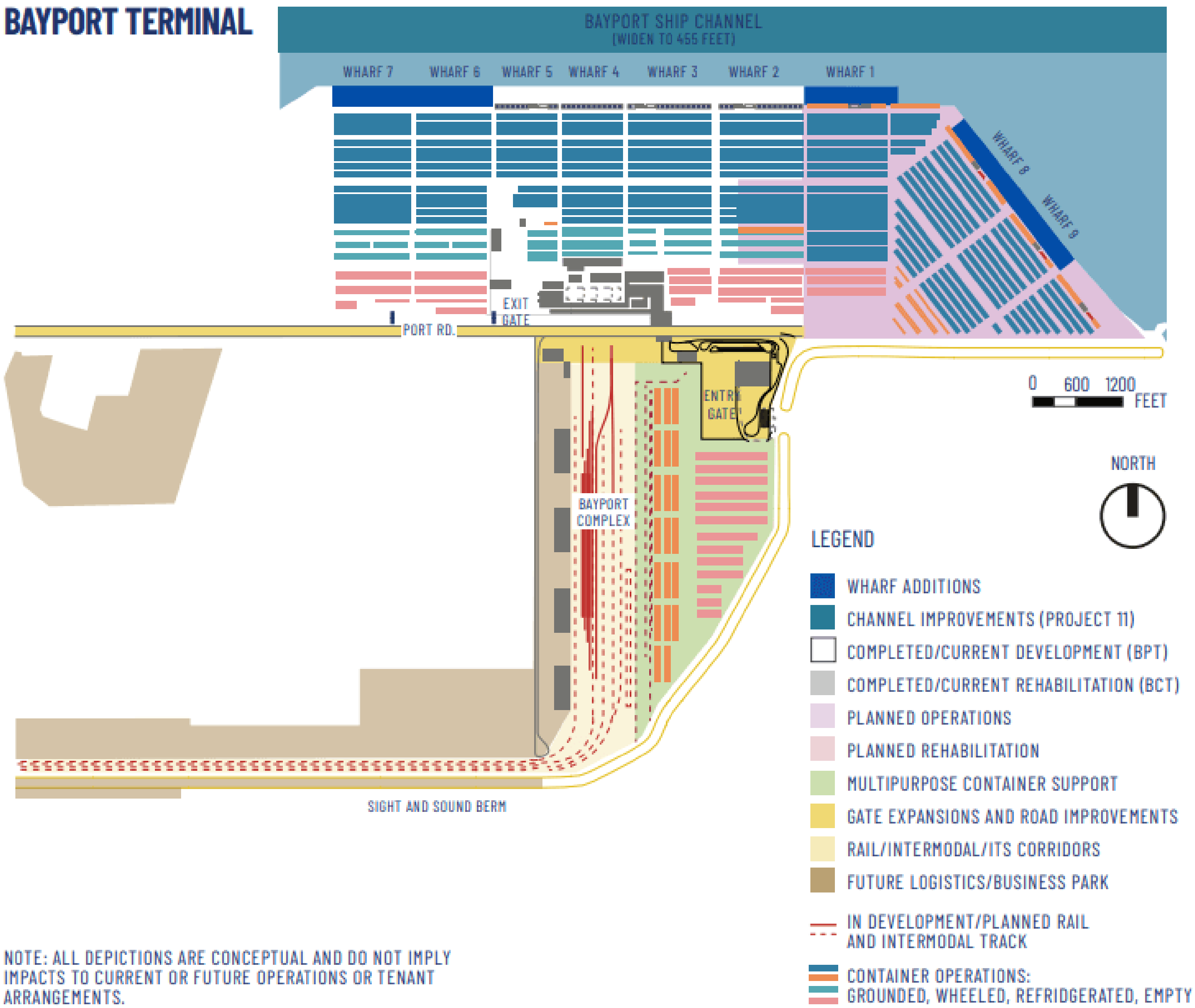
The Houston Ship Channel Expansion Project 11 will widen the channel along its Galveston Bay reach from 530 feet to 700 feet, deepen the upstream segments to between 39 feet and 46.5 feet, and make other safety and efficiency improvements. The Freeport Harbor Channel Improvement Project will further deepen the channel to authorized depths of 51 feet to 56 feet, making Port Freeport the deepest port in Texas. It also includes enhancements to the upper turning basin and selective widening of the channel and lower channel bend easing, making it easier for modern ships to navigate.

Despite projects to improve the efficiency and depth of the region's ship channels, some vessel types still cannot be accommodated in the region's ports. Very Large Crude Carriers (VLCCs), capable of carrying two million barrels of crude oil, require a depth of 66 feet and cannot access the region's ports. Currently, loading these vessels requires an operation called lightering, where smaller vessels are loaded in the ports and travel to where a VLCC is anchored offshore, and the load is transshipped. This process requires several shuttles to load the vessel. A private company has announced plans to build Sea Port Oil Terminal, which would be built 27 miles offshore from Brazoria County and would be capable of accommodating two VLCCs. New onshore terminals and pipelines would connect to subsea pipelines and a tanker mooring point, where the VLCCs would be loaded. This development has the potential to reduce vessels transiting some ship channels. The Final Environmental Impact Statement (EIS) was published in the Federal Register on July 29, 2022.

2.2.2 Port Terminals

In addition to expanding channel capacity, the region's ports will also need to consider terminal expansion to accommodate growing volumes and needs of their respective port customers. The need for port terminals to grow and expand to accommodate growth and changes in volume is vital in maintaining the competitiveness of the region's businesses and supply chains that rely on port infrastructure in the region. All Houston area ports have plans to expand their terminals, except for Texas City, which is a privately owned port. For example, the Galveston Wharves Strategic Master Plan identifies the port growing its cargo land from 218.6 acres in 2018 to 368 acres in 2040, and Port Houston's 2040 plans identifies a series of conceptual alternatives to accommodate growth. An example is shown in Figure 1.

Figure 1. Conceptual Expansion Plan for Bayport Terminal



2.2.3 Gulf Intracoastal Waterway

Maintaining the condition of the Gulf Intracoastal Waterway (GIWW) to its authorized 12-foot depth and 125-foot width is an ongoing task. Sediment is deposited from the rivers that intersect with the GIWW due to wind and wave action from the Gulf of Mexico.

> *The GIWW Legislative report to the 87th Texas Legislature identified that the Corps is unable to consistently maintain the authorized dimensions along the entire length of the channel.*

Past studies have shown that certain segments of the channel are periodically shoaled to depths of less than 10 feet which makes the waterway impassable to fully laden barges.

Shoaling often results in light loading of vessels, where vessel operators do not fully load the vessel to leave additional draft. This increases shipping costs and reduces the efficiency of freight movement.

The Brazos River Floodgates (BRFG) were designed to help reduce shoaling and the gates are predominately kept open to facilitate navigation unless there are high flows on the river. Figure 2 illustrates this bottleneck on the GIWW with floodgates either side of the Brazos River. It also shows a barge leaving the western gate heading eastbound. Addressing the condition and capacity of this bottleneck is a key need for the barge transportation industry.

According to the United States Army Corps of Engineers (USACE), *the narrow opening of the gated structure creates an impedance to the flow of water causing the water to swell and rise locally, which accelerates the water through the structure creating hazardous navigation conditions. At a certain level of swell, or head differential, navigation is deemed too hazardous, and the river crossing is closed to navigation either by policy or by physically closing the gates. Also, the 75-foot opening causes the tows that are assembled to two barges wide to break down to single wide and commonly a single barge for shuttling across the river in a process known as tripping. After all barges have been shuttled across the river, they are reassembled by cabling them back together into their original tow configuration. Additionally, the narrow gate opening and crossing geometry create hazardous cross currents and eddies, which when coupled with winds and other drivers are the cause for many vessel impacts (allisions) to the structures with many more at BRFG than Colorado River Locks (CRL) (65 versus 8 annually). These problems combine to create massive average delays to navigation (12 hours at BRFG, 3 hours CRL) as well as contributing to hazards to mariners.*

Figure 2. Brazos River Floodgates

Figure 3. Barges Queuing at the Brazos River Flood Gates

Figure 3 is an aerial image showing a queue of barges (highlighted in red) waiting to pass eastbound through the BRFG.

2.3 Rail

2.3.1 Introduction

The Houston, Texas area and surrounding Gulf Coast Region continues to experience some of the largest economic growth occurring in the United States today. Higher-than-average population growth coupled with increasing economic activity and port development across the region has led to an overall increase in local transportation demand, as well as a need for expanded transportation options among area freight shippers and manufacturers. Rail transportation has long played an important role in meeting the freight transportation needs of the Houston region.

> *Many of Houston's rail lines were initially developed to meet regional transportation needs, and many of the early railroad companies in the area were headquartered in Texas, as was required by state law at the time.*[1]

However, as corporate mergers throughout the twentieth century saw regional railroad systems combined into larger networks, and rail traffic flows began shifting toward longer, transcontinental trips over a single carrier, the railroad infrastructure in the Houston area began handling larger shares of through freight traffic that is neither originating nor terminating in the region.[2]

Today, Houston is served by three large, national Class I freight railroads, with routes that extend in every direction from the City. These Class I carriers are BNSF Railway (BNSF), Union Pacific Railroad (UP), and Kansas City Southern Railway (KCS). These railroads offer connections to other Class I railroads as well as many smaller Class II (regional) and Class III (short line railroads) nationwide.

Railroad operations remain firmly integrated into the local manufacturing, shipping, and logistics supply chains. The freight railroad companies that serve the Houston region have made significant investments in capacity improvements in the region to better adapt the railroad infrastructure to accommodate present day operations as well as future growth.

2.3.2 BNSF Railway

BNSF has a significant presence in the region, operating primarily on trackage rights over UP rail lines through the City of Houston, although BNSF does own lines that extend north from Houston to Dallas-Fort Worth, northwest to Amarillo, and south to Galveston. The majority of BNSF's trackage rights were gained during the 1996 UP-Southern Pacific (SP) merger in order to preserve competition where UP's existing network at the time was duplicated by nearby former SP lines. Trackage rights on the Port Terminal Railroad Association (PTRA) also provide BNSF access to various customers and industrial railways in the Houston region. The BNSF network and connections tie together its Texas Gulf Coast trackage with the Louisiana Gulf Coast, Midwest, northern states, West Coast, and Mexico.

Houston is a significant hub for BNSF. Trains moving between the West Coast and Gulf Coast and trains moving between the central U.S. and South Texas or Mexico pass through the Houston region. BNSF operates a Houston-area intermodal facility and adjacent automotive ramp on Brisbane Road by the William P. Hobby Airport. In addition, BNSF intermodal trains service the Barbours Cut intermodal ramp at Port Houston.

2.3.3 Union Pacific Railroad

UP has the largest presence of all the Class I railroads operating within the Gulf Coast Region. The Houston area is a hub for UP lines radiating from the Texas Gulf Coast, linking the region by rail to the West Coast, Midwest, Louisiana Gulf Coast, and Mexico. UP's network of rail lines in the region is made up of many predecessor railroads that UP has acquired or merged with, the most recent being the UP-SP merger in 1996. Although Houston generates a significant amount of rail traffic of all kinds for UP, the railroad also operates trains that pass through Houston while moving to and from other regions of the continent.

UP serves three intermodal terminals in the region, two in northeast Houston and one serving Port Houston. UP's Settegast intermodal terminal is located on Kirkpatrick Boulevard off of IH 610 and handles both truck trailers and containers and its Englewood intermodal terminal is located on Wallisville Road north of IH 10 and handles only containers. UP also serves the Barbours Cut intermodal ramp at Port Houston.

In addition to operating numerous local freight yards that serve as the base for local freight trains to switch area manufacturers and other shippers, UP operates a large classification yard in Houston, Englewood Yard, where inbound railcars are sorted

1 Texas State Historical Association, Railroads. Retrieved from: https://www.tshaonline.org/handbook/entries/railroads
2 Houston-Galveston Area Council, Ports Area Mobility Study Rail Tech Memo, May 8, 2019.

and assembled into new outbound trains destined for other terminals around the UP network.

As a result of the mergers and acquisitions of predecessor railroads over the years, UP now has many different rail yards and industrial spurs across the Houston region that have slowly become more integrated with each other over time. Because UP controls most rail routes throughout the city, other railroads (including BNSF, KCS, and the PTRA) operate over UP's lines via trackage rights agreements.

2.3.4 Kansas City Southern Railway

KCS's main line between the Midwest/South Central regions of the U.S. and Mexico passes through Houston. KCS owns no trackage in the city itself; it operates over a portion of the UP network via a trackage rights agreement from Beaumont, Texas (where a connection exists with KCS's main U.S. north-south artery) through Houston and west to Rosenberg, Texas, where KCS-owned trackage begins again headed south to Victoria, Texas. Through additional trackage rights and connecting trackage it acquired with its purchase of the Texas Mexican Railway, the KCS system extends south from Houston to the Mexican border at Laredo, Texas, where it connects to its Mexican affiliate, Kansas City Southern de Mexico (KCSM).

As a result, KCS operations in Houston consist mostly of trains moving between the U.S. and Mexico that do not serve local customers, except in some cases for Houston-area traffic destined to and from Mexico. However, KCS operates an intermodal terminal and automotive ramp in Kendleton, Texas that serves the Houston region. The Kendleton terminal is a 185-acre facility that has 10,000 feet of working track for intermodal traffic and a lift capacity of 152,400 units per year, as well as 5,000 feet of working track for automotive traffic.

In 2021, Canadian Pacific Railway Limited (CP) and KCS entered into a merger agreement whereby CP would acquire KCS. The merger is subject to review and approval by the U.S. Surface Transportation Board (STB). If approved, the combined railroad would form an end-to-end connection linking the U.S., Canada, and Mexico.

As a result of the potential merger, North American rail shipments originating or terminating on the CP network would now have increased single-carrier access to or from points along the KCS network, including the Gulf Coast region of the U.S. and parts of Mexico. This is anticipated to result in additional trade flows between the U.S. and Mexico via the KCS network passing through Houston.

2.3.5 Houston Terminal Challenges

The Houston regional rail network's infrastructure, operational methods and practices, and railway traffic have changed in response to industrial growth, changes in industrial methods and activities, shifts in logistics and supply chains, and railway economic regulation that allowed mergers, acquisitions, and line sales to occur.

> *Rail operations in Houston are defined by the shared use of joint facilities, whereby one or more tenant railroads operate trains over infrastructure assets owned by another railroad via a formalized trackage rights agreement using their own operating employees.*

More than 300 train movements traverse the railroad network of the Houston area daily, moving to, from, or between 14 different railroad corridors linking Houston with other cities.

Central Houston is ringed by a railroad inner belt line (formed by UP's East Belt Subdivision and West Belt Subdivision) and an outer belt line (UP's Strang Subdivision), from which railroad main lines of both BNSF and UP diverge in all directions. There are numerous junctions throughout the city where intersecting routes converge or cross each other at-grade. Unlike a highway interchange where dedicated lanes separate the merging traffic from through traffic without interference or interruption from vehicles traveling the opposite direction, the railroad junctions of Houston are at ground level and are designed more like three-way or four-way street intersections. Rail traffic merging to or from the belt lines may have to stop and wait for other rail traffic continuing around the belt lines to pass.

In addition, many of the railroad lines merging into the belt lines, and portions of the Terminal Subdivision, have only one main line track, like a one-lane road. Rail traffic cannot move in two directions simultaneously on a single-track railroad. Instead, trains moving one direction must pull into passing sidings to stop and wait for opposing traffic on the single-track main line to pass before resuming their journey. In Houston, trains may also stop and wait on the double-track segments of the belt lines for oncoming trains to move off the single-track main lines.

Rail operations in the Houston area are further challenged by the need for through trains to be re-crewed at some point during their transit through the City. Because Houston has multiple rail yards in different locations around the city, the boundaries of the terminal area used to designate where crew changes are planned to take place is expanded to include all possible routings between adjoining subdivisions via the inner and/or outer belt lines and connectors. As a result, trains may come to a stop for extended periods of time both within yards and at points in between yards while they await a new crew to board the train and take it to the next terminal.

> *The average length of freight trains in the U.S. has increased by as much as 25 percent from 2008 to 2017.[3] This trend poses a challenge for railroad operations where yards and terminals are undersized to efficiently accommodate trains beyond a certain length.*

Additional investment is required to extend yard tracks or to establish suitable locations outside of yards for longer trains to hold as they await clearance to enter a yard or to await a new crew to board the train to take it to the next terminal without occupying highway-rail grade crossings or railroad at-grade junctions.

The pending merger of the KCS with the Canadian Pacific Railway (CP) is anticipated to result in an increase by as much as eight trains per day operated by the combined railway through Houston area via trackage rights to be inherited from the KCS. This additional traffic would be driven by synergies offered by the combined railroad to handle freight between the U.S., Canada, and Mexico via a single carrier. BNSF and UP have expressed concern over the impacts of this increased traffic on the overall operational fluidity of the Houston terminal area without capacity expansion projects to accommodate the additional trains.[4]

2.4 Highway

Capacity of the highway network is influenced by many different factors such as closures related to crashes, rail crossings, weather events, and closures related to highway maintenance or rehabilitation programs. Congestion is the primary consequence of the lack of capacity of the highway system and/or public transit options available to meet demand associated with all road users. Increased congestion results in increased air pollution due to vehicle emissions, lower public health outcomes, and increased wear and tear on highway infrastructure.

2.4.1 Congestion

In this analysis, we consider the extent of goods movement trucking congestion within the H-GAC region. Congestion affects all transportation equally. Hence, strategies that reduce all kinds of congestion not just congestion caused due to freight movement, should be considered when considering mitigation measures.

CONGESTION RANKING SOURCES - ATRI

This subsection discusses the American Trucking Research Institute's (ATRI) ranking associated with locations across the nation that experience the most truck congestion.

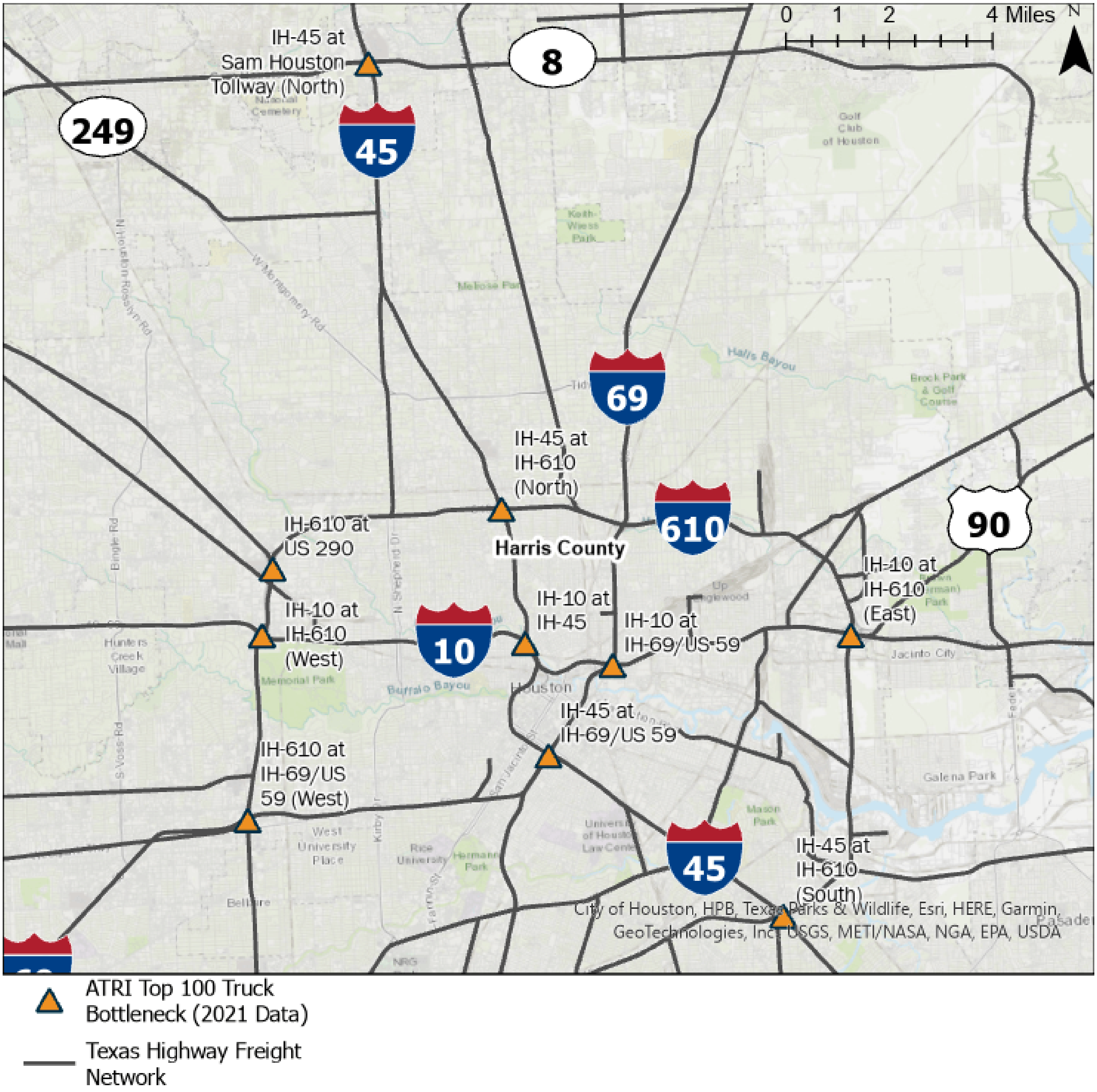
> *It is very significant to note that 10 out of Top 100 most truck congested locations in the nation are within the H-GAC region, as shown in Figure 4.*

Typically, these locations are highway interchanges where two interstates cross-over. For example, eight out of 10 locations in the H-GAC region are at Interstate intersections. One location is at an Interstate and US Highway intersection, and one more is at an Interstate and State Highway intersection.

3 United States Government Accountability Office, Freight Trains Are Getting Longer, and Additional Information Is Needed to Assess Their Impact, May 2019. Retrieved from: https://www.gao.gov/assets/gao-19-443.pdf

4 Texas Rail Advocates, CP-KCS Merger Raises Texas Concerns From Other Class I Railroads, July 28th, 2022. Retrieved from: https://www.texasrailadvocates.org/post/cp-kcs-merger-raises-texas-concerns-from-other-class-1-railroads

Figure 4. ATRI Top 100 Truck Bottleneck Locations



The intersections shown above in Figure 4 are part of the Texas Highway Freight Network (THFN). This is an expanded version of the National Highway Freight Network (NHFN) and includes roads that are important for freight movement within the H-GAC area. 'Freight Network'-designated highways are subsets of existing highway networks where truck traffic is substantially more than on other roads. Roads along the THFN join large freight inflow/outflow locations like railyards, port terminals or dry docks/airports and areas with a concentration of warehouses, industries, or downtown areas.

Figure 5. National Highway Freight Network (NHFN) and Texas Highway Freight Network (THFN)

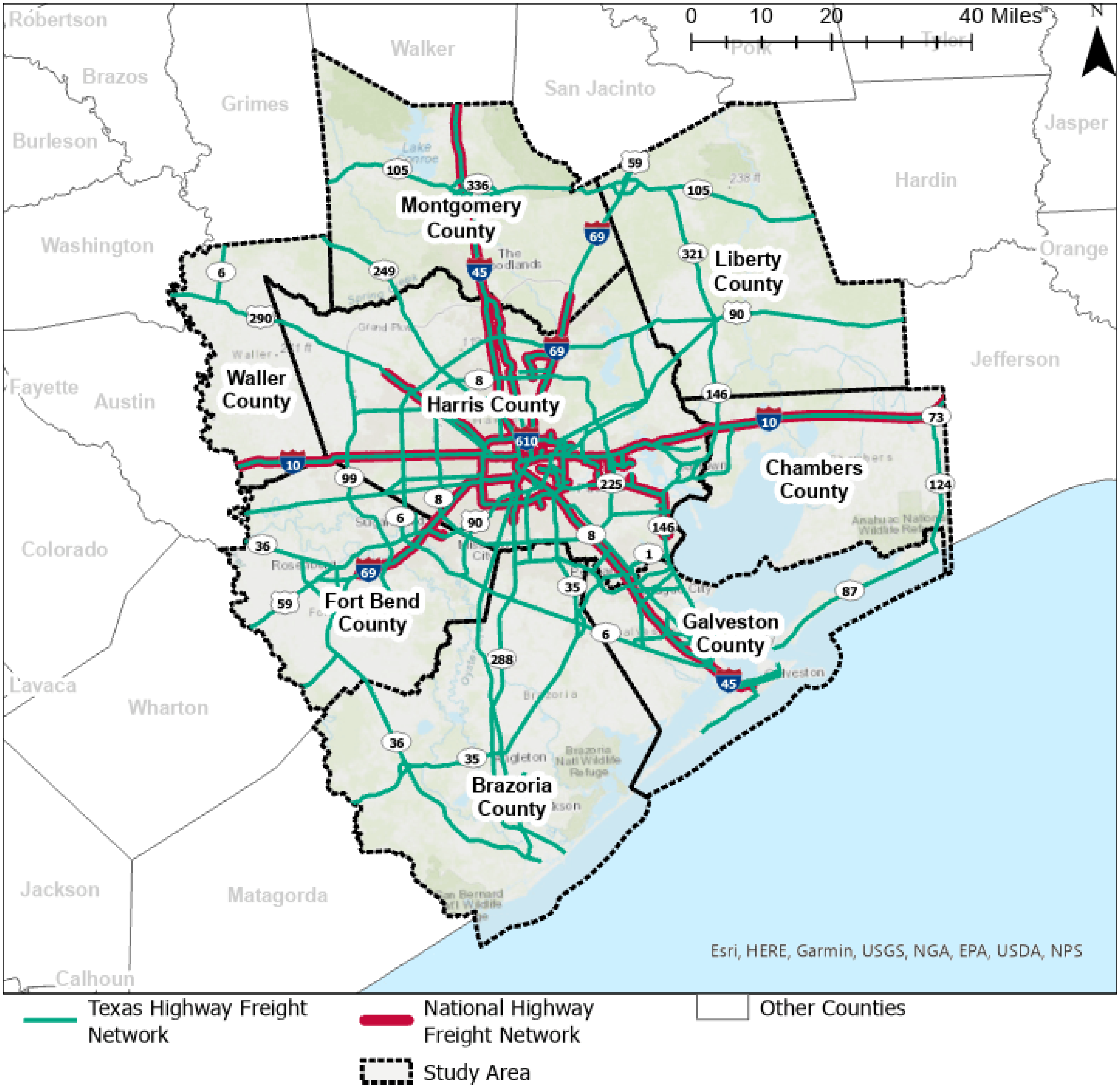


Figure 5 shows the NHFN and THFN networks in the H-GAC area. The total length of NFHN is 387 miles, and that of the THFN is 1,693 miles within the H-GAC eight county study area.

TxDOT collaborates with the Texas Transportation Institute (TTI) to classify roadways based on their congestion level and publishes an annual report.

Figure 6. TxDOT Top 100 Congested Roadways

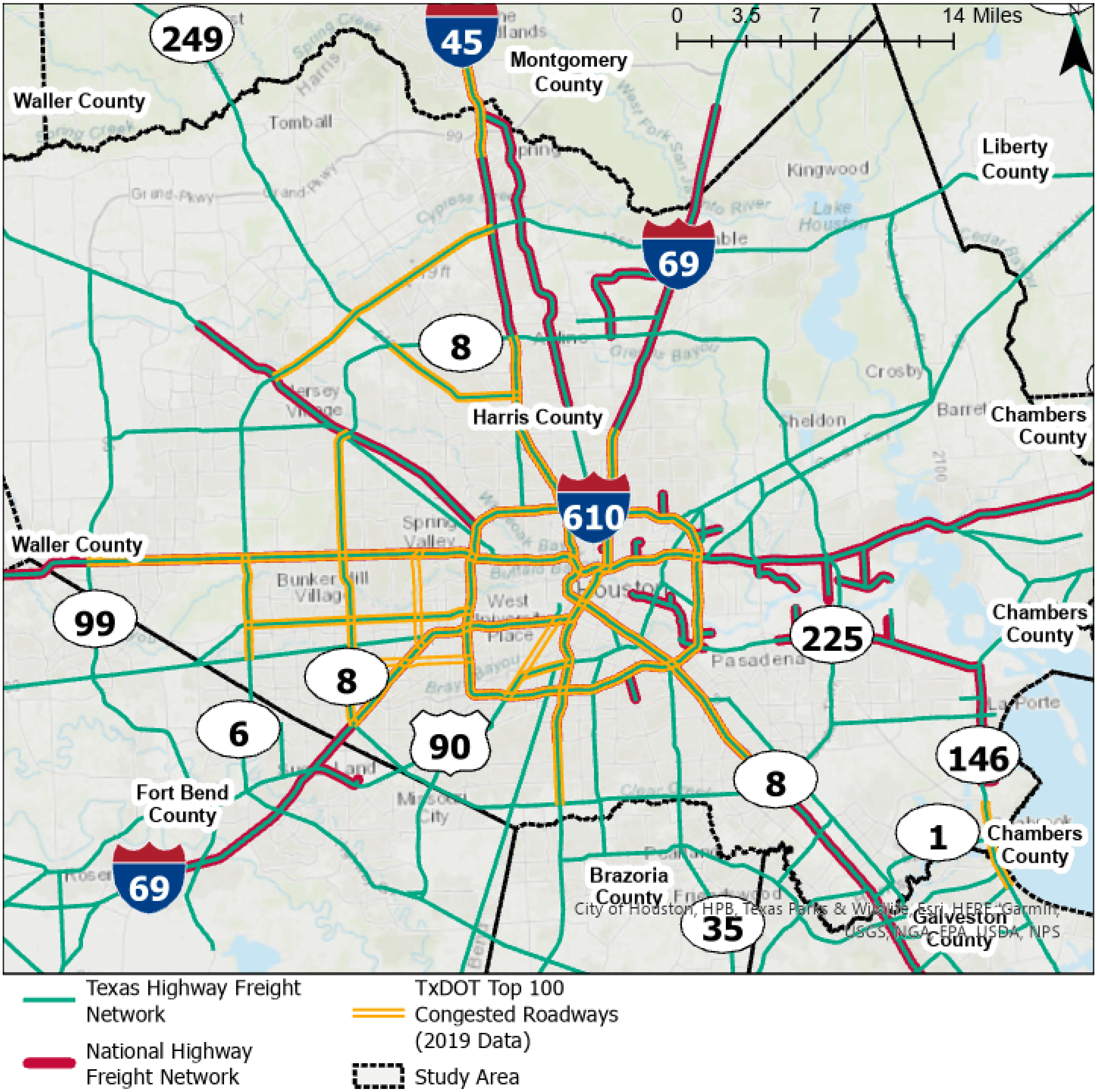
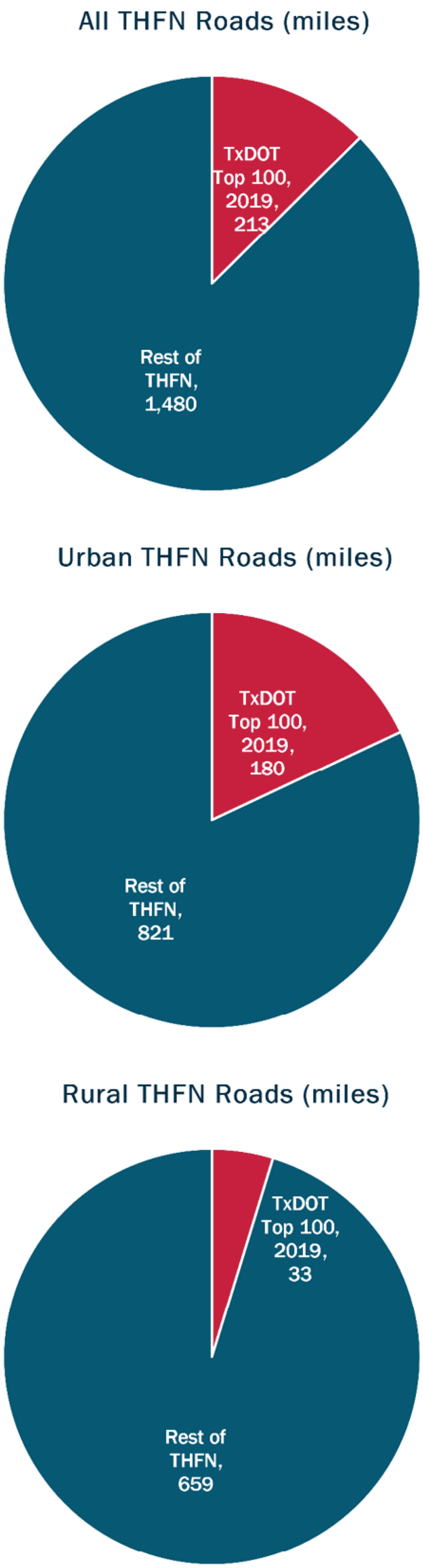


Figure 6 shows the Top 100 Congested Corridors for the H-GAC region, and Figure 7 compares them to the THFN.

Figure 7. Distribution of Road Length by Type



As shown in Figure 7, 213 of the 1,693 miles (12.6%) of THFN within the study area are part of TxDOT's Top 100 Congested roads. One hundred eighty miles (18%) of all urban THFN network roads are congested, while only 33 miles (4.5%) of rural THFN roads are congested. This demonstrates that congestion in the H-GAC region is an urban phenomenon.

Most of the truck congestion hotspots are relatively near each other – all of them are on or within the Beltway 8 corridor. Figure 8 shows the catchment areas within one, two and three miles from the hotspots. At the two-mile level, the following four hotspots have overlapping catchment areas:

- IH 45 N @ IH 610 North Loop
- IH 10 @ IH 45 N
- IH 10 @ I-69 N
- IH 45 @ I-69

At the 3-mile level, 9 of the 10 hotspots have overlapping catchment areas.

> *Congestion around one hotspot is compounded by congestion from other hotspots.*

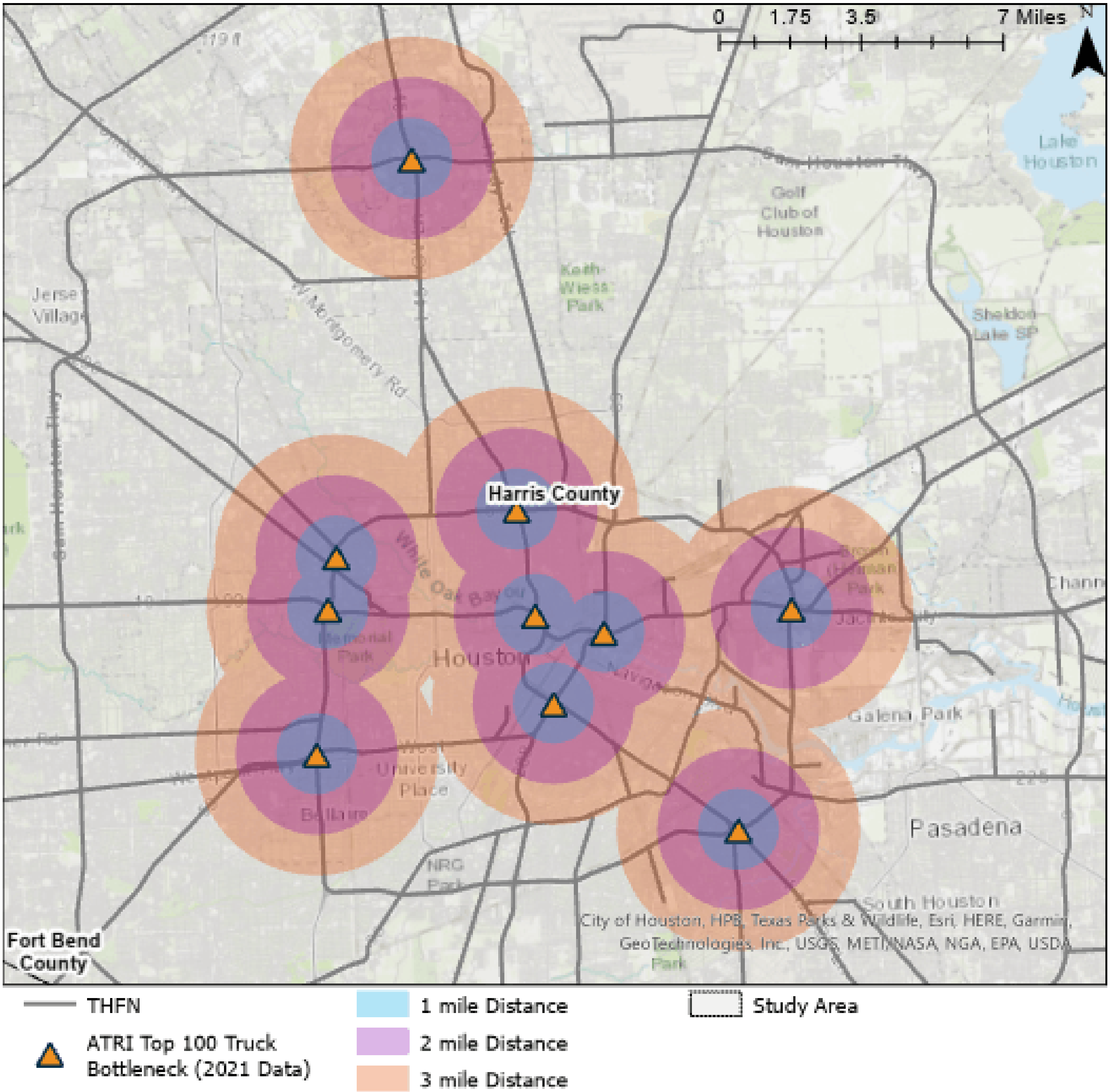
Figures 9 through 11 show this trend in three graphs. As one traverses along the three major highways – IH 45, IH 10, and IH 610 – statistics show the trend of marginal (or additional) truck vehicle miles traveled (VMT). In addition, they show that there are two large Influence Areas in Houston – the Downtown area (DTN) and the West Loop area (WLP). The concentration hotspots in the DTN are:

- IH 45 N @ IH 610 North Loop
- IH 10 @ IH 45 N
- IH 10 @ I-69/US 59 N
- IH 45 @ I-69/US 59

And those in the WLP area are:

- IH 610 @ I-69/US 59
- IH 610 @ IH 10 W
- IH 610 @ US-29

Figure 8. One-, Two-, and Three-Mile Catchment Areas around Truck Hotspots



The other three hotspots are isolated and do not interact with the rest at the 2-mile level. Hotspot locations within the DTN or WLP areas experience higher truck VMT than outside. This trend is more pronounced as one moves farther away from the hotspot. Figure 12 shows that as the distance from the hotspots increases, the difference between average VMT within and outside the Influence Area increases steadily.

Figure 9. Truck Vehicle Miles Traveled (VMT) Along IH 45

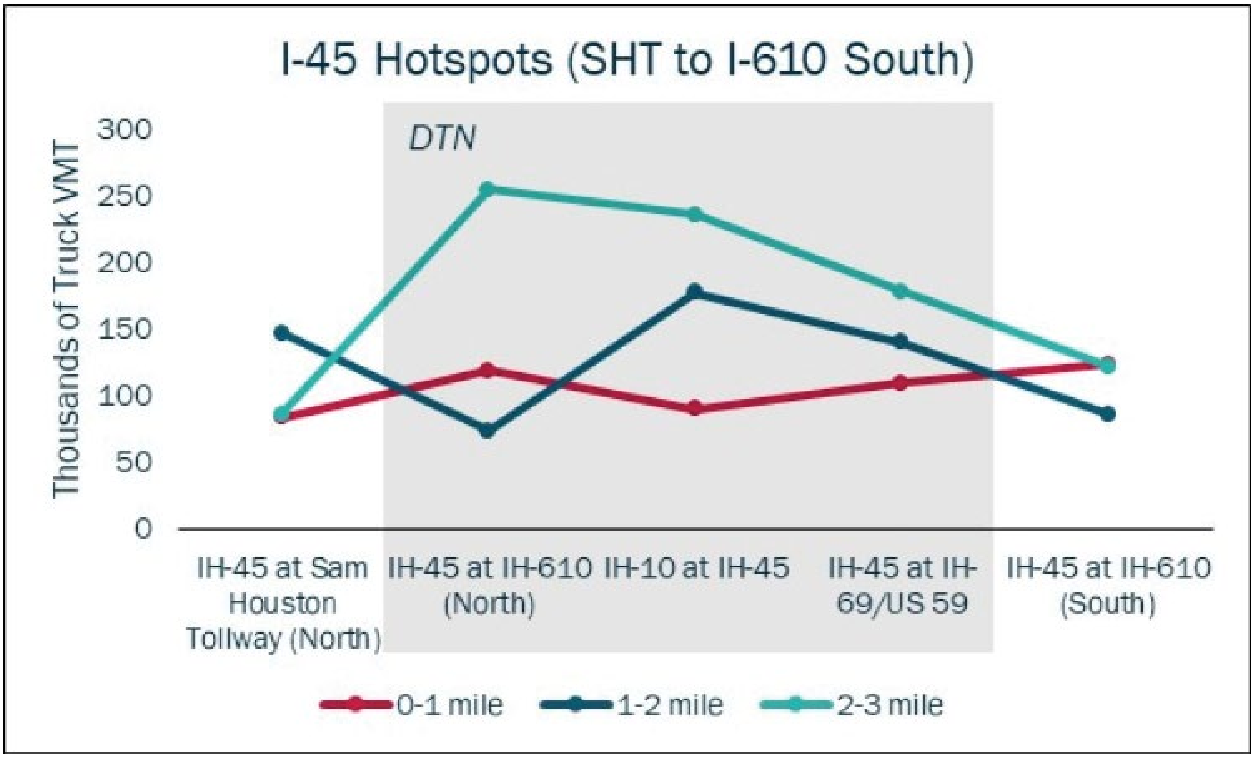


Figure 10. Truck Vehicle Miles Traveled (VMT) Along IH 10

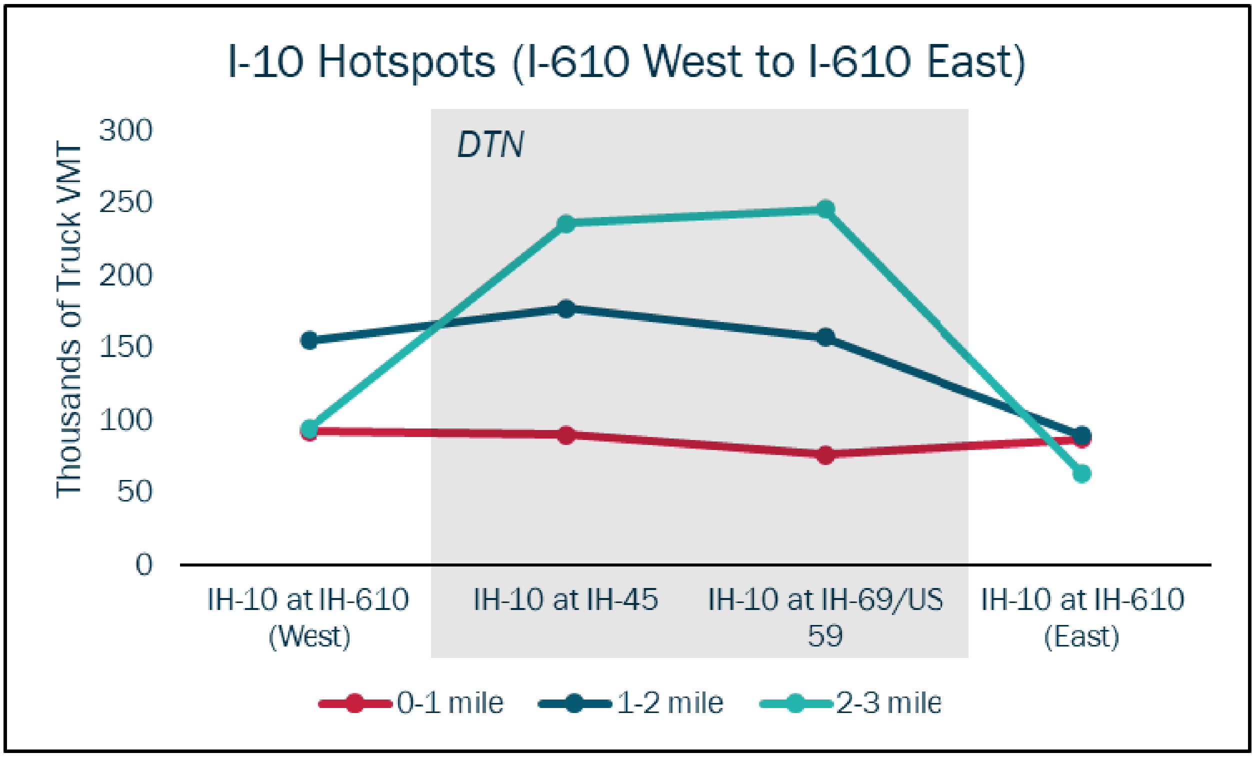


Figure 11. Truck Vehicle Miles Traveled (VMT) Along IH 610

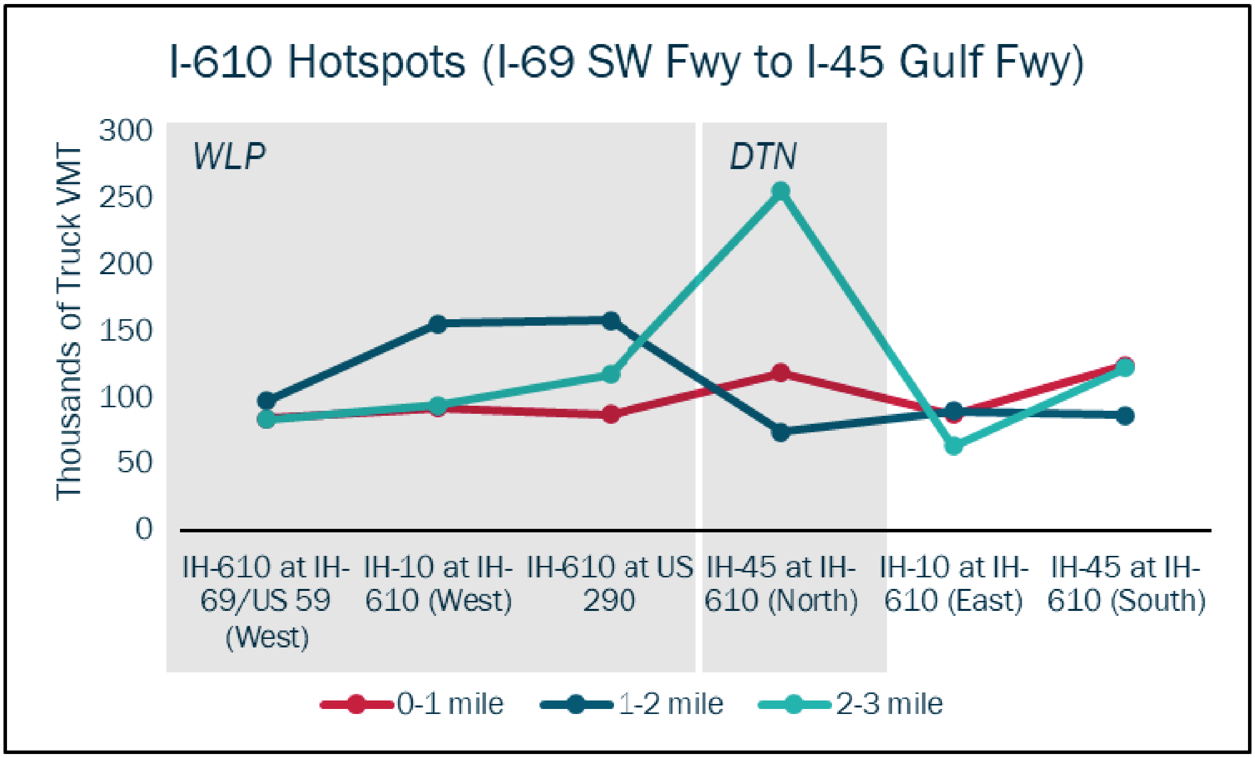
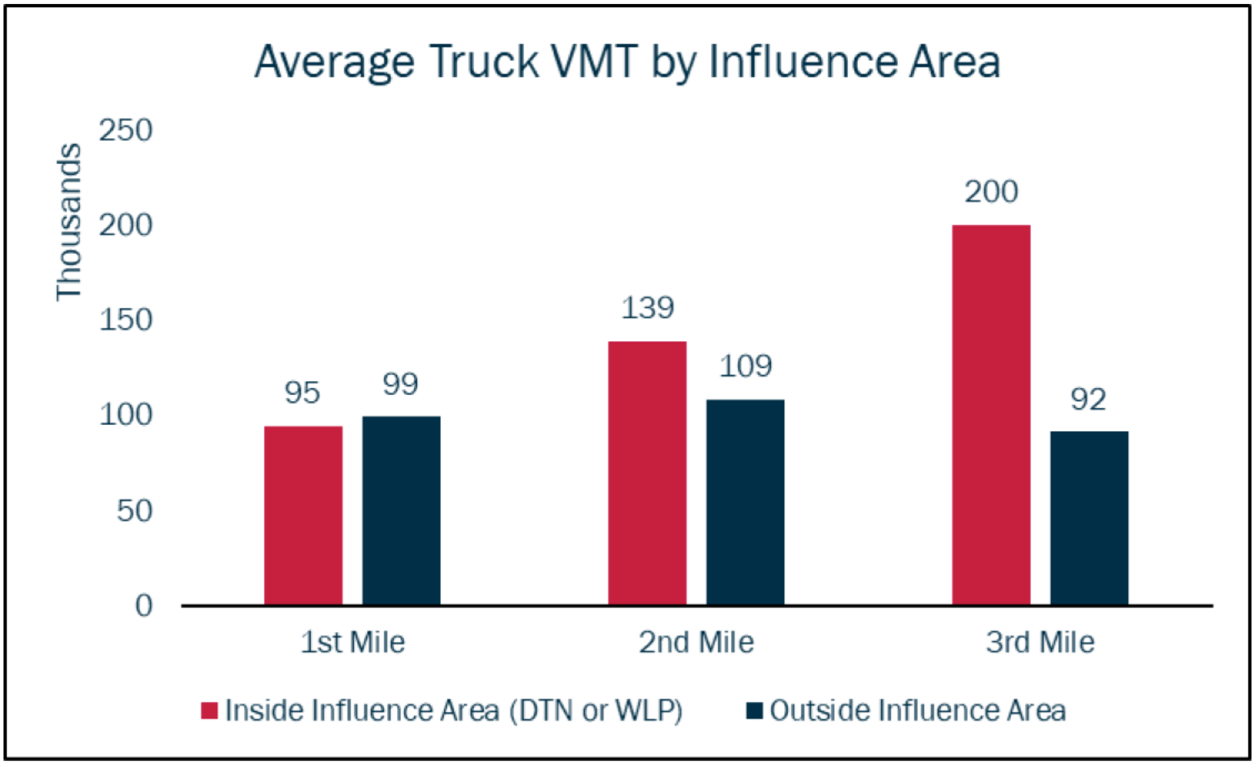


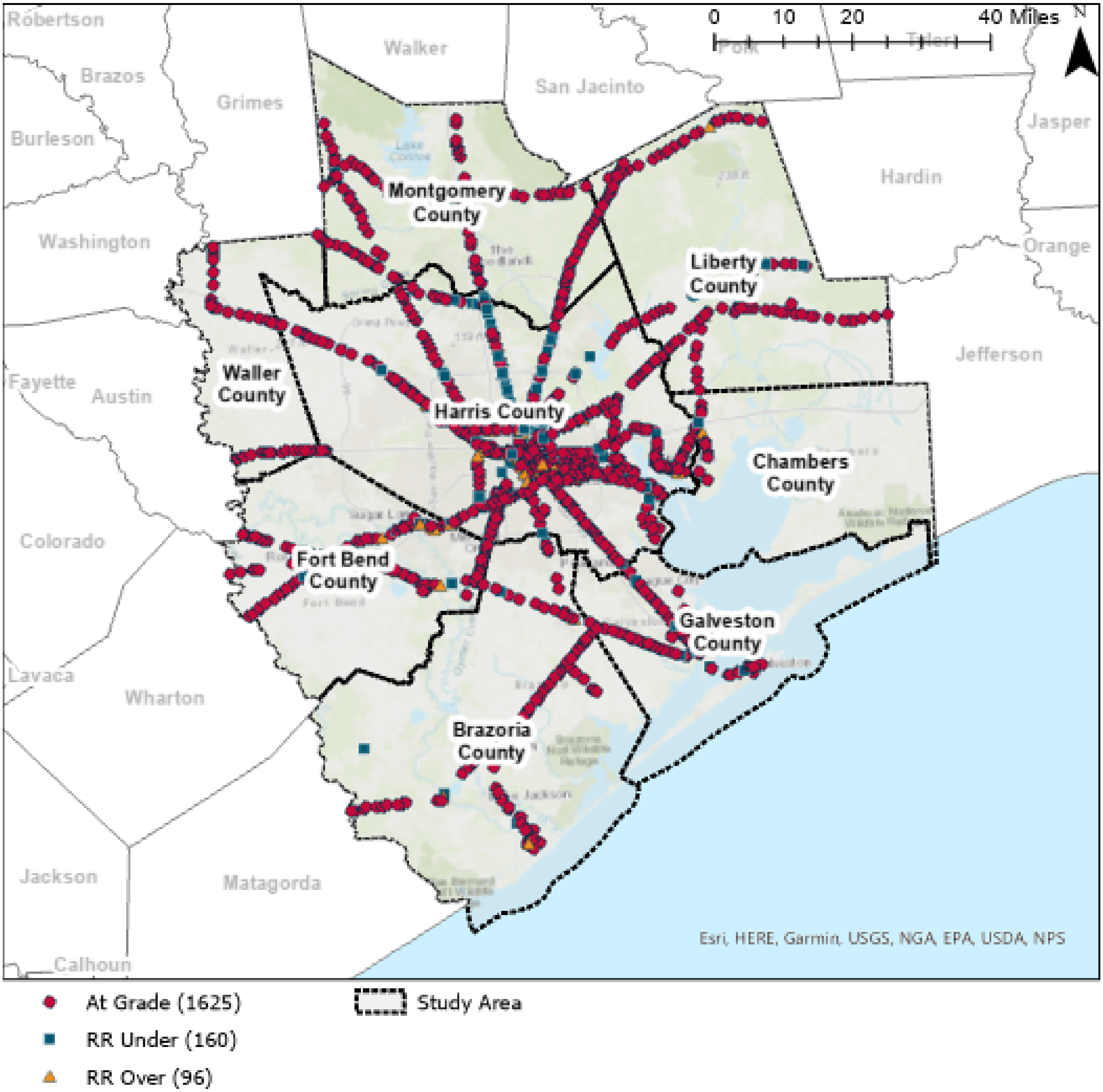
Figure 12. Average Truck Vehicle Miles Traveled (VMT) by Influence Area and Ordinal Mile



2.4.2 Highway and Railroad Crossings

There are 1,881 railroad crossings in the H-GAC region on tracks owned or used by seven companies. Most of the tracks are owned by Union-Pacific, which is reflected in the number of crossings. This section presents railroad crossings, their spatial distribution and how they interact with the THFN. Figure 13 shows the distribution of railroad crossings in the H-GAC region.

Figure 13. Distribution of Railroad Crossings in H-GAC Region

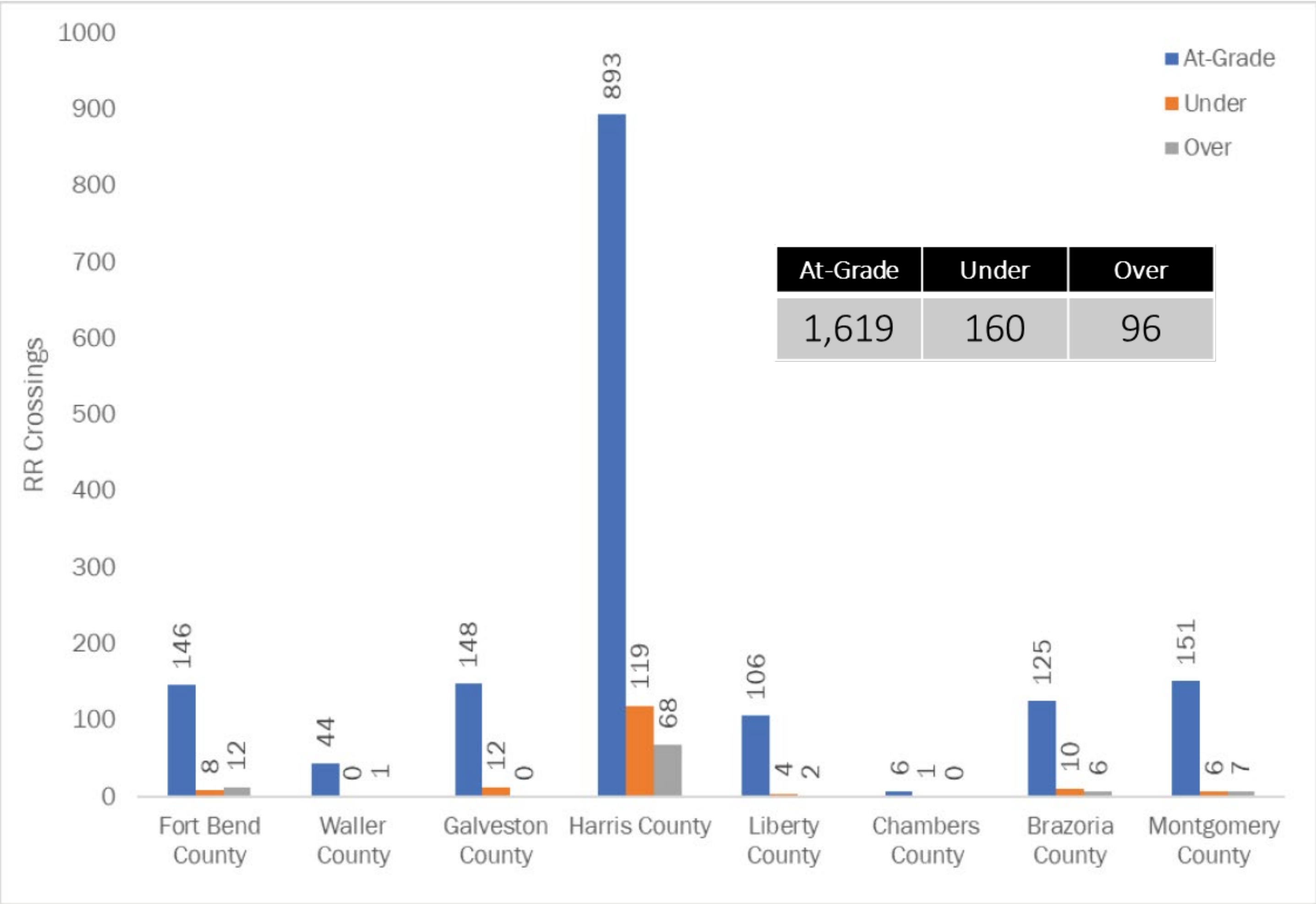


AT-GRADE CROSSINGS

At-grade crossings are where the railroad intersects with a roadway at the same level. This necessitates the use of gates that stop the movement of vehicles to let trains pass. Frequent gate closures can cause long back-ups resulting in severe congestion on high-traffic roadways and emergency vehicle inaccessibility. Frequency and timing of railroad crossing closures is dependent on a timetable of train movement. By one estimate, using 30mph as train speed, an average freight train that's 6,600 feet long would take about 150 seconds (2.5 minutes) to pass each crossing.

Figure 14 shows the distribution of railroad crossings by county in the study area. Harris County has the greatest number of crossings – 1,080, nearly 60% of all crossings. This can be attributed to the presence of industrial areas on the east side of the county and the higher density of roads that cross the railroad frequently.

Figure 14. Railroad Crossings by Type and County

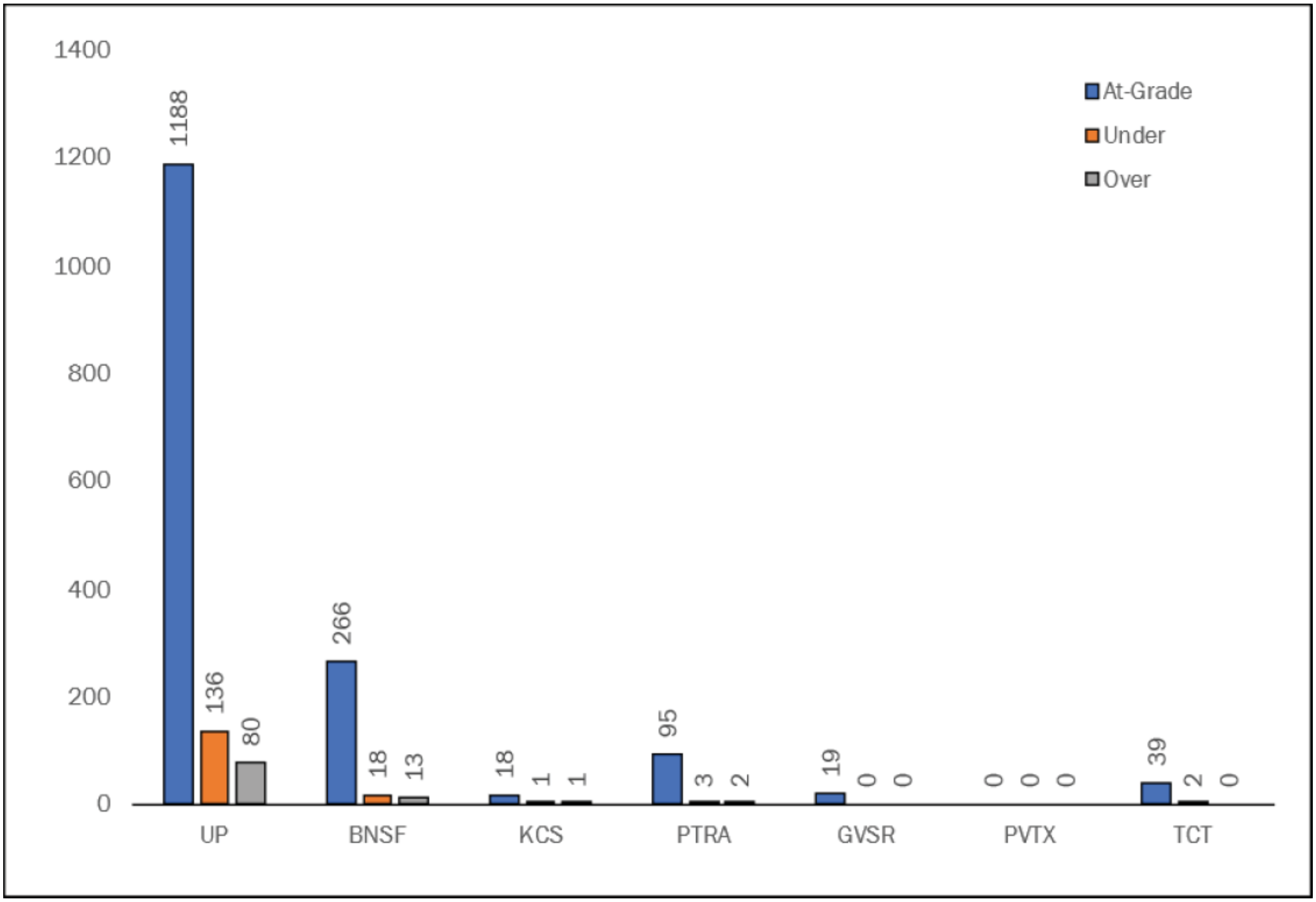


At-Grade	Under	Over
1,619	160	96

At-Grade crossings are the most frequent type in the study area and make up more than 90% of all railroad crossings outside of Harris County. In Harris County, 80% of all railroad crossings are at-grade.

The greatest number of crossings are on tracks owned by Union Pacific and BNSF. Together, they account for 90% of all railroad crossings in the H-GAC region. Other smaller rail owners like the Port Terminal Railroad (PTRA) have track exclusively around Port Houston to allow access for ships to transfer goods to railroads. As a result, only 5% of all railroad crossings are associated with PTRA tracks. Figure 15 shows the distribution of railroad crossings by ownership.

Figure 15. Railroad Crossings by Ownership



BLOCKED CROSSINGS

At some locations across the H-GAC region, trains carrying goods halt for extended periods of time and block access across the roadway, forcing traffic to seek alternative routes. Such occurrences are marked in the Blocked Crossing Incident Report handled by the U.S. Federal Railroad Administration. There are 39 locations in the H-GAC region where trains consistently block crossings. While 37 of those are on tracks owned by UP, two are on BNSF tracks.

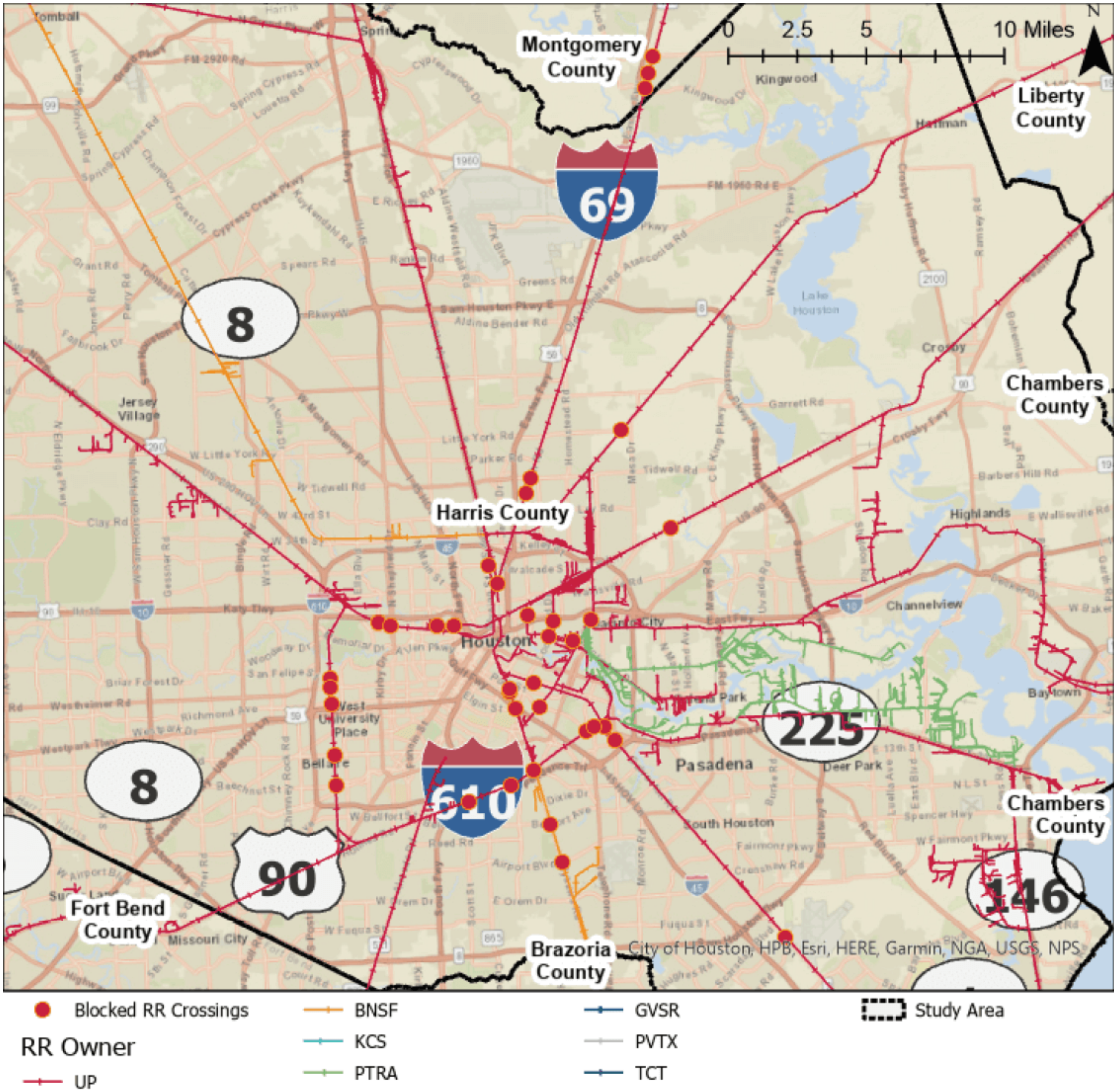
Table 1 shows the occurrence of blocked crossings by area of the H-GAC region.

Table 1: Distribution of Blocked Crossings

LOCATION	# OF BLOCKED CROSSINGS
Within Downtown Loop	0
Within IH 610 Loop	28
Within BW 8/Sam Houston Tollway (SHT) Loop	8
Outside BW 8/SHT Loop	3

The presence of 28 blocked crossings along the IH 610 loop is significant given that several areas of high population and traffic concentration are found in the same locations. Figure 16 shows the spatial distribution of blocked railroad crossings in the H-GAC region.

Figure 16. Locations of Blocked Railroad Crossings



CROSSINGS AND KEY ARTERIALS

This subsection about crossings and key arterials shows how railroads interact with the THFN. There are a total of 212 crossings that lie on the THFN. Expectedly, 67% of them are in Harris County (141 crossings). However, unlike the distribution of all railroad crossings in Harris County, in the distribution of those along THFN, we see that grade-separated crossings are 60% of all crossings.

Figure 17 shows the distribution of crossings at the THFN network intersection by county.

Figure 17. County-Wide Distribution of Railroad Crossings at THFN Intersections

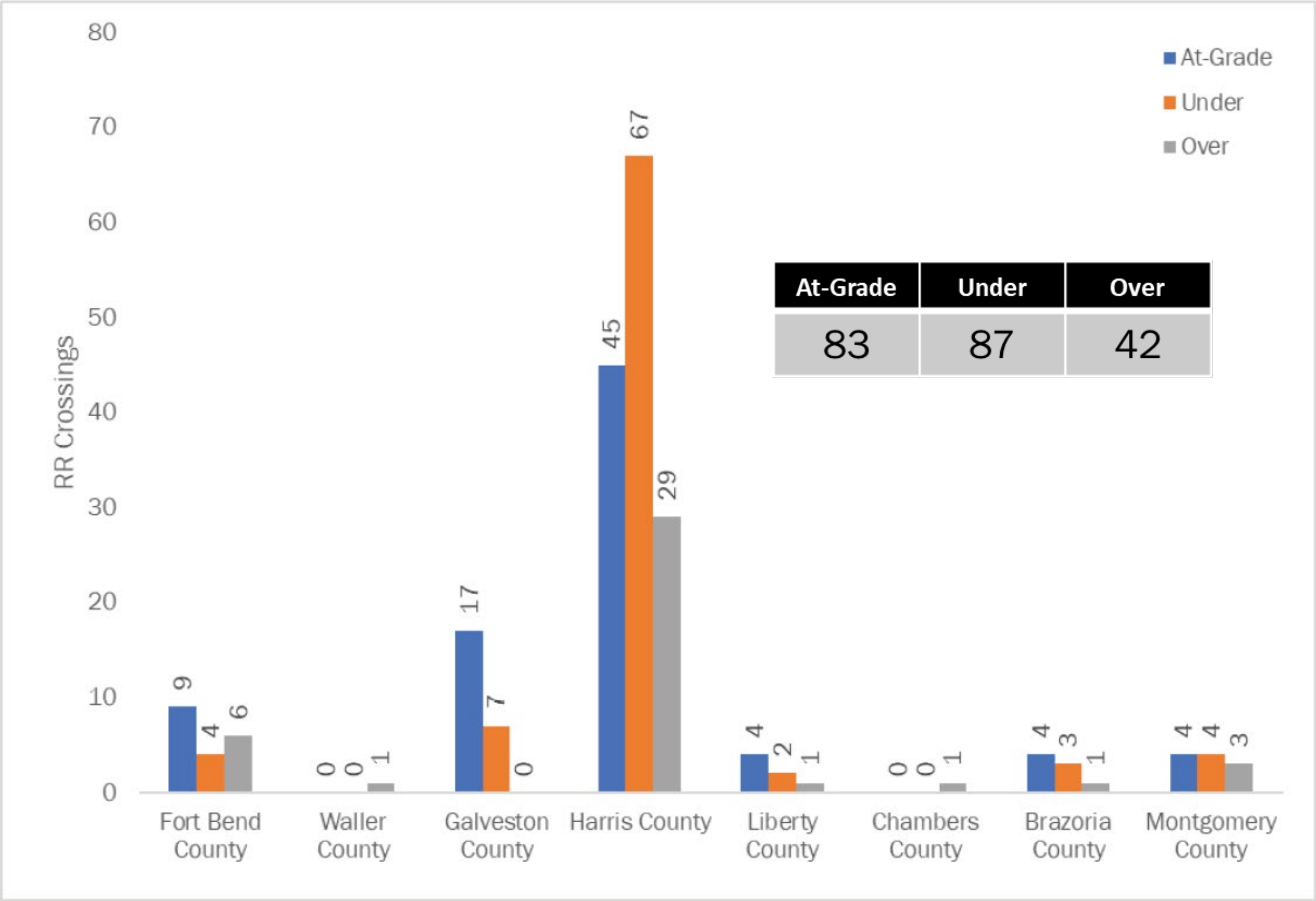


Table 2 shows the difference in the distribution of crossings by type across the H-GAC and those on the THFN with the region. While at-grade crossings are 86% of all crossings overall, they represent only 39% of crossings along the THFN.

Table 2: Variance in Distribution of Railroad Crossings by Type

RAILROAD CROSSING TYPE	ALL H-GAC	AT THFN ROADWAYS
At Grade	86%	39%
Grade Separated	14%	61%

2.5 Condition

Condition of the freight system is a key component of performance. In previous sections, we have discussed the condition of the maritime system and in particular shoaling associated with the GIWW and the challenges with maintaining the authorized depth. Other types of freight goods movement infrastructure also require maintenance:

- Pipeline condition is largely the pipeline owner's responsibility with oversight from various regulatory agencies, including the Pipeline and Safety Hazardous Materials Safety Administration (PHMSA) and the Railroad Commission of Texas.
- Airport pavement conditions, namely runways, taxiways and aprons are the responsibility of the airport operator and good conditions are required for the safe and efficient operation of aircraft. Hazardous pavement conditions include holes and cracking that can produce pavement debris. This debris can be pulled into jet engines and damage aircraft, with potentially life-threatening or fatal consequences.

> *Bridge condition can have a significant influence on freight mobility. Bridges that are in poor structural condition can have weight restrictions placed upon them, and bridges with insufficient vertical clearance may either be struck repeatedly by oversize trucks or result in trucks using longer detours, increasing VMT, emissions, and wear and tear on roadways.*

The main consideration within this section is the condition of the highway system, especially bridges. There are 2,586 bridges in the H-GAC region along the THFN. The bridges within the study area have high volumes of oversize and overweight (OSOW) movements. Data relevant to four aspects of regional bridges is considered here – clearance under the bridges where another road passes underneath, clearance above the bridge, their structural condition, and weight restriction.

2.5.1 Clearances

Bridge strikes occur when vehicles crash into bridges. They usually take place when an oversized vehicle passes under a bridge, and their heights are mismatched. Thus, understanding the clearance under a bridge is important for avoiding crashes and improving freight movement efficiency. The existing standard for space under the bridge is 18.5 feet[5] for freeways and highways located along the freight network. Therefore, bridges with clearance of less than 18.5 feet are considered to be outside of the TxDOT-established standard. However, this standard is relatively new, and many bridges are built to an earlier standard (16.5 feet).

Figure 18 shows the location of bridges that are below the standard. The bridges below the current standard are along the oldest highways in the area – namely IH 10 and IH 610. Six percent of all bridges have a clearance of less than 14.5 feet; 42% have clearance between 14.5 feet and 16.5 feet; and 33% have clearance between 16.5 feet and 18.5 feet.

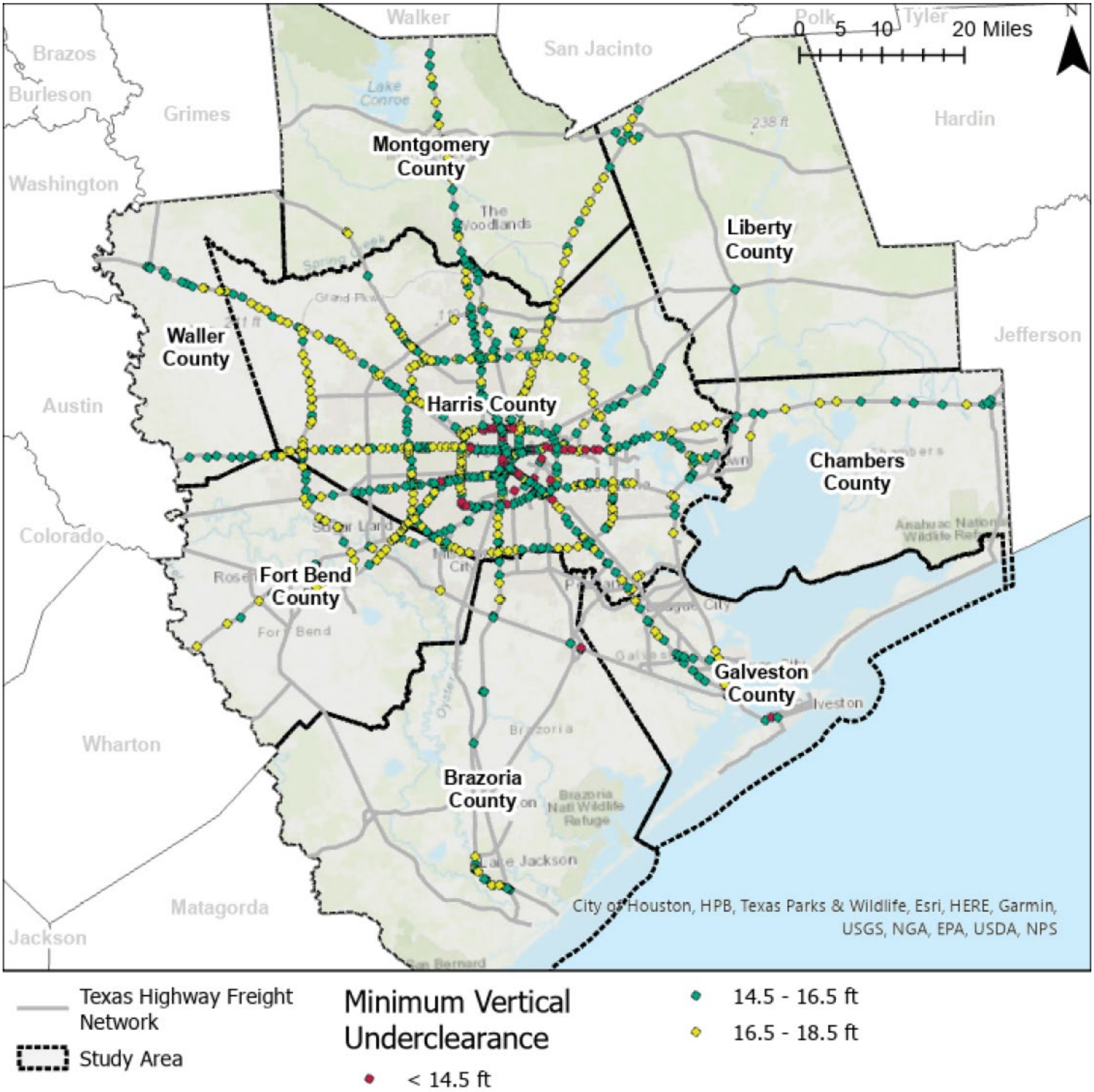
> *Only 19% of bridges in the study area meet the existing clearance requirement of 18.5 feet, and 50% of the bridges have clearance less than 16.5 feet.*

Table 3: Under Clearance (18.5 feet) Bridges by Decade Built

DECADE BUILT	FAILS STANDARD	MEETS STANDARD	% MET
Before 1950	16	7	30%
1950s	22	6	21%
1960s	165	23	12%
1970s	157	24	13%
1980s	171	62	27%
1990s	323	73	18%
2000s	272	66	20%
2010s	178	47	21%
2020s	35	11	24%

5 Table 2-11 of te TxDOT Roadway Design Manual, May 2022 for Texas Highway Freight Network roadways

Figure 18. Bridges – Vertical Clearance



The standard for clearance above a bridge (in cases where there is a stacking of bridges) is also 18.5 feet. Figure 19 shows the distribution of bridges that do not meet the standard. The bridges with the highest numbers below the current standard are along the oldest highways in the area – namely I-69 and IH 610. Only two percent of the bridges have more than the 18.5-foot clearance on top of them that meets the standard. However, 92% have no height restrictions since no roadbed is passing above them.

Figure 19. Bridges – Vertical Clearance Over Bridge Deck

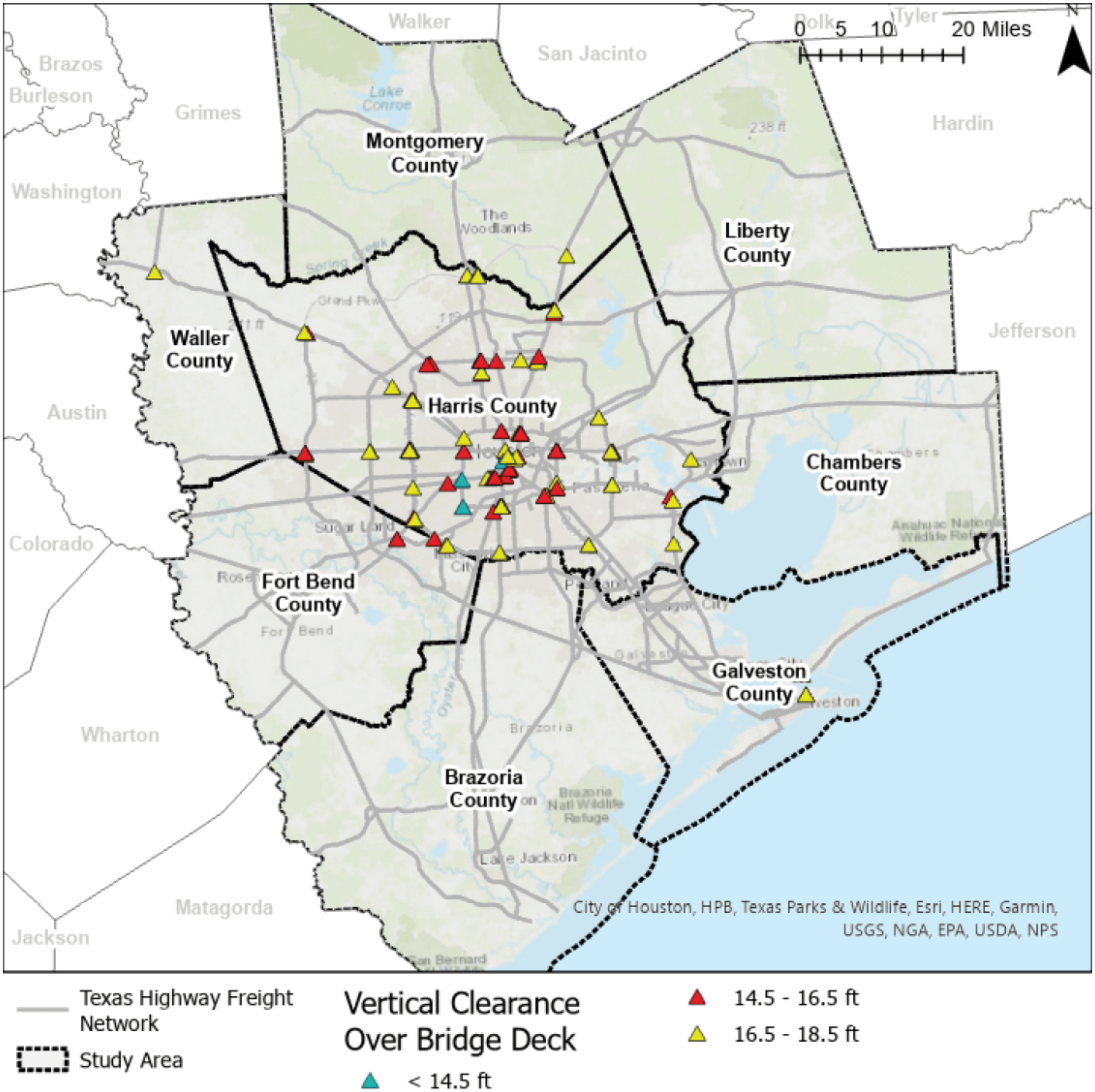


Table 4: Overhead Clearance (18.5 feet) Bridges by Decade Built

DECADE BUILT	BELOW STANDARD	MEETS STANDARD	% MET	STANDARD NOT APPLICABLE
Before 1950	0			82
1950s	2	1	33%	52
1960s	16	5	24%	255
1970s	23	5	18%	229
1980s	22	6	21%	395
1990s	29	18	38%	529
2000s	33	18	35%	431
2010s	16	9	36%	333
2020s	4	1	20%	65

2.5.2 Structural Conditions

Structural integrity is a key indicator of the quality of a bridge. As bridges age, their structural condition deteriorates. Figure 20 demonstrates the structural condition of bridges in the study area relative to the age. Bridges are usually designed to last 50-100 years. As such, 98% of bridges in the study area were rated Fair or Good for structural conditions. Of the 61 bridges rated Poor or Unsatisfactory, 14 were Poor (23%). None of the 428 bridges built after 2010 were rated Poor or Unsatisfactory.

> *About 75% of the bridges built before 1990 are either Fair or worse. Overall, nearly half of all existing bridges are rated Fair or worse.*

Figure 20. Bridges – Structural Condition by Decade of Construction

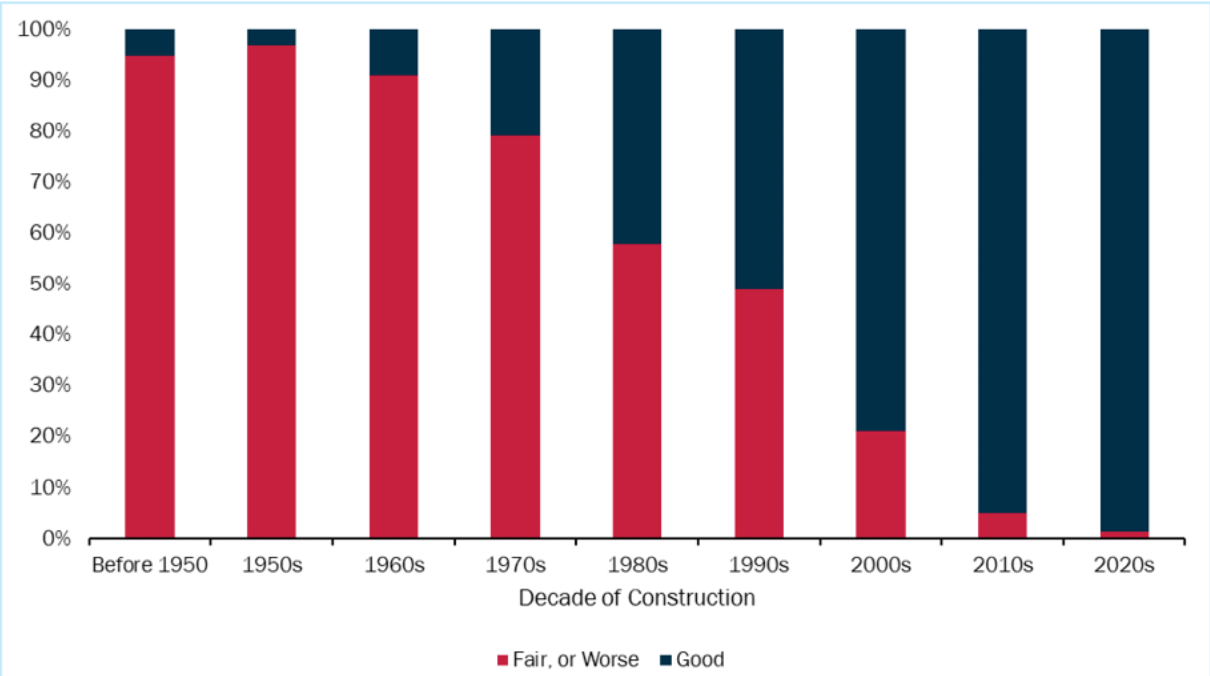
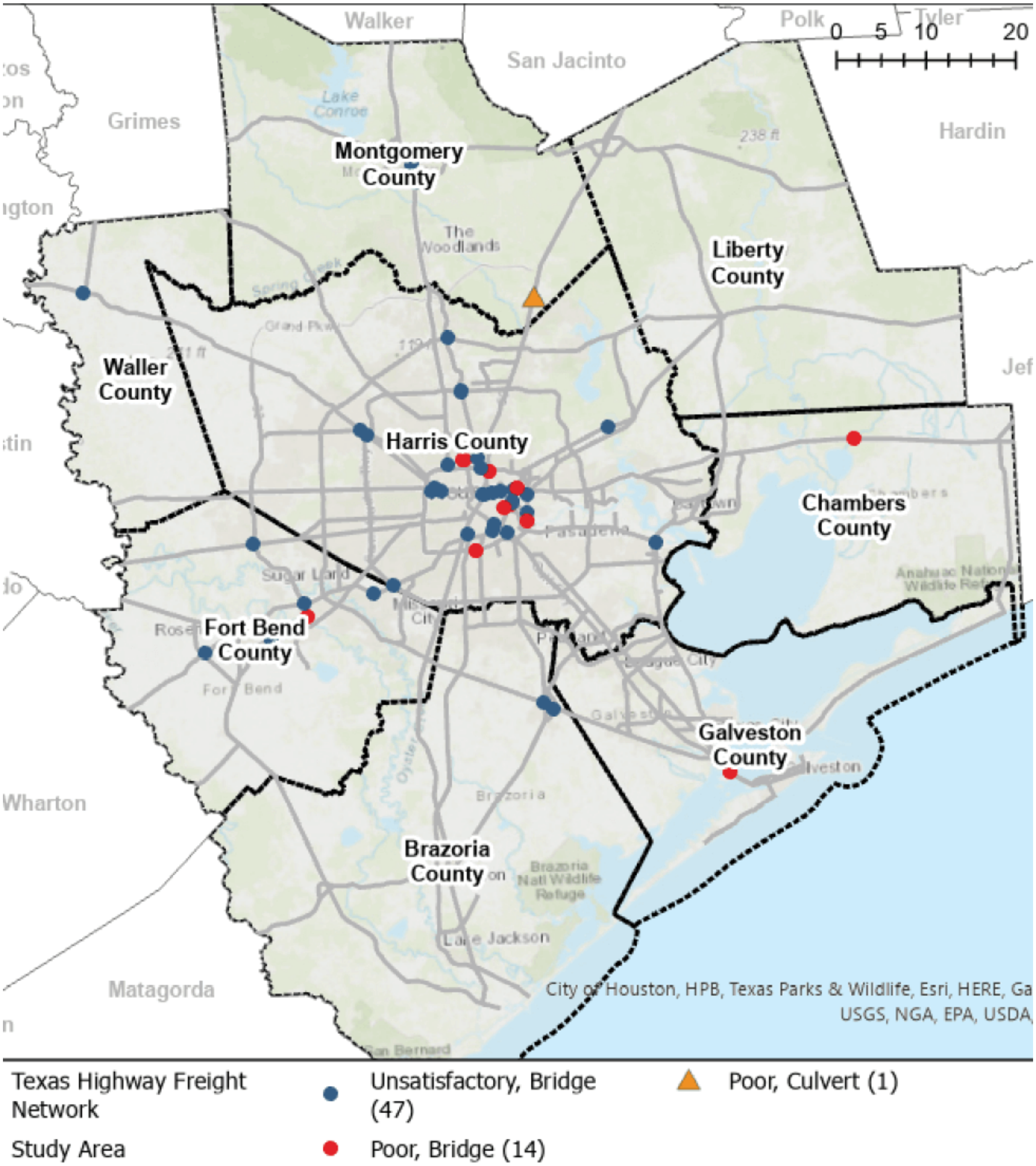


Figure 21 shows the location of bridges rated poor and unsatisfactory. There is also one culvert that is rated Poor in Montgomery County. There is a concentration of poor and unsatisfactory bridges along IH 610 on the east side of the Loop.

Figure 21. Bridges – Structural Condition



2.5.3 Weight

There are two bridges in the H-GAC region with a maximum allowable loading of 80,000 lbs. Both are in the city of Houston – one at the intersection of Lockwood Drive and Wallisville Road, and the other on Navigation Boulevard just east of McFarland Street.

3. Safety and Security

3.1 Highway

Freight trucks can have a higher impact on road safety compared to passenger vehicles due to their weight, limited visibility, and longer stopping distances. This is often manifested through higher collision severities and fatality rates for collisions that involve trucks. Collision analysis can be used to identify hot spots or problem corridors where trucks are involved in higher rates of collisions than typical. Once problem areas have been identified, location specific measures can be taken such as changing road and intersection geometry, adjusting speed limits, or making changes to signage and lighting. There are also changes that can be made to trucks to improve their visibility and safety, in the event of colliding with a pedestrian, cyclist, or another vehicle. This includes encouraging the use of trucks that have improved visibility and reduced blind spots, and side guards and rear underride protection.

The safety of freight movement and other traffic due to freight movement are discussed in this section. It presents crashes as they occur along with the THFN network and their consequences.

Crash data was collected from TxDOT's CRIS database for years 2017 to 2021. Then, those crashes which occurred along the THFN were filtered and analyzed.

3.1.1 Hotspots Along the Freight Network

A total of 323,391 crashes were recorded along the THFN between 2017 and 2021. 300,153 or 93% of these crashes were related to passenger cars, and 7% of these crashes were involved with at least one commercial vehicle. To compare crashes across time and space, all crashes were converted to a rate – per month, per mile.

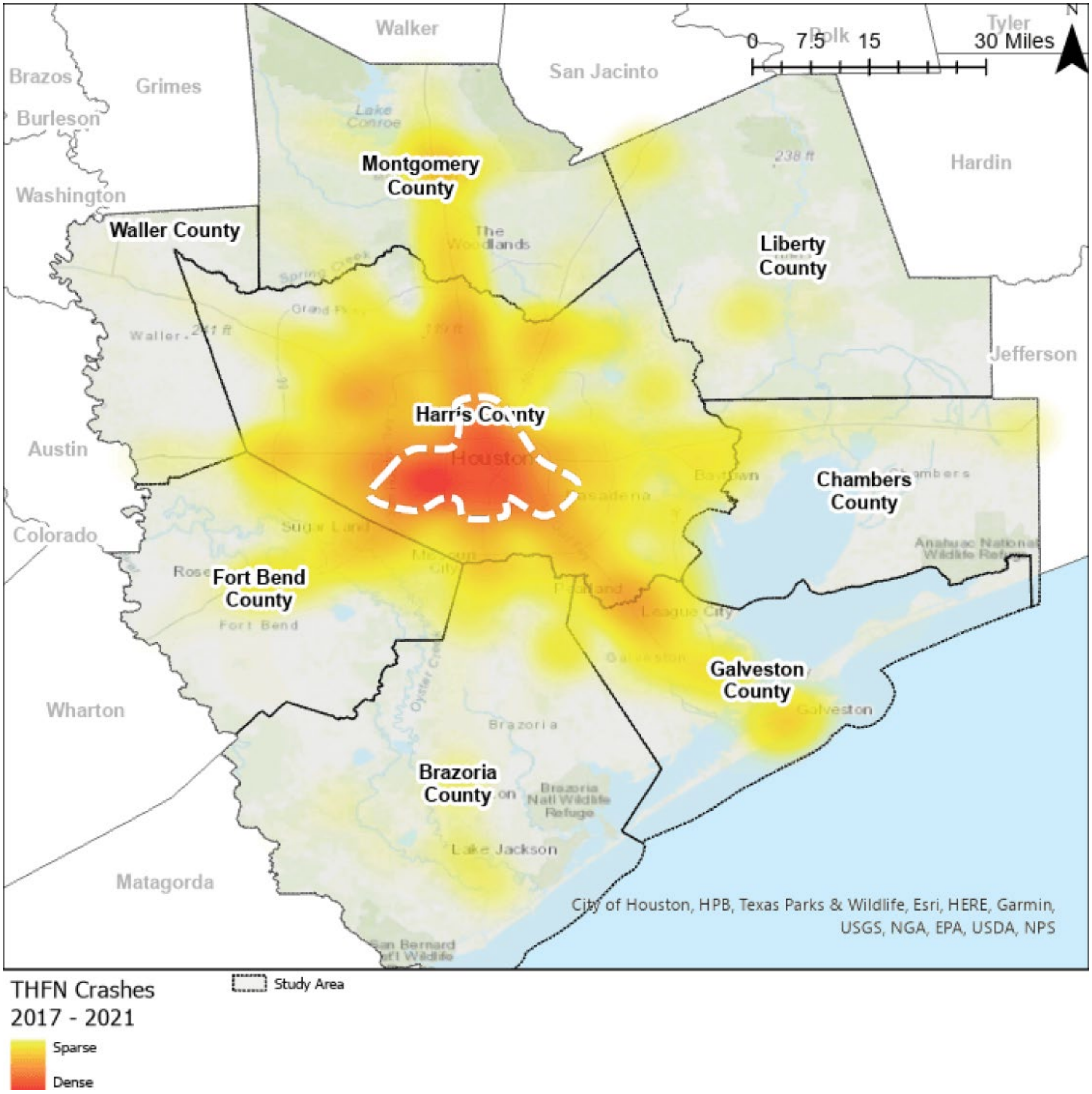
Table 5 shows the crash rates by type of vehicle. Crashes temporarily reduce capacity of roadway. All vehicles, including heavy/freight vehicles experience delays when law enforcement/emergency services provide incident management services. The frequency and spread of all fatal crashes is therefore important to note in the context of freight movement.

Figure 22 shows the distribution of crashes along the THFN. Crashes were concentrated around the Houston Downtown region (white dashed outline) and distributed along the main highways. Some isolated cases were also found near Lake Jackson and in outlying areas of Liberty County. Almost the entire length of IH 45 in the H-GAC region experienced high crash density when compared to other interstates.

Table 5: Crashes by Type of Vehicle

BY VEHICLE TYPE	NUMBER	RATE, PER MONTH PER MILE
Passenger	300,153	22
Commercial	23,238	2
TOTAL	**323,391**	**24**

Figure 22. THFN Crashes from 2017 to 2021 – All Crashes



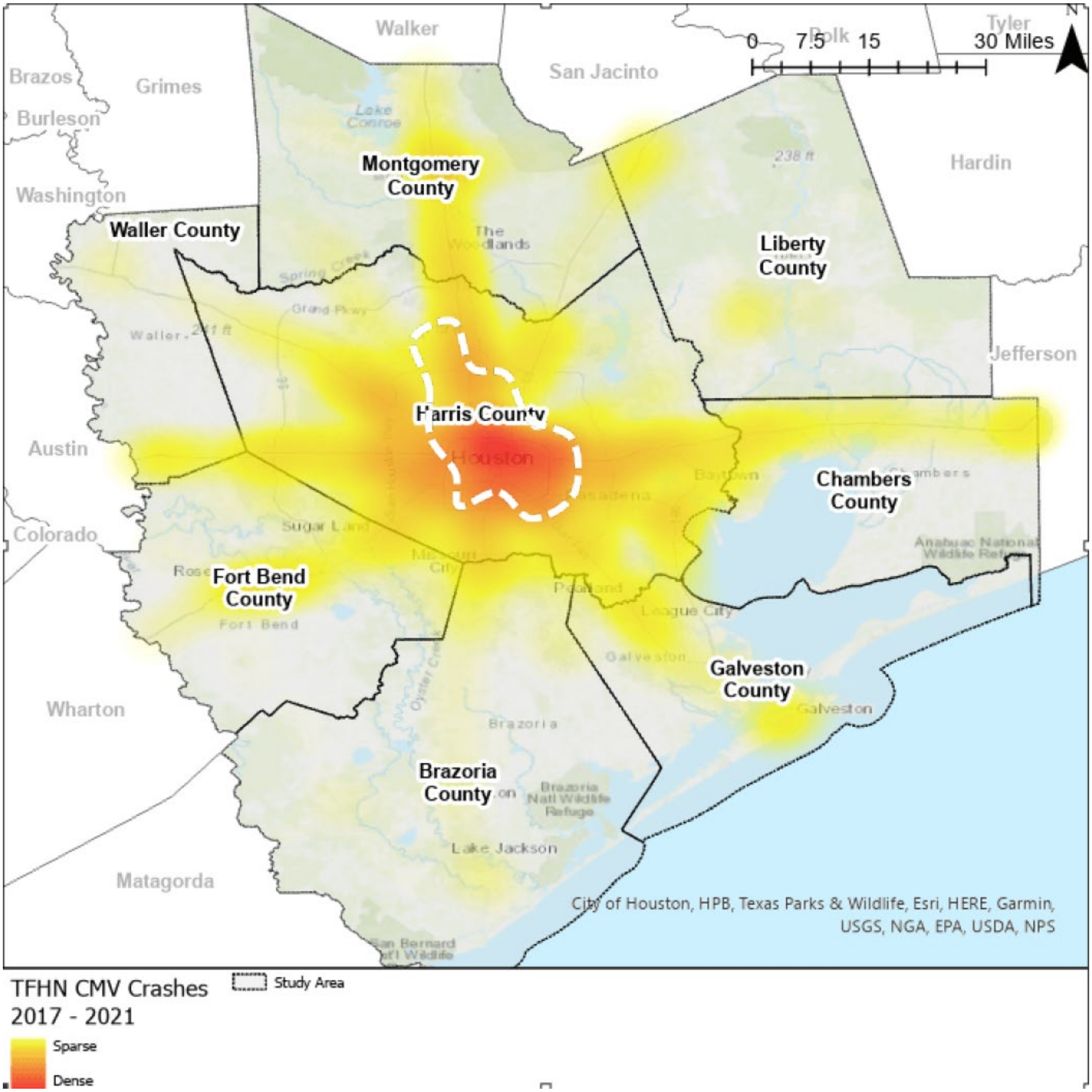
3.1.2 Truck-Related Crashes on H-GAC Network

Crashes involving commercial vehicles were 7% of all crashes, but as shown in Figure 23, the nature of their distribution differed from those involving passenger vehicles.

Commercial vehicle crashes were concentrated along the main highways, with the maximum concentration being along the north and east of the Houston Downtown region. This is in line with the knowledge that freight movement is concentrated along this side of the Houston downtown region.

A total of 23,238 crashes involving commercial vehicles were recorded in the H-GAC region between 2017 and 2021. Crash density is continuously high along both IH 45 and IH 10 from end to end.

Figure 23. THFN Crashes from 2017 to 2021 – Commercial Vehicles



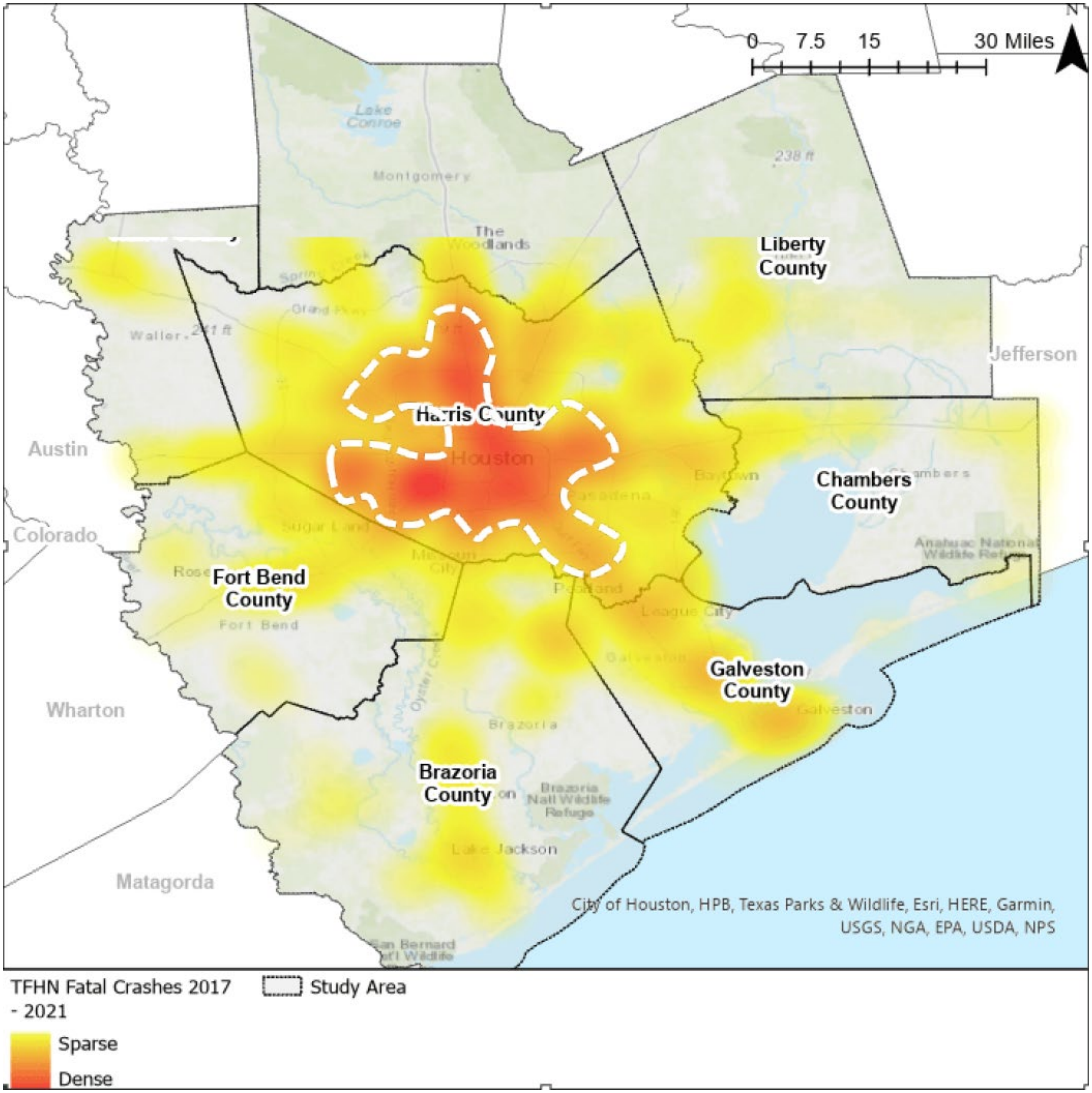
3.1.3 Fatalities and Critical Injuries

87,315 crashes involved either an injury or a fatality. These represented 27% of all crashes in the H-GAC region within the study period. Seventy three percent of crashes resulted in damage to the property alone.While there were 1,591 fatal crashes, 1,712 fatalities were recorded.

The study area had a fatality rate of 107 deaths per 100 crashes, based on the data from 2017 to 2021.

The greatest number of fatalities per crash was recorded as four. Figure 24 shows fatal crashes.

Figure 24. THFN Crashes from 2017 - 2021 – Fatal Crashes Only



Most of the fatal crashes were concentrated in Harris County, with IH 45 experiencing higher fatality rates than other corridors. Isolated locations with a high density of fatal crashes were also seen in Brazoria County near Lake Jackson. Table 6 shows various aspects of crashes' rate of injury/fatality.

Some crashes resulted in the loss of more than one life. Table 7 details fatal crashes by number of fatalities. Commercial vehicle crashes led to 13% of all fatalities (217). Five percent of all fatal commercial crashes resulted in more than one fatality.

Passenger vehicle crashes were responsible for 87% of all fatalities. In addition, seven percent of all fatal passenger crashes led to more than one fatality.

Table 6: Crashes by Severity (Fatal and Injuries)

BY SEVERITY	PASSENGER	PASSENGER, RATE PER MILE/MONTH	COMMERCIAL	COMMERCIAL, RATE PER MILE/MONTH
Fatality	1,374	0.08	217	0.02
Injury	79,941	5.6	5,783	0.4
TOTAL	**81,315**	**5.68**	**6,000**	**0.42**

Table 7: Distribution of Fatal Crashes, by Number of Fatalities

FATALITIES PER CRASH	PASSENGER	COMMERCIAL	TOTAL FATALITIES
1	1,282	206	**1,488**
2	77	11	**88**
3	12	0	**12**
4	3	0	**3**
TOTAL FATALITIES	**1,374**	**217**	**1,591**

3.1.4 Bridge Strikes

A high density of roads in a primarily metropolitan area means that the number of bridges that vehicles must cross under is also likely to be high. Figure 25 shows the spatial distribution of bridge strikes- when a vehicle crashes into a bridge. A high concentration of bridge strikes happened in the Houston Downtown area at the IH 10/IH 45 interchange. IH 45 from north of Harris County to Galveston sees bridge strikes at several locations. Table 8 shows the number and rate of bridge strikes in the H-GAC area.

Figure 25. THFN Crashes from 2017 to 2021 – Bridge Strikes

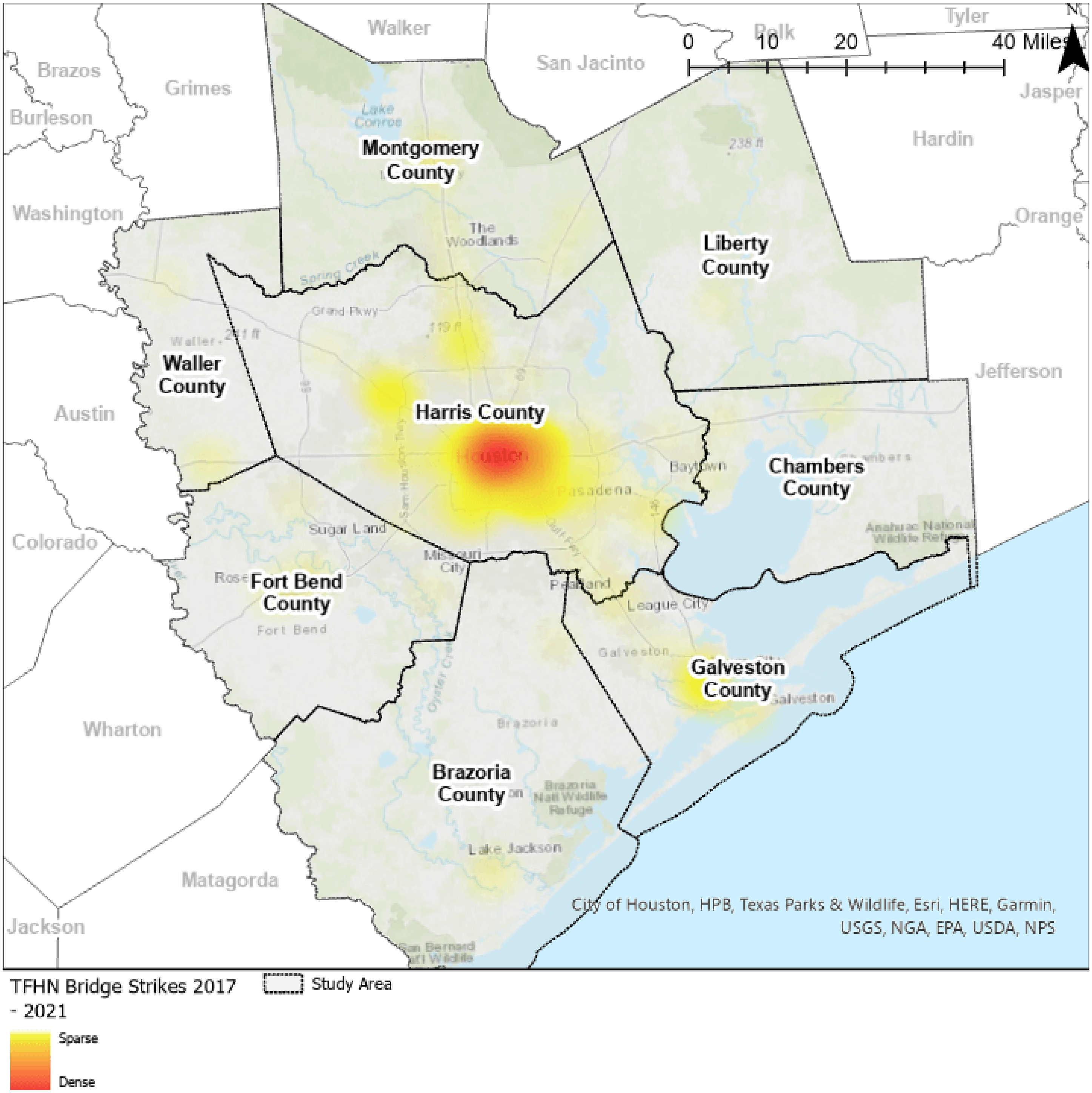


Table 8: Bridge Strikes by Type of Vehicle

BY VEHICLE TYPE	BRIDGE STRIKES	RATE
Passenger	-	-
Commercial	240	0.2 per year per mile
TOTAL	**240**	**0.2 PER YEAR PER MILE**

3.1.5 Truck Parking

We have considered the region's truck parking availability in the safety section of this report because the prime objective of truck parking is to ensure truck drivers have a safe and convenient place to park while they adhere to the federal rules associated with truck drivers' hours of service. These rules are aimed at ensuring drivers are rested and stay awake and alert.

In the H-GAC area, there are two kinds of parking areas based on ownership of land: Publicly-Held Parking and Privately-Held Parking. This section describes parking conditions in the study area. Data for this was acquired from H-GAC's Regional Parking Study conducted in 2018.

PUBLICLY-HELD PARKING

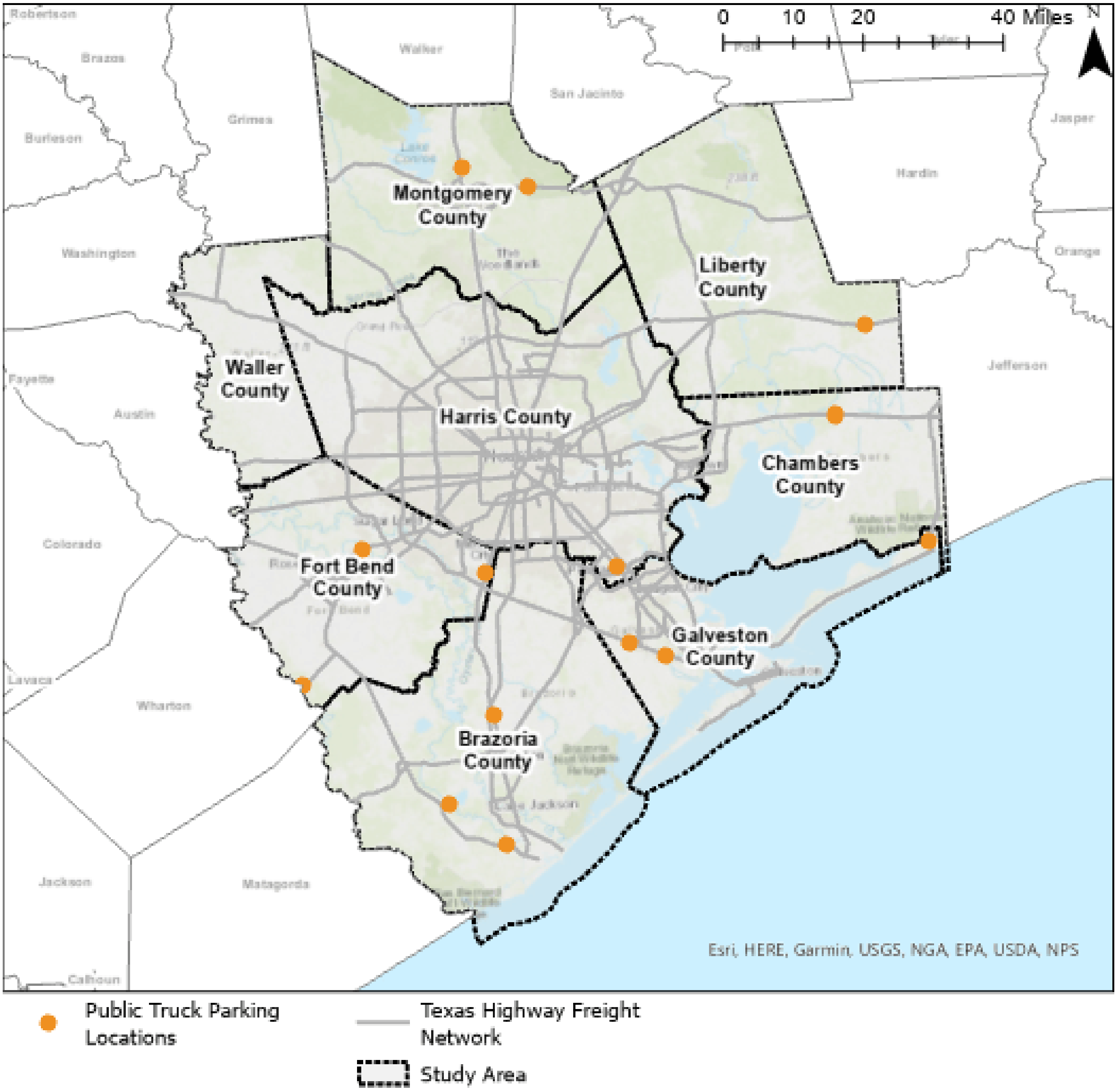
Very few truck parking slots in the H-GAC area are on public lands. Table 9 shows the parking supply and demand distribution by number of slots and their distribution around the Houston area.

Table 9: Publicly-Held Parking Slots by Area

LOCATION	PEAK DEMAND	SUPPLY
Inside Downtown Loop		
Inside IH 610 Loop		
Inside BW 8/SHT Loop		
Inside Grand Pkwy/SH 99 Loop		35
Outside Grand Pkwy/SH 99 Loop	44	52

Figure 26 shows the distribution of locations of public parking. However, enough public parking supply for peak demand can only be found in Chambers County.

Figure 26. Distribution of Publicly-Held Parking



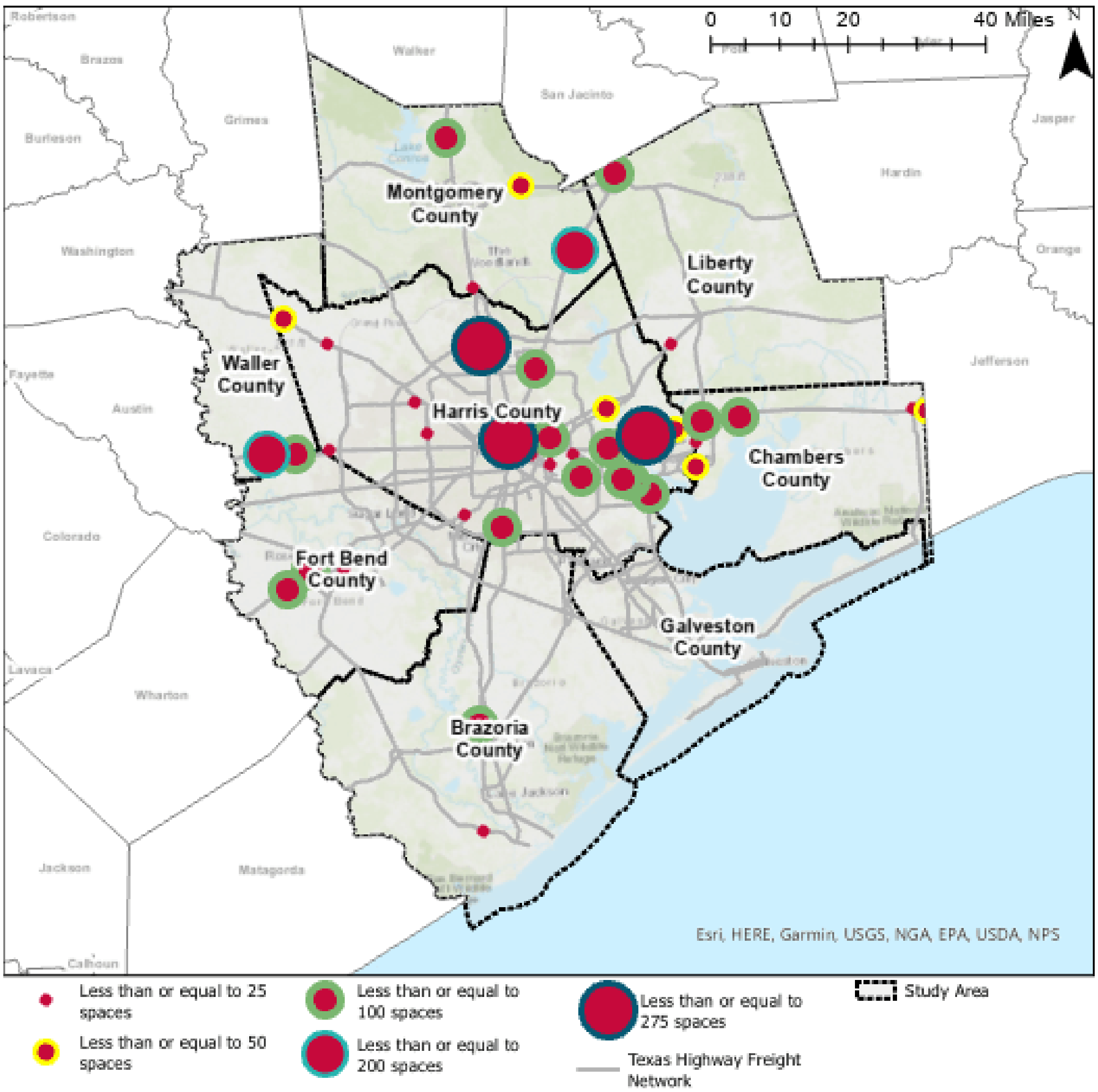
PRIVATELY-HELD PARKING

More privately-held parking areas exist than publicly-held. They are distributed across the region outside of the Downtown Houston Loop. Table 10 shows parking supply and demand by number of slots and their distribution.

Table 10: Privately-Held Parking Slots by Area

LOCATION	PEAK DEMAND	SUPPLY
Inside Downtown Loop		
Inside IH 610 Loop	180	317
Inside BW 8/SHT Loop	561	531
Inside Grand Pkwy/SH 99 Loop	1372	1308
Outside Grand Pkwy/SH 99 Loop	1180	1423

Figure 27. Distribution of Privately-Held Parking by Number of Slots



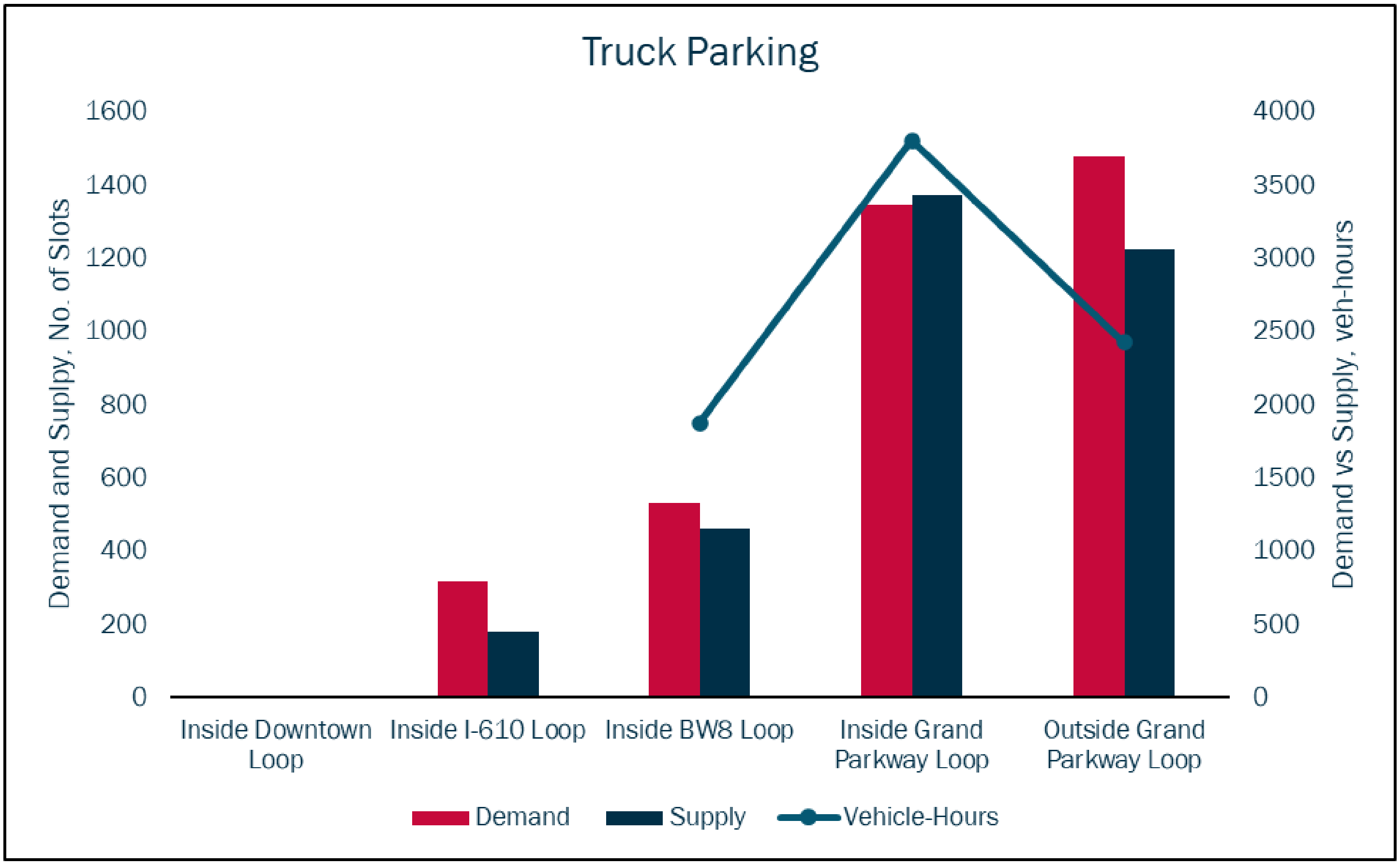
3.2 Demand vs. Capacity

Peak Demand for truck parking outpaces supply for both privately- and publicly-held truck parking facilities. However, demand is not distributed evenly across the day. Table 11 shows the total excess vehicle demand hours. This is calculated by multiplying the difference between peak parking demand and available parking supply by the number of hours demand outpaces supply.

Table 11: Total Vehicle Demand Hours

LOCATION	PRIVATE PARKING	PUBLIC PARKING
Inside Downtown Loop		
Inside IH 610 Loop		
Inside BW 8/SHT Loop	1877 vehicle-hours	
Inside Grand Pkwy/SH 99 Loop	3803 vehicle-hours	
Outside Grand Pkwy/SH 99 Loop	2417 vehicle-hours	6 vehicle-hours

Figure 28. Truck Parking – Supply and Demand



3.3 At Grade Rail Crossings

At grade railroad crossings are another primary instance where the freight network conflicts with passenger transportation and can have safety impacts. Upgrades can include the addition of warning/control devices such as bells, lights, and gates, and larger improvements such as grade separation. These types of improvements have helped to increase the safety of crossings and reduce the rate of fatalities and injuries in past decades.[6]

Crossings can be reviewed and assessed to determine if they comply with current standards, and the Federal Railroad Administration provides funding to upgrade and prioritized crossings through their Rail Crossing Eliminate Program.[7]

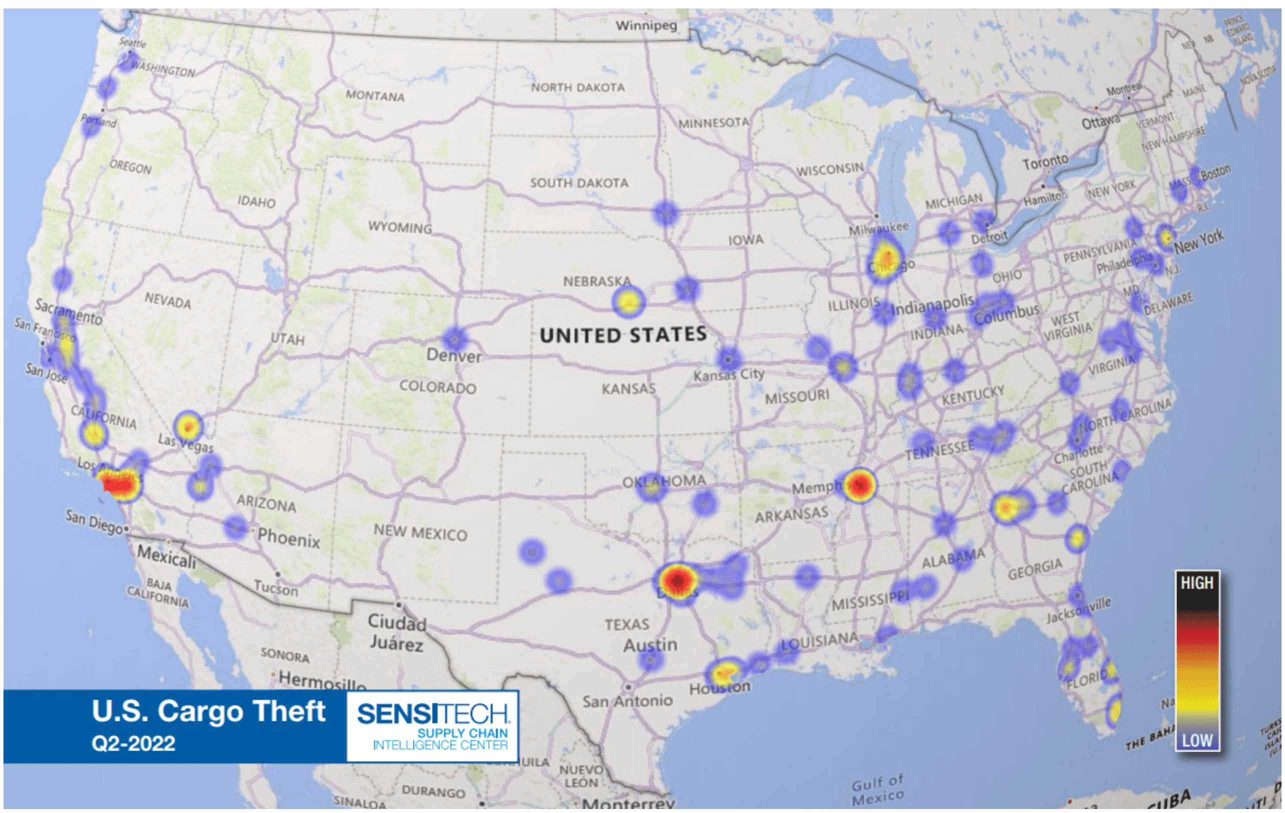
3.4 Transportation Security

The transportation system is often seen as a target for criminals who seek to exploit security weaknesses. In response to threats, many components of the freight system are governed by regulations including the Maritime Transportation Security Act of 2002 which is overseen by the U.S. Coast Guard, the U.S. Department of Transportation's (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) rules for the transportation of hazardous materials and the Transportation Security Administration's (TSA) broad authority to ensure the adequacy of security measures for the transportation of cargo, as well as authorities relating specifically to air cargo.

Examples of requirements associated with these regulations include management and control of physical access to terminals, staff background checks, and requirement of identity cards for access to terminal facilities, including the Transportation Worker Identification Credential (TWIC)- a federal form of identification requiring extensive background checks and personal information for issuance.

Preventing cargo theft is an important consideration for freight system users and operators. Analysis by Sensitech identifies the Houston region as a freight theft hotspot, though the Dallas-Fort Worth area has a higher concentration.

Figure 31. US Cargo Theft Hotspots



Source: Sensitech Security Services

6 https://railroads.dot.gov/program-areas/highway-rail-grade-crossing/highway-rail-grade-crossings-overview
7 https://highways.dot.gov/safety/hsip/xings/railway-highway-crossing-program-overview#:~:text=The%20Railway%2DHighway%20Crossings%20(Section,at%20railway%2Dhighway%20grade%20crossings.

In Q2-2022, Texas accounted for 20% of total thefts. According to the Sensitech analysis, the most prevalent location for large-scale cargo thefts is Unsecured Parking, accounting for 49% of thefts in which a location was declared, followed by 24% from Truck Stops/Fuel Stations and 11% from Warehouses/Distribution centers. Expanding the number of secure truck parking facilities and improving security of existing facilities is a high-priority need for the Houston region.

The freight system is increasingly operated, managed, and monitored through IT systems which can be exposed to cyber-attacks. Recent examples include:

- A cyber-attack on Port Houston in 2021
- Colonial Pipeline (which originates in Houston) suffered a cyber-attack in 2021 that led to the pipeline closure for several days
- Maersk: A cyber-attack in 2017 that closed several port terminals

All components and operators of the freight network within the region need to be cognizant of the threat presented by and the potential impact associated with cyber-attacks.

4. Intermodal Connectivity

Ports, airports, rail terminals, and other freight facilities require connectivity with different modes of transportation to facilitate the efficient flow of goods from origin to destination. Poor intermodal connectivity creates friction and adds cost and time to freight movement and may have other negative impacts such as congestion and poor safety outcomes. Several intermodal connectivity tactics can reduce this friction and improve the velocity of freight movement and throughput of freight related infrastructure, including:

- Increasing local and regional support for public transit where possible, to reduce passenger vehicle volume on Critical Urban Freight Corridors
- Adding new rail lines while reducing the number of at grade rail crossings
- Widening highways and adding new lanes
- Adding additional pipelines
- Improving the efficiency of junctions and intersections
- Incentivizing development of new intermodal infrastructure
- Focusing actions on commodity needs such as project cargoes and Over Size/Overweight shipments

The region has a good record of facilitating and improving intermodal connectivity, examples being:

- Construction of dedicated flyover ramps connecting SH 146 and Port Road to the Bayport container terminal.
- The Phase 3 Expansion of Port Road: construction of 9,000 feet of new roadway and drainage improvements to expand the existing divided road from four to six lanes between SH 146 and Cruise Road.
- Construction of a rail terminal connected to the Bayport container terminal and extensive railway connections serving public and private industrial sites and port terminals.
- Widening of SH 36 from two lanes to four lanes of divided highway.

As intermodal facilities handle consistently increasing volumes of cargo, the highway network serving those facilities also needs to adapt and expand. However, cost and acquisition of right of way may impede progress on necessary improvements.

Given the region's prominence in energy, chemical processing, and resins production, the interconnection of pipelines with port terminals and industrial facilities is vital. Without pipeline connectivity, many terminals would not be economically viable- especially in the bulk liquids and gas sectors, such as the LNG export terminal at the Port Freeport.

RECOMMENDATIONS FOR IMPROVING INTERMODAL CONNECTIVITY

- Address intermodal connectivity problems via creation of new connections between other modal transportation infrastructure and terminals, like new railway terminals at ports and increased pipeline connections with ports and industrial facilities.
- Better integrate existing operations via automation and improve the flow of containers through the region's ports to mitigate the need for highway expansions.
- Adopt new technologies and adapt them to the freight sector. For example, the Freight Shuttle Xpress concept initiated by the Texas A&M Transportation Institute could replace container-on-barge services.

5. Community & Livability Friction

Freight vehicles and infrastructure can have adverse impacts on neighboring land uses and residents, including through light, noise, air pollution, vibration pollution, and impediment to emergency services. The negative impacts of freight transportation on a community can increase when truck and train volumes grow, existing corridors and rail lines are expanded, or when new corridors or freight generators are built.

RECOMMENDATIONS TO REDUCE NEGATIVE COMMUNITY & LIVABILITY IMPACTS

- Adopt the Freight Goods Movement Equity Framework- a separate deliverable that was developed as a guideline for evaluation of future freight goods movement projects. Prioritizing equity considerations reduces negative impacts on communities and aligns with the Justice40 Initiative requirement that 40 percent of the overall benefits of certain Federal investments- including those disbursed under the Infrastructure Investment and Jobs Act (IIJA) flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.
- Center affected communities in the decision-making process for projects that will affect them. An excellent paradigm for public engagement that H-GAC can use is the International Association for Public Participation (IAP2) spectrum: inform, consult, involve, collaborate, empower.
- Proactively shift freight activity away from residential corridors through specified routing for trucks, and work with the community to mitigate potential impacts using interventions like visual or noise barriers and buffers.
- Identify and protect existing and future strategic freight corridors. This can be done by acquiring land and limiting conflicting land uses from development along it.
- Future developments that contain land uses and activities that may be sensitive to the impacts of freight transportation, such as residential, commercial and recreational, should be planned away from major existing or planned freight corridors.
- Major freight generators such as industrial facilities, intermodal yards, and warehouses and distribution centers should be located near to the existing freight networks and away from residential, commercial, and recreational areas.

Environmental Justice

Environmental justice is the concept that everyone has the right to a clean and healthy environment, regardless of their socioeconomic status or race. Environmental injustice occurs when a certain community is more exposed to negative environmental effects, such as pollution, than the general population. Proximity between large industrial facilities and residential communities in the study area- such as in the Harrisburg, Manchester, Sunnyside, and Pleasantville neighborhoods- have resulted in environmental injustice taking place.[8] Adoption of the Freight Goods Movement Equity Framework can help ensure these injustices are not replicated in the future.

The impacts of freight transportation can disproportionally effect communities, based on where the major corridors and trip generators are located. The planning and operation of the freight network should consider the socio-economic impacts of the existing system, and what can be done to reduce or eliminate environmental injustice in new projects.

8 https://www.understandinghouston.org/blog/examining-the-effects-of-environmental-racism-in-houston

6. Energy/Environment

The transportation of freight (whether by road, rail, air, or water) and development of the infrastructure to support its movement can have an impact on the natural environment and the people that live near it. Types of impacts can include light, noise, and air pollution and safety impacts.

H-GAC can take a proactive role in minimizing the current impacts of freight transportation and planning the future network and operations through the planning and development of the region's goods movement network. One example of this type of effort is the Heavy Duty Diesel Replacement program, which provides grants to cover the cost of new, cleaner diesel equipment and new equipment powered by alternative fuels (CNG, LNG, Electric, etc.).[9]

However, projected growth of freight travel and planned additions to the network will necessitate further action to reduce the impact of freight transportation in the H-GAC. The following sections provide a high-level summary of some of the impact areas related to energy and the environment and identify tools and strategies that can be used to reduce the negative impacts of freight transportation on the environment.

6.1 Climate Change, Emissions, and Extreme Weather Events

Transportation is a significant generator of greenhouse gas emissions, and these emissions have negative impacts on air quality, contributing significantly to climate change.

> *It is estimated that the transportation sector in the City of Houston produced 17 Million Metric tons (MMT) of greenhouse gas (GHG) emissions in 2019, which represents 25% of the regions' total emissions.[10] Freight transportation, specifically trucking, is a major producer of these emissions.*

97% of climate scientists agree that human-caused emissions are the primary factor behind climate change,[11] and climate change is already affecting the region. Over the past decade, the region has become hotter and wetter than it was in the decade before. 2016 and 2020 are tied for the hottest years on record, and recent extreme precipitation events such as Hurricane Harvey in 2017 had drastic effects, flooding over a quarter million homes and resulting in over 60 direct fatalities.[12] [13]

It is expected that Houston will face significant precipitation fluctuations in the future, with both intense rainstorms and longer drought periods. Due to its location on the Gulf Coast, the lower lying areas of the region will be at risk of flooding and displacement.

The freight transportation system can be planned and operated in ways that reduce its impacts on the environment and climate change and make it resilient to the future changes in climate and potential extreme weather events.

RECOMMENDATIONS FOR REDUCING CLIMATE CHANGE IMPACTS

- Improve the energy efficiency of freight vehicles and airplanes, shifting to alternative fuel sources
- Pilot and adopt autonomous trucks
- Plan the freight network infrastructure and land uses to reduce travel distances
- Build new infrastructure to be resilient to the effects of climate change and other potential disruption events

The use of alternative fuels and electrification has the potential to greatly reduce GHG emissions, for trucks, rail and cargo handling equipment (particularly in port and rail container terminals) in the immediate and near term, and potentially air and marine in the longer term. This shift will require advances in technology that are currently underway, but also the addition of significant amounts of new infrastructure such as new production, refining, re-fueling and charging infrastructure.

Several oil refineries in the nation have been repurposed from processing crude oil to producing renewable diesel from non-fossil feedstocks. Indeed, the region's existing facilities are

9 https://www.h-gac.com/heavy-duty-diesel-replacement-program
10 https://www.understandinghouston.org/topic/environment/climate-change#greenhouse_gas_emissions
11 https://climate.nasa.gov/scientific-consensus/
12 https://www.hcfcd.org/About/Harris-Countys-Flooding-History/Hurricane-Harvey
13 https://www.worldvision.org/disaster-relief-news-stories/2017-hurricane-harvey-facts

already being used to support the production of sustainable fuels. Used cooking oil from restaurants and waste from animal and vegetable processing plants are stored in a terminal in Houston before being exported to processing plants in Finland, Netherlands or Singapore. The fuel is then reimported for further processing at a facility in Galena Park to produce renewable jet fuels and renewable diesel. Sustainable aviation fuel has already been used at William-Hobby Airport.

Another technology that could help reduce freight emissions is autonomous trucks, which are currently being piloted between Houston and Dallas on the IH 45 corridor.[14] While these trucks are powered by conventional diesel engines, fuel savings are anticipated to result from better-managed speeds and because more trips will be able to be completed off peak hours, avoiding traffic congestion.[15 16]

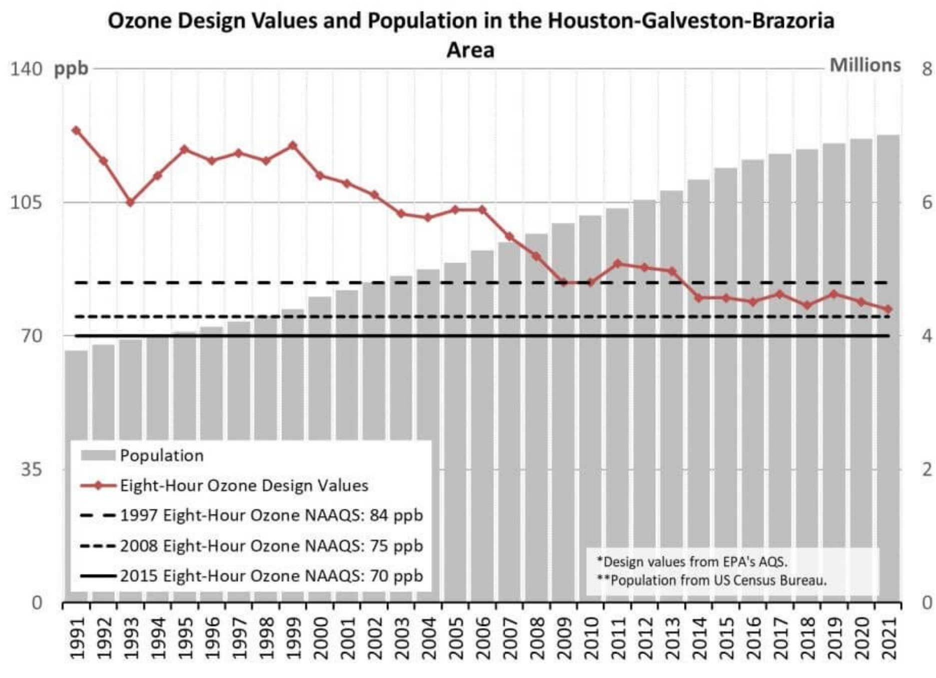
6.2 Air Quality

Emissions from vehicular traffic have negative effects on the health and wellbeing of the environment and on residents of the H-GAC region. Emissions from trucks carrying freight make up a significant portion of the region's total transportation-based emissions.

It is estimated that trucks contribute 72% of the region's NOX, 68% of the PM2.5, 53% of the CO2, and 37% of the VOCs in 2011.[17 18]

Air quality in the H-GAC region and Texas has significantly improved over the past 20 years. Some of this improvement can be attributed to active initiatives to improve air quality, including the Air Quality State Implementation Plan 19 which is administered by the Texas Commission on Environmental Quality. Figure 32 shows that while the regional population has increased by 85% in the past 30 years, air pollution (in terms of the eight-hour ozone design metric) has decreased by 29%. Concentrations of NOX, VOC and SO2 have experienced similar trends.

Figure 32. Ozone Design Values vs. Population for the Houston-Galveston-Brazoria Area



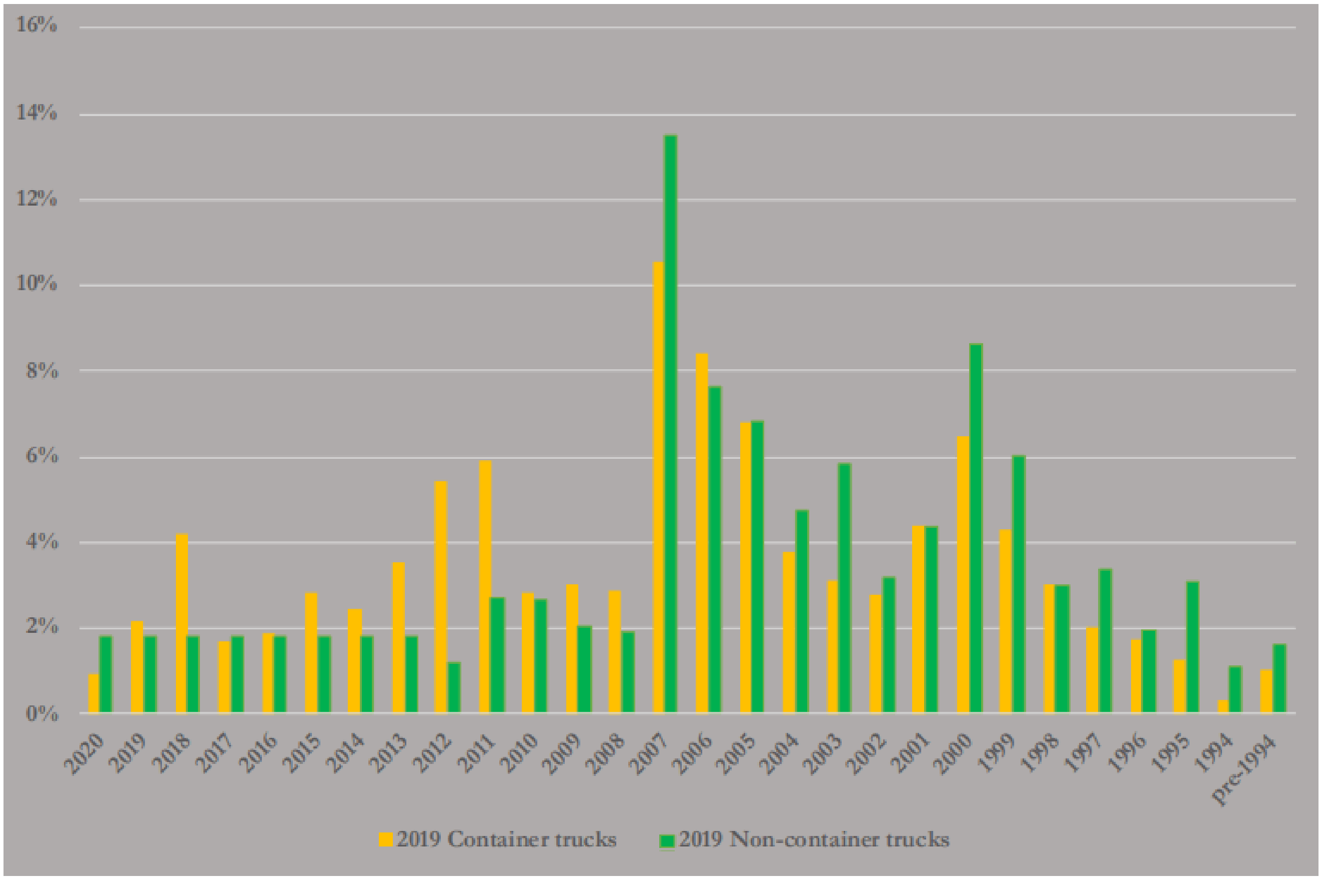
Source: ***https://www.tceq.texas.gov/airquality/airsuccess/airsuccessmetro***

14 H-GAC Regional Goods Movement Plan, 2013
15 https://www.trucknews.com/transportation/autonomous-trucks-continue-to-prove-themselves-in-pilot-projects/1003168448/
16 https://www.govtech.com/fs/more-autonomous-big-rigs-are-bound-for-interstate-45
17 H-GAC Regional Goods Movement Plan, 2013
18 Although the portion of the region's transportation emissions that are associated with trucking and freight transportation in general may have decreased due to advances in truck efficiency, freight transportation is still considered to be a major generator of emissions in the H-GAC.
19 https://www.tceq.texas.gov/airquality/sip/sipintro.html#what-is-the-history

Despite these improvements, the Houston region still has some of the poorest air quality in the country, ranking 8th most polluted for ozone, according to the 2022 State of Air report by the Lung Association[20].

Replacing older vehicles including trucks, rail locomotives, harbor vessels and cargo handling equipment with newer more efficient and less polluting vehicles is a particular need for the region. This is because there are many instances of older equipment being used in the region, pre-dating many of the technological improvements installed in engines to reduce air pollutants. The PTRA locomotives are classed as Tier 0 and pre Tier 0 and the inventory of the age of trucks visiting PHA container terminals shows that there are still a significant number of visits by trucks that pre date 2007. Model year trucks with 2007 and newer engines are typically equipped with diesel particulate filters (DPFs) and those with 2010 and newer engines are also equipped with selective catalytic reduction (SCR) systems (with some exceptions). Figure 33 identifies the age profile of trucks calling at public terminals in Port Houston.

Figure 33. Age Profile of Trucks



Source: PHA Goods Movement Emissions Inventory 2019

RECOMMENDATIONS FOR AIR QUALITY IMPROVEMENTS

- Increasing the pace of fleet turnover and replacing the older, most polluting trucks and other freight vehicles are vital enablers to help improve the region's air quality. Based on the 2019 emissions data, approximately 46% of trucks calling at Port Houston container terminals are 2006 or older.
- Continue the Heavy Duty Diesel Replacement project and other replacement programs.
- Continue applying for air quality mitigation-related grants.

20 https://www.lung.org/media/press-releases/sota-houston-fy22

In 2021, Port Houston applied for and was awarded $2.5 million towards repowering two tugboats with newer cleaner engines.

- Replace older equipment with those using alternative fuels or hybrid motors wherever possible. Port Houston has added hybrid RTG cranes to its container terminals in recent years and in 2022, the first electric truck collected a container from the Bayport container terminal.
- Restrict the age of trucks that can visit regional terminals, in line with best practices from other ports across the nation.
- Create a grant assistance program for segments of the trucking community with limited access to capital to purchase newer trucks.
- Create an awareness campaign around the EPA's proposed new standards[21] for heavy-duty vehicles in advance of the standards which help reduce emissions from new gasoline and diesel engines prior to them going into effect in 2027.
- Support modal shift to reduce emissions by improving access to rail and marine transportation through the creation / enhancement of existing routes and terminals.
- Improve access to non-trucking modes to assist with rail and marine transit times, capability, and reliability to help attract trips from truck transportation.
- Investigate alternatives to discharging a container on barge vessels in busy ports.
- Plan and build freight systems and infrastructure to be resilient to changing climate and extreme weather events such as flooding and high temperatures and that can adapt and continue operating during disruption events.
- Develop freight network redundancy, i.e., multiple routes for cargo to take if one cannot be used.

Initiatives to reduce emissions from ships while in port when they are loading and discharging cargoes can also help improve air quality in neighborhoods and communities surrounding port terminals. Most efforts to date have been focused on electric shore power in cruise terminals, where the same vessels return to their home port. However, this is very different to the situation in the Houston region's ports where the majority of vessels are not returning on a frequent and regular basis, and terminals may handle ships of various sizes and ages which complicates the placement and type of infrastructure to provide the ship to shore power connection.

The predominate vessel calling at the Gulf Coast region's ports are tanker vessels, and these vessels have a high auxiliary boiler load while discharging their cargo. Innovative solutions such as generators powered by hydrogen, LNG, or batteries placed on barges could play a future role in improving air quality and be used in specific terminals within the port such as the container terminals that account for 51.4% of Port Houston's at berth ocean going vessel emissions.[22]

Similar improvements in fuel efficiency and transitions to other fuels and technologies are likely to occur for the other modes, including air, rail, and marine vessels in the long term, and these will help reduce the impact of freight transportation has on the region's air quality.

Modal shift also provides an opportunity to reduce the emissions associated with freight transportation. Air and truck transportation are the two highest emitting modes by ton-mile and shifting trips to rail and marine can reduce the transportation emissions. Rail is estimated to be an average of three to four times more efficient than truck and provides other benefits, including reduced road congestion and public safety improvements.[23]

Container on barge is an existing operation serving the region's ports but can be impacted when all container terminal berths are in use by ocean going vessels. Other approaches to discharging a container on barge vessel in busy ports, needs to be investigated by the maritime industry.However, it is important to note that modal shift is only possible for certain cargo types and trips.

6.3 Dredging

Dredging of the region's commercial waterways can impact the marine environment, including vegetation, spawning locations, and marine mammals, although these impacts can be mitigated through planning and management.[24] The Houston Ship Channel Expansion Project 11 is actively mitigating the environmental impacts of this project and includes several environmental components, including the creation of new marsh lands, a bird island, a new oyster reef, and air quality improvements.

21 https://www.epa.gov/newsreleases/epa-proposes-stronger-standards-heavy-duty-vehicles-promote-clean-air-protect
22 https://porthouston.com/wp-content/uploads/Port-Houston-2019-GMEI-Report_Dec-2021.pdf
23 https://www.aar.org/wp-content/uploads/2020/06/AAR-Sustainability-Fact-Sheet.pdf
24 https://academic.oup.com/icesjms/article/72/2/328/676320

7. Funding and Financing

7.1 Funding Types

Funding is a primary hurdle to implementing necessary freight system and infrastructure improvement projects across the study area. This chapter provides a high-level summary of the primary funding programs that are available for freight transportation in the H-GAC region. It lists key programs, the agency responsible for the program, and includes hyperlinks where more information on each program can be found. Additional details on these programs and others can also be found through the Grants.gov portal, which contains a detailed listing of current and past Notice of Funding Opportunities (NOFOs).

7.1.1 Infrastructure Investment and Jobs Act (IIJA) Funding

The IIJA is a significant source of funding for transportation infrastructure projects, including for roads, bridges, transit, rail, ports, airports, and other types of infrastructure. It will be allocated over the next five years through targeted discretionary programs, and each of the main programs are listed in Table 12.

Table 12: IIJA Funds

PROGRAM	AGENCY
Bridge Investment Program[25]	Federal Highway Administration (FHWA)
Congestion Mitigation and Air Quality Program[26]	Federal Highway Administration (FHWA)
Consolidated Rail Infrastructure and Safety Improvements Program[27]	Federal Railroad Administration (FRA)
Federal Lands Access Program[28]	Federal Highway Administration (FHWA)
Federal Lands Transportation Program[29]	Federal Highway Administration (FHWA)
Highway Safety Improvement Plan[30]	Federal Highway Administration (FHWA)
National Highway Freight Program[31]	Federal Highway Administration (FHWA)
National Highway Performance Program[32]	Federal Highway Administration (FHWA)
Nationally Significant Multimodal Freight and Highway Projects (INFRA)[33]	Office of Multimodal Freight Infrastructure and Policy
National Infrastructure Project Assistance[34]	Office of Multimodal Freight Infrastructure and Policy
Rebuilding American Infrastructure with Sustainability & Equity[35]	Office of Multimodal Freight Infrastructure and Policy
Rural Surface Transportation Program[36]	Office of Multimodal Freight Infrastructure and Policy
Surface Transportation Block Grant[37]	Federal Highway Administration (FHWA)
Rail Crossing Elimination Program[38]	Federal Railroad Administration (FRA)
Tribal Transportation Program (Base, Bridge and Safety programs)[39]	Federal Highway Administration (FHWA) – Office of Tribal Transportation (OTT)

25 https://www.fhwa.dot.gov/bipartisan-infrastructure-law/bip_factsheet.cfm
26 https://www.fhwa.dot.gov/environment/air_quality/cmaq/
27 https://railroads.dot.gov/grants-loans/competitive-discretionary-grant-programs/consolidated-rail-infrastructure-and-safety-2
28 https://highways.dot.gov/federal-lands/programs-access
29 https://highways.dot.gov/federal-lands/programs/transportation
30 https://highways.dot.gov/safety/hsip
31 https://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.cfm
32 https://www.fhwa.dot.gov/specialfunding/nhpp/
33 https://www.transportation.gov/grants/infra-grants-program
34 https://www.transportation.gov/grants/mega-grant-program
35 https://www.transportation.gov/RAISEgrants/about
36 https://www.transportation.gov/grants/rural-surface-transportation-grant
37 https://www.fhwa.dot.gov/specialfunding/stp/
38 https://highways.dot.gov/safety/hsip/xings/railway-highway-crossing-program-overview#:~:text=The%20Railway%2DHighway%20Crossings%20(Section,at%20railway%2Dhighway%20grade%20crossings.
39 https://highways.dot.gov/federal-lands/programs-tribal

Administering agencies for these programs include the Federal Highway Administration (FHWA), the Federal Railroad Administration (FRA), and the Office of Multimodal Freight and Infrastructure Policy. The Government Finance Officers Association (GFOA) provides a summary of the IIJA Act and the associated White House IIJA Guidebook, both of which can provide more information on the funding programs.40

7.1.2 Other Federal Funding

In addition to funding through the IIJA, there are several other federal programs that are applicable to freight transportation, and they are listed in Table 13 below.

Table 13: Other Federal Funds

PROGRAM	AGENCY
Airport Improvement Program41	Federal Aviation Administration (FAA)
Diesel Emission Reduction Act Grants42	Environmental Protection Agency (EPA)
Economic Adjustment Assistance43	Economic Development Administration (EDA)
High Priority Grant Program44	Federal Motor Carrier Safety Administration (FMCSA)
Motor Carrier Safety Assistance Program45	Federal Motor Carrier Safety Administration (FMCSA)
Metropolitan Planning Program46	Federal Transit Administration (FTA)
Railroad Rehabilitation & Improvement Financing47	Federal Railroad Administration (FRA)
Transportation Infrastructure Financing and Innovation Act48	Federal Railroad Administration (FRA)
Transportation Alternatives Program49	Federal Highway Administration (FHWA)

7.1.3 State Funding

In addition to the main federal programs, the State of Texas also provides funding for transportation infrastructure projects through grants. TxDOT and the Texas Transportation Commission use the Unified Transportation Program[50] (UTP) to guide transportation project development over a 10-year rolling period. The 2023 UTP report[51] describes the 12 categories where funding will be allocated over the next 10 years. The categories and brief descriptions of each are summarized in Table 14.

40 https://www.gfoa.org/the-infrastructure-investment-and-jobs-act-iija-was
41 https://www.faa.gov/airports/aip
42 https://www.epa.gov/dera
43 https://eda.gov/arpa/economic-adjustment-assistance/#:~:text=The%20Economic%20Adjustment%20Assistance%20program,designed%20to%20meet%20local%20needs.
44 https://www.fmcsa.dot.gov/grants/mcsap-high-priority-grant/motor-carrier-safety-assistance-program-high-priority-grant-match
45 https://www.fmcsa.dot.gov/grants/mcsap-basic-incentive-grant/motor-carrier-safety-assistance-program-mcsapgrant#:~:text=The%20MCSAP%20is%20a%20Federal,commercial%20motor%20vehicles%20(CMVs).
46 https://www.transit.dot.gov/funding/grants/metropolitan-statewide-planning-and-nonmetropolitan-transportation-planning-5303-5304
47 https://www.transportation.gov/buildamerica/financing/rrif
48 https://www.transportation.gov/buildamerica/financing/tifia/tifia-credit-program-overview
49 https://www.fhwa.dot.gov/environment/transportation_alternatives/
50 https://www.txdot.gov/projects/planning/utp.html
51 https://ftp.txdot.gov/pub/txdot/tpp/utp/utp-2023.pdf

Table 14: Texas State Funding Allocation through UTP[52]

CATEGORY	DESCRIPTION
1 – Preventative Maintenance and Rehabilitation	Preventive maintenance and rehabilitation of the existing state highway system, including pavement, signs, traffic signals, and other infrastructure assets.
2 – Metropolitan and Urban Area Corridor Projects	Category 2 addresses mobility and added capacity projects on urban corridors to mitigate traffic congestion, as well as traffic safety and roadway maintenance or rehabilitation. Projects must be located on the state highway system.
3 – Non-Traditionally Funded Transportation Projects	Category 3 is for transportation projects that qualify for funding from sources not traditionally part of the State Highway Fund, including state bond financing (such as Proposition 12 and Proposition 14), the Texas Mobility Fund, pass-through financing, regional revenue and concession funds, and local funding.
4 – Statewide Connectivity Corridor Projects	Category 4 addresses mobility on major state highway system corridors, which provide connectivity between urban areas and other statewide corridors.
5 – Congestion Mitigation and Air Quality Improvement	Category 5 addresses attainment of National Ambient Air Quality Standard in non-attainment areas (currently the Dallas-Fort Worth, Houston, San Antonio, and El Paso metro areas).
6 – Structures Replacement and Rehabilitation (Bridge):	Category 6 addresses bridge improvements through several programs.
7 – Metropolitan Mobility and Rehabilitation	Category 7 addresses transportation needs within the boundaries of MPOs with populations of 200,000 or greater — known as transportation management areas (TMAs).
8 – Safety	Category 8 addresses highway safety improvements through the sub-programs listed below. Common Category 8 project types include medians, turn lanes, intersections, traffic signals, and rumble strips.
9 – Transportation Alternatives Set-Aside Program	Category 9 handles the federal Transportation Alternatives (TA) Set-Aside Program, including for sidewalks, cycling infrastructure, safety, etc.
10 – Supplemental Transportation Programs	Category 10 addresses a variety of transportation improvements through a variety of smaller programs.
11 – District Discretionary	Category 11 addresses TxDOT district transportation needs through several sub-programs. Projects include roadway maintenance or rehabilitation, added passing lanes, and roadway widening (non-freeway).
12 – Strategic Priority	Category 12 addresses projects with specific importance to the state including, energy sector access, border and port connectivity.

In addition to the UTP, State funding for freight infrastructure projects may also be achieved through the Texas Commission on Environmental Quality[53] and the State Infrastructure Bank.[54]

7.1.4 Other Potential Funding Sources

In addition to Federal and State grant programs, funding may also be sought from municipalities, private transportation entities (such as the railroads), or private equity. Project type, location, project costs determine which of these additional funding sources is most appropriate. Private parties and private equity may be interested in funding projects where revenue (such as through a toll) can be collected to create profit.

52 https://ftp.txdot.gov/pub/txdot/tpp/utp/utp-2023.pdf
53 https://www.tceq.texas.gov/agency/financial/funding
54 https://www.txdot.gov/business/grants-and-funding/state-infrastructure-bank.html

8. Specific Corridor Review

8.1 Introduction

8.1.1 Purpose

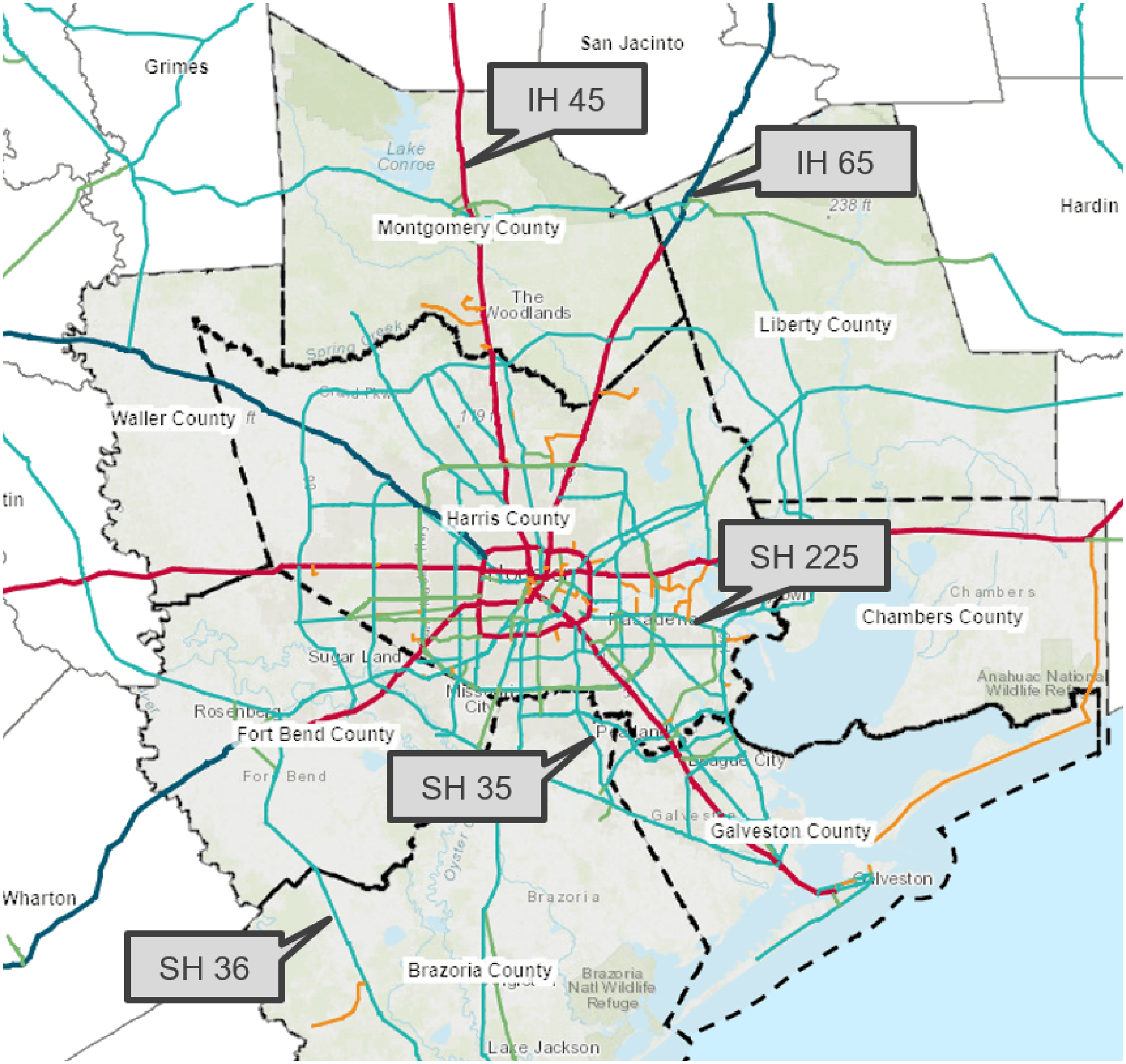
Specific freight corridors were selected for further study to assess corridor needs, review planned projects, and identify additional opportunities for freight-related improvements. The five corridors (Figure 34) selected for further study include SH 35, SH 36, IH 69/US 59, IH 45, and SH 225. This section briefly documents results of the needs assessment for each corridor and recommends improvements to enhance freight movement such as dedicated truck lanes, off-peak delivery of commercial vehicles, and time-of-day tiered truck toll pricing. The assessment consisted of three steps:

(1) Assess freight needs using methodology consistent with TxDOT's 2023 Freight Investment Plan;

(2) Review projects from TxDOT's 2023 UTP, TxDOT's Project Tracker Application, and other sources; and

(3) Identify gaps/unmet needs locations with freight needs and no planned projects

Figure 34. Study Corridors

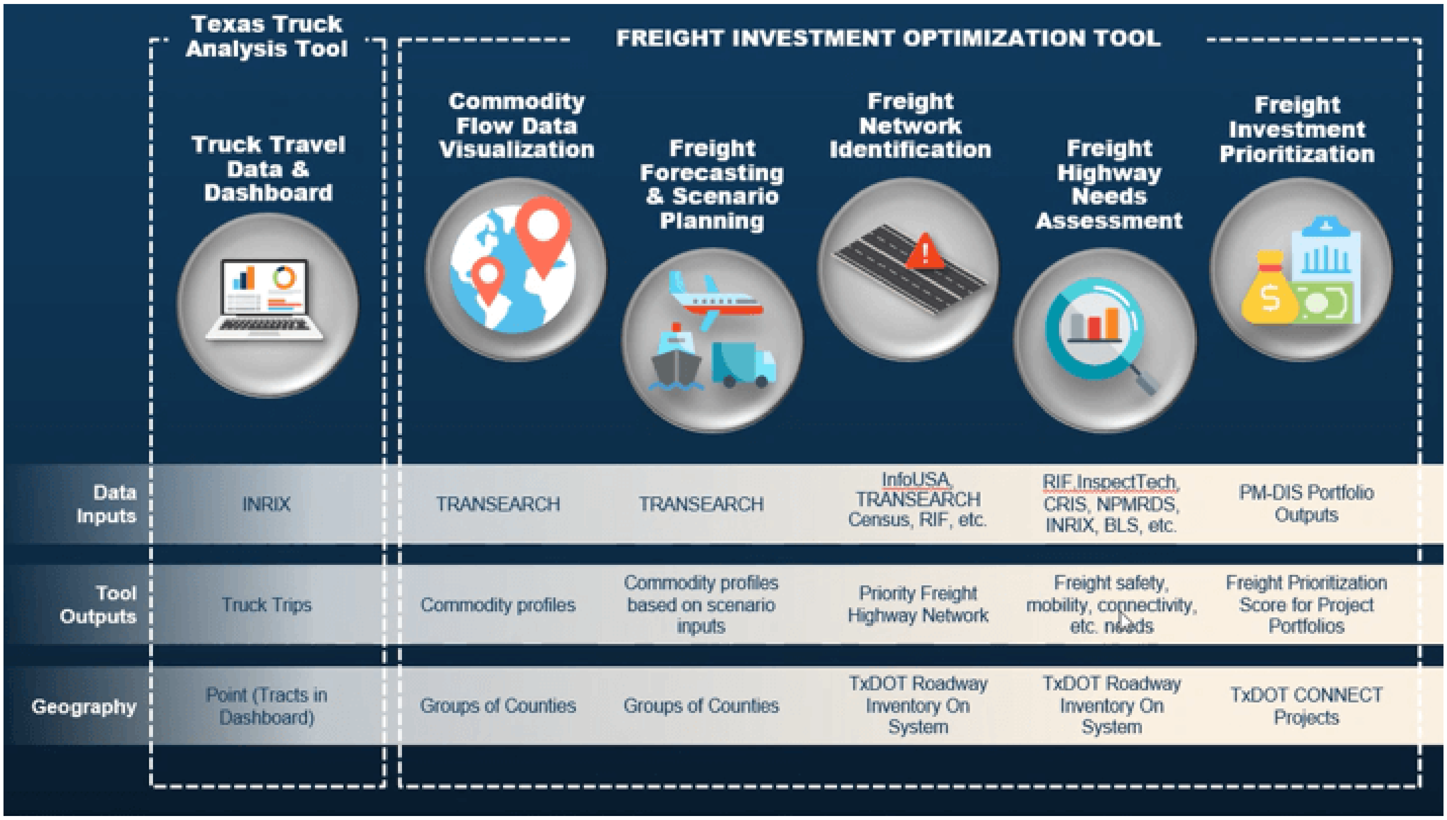


8.1.2 Corridor Needs

TxDOT created a statewide freight investment optimization tool consisting of five parts (snapshot provided as Figure 35), including a freight highway needs assessment. For purposes of the needs assessment, TxDOT input data from RIF, InspecTech, CRIS, NPMRDS, INRIX, BLS, and others and joined key metrics to the statewide roadway inventory attribute table. Based on these metrics, the tool generates 'freight needs scores' regarding safety, mobility, connectivity, etc.

Needs assessment output for the H-GAC eight-county region was provided by TxDOT. Needs assessment output details are provided in Appendix A.

Figure 35. TxDOT Freight Investment Optimization Tool



Source: TxDOT with Cambridge Systematics, Inc., 2022

A high-level, holistic, and systemwide assessment was conducted to complement TxDOT's data-intensive needs assessment. The complementary assessment consisted of reviewing the Regional Goods Movement Dashboard maps, a Tableau Dashboard with Truck Origin-Destination analysis, TxDOT's Statewide Planning Map, and several previous studies. A summary of study corridor needs, including future traffic, percent trucks, congestion, freight network, and evacuation route classification, is provided in Table 15.

Table 15: Summary of Study Corridor Needs

CORRIDOR	FUTURE TRAFFIC & PERCENT TRUCKS	CONGESTION (FORECAST YEAR)	FREIGHT NETWORK/ EVACUATION ROUTE
SH 35 From: IH 45 Houston) To: FM 523 (Angleton)	**@ South of IH 610** • 2021 AADT: 18,366 • 2041 Estimated AADT: 24,243 • 24 Hour Truck Percentage: 12.5%	Moderate congestion is reported in segments between Beltway 8 and SH 6.	Full limits included in TxDOT's freight network.
SH 36 From: Austin County Line To: FM 1495 (Freeport)	**@ Brazos River** • 2021 AADT: 5,267 • 2041 Estimated AADT: 7,374 • 24 Hour Truck Percentage: 25.8%	None	Full limits included in TxDOT's freight network. Full limits included as hurricane evacuation route, except segments near Rosenberg within Spur 10.
IH 69 From: Wharton County Line To: San Jacinto County Line	**@ Wharton County Line** • 2021 AADT: 20,021 • 2041 Estimated AADT: 28,029 • 24 Hour Truck Percentage: 27.1% **@ San Jacinto County Line** • 2021 AADT: 31,765 • 2041 Estimated AADT: 44,471 • 24 Hour Truck Percentage: 30.6%	Moderate congestion is reported from Wharton CL to SH 36 (Rosenberg). Congestion reported in all other segments (from SH 36 to San Jacinto CL). Three of the most-congested roadway segments (#s 3, 5, and 18) and three truck bottlenecks are along IH 69.	Full limits included in TxDOT's freight network. FM 762 (Rosenberg) to FM 1314 (Porter) included in FHWA's freight network. Beltway 8 to San Jacinto CL included as hurricane evacuation route.
IH 45 From: Walker County Line To: SH 87 (Galveston)	**@ Walker County Line** • 2021 AADT: 66,555 • 2041 Estimated AADT: 93,177 • 24 Hour Truck Percentage: 20.8% **@ 61st Street (Galveston)** • 2021 AADT: 60,324 • 2041 Estimated AADT: 84,454 • 24 Hour Truck Percentage: 27.7%	Moderate congestion is reported from FM 519 (La Marque) to Galveston; congestion reported in all other segments. Six of the most congested roadway segments (Numbers 6, 11, 25, 27, 96, and 97) and five truck bottlenecks are along IH 45.	Full limits included in TxDOT's and FHWA's freight network. Full limits included as hurricane evacuation route.
SH 225 From: IH 610 To: SH 146	**@ SH 146** • 2021 AADT: 79,201 • 2041 Estimated AADT: 110,881 • 24 Hour Truck Percentage: 21.6%	Congestion reported within full segment (IH 610 to SH 146).	Full limits included in TxDOT's and FHWA's freight network. Beltway 8 to SH 146 included as hurricane evacuation route.

8.1.3 Programmed/Planned Projects

A review of existing literature was conducted to understand the status of previously-identified projects along study corridors. Sources reviewed include TxDOT's 2023 UTP, TxDOT's Project Tracker Application, TxDOTs Houston District's Projects and Studies, TxDOT's 2017 Freight Mobility Plan, H-GAC's 2045 RTP, and others. A summary of Project Tracker data (dated 8/31/2022) is provided below, and additional project details are provided in Appendix B.

Table 16: Summary of Project Cost by Highway

HIGHWAY GROUP	CONSTRUCTION COST	PROJECT LENGTH	PROJECT COUNT
Top 16	16,893,286,359	1,678	487
Other (143)	3,407,008,532	1,331	508
Total (159)	20,300,294,891	3,009	995

Table 17: Details of Project Cost by Highway

HIGHWAY/CORRIDOR	CONSTRUCTION COST	PROJECT LENGTH	PROJECT COUNT
1) IH 45	6,054,655,350	274	74
2) IH 10	2,325,968,203	142	53
3) SH 99	1,780,975,913	186	32
4) SH 288	1,108,654,384	59	27
5) IH 69	1,074,902,952	177	38
6) IH 610	666,202,456	83	30
7) SH 36	562,784,738	59	16
8) SH 146	541,068,009	80	35
9) US 59	507,356,238	63	16
10) SH 35	424,600,311	80	24
11) US 290	405,335,741	98	23
12) FM 1488	309,738,268	48	11
13) FM 2920	299,733,473	25	12
14) SH 105	298,734,099	81	26
15) US 90	279,656,646	136	30
16) SH 6	252,919,578	87	40
37) SH 225	58,394,676	50	9

As shown in Table 16, projects along the top 16 high-cost highways represent <50% of total projects and 83% of total cost (details provided as Table 17). As shown in Table 18, six types of projects represent <30% of Top-16 corridor projects and 90% of corridor cost (details provided as Table 19). Therefore, the review of planned projects along study corridors focused on projects of these six types.

Table 18: Summary of Project Cost by Project Type

PROJECT TYPE	CONSTRUCTION COST	PROJECT COUNT	COST PER PROJECT
Top 6	15,122,531,362	133	113,703,243
Other (10)	1,770,754,997	354	5,002,133
TOTAL (TOP 16)	**16,893,286,359**	**487**	**34,688,473**

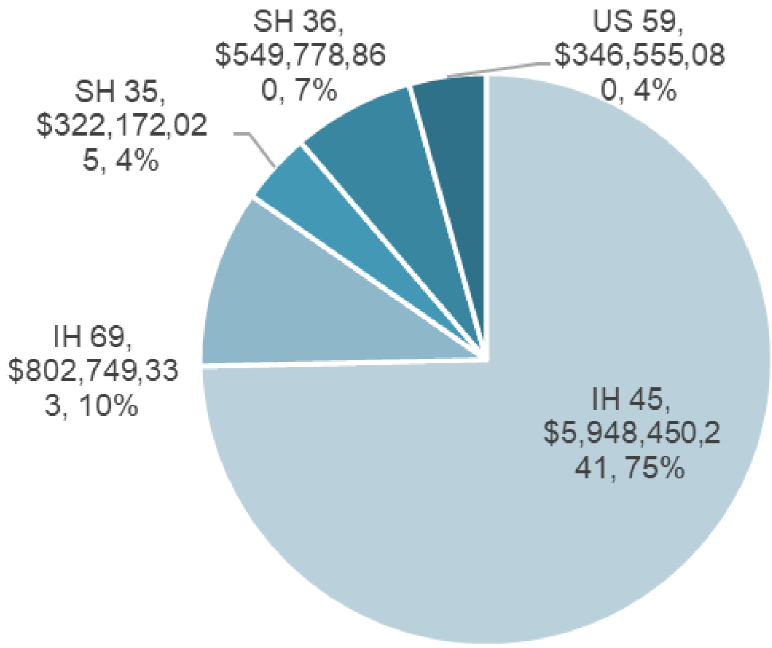
Table 19: Details of Project Cost by Project Type

PROJECT TYPE	CONSTRUCTION COST	PROJECT COUNT	COST PER PROJECT
Widen Road - Add Lanes	11,491,162,217	83	138,447,738
Construct Direct Connectors	1,326,737,212	11	120,612,474
Construct New Toll Road	829,150,000	4	207,287,500
Construct New Road	638,118,782	9	70,902,087
Highway Improvement	440,965,560	15	29,397,704
Bridge Replacement	396,397,591	11	36,036,145

As shown in Figure 36, 52 projects for a total of approximately $8 Billion are allocated to the Top-Six project types along study corridors – SH 35, SH 36, IH 45, I-69 and SH 225.

> *Investments along IH 45 (including the NHHIP major investment project) total approximately $6 Billion (75% of total investments). Whereas no projects of these types are planned along SH 225.*

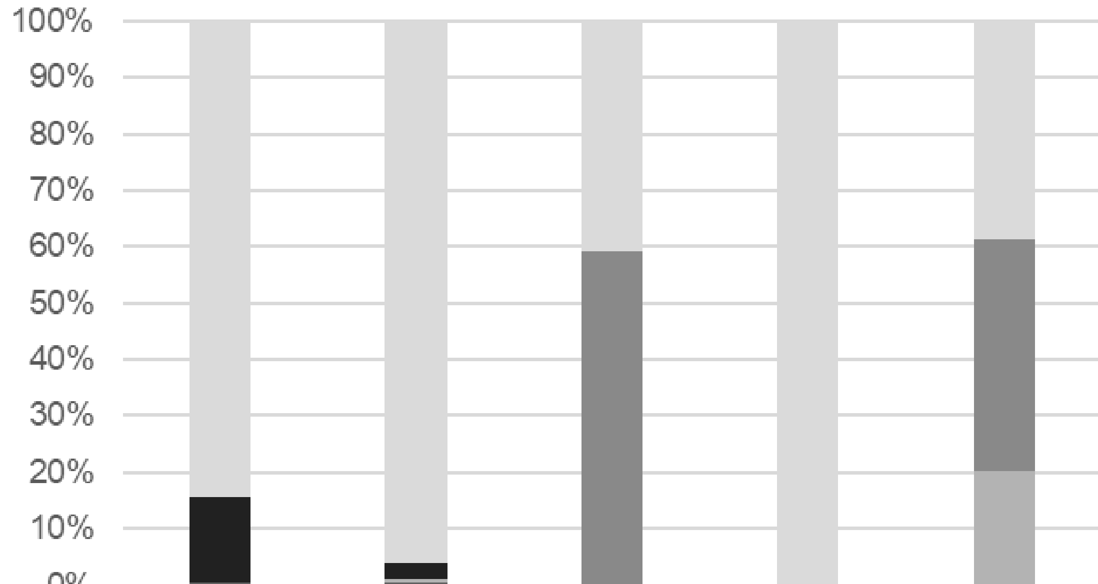
Figure 36. Funds by Corridor



As shown in Figure 37 and Figure 38, approximately 83% of funds are allocated to widening lanes and 11.5% of funds are allocated to constructing direct connectors (almost exclusively along IH 45).

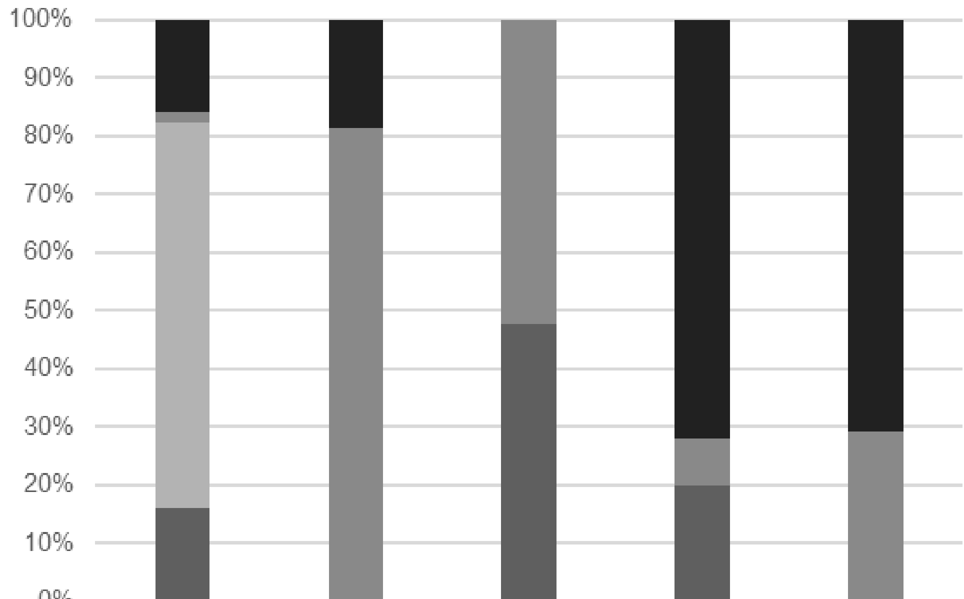
Approximately 60% of funds along SH 35 are allocated to constructing new road (CSJ 17809018 & 17809020) from IH 45 to Dixie Drive in Harris County, construction to begin within 4 years. Approximately 40% of funds along US 59 are allocated to constructing new road (CSJ 8909066) from FM 360 to Darst Road in Fort Bend County; construction is nearly complete.

Figure 37. Funds by Corridor by Project Type



	IH 45	IH 69	SH 35	SH 36	US 59
Widen Road - Add Lanes	$5,027,035,136	$771,886,481	$131,900,000	$549,778,860	$133,473,457
Construct Direct Connectors	$894,764,286	$22,358,859			
Construct New Road			$190,272,025		$143,081,623
Highway Improvement	$3,954,735	$4,460,875			$70,000,000
Bridge Replacement	$22,696,084	$4,043,118			

Figure 38. Funds by Corridor by Project Status



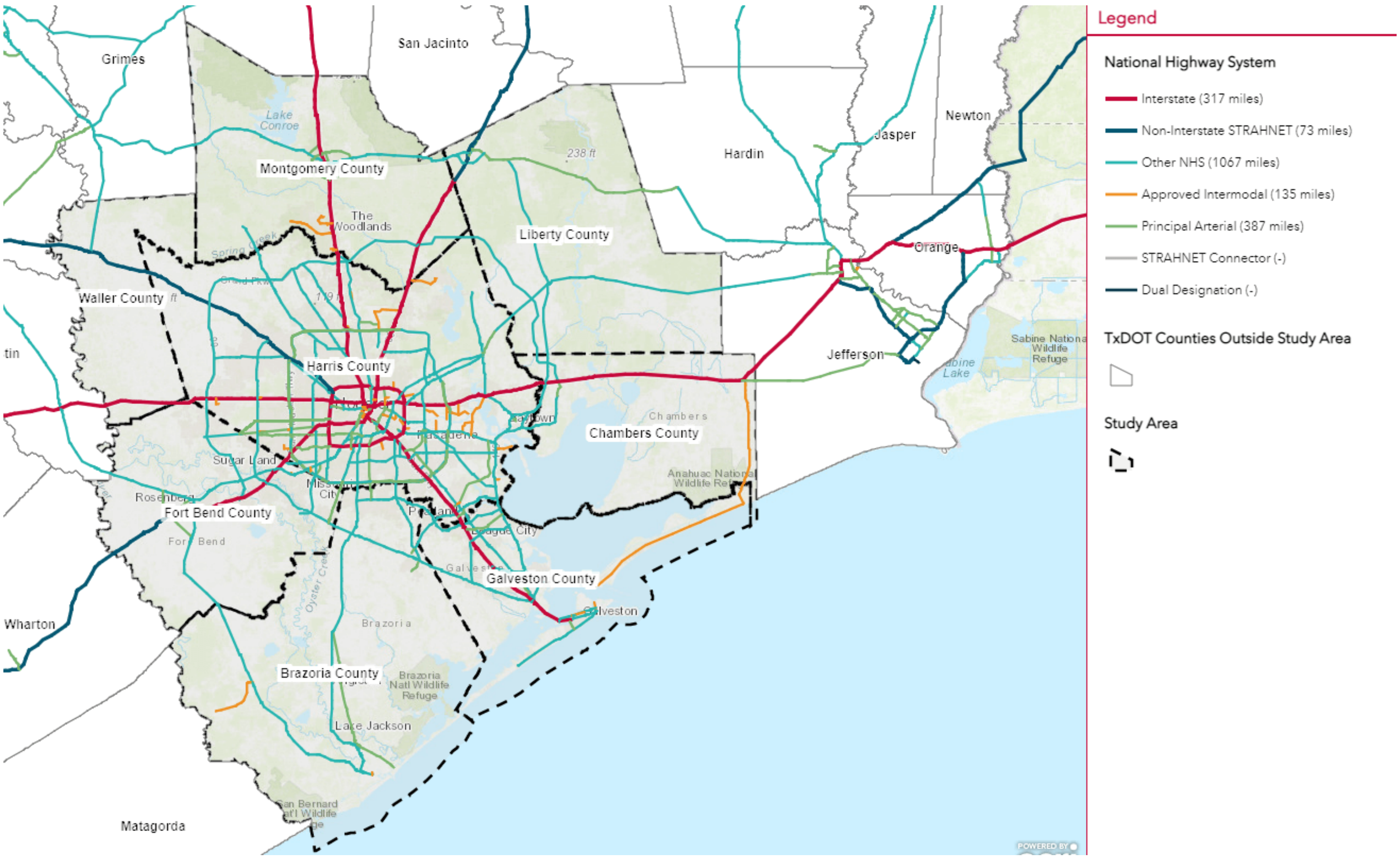
	IH 45	IH 69	SH 35	SH 36	US 59
Construction underway or begins soon	$945,916,961	$177,955,387		$395,378,860	$314,996,223
Construction begins within 4 years	$111,774,351	$775,929,599	$187,540,174	$45,000,000	$130,000,000
Construction begins in 5 to 10 years	$3,937,358,929	$4,064,900			
Corridor Studies, construction in 10+ years	$953,400,000		$170,600,000	$109,400,000	

8.2 Gaps (Unmet Needs)

8.2.1 Introduction

The five study corridors (Figure 39) were segmented at major roadways with respect to previous/planned projects. Corridor needs were compared to planned projects to identify gaps (segments with unmet needs). Planning-level considerations to resolve high-priority, unmet needs are recommended based on corridor context, segment needs, adjacent projects, and desired project benefits. Recommendations are preliminary, based on a limited, high-level assessment of available information and further study should be conducted to verify/refine corridor recommendations. Freight gaps with additional opportunities for improvements are provided below, within each corridor-specific subsection.

Figure 39. Study Corridors



8.2.2 SH 35

SH 35, from IH 45 to SH 288, was divided into five segments as shown in Table 20.

Table 20: SH 35 Gap Analysis (by Segment)

SEGMENT	DESCRIPTION
SH 35-01 From: IH 45/Spur 5 To: Dixie Drive CSJ: 0178-09-018, 0178-09-020	Spur 5 and Mykawa Road (from Dixie Drive to Airport Boulevard) will be redesignated as principle arterials. CSJ 17809018 to construct a new road (limited-access roadway) between these arterials is intended to address truck bottlenecks at the IH 45 @ IH 610 interchange by providing alternate route. However, the proposed alternate route is indirect and may not redistribute high volumes (particularly since IH 610 @ IH 45 direct connectors were recently constructed).
SH 35-02 From: Dixie Drive To: North Gordon Street (BS 35-C) CSJ: None	With the planned limited-access roadway (SH 35 extension) to the north and existing limited-access Alvin Bypass to the south, opportunities for increased capacity should be explored between Houston and Alvin. Mobility improvements should consider ROW constraints near FM 518 within City of Pearland's Old Town, close to the BNSF railroad. **A potential project for consideration includes widening SH 35 to a six-lane median-divided roadway between FM 518 (Pearland) and North Gordon Street (Alvin).**
SH 35-03 From: North Gordon Street (BS 35-C) To: Stelle Road CSJ: 0178-02-092	CSJ 0178-02-092 to construct new roadway lanes between North Gordon Street (BS 35-C) and Stelle Road will improve the Alvin Bypass and provide capacity in a moderately-congested segment of SH 35.
SH 35-04 From: Stelle Road To: FM 2403 CSJ: None	Similar to CSJ 178-02-092, grade-separated roadway lanes should be considered to improve the Alvin Bypass and replace bridge @ SH 6 (which has a clearance of 14'). While volumes south of SH 6 are significantly lower than north of SH 6, **increased freight at Port Freeport and capacity improvements along SH 35 between Alvin and Angleton will increase future traffic volumes, meriting capacity improvements along the Alvin Bypass.**
SH 35-05 From: FM 2403 To: FM 523 CSJ: 0178-02-092	CSJ 0178-02-092 to widen SH 35 (expectedly a four-lane roadway with Two way left turn lane (TWLTL)) will support increased freight and general traffic volumes along SH 35 between Alvin and Angleton.

8.2.3 SH 36

SH 36, from Austin County Line to FM 1495 (Freeport), was divided into three segments as shown in Table 21. A brief description of the SH 36A rail corridor is also included.

Table 21: SH 36 Gap Analysis (by Segment)

SEGMENT	DESCRIPTION
SH 36-01 From: Austin County Line To: US 90A (Rosenberg) CSJ: 0187-05-049	CSJ 18705049 to conduct a corridor study which considers widening SH 36. Future widening will support increased truck traffic (about 15%) and general traffic volumes along SH 36 between Rosenberg and Sealy.
SH 36-02 From: US 90A (Rosenberg) To: IH 69 (Rosenberg) CSJ: None	SH 36 (also called 1st Street) from US 90A to IH 69 is a four-lane roadway with TWLTL. Spur 10 provides a natural bypass for freight trips between Freeport and Sealy (IH 10 west). FM 2218 was recently widened and is a more direct connection between Freeport and IH 69 inbound. Therefore, few thru truck trips (about 3%) are expected along SH 36 between US 90A and Spur 10. **Spur 10 should be considered for freight investments, rather than urban segments of SH 36.** Spur 10 is included in TxDOT's freight network, and truck percentages of over 30% are reported along Spur 10 near IH 69.
SH 36-03 From: IH 69 (Rosenberg) To: FM 1495 (Freeport) CSJ: Various	An estimated $440 Billion (nine CSJs) is allocated to widen SH 36 to a four-lane roadway from IH 69 (Rosenberg) to FM 1495 (Freeport). Projects are either complete, underway, or will bid before 2023. Expected cross section varies as median type may be raised, flush, or TWLTL). Per Highway 36A Coalition, Inc., "Existing Highway 36 is a mostly two-lane undivided roadway in Fort Bend and Brazoria Counties. TxDOT is proposing several projects along SH 36 from Spur 10 to FM 1495 including expanding to a four-lane divided roadway with a grassy center median in rural sections and adding center left-turn lanes in urban sections. Already completed is an extension of Spur 10 south of US 59 along Hartledge Road."
SH 36A From: US 59S/IH 69S To: US 290/SH 6 CSJ: None Length: 65 miles	Per Highway 36A Coalition, Inc., "The Texas Department of Transportation has launched a $2 million draft Environmental Impact Statement (EIS) for the 36A corridor which extends from Rosenberg (US 59S/IH 69S) across IH 10 to Hempstead (US 290/SH 6). The study will analyze alternatives and determine a preferred route that best meets the needs of the area while avoiding or minimizing impacts to the natural and man-made environment."

8.2.4 IH 69

IH 69, from Wharton County Line to San Jacinto County Line, was divided into three segments as shown in Table 22.

Table 22: IH 69 Gap Analysis (by Segment)

SEGMENT	DESCRIPTION
IH 69-01 From: Wharton County Line To: IH 610 (West Loop) CSJ: 0089-09-066 & 0089-09-058	Significant investments have occurred along IH 69 N in recent years including widening to eight main lanes with two-way HOV lanes alongside frontage roads, ITS, and TMS improvements (CSJ 27-12-097). Approximately $80 Million of funds are allocated to construct new road (CSJ 0089-09-066) south of Beasley (construction underway) and widen IH 69 to six main lanes (CSJ 0089-09-058) north of Beasley (construction underway). These projects are the final stages of nearly one decade of construction, to upgrade IH 69 to a freeway-class facility within the region.
IH 69-02 From: IH 610 (West Loop) To: IH 610 (North Loop) CSJ: 0027-13-210 & 0027-13-211; 0027-13-200 & 0027-13-201	Major investments are planned along inner-loop segments of IH 69 to increase capacity within most-congested roadway segments and resolve three truck bottlenecks. Approximately $800 Million of funds are allocated to constructing direct connectors (CSJs 0027-13-210 & 0027-13-211) at IH 610 (construction underway) and widening IH 69 (CSJs 0027-13-200 & 0027-13-201) from Spur 527 to SH 288 (construction to begin within 4 years). These investments will increase capacity and reduce congestion for truck traffic (about 9%) and general traffic volumes along IH 69.
IH 69-03 From: IH 610 (North Loop) To: San Jacinto County Line CSJ: 0177-03-096 & 0177-03-099	In 2019, IH 69 from IH 10 to Little York Road was listed #91 of most-congested roadway segments. This segment is not included in the 2021 list, in part due to significant investment along IH 69 N in recent years. Approximately $160 Million of funds are allocated to constructing new road (CSJ 0177-03-096) south of Cleveland (construction underway) and converting non-freeway (CSJ 0177-03-099) in Cleveland (construction to begin within 4 years). These projects are the final stages of nearly one decade of construction, to upgrade IH 69 to a freeway-class facility within the region.

8.2.5 IH 45

In 2016, TxDOT published the IH 45 Freight Corridor Plan (FCP) which "serves as a master plan for freight system improvements in the IH 45 corridor, identifying short- and long-term improvement strategies, including infrastructure enhancements, operational improvements, and freight policies." FCP recommendations along IH 45, from SH 75 (Huntsville) to SH 87 (Galveston), were divided into six segments and are provided as Table 23 and Table 24. Excerpts from the IH 45 FCP are provided in Appendix C. The majority of programmed projects (high mast illumination; transportation system management; and reconstruction of frontage roads) and planned projects (widening of mainline and frontage roads; reconfiguration of interchanges; and addition of managed lanes, express lanes, or HOV lanes) listed in the 2016 FCP have been implemented and are not included in the table below. These improvements will bring most bridges along these segments of IH 45 into compliance with TxDOT height standards.

Table 23: IH 45 Gap Analysis (by Segment)

SEGMENT	DESCRIPTION
IH 45-01 From: SH 75 (Huntsville) To: SH 242 (The Woodlands)	Quick Start: CVO traveler information; ITS collision avoidance; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; and public education/safety campaign. Multimodal Enhancements: Reconstruction of 8 bridges crossing the primary freight network to height clearance of 18'6"; interchange improvements at US287/FM1394/SH84; integrated corridor management; variable pricing HOV; and add general purpose lanes/capacity
IH 45-02 From: SH 242 (The Woodlands) To: FM 1960	Quick Start: CVO traveler information; ITS collision avoidance; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; and public education/safety campaign. Multimodal Enhancements: Increase eight bridges to crossing the primary freight network height clearance of 18'6"; integrated corridor management; variable pricing HOV; and add general purpose lanes/capacity.
IH 45-03 From: FM 1960 To: IH 610 (North Loop)	Quick Start: CVO traveler information; ITS collision avoidance; truckload consolidation; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; and public education/safety campaign Multimodal Enhancements: Reconstruction of 15 bridges crossing the primary freight network to height clearance of 18'6"; bridge rehabilitation/replacement/reconstruction; interchange improvements at 610N; BW 8; integrated corridor management; variable pricing HOV; and add general purpose lanes/capacity.

Source: TxDOT IH 45 Freight Corridor Plan, Page 13 &14, February 2016

Table 24: IH 45 Gap Analysis (by Segment) (Continued)

SEGMENT	DESCRIPTION
IH 45-04 From: IH 610 (North Loop) To: IH 10	Quick Start: CVO traveler information, ITS collision avoidance, truckload consolidation, detailed corridor safety analysis, enhanced weigh in motion monitoring, bright striping of low bridges, public education/safety campaign, and restricted truck lanes. Multimodal Enhancements: Reconstruction of 6 bridges crossing the primary freight network to height clearance of 18'6", interchange improvements at I-10, US 59, integrated corridor management, variable pricing HOV, pavement rehabilitation, roadway reconstruction, and add general purpose lanes/capacity.
IH 45-05 From: IH 10 To: IH 610 (South Loop)	Quick Start: CVO traveler information; ITS collision avoidance; truckload consolidation; detailed corridor safety analysis; enhanced WIM weigh in motion monitoring; bright striping of low bridges; public education/safety campaign; and restricted truck lanes. Multimodal Enhancements: Reconstruction of 18 bridges crossing the primary freight network to height clearance of 18'6" and 3 bridges crossing the secondary freight network to a height clearance of 16'6"; bridge rehabilitation/replacement/reconstruction interchange improvements at I-610S; integrated corridor management; variable pricing HOV; pavement rehabilitation; roadway reconstruction; and add general purpose lanes/capacity.

SEGMENT	DESCRIPTION
IH 45-06 From: IH 610 (South Loop) To: SH 87 (Galveston)	Quick Start: CVO traveler information; ITS collision avoidance; changes in port operation/off peak hours; truckload consolidation; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; public education/safety campaign; and restricted truck lanes. Multimodal Enhancements: Reconstruction of 20 bridges crossing the primary freight network to height clearance of 18'6"; integrated corridor management; variable pricing HOV; pavement rehabilitation; roadway reconstruction; and add general purpose lanes/capacity.

Source: TxDOT IH 45 Freight Corridor Plan, Page 13 &14, February 2016

8.2.6 SH 225

SH 225, from IH 610 to SH 146 was analyzed as a single segment as shown in Table 25.

Table 25: SH 225 Gap Analysis

SEGMENT	DESCRIPTION
SH 225 (PEL) From: IH 610 To: SH 146 CSJ: 0502-01-228	Approximately $6.5 Million is allocated within TxDOT's UTP for improvements along SH 225 which includes traffic control devices and safety improvement projects (CSJs 0502-01-231, 0502-01-235, and 0502-01-237). In 2020, TxDOT began a Planning and Environmental Linkages (PEL) Study on approximately 15 miles of SH 225 from IH 610 East to SH 146 (CSJ 0502-01-228). The purpose of the PEL is to analyze corridor needs, create a corridor vision, develop the universe of alternatives, and recommend solutions. The majority of the corridor has a 300' ROW, but some locations near Shaver Street have a 200' ROW. Freight needs along the corridor (in terms of truck percentage [Figure 40], truck volume, crash rate, etc.) are much greater than programmed investments. **The PEL study should be expedited to sooner implement projects which resolve freight needs along the corridor.**

Figure 40. SH 225 Truck Percentages

Source: SH 225 PEL Stakeholder and Agency Workshop #2 Meeting Summary, May 11, 2021 1:30 p.m.

8.3 Freight Initiatives

A literature review was conducted to organize information of seven freight initiatives: dedicated truck lanes, off-peak delivery of commercial vehicles, time-of-day tiered truck toll pricing, heavy duty truck corridors, zero emissions corridors, truck parking opportunities, freight intelligent transportation systems. A summary of each freight initiative is provided as Table 26, including application, benefits, and use.

Table 26: Summary of Freight Initiatives

INITIATIVE	APPLICATION	BENEFIT	H-GAC USE
Dedicated truck lanes	Corridors with high percentages of truck traffic	Keeps larger and slower moving truck traffic separate from other vehicle traffic. Provides clear driver expectation.	Corridors near industrial, logistics and shipping hubs (i.e. SH 225 and SH 146 near Port Houston and Bayport).
Off-peak delivery by commercial vehicles	In areas with high peak period congestion and/or nearby residential areas.	Improves efficiency by having freight move during off peak times. Removes traffic from cut through residential areas.	Areas with industrial, logistics and shipping hubs (i.e. trips between Bayport and Barbours Cut)
Time-of-day tiered truck toll pricing	Corridors with high percentage of freight traffic and congested nearby free routes	Removes freight traffic from congested and commuter facilities	Areas with longer distance freight / truck trips.
Heavy duty truck corridors	Shorter corridors with high percentages of truck traffic. May have wider lanes and stronger pavement section.	Can reduce pavement wear and handle oversize trucks.	Near major shipping hubs.
Zero emissions corridors	On commuter routes and in environmentally sensitive areas.	Provides incentive for zero emission vehicle operations (purchase).	More suited toward commuter routes and through environmentally sensitive areas.
Truck parking opportunities	Longer corridors with high percent of freight trips. Location near high volume freight centers.	Provides for driver rest and compliance with CDL regulations. Allows drivers to confirm delivery/ pickup times and paperwork.	On interstates and near ports.
Freight Intelligent Transportation Systems (FITS)	Near major trip generators and along high volume truck routes.	Provides travel time information to trucks and alternative routings if required.	On high volume truck corridors.

8.4 Specific Corridor Recommendations

We have made recommendations throughout the document that broadly apply to each subject area. The recommendations below in Table 27 are specific to individual corridors: planning-level recommendations (including potential freight initiatives) to resolve high-priority, unmet needs along the five study corridors. Recommendations are preliminary, based on a limited, high-level assessment of available information and further study should be conducted to verify/refine corridor recommendations.

Table 27: Specific Corridor Recommendations

SEGMENT	RECOMMENDATION	FREIGHT INITIATIVE
SH 35-02 From: Dixie Drive To: North Gordon Street (BS 35-C) CSJ: None	Widen SH 35 to a six-lane median-divided roadway between FM 518 (Pearland) and North Gordon Street (Alvin).	FITS, Truck parking
SH 35-04 From: Stelle Road To: FM 2403 CSJ: None	Construct grade-separated roadway lanes and replace highway bridge at SH 6 (which has a clearance of 14').	FITS
SH 36-01 & SH 36-02 From: Austin County Line To: IH 69 (Rosenberg) CSJ: 0187-05-049	Advance CSJ 0187 05 049 (corridor study) and expand the study area to include Spur 10. Consider freight investment along Spur 10, rather than urban segments of SH 36.	FITS, Truck parking
IH 69-03 From: IH 610 (North Loop) To: San Jacinto County Line CSJ: 0177-03-096 & 0177-03-099	Conduct a corridor study or PEL to recommend long-term improvements along IH 69 N, at intersecting roadways, and at highway-rail crossing locations along the UPRR Lufkin Subdivision.	FITS, Truck parking, Dedicated truck lanes
IH 45 (FCP) From: SH 75 (Huntsville) To: SH 87 (Galveston) CSJ: Various	Develop and implement recommendations of TxDOT's IH 45 FCP including ITS collision avoidance; truckload consolidation; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; and public education/safety campaign.	FITS, Truck parking, Dedicated truck lanes, Time-of-day tiered truck toll pricing (Hardy Toll Road)
IH 45 (PEL) From: Loop 336 South (Conroe) To: Beltway 8 North CSJ: 0912-00-536	Develop and implement freight-related recommendations of TxDOT's PEL.	FITS, Truck parking, Dedicated truck lanes, Time-of-day tiered truck toll pricing (Hardy Toll Road)
SH 225 (PEL) From: IH 610 To: SH 146 CSJ: 0502-01-228	Expedite the SH 225 PEL study to sooner implement projects which resolve freight needs along the corridor.	FITS, Truck parking, Dedicated truck lanes, Heavy duty truck corridors
Other Corridors	Additional freight corridors should be selected for further study to assess corridor needs, review planned projects, and identify additional opportunities for freight-related improvements. Additional corridors may include IH 10, SH 99, SH 288, IH 610, and SH 146.	All (FITS, Truck parking, Dedicated truck lanes, Time-of-day tiered truck toll pricing, Heavy duty truck corridors, Off-peak delivery by commercial vehicles, Zero emissions corridors)

APPENDIX A.

TxDOT UTP

CSJ_Text	Fiscal__ Year	Highway	From	To	Project_Class	Cost_to_Let	Funding_Status	Project_Grouping	2050_Priority	FIP
0500-03-601	2030	IH 45	At IH 69 South		Widen Freeway	$1,172,300,000	Partially Funded	Mobility	High	Unconstrained
0500-03-599	2027	IH 45	At IH 10 West		Widen Freeway	$903,750,000	Fully Funded	Mobility	High	Yes
0500-03-596	2031	IH 45	IH 610	Airline Drive	Widen Freeway	$546,044,643	Unfunded	Mobility	High	Unconstrained
0500-03-560	2031	IH 45	IH 10	IH 610	Widen Freeway	$420,500,000	Partially Funded	Mobility	High	Unconstrained
0500-01-119	2023	IH 45	South Of Causeway	South Of 61St Street	Widen Freeway	$108,570,000	Fully Funded	Mobility	High	Yes
0110-04-202	2024	IH 45	S Of Shenandoah Park Dr	SH 242	Freeway Operational Impro	$10,552,000	Fully Funded	Mobility	High	Yes
0110-05-138	2026	IH 45	FM 1960	Montgomery County Line	Traffic Control Devices	$1,624,283	Fully Funded	Safety	High	Yes
0500-03-638	2025	IH 45	SL 8 South	IH 610 South	Traffic Control Devices	$1,510,480	Fully Funded	Safety	High	Yes
0675-08-118	2024	IH 45	FM 830	Shepherd Hill Rd	Safety Improvement Projec	$1,492,637	Fully Funded	Safety	High	Yes
0500-03-645	2025	IH 45	IH 610 (S)	SL 8	Corridor Traffic Manageme	$1,200,000	Fully Funded	Mobility	High	Yes
0110-05-137	2026	IH 45	Kuykendahl	FM 1960	Traffic Control Devices	$1,149,068	Fully Funded	Safety	High	Yes
0675-08-116	2026	IH 45	SL 336(S)	SH 75	Traffic Control Devices	$1,120,478	Fully Funded	Safety	High	Yes
0110-05-134	2024	IH 45	South Of Kuykendahl Rd.	Montgomery County Line	Traffic Control Devices	$1,100,000	Fully Funded	Safety	High	Yes
0500-03-647	2026	IH 45	IH 610 N	N Of Veterans Memorial	Traffic Control Devices	$1,031,189	Fully Funded	Safety	High	Yes
0110-06-152	2026	IH 45	N Of Veterans Memorial	SL 8	Traffic Control Devices	$914,450	Fully Funded	Safety	High	Yes
0110-04-212	2026	IH 45	Harris County Line	FM 1488	Traffic Control Devices	$894,690	Fully Funded	Safety	High	Yes
0110-04-208	2024	IH 45	Harris County Line	SL 336 (South)	Traffic Control Devices	$832,000	Fully Funded	Safety	High	Yes
0110-05-140	2023	IH 45	Kuykendahl	FM 1960	Traffic Control Devices	$468,000	Fully Funded	Safety	High	Yes
0675-08-115	2024	IH 45	SL 336 (South)	North Of League Line Rd.	Traffic Control Devices	$468,000	Fully Funded	Safety	High	Yes
0110-06-153	2026	IH 45	SL 8	Kuykendahl	Traffic Control Devices	$324,096	Fully Funded	Safety	High	Yes
0110-04-213	2026	IH 45	FM 1488	SL 336(S)	Traffic Control Devices	$280,119	Fully Funded	Safety	High	Yes
0110-04-209	2024	IH 45	North Of FM 1488	SL 336 (South)	Freeway Operational Impro	$251,973	Fully Funded	Mobility	High	Yes
0110-06-156	2023	IH 45	SL 8 North	Kuykendahl	Traffic Control Devices	$132,000	Fully Funded	Safety	High	Yes
0500-03-597	2031	IH 45	At IH 610		Interchange (New or Recon	$650,064,286	Partially Funded	Mobility	Medium	Unconstrained
0500-03-598	2030	IH 45	IH 69 South	IH 10	Interchange (New or Recon	$244,700,000	Fully Funded	Mobility	Medium	Yes
0675-08-120	2024	IH 45	N Of FM 830	S Of FM 1097	Intersection & Operational	$1,752,378	Fully Funded	Mobility	Medium	Yes
0110-04-211	2026	IH 45	S Of Shenandoah Park Dr.	S Of SH 242	Widen Freeway	$1,315,057	Fully Funded	Mobility	Medium	Yes
0110-05-136	2026	IH 45	SH 99 Exit	Spring Creek	Restoration	$1,285,600	Fully Funded	Asset Management	Medium	Yes
0675-08-117	2026	IH 45	SH 75	Walker County Line	Traffic Control Devices	$266,969	Fully Funded	Safety	Medium	Yes
0110-04-205	2024	IH 45	At SH 242		Interchange (New or Recon	$12,000,000	Fully Funded	Mobility	Low	Yes
0110-04-217	2024	IH 45	IH 45 NB Ml At Spring Creek		Bridge Maintenance	$2,506,964	Fully Funded	Asset Management	Low	Yes
0110-04-216	2024	IH 45	IH 45 SB Ml At Spring Creek		Bridge Maintenance	$2,501,062	Fully Funded	Asset Management	Low	Yes
0675-08-121	2030	IH 45	At SL 336 South		Culvert & Storm Drainage W	$2,475,354	Fully Funded	Asset Management	Low	Yes
0110-04-207	2025	IH 45	At Research Forest / Tamina		Intersection & Operational	$2,150,000	Fully Funded	Mobility	Low	Yes
0500-03-644	2028	IH 45	At Cullen Blvd		Culvert & Storm Drainage W	$1,891,235	Unfunded	Asset Management	Low	Unconstrained
0110-04-214	2024	IH 45	At Spring Creek Rel (SB Mainlanes)		Bridge Maintenance	$1,183,653	Fully Funded	Asset Management	Low	Yes
0110-04-215	2024	IH 45	At Spring Creek Rel (NB Mainlanes)		Bridge Maintenance	$1,126,101	Fully Funded	Asset Management	Low	Yes
0110-04-210	2026	IH 45	NB Frontage Road At SH 242		Intersection & Operational	$700,000	Fully Funded	Mobility	Low	Yes
0027-13-201	2024	IH 69	SH 288	Spur 527	Widen Freeway	$460,600,000	Fully Funded	Mobility	High	Yes
0177-05-112	2023	IH 69	Harris County Line	Liberty County Line	Corridor Traffic Manageme	$5,165,179	Fully Funded	Mobility	High	Yes
0027-12-164	2026	IH 69	E Of SS 529	Harris County Line	Traffic Control Devices	$2,269,169	Fully Funded	Safety	High	Yes
0027-13-241	2027	IH 69	SL 8	S Of Westpark Drive	Safety Improvement Projec	$918,028	Fully Funded	Safety	High	Yes
0177-07-120	2025	IH 69	SL 8 East	S Of FM 1960	Traffic Control Devices	$823,480	Fully Funded	Safety	High	Yes
0177-06-091	2025	IH 69	S Of FM 1960	Montgomery County Line	Traffic Control Devices	$470,560	Fully Funded	Safety	High	Yes
0177-06-089	2023	IH 69	FM 1960	Montgomery County Line	Traffic Control Devices	$455,855	Fully Funded	Safety	High	Yes
0027-13-245	2026	IH 69	Fort Bend County Line	E Of SL 8	Traffic Control Devices	$183,059	Fully Funded	Safety	High	Yes
0027-13-200	2025	IH 69	SH 288	IH 45	Widen Freeway	$311,286,481	Fully Funded	Mobility	Medium	Yes
0027-13-221	2025	IH 69	At Mcgowen, Tuam And Elgin		Bridge Replacement	$63,886,667	Fully Funded	Asset Management	Medium	Yes
0027-13-246	2027	IH 69	South Of Bissonnet	South Of Rice Avenue	Traffic Control Devices	$4,064,900	Fully Funded	Safety	Medium	Yes
0177-07-118	2023	IH 69	SL 8 East	FM 1960	Traffic Control Devices	$852,890	Fully Funded	Safety	Medium	Yes

CSJ_Text	Fiscal__ Year	Highway	From	To	Project_Class	Cost_to_Let	Funding_Status	Project_Grouping	2050_Priority	FIP
0177-11-159	2023	IH 69	IH 69 NB	IH 610 WB	Safety Improvement Projec	$126,616	Partially Funded	Safety	Medium	Unconstrained
0177-11-160	2024	IH 69	IH 69 SB	IH 10 EB	Safety Improvement Projec	$121,033	Fully Funded	Safety	Medium	Yes
0177-05-123	2024	IH 69	Roman Forest Boulevard	At IH 69	Rail Hwy Crossing Signals/	$0	Fully Funded	Safety	Medium	Yes
0027-12-160	2024	IH 69	At Brazos River		Bridge Widening or Rehabil	$50,961,538	Fully Funded	Asset Management	Low	Yes
0027-12-158	2023	IH 69	At Oyster Creek		Bridge Replacement	$4,043,118	Fully Funded	Asset Management	Low	Yes
0027-13-242	2028	IH 69	At Hazard Street		Culvert & Storm Drainage W	$3,342,003	Unfunded	Asset Management	Low	Unconstrained
0027-13-243	2028	IH 69	At Mandell Street		Culvert & Storm Drainage W	$1,300,000	Unfunded	Asset Management	Low	Unconstrained
0177-05-118	2023	IH 69	Harris County Line	Kingwood Drive	Traffic Control Devices	$161,755	Fully Funded	Safety	Low	Yes
0027-13-244	2025	IH 69	IH 610 W	Spur 527	Preliminary Engineering	$0	Fully Funded	Other	Low	Yes
0177-11-149	2029	IH 69	At Buffalo Bayou		Preliminary Engineering	$0	Fully Funded	Other	Low	Yes
0502-01-237	2025	SH 225	Sens Rd	Robin St	Safety Improvement Projec	$2,851,925	Fully Funded	Safety	High	Yes
0502-01-235	2024	SH 225	IH 610 East	SH 146	Traffic Control Devices	$2,767,600	Fully Funded	Safety	High	Yes
0502-01-231	2024	SH 225	IH 610	SL 8	Traffic Control Devices	$896,000	Fully Funded	Safety	High	Yes
0502-01-217	2023	SH 225	At Bw 8		Interchange (New or Recon	$116,000,000	Fully Funded	Mobility	Medium	Yes
0178-01-042	2023	SH 35	0.1 Mile North Of SL 8	0.1 Mile South Of SL 8	Safety Improvement Projec	$588,454	Fully Funded	Safety	High	Yes
0178-03-159	2025	SH 35	FM 523	500 Feet West Of BS 288-	Safety Improvement Projec	$519,972	Fully Funded	Safety	High	Yes
0178-02-094	2025	SH 35	CR 129	FM 528	Safety Improvement Projec	$476,093	Fully Funded	Safety	High	Yes
0178-01-041	2024	SH 35	IH 45 (S)	SL 8 (S)	Traffic Control Devices	$256,680	Fully Funded	Safety	High	Yes
0179-02-089	2024	SH 35	FM 2852	BS 35-E	Safety Improvement Projec	$53,577	Fully Funded	Safety	High	Yes
0178-09-018	2023	SH 35	Griggs Road	IH 45/Spur 5	New Location Freeway	$77,000,000	Fully Funded	Connectivity	Medium	Yes
0178-09-020	2025	SH 35	Dixie Dr	North Of Griggs Road	New Location Freeway	$60,627,279	Partially Funded	Connectivity	Medium	Unconstrained
0178-02-092	2024	SH 35	North Gordon Street (BS 3	Steele Road	New Location Non-Freeway	$35,968,149	Fully Funded	Connectivity	Medium	Yes
0178-09-019	2024	SH 35	Dixie Drive	Long Drive	New Location Non-Freeway	$19,397,992	Fully Funded	Connectivity	Medium	Yes
0179-05-004	2023	SH 35	0.1 Miles East Of FM 1301	0.1 Miles West Of FM 130	Safety Improvement Projec	$239,347	Fully Funded	Safety	Medium	Yes
0188-07-006	2024	SH 35	BS 35-E	SH 36	Safety Improvement Projec	$78,333	Fully Funded	Safety	Medium	Yes
0188-01-016	2024	SH 36	IH 69(S)	FM 2218	Widen Non-Freeway	$45,000,000	Fully Funded	Mobility	High	Yes
0187-05-062	2026	SH 36	Austin County Line	Spur 10	Corridor Traffic Manageme	$8,521,224	Fully Funded	Mobility	High	Yes
0188-01-040	2024	SH 36	Ua 90	IH 69	Safety Improvement Projec	$143,866	Fully Funded	Safety	High	Yes

APPENDIX B.

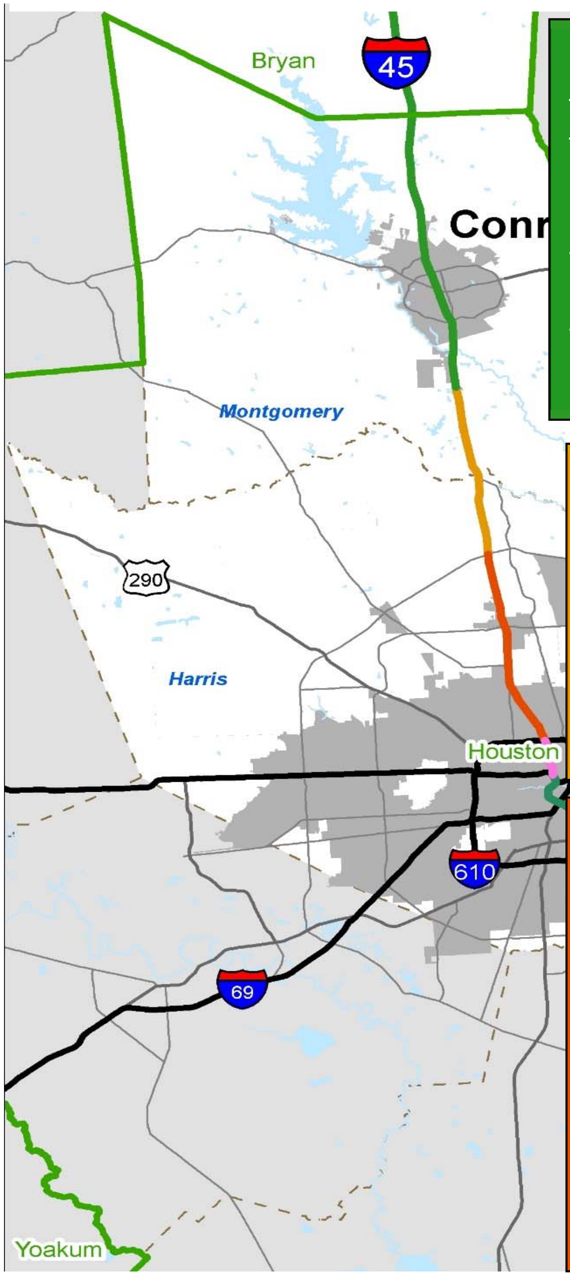
TxDOT Project Tracker Application Data

Control Section	County	Highway	From Limit	To Limit	Project Length	Description	Construction Cost/Estimate	Status	Tier	Trunk System
0500-03-601	Harris	IH 45	AT IH 69 SOUTH	.	0.738	Widen Road - Add Lanes	$ 1,172,300,000	Construction begins in 5 to 10 years	1	N
0500-03-599	Harris	IH 45	AT IH 10 WEST	.	0.8	Widen Road - Add Lanes	$ 903,750,000	Construction begins in 5 to 10 years	1	N
0500-03-597	Harris	IH 45	AT IH 610	.	0.34	Construct Direct Connectors	$ 650,064,286	Construction begins in 5 to 10 years	1	N
0500-03-596	Harris	IH 45	IH 610	AIRLINE DRIVE	2.433	Widen Road - Add Lanes	$ 546,044,643	Construction begins in 5 to 10 years	NA	N
0500-03-560	Harris	IH 45	IH 10	IH 610	3.132	Widen Road - Add Lanes	$ 420,500,000	Construction begins in 5 to 10 years	1	N
0110-06-139	Harris	IH 45	SOUTH OF SHEPHERD DRIVE	SOUTH OF WEST ROAD	0	Widen Road - Add Lanes	$ 392,850,000	Corridor Studies, construction in 10+ year	NA	N
0500-03-446	Harris	IH 45	AIRLINE DRIVE	SOUTH OF SHEPHERD DRIVE	2.516	Widen Road - Add Lanes	$ 300,000,000	Corridor Studies, construction in 10+ year	NA	N
0110-06-132	Harris	IH 45	SOUTH OF WEST ROAD	SL 8	1.987	Widen Road - Add Lanes	$ 260,550,000	Corridor Studies, construction in 10+ year	NA	N
0500-03-598	Harris	IH 45	IH 69 SOUTH	IH 10	2.396	Construct Direct Connectors	$ 244,700,000	Construction begins in 5 to 10 years	1	N
0500-04-106	Galveston	IH 45	N OF FM 517	S OF FM 1764	5.07	Widen Road - Add Lanes	$ 228,823,555	Construction underway or begins soon	NA	N
0500-04-105	Galveston	IH 45	SOUTH OF FM 1764	NORTH OF FM 519	3.395	Widen Road - Add Lanes	$ 162,914,778	Construction underway or begins soon	NA	N
0500-04-104	Galveston	IH 45	N OF FM 519	N OF TEXAS CITY WYE	3.283	Widen Road - Add Lanes	$ 128,025,750	Construction underway or begins soon	1	N
0500-04-096	Galveston	IH 45	0.452 MI S. OF FM 518	N OF FM 517	3.394	Widen Road - Add Lanes	$ 121,744,991	Construction underway or begins soon	NA	N
0500-01-119	Galveston	IH 45	SOUTH OF CAUSEWAY	SOUTH OF 61ST STREET	0	Widen Road - Add Lanes	$ 108,570,000	Construction begins within 4 years	1	N
0500-04-103	Galveston	IH 45	N OF TEXAS CITY WYE	S OF TEXAS CITY WYE	2.008	Widen Road - Add Lanes	$ 92,571,478	Construction underway or begins soon	1	N
0500-01-107	Galveston	IH 45	S OF TEXAS CITY WYE	N OF CAUSEWAY	1.574	Widen Road - Add Lanes	$ 89,225,679	Construction underway or begins soon	1	N
0500-03-107	Harris	IH 45	S OF NASA 1 BYPASS	GALVESTON COUNTY LINE	0.863	Widen Road - Add Lanes	$ 51,187,203	Construction underway or begins soon	NA	N
0500-04-117	Galveston	IH 45	HARRIS COUNTY LINE	0.452 MI S. OF FM 518	1.055	Widen Road - Add Lanes	$ 47,977,059	Construction underway or begins soon	NA	N
0500-01-144	Galveston	IH 45	IH 45 NB AT BNSF RR	.	0.468	Bridge Replacement	$ 14,025,778	Construction underway or begins soon	NA	N
0110-05-126	Harris	IH 45	CYPRESS STA. DRIVE	CYPRESS OAK DRIVE	1.556	Bridge Replacement	$ 6,683,534	Construction underway or begins soon	NA	N
0500-03-629	Harris	IH 45	IH 45 NB FRONTAGE RD AT GRIGGS	.	0.041	Bridge Replacement	$ 1,986,772	Construction underway or begins soon	NA	N
0675-08-120	Montgomery	IH 45	N OF FM 830	S OF FM 1097	1.906	Highway Improvement	$ 1,752,378	Construction begins within 4 years	NA	N
0500-03-645	Harris	IH 45	IH 610 (S)	SL 8		Highway Improvement	$ 1,200,000	Construction begins within 4 years	NA	N
0110-05-127	Harris	IH 45	AT CYPRESSWOOD	.	0.1	Highway Improvement	$ 750,384	Construction underway or begins soon	NA	N
0110-04-209	Montgomery	IH 45	NORTH OF FM 1488	SL 336 (SOUTH)		Highway Improvement	$ 251,973	Construction begins within 4 years	NA	N
0027-13-201	Harris	IH 69	SH 288	SPUR 527	1	Widen Road - Add Lanes	$ 460,600,000	Construction begins within 4 years	1	N
0027-13-200	Harris	IH 69	SH 288	IH 45	0	Widen Road - Add Lanes	$ 311,286,481	Construction begins within 4 years	1	N
0027-12-097	Fort Bend	IH 69	W OF FM 762	0.31 MI W OF FM 2759	4.271	Widen To 8 Ml, Frontage Roads, Its	$ 155,200,553	Construction underway or begins soon	NA	N
0027-13-211	Harris	IH 69	IH 69 SOUTHWEST FWY NORTH BO	IH 610 NORTH BOUND CONNECTO	0.657	Construct Direct Connectors	$ 12,147,088	Construction underway or begins soon	NA	N
0027-13-210	Harris	IH 69	IH 69 SOUTHWEST FWY SOUTH BO	IH 610 SOUTH BOUND CONNECTO	0.549	Construct Direct Connectors	$ 10,211,771	Construction underway or begins soon	NA	N
0027-13-246	Harris	IH 69	SOUTH OF BISSONNET	SOUTH OF RICE AVENUE		Highway Improvement	$ 4,064,900	Construction begins in 5 to 10 years	NA	N
0027-12-158	Fort Bend	IH 69	AT OYSTER CREEK	.	0.053	Bridge Replacement	$ 4,043,118	Construction begins within 4 years	NA	N
0177-07-001	Harris	IH 69	WILL CLAYTON	BF 1960A	1.665	Highway Improvement	$ 395,975	Construction underway or begins soon	NA	N
0178-03-136	Brazoria	SH 35	FM 2403	FM 523	15.6	Widen Road - Add Lanes	$ 131,900,000	Corridor Studies, construction in 10+ year	NA	N
0178-09-018	Harris	SH 35	GRIGGS ROAD	IH 45/SPUR 5	2.2	Construct New Road	$ 90,944,746	Construction begins within 4 years	1	N
0178-09-020	Harris	SH 35	DIXIE DR	NORTH OF GRIGGS ROAD	0	Construct New Road	$ 60,627,279	Construction begins within 4 years	1	N
0178-03-137	Brazoria	SH 35	SH 99	BS 35-C SOUTH	2	Construct New Road	$ 38,700,000	Corridor Studies, construction in 10+ year	NA	N
0178-02-092	Brazoria	SH 35	NORTH GORDON STREET (BS 35-C)	STEELE ROAD	1.798	Construct New Roadway Lanes	$ 35,968,149	Construction begins within 4 years	NA	N
0187-05-049	Fort Bend	SH 36	AUSTIN COUNTY LINE	SS 529 IN ROSENBERG	12.996	Widen Road - Add Lanes	$ 97,300,000	Corridor Studies, construction in 10+ year	NA	Y
0188-05-027	Brazoria	SH 36	SOUTH OF CITY OF BRAZORIA	SOUTH OF JONES CREEK BRIDGE	9.613	Widen Road - Add Lanes	$ 96,532,489	Construction underway or begins soon	1	Y
0188-02-029	Fort Bend	SH 36	0.43 MI N OF FM 2218	0.284 MI S OF NEEDVILLE-FAIRCHI	0	Widen Road - Add Lanes	$ 81,760,171	Construction underway or begins soon	1	Y
0188-03-019	Brazoria	SH 36	FORT BEND COUNTY LINE	N OF CR 467/HOGG RANCH RD	0	Widen Road - Add Lanes	$ 75,955,686	Construction underway or begins soon	1	Y
0188-04-025	Brazoria	SH 36	FM 522	NORTH OF SH 332	4.318	Widen Road - Add Lanes	$ 47,078,160	Construction underway or begins soon	1	Y
0188-01-016	Fort Bend	SH 36	IH 69(S)	FM 2218	2.9	Widen Road - Add Lanes	$ 45,000,000	Construction begins within 4 years	1	N
0188-04-035	Brazoria	SH 36	SH 35	FM 522	2.195	Widen Road - Add Lanes	$ 41,394,494	Construction underway or begins soon	1	Y
0188-06-046	Brazoria	SH 36	S. OF JONES CREEK BRIDGE	BRAZOS RIVER	3.84	Widen Road - Add Lanes	$ 32,995,992	Construction underway or begins soon	1	Y
0187-04-033	Austin	SH 36	FM 1952	FORT BEND COUNTY LINE	1.853	Widen Road - Add Lanes	$ 12,100,000	Corridor Studies, construction in 10+ year	NA	Y
0188-04-050	Brazoria	SH 36	SH 35	SOUTH OF SH 35	0.347	Widen Road - Add Lanes	$ 10,738,703	Construction underway or begins soon	1	Y
0111-08-100	Brazoria	SH 36	0.5 MI S OF THE BRAZOS RIVER	FM 1495 (SEG. 15)	1.246	Widen Road - Add Lanes	$ 8,923,165	Construction underway or begins soon	1	N
0177-03-096	Liberty	US 59	SOUTH END OF CLEVELAND BYPAS	MONTGOMERY COUNTY LINE	4.475	Construct New Road	$ 100,894,404	Construction underway or begins soon	NA	Y
0177-02-057	San Jacinto	US 59	FM 2914	LIBERTY C/L	3.58	Highway Improvement	$ 70,000,000	Construction begins within 4 years	1	Y
0027-12-105	Fort Bend	US 59	W OF SH 36	W OF FM 762	3.21	Widen Road - Add Lanes	$ 66,758,907	Construction underway or begins soon	NA	N
0027-12-106	Fort Bend	US 59	SP 10	W OF SH 36	4.14	Widen Road - Add Lanes	$ 66,714,550	Construction underway or begins soon	NA	N
0177-03-099	Liberty	US 59	SAN JACINTO C/L	.65 MILE SOUTH OF SL 573	3.04	Convert NoN-Freeway	$ 60,000,000	Construction begins within 4 years	1	Y
0089-09-066	Fort Bend	US 59	FM 360	WEST OF DARST ROAD	3.447	Construct New Road	$ 42,187,219	Construction underway or begins soon	NA	Y
0089-09-058	Fort Bend	US 59	WEST OF HAMLINK ROAD	WEST OF SPUR 10	2.272	Widen To 6 Main Lanes, Grade Sep	$ 38,441,143	Construction underway or begins soon	NA	Y

APPENDIX C.

TxDOT IH 45 Freight Corridor Plan Excerpts

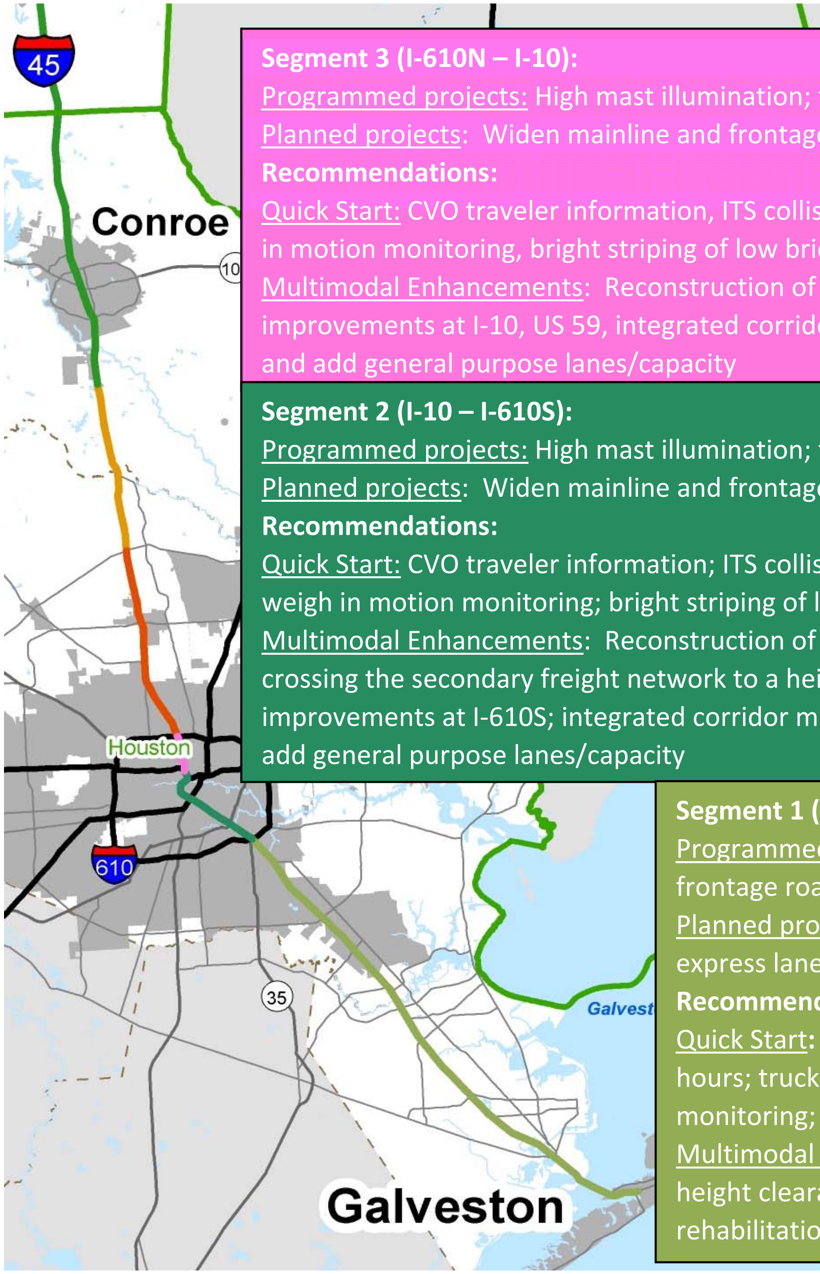
Houston District Freight Recommendations, 1 of 2



Segment 6 – Houston District portion (SH 75 in Huntsville – SH 242 south of Conroe):
Programmed projects: Construct park and ride lot and create 2 managed lanes
Planned projects: Widen mainline; construct northbound frontage road; ramp modifications; and add auxiliary lanes
Recommendations:
Quick Start: CVO traveler information; ITS collision avoidance; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; and public education/safety campaign
Multimodal Enhancements: Reconstruction of 8 bridges crossing the primary freight network to height clearance of 18’6”; interchange improvements at US287/FM1394/SH84; integrated corridor management; variable pricing HOV; and add general purpose lanes/capacity

Segment 5 (SH 242 south of Conroe - FM 1960):
Programmed projects: Create 2 managed lanes
Planned projects: Ramp modifications and add auxiliary lanes
Recommendations:
Quick Start: CVO traveler information; ITS collision avoidance; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; and public education/safety campaign
Multimodal Enhancements: increase 8 bridges to crossing the primary freight network height clearance of 18’6”; integrated corridor management; variable pricing HOV; and add general purpose lanes/capacity

Segment 4 (FM 1960 – I-610N):
Programmed projects: Create 2 managed lanes; high mast illumination; transportation system management; and reconstruct frontage roads
Planned projects: Widen mainline and frontage roads; add managed lanes express lanes or HOV lanes; andreconfigure interchanges
Recommendations:
Quick Start: CVO traveler information; ITS collision avoidance; truckload consolidation; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; and public education/safety campaign
Multimodal Enhancements: Reconstruction of 15 bridges crossing the primary freight network to height clearance of 18’6”; bridge rehabilitation/replacement/reconstruction; interchange improvements at 610N; BW 8; integrated corridor management; variable pricing HOV; and add general purpose lanes/capacity



Segment 3 (I-610N – I-10):
Programmed projects: High mast illumination; transportation system management; and reconstruct frontage roads
Planned projects: Widen mainline and frontage roads; reconfigure interchanges; and add managed lanes, express lanes, or HOV lanes
Recommendations:
Quick Start: CVO traveler information, ITS collision avoidance, truckload consolidation, detailed corridor safety analysis, enhanced weigh in motion monitoring, bright striping of low bridges, public education/safety campaign, and restricted truck lanes
Multimodal Enhancements: Reconstruction of 6 bridges crossing the primary freight network to height clearance of 18'6", interchange improvements at I-10, US 59, integrated corridor management, variable pricing HOV, pavement rehabilitation, roadway reconstruction, and add general purpose lanes/capacity

Segment 2 (I-10 – I-610S):
Programmed projects: High mast illumination; transportation system management; reconstruct frontage roads
Planned projects: Widen mainline and frontage roads; reconfigure interchanges; and add managed lanes express lanes or HOV lanes
Recommendations:
Quick Start: CVO traveler information; ITS collision avoidance; truckload consolidation; detailed corridor safety analysis; enhanced WIM weigh in motion monitoring; bright striping of low bridges; public education/safety campaign; and restricted truck lanes
Multimodal Enhancements: Reconstruction of 18 bridges crossing the primary freight network to height clearance of 18'6" and 3 bridges crossing the secondary freight network to a height clearance of 16'6"; bridge rehabilitation/replacement/reconstruction interchange improvements at I-610S; integrated corridor management; variable pricing HOV; pavement rehabilitation; roadway reconstruction; and add general purpose lanes/capacity

Segment 1 (I-610S - SH 87 in Galveston):
Programmed projects: High mast illumination; transportation system management; reconstruct frontage roads; and pavement overlay
Planned projects: Widen mainline and frontage roads; reconfigure interchanges; add managed lanes express lanes or HOV lanes; and build direct connector to Loop 197
Recommendations:
Quick Start: CVO traveler information; ITS collision avoidance; changes in port operation/off peak hours; truckload consolidation; detailed corridor safety analysis; enhanced weigh in motion monitoring; bright striping of low bridges; public education/safety campaign; and restricted truck lanes
Multimodal Enhancements: Reconstruction of 20 bridges crossing the primary freight network to height clearance of 18'6"; integrated corridor management; variable pricing HOV; pavement rehabilitation; roadway reconstruction; and add general purpose lanes/capacity

APPENDIX D.

Freight Initiative Resources

Freight Initiative Resources

Source, Contact	Description	Freight Initiatives
Alameda County Transportation Commission (CTC) **Antonino Genoese**	Alameda CTC is the implementing agency for the Global Opportunities at the Port of Oakland (GoPort) program, a suite of landside transportation improvement projects at the Port of Oakland (Port) to provide congestion relief, improve the efficiency and reliability of truck and rail access, and improve circulation within the Port. The first of the three projects slated for implementation is the technology demonstration project known as the Freight Intelligent Transportation System (FITS) project. • Changeable message signs • On-site cameras • Fiber and Wi-Fi communications • A traffic management center/emergency operations center • Traffic signal enhancements • Vehicle and queue detection • Train detection system • Weigh-in-motion technology • A GoPort Freight ITS phone application • A smart parking system	Freight Intelligent Transportation System (FITS)
Port of Oakland **Antonino Genoese**	The Alameda County Transportation Commission has received $12.45 million from the California Transportation Commission for the implementation of the Freight Intelligent Transportation System (FITS) program at the Port of Oakland. FITS includes 15 freight technology demonstration projects designed to address traffic management, security systems and roadway improvements at the Oakland seaport. Some examples of FITS demonstration projects: • Interagency emergency operations and traffic management center; • WiFi for truckers to access traffic and terminal gate updates; • Changeable message signs to show traffic delays for truckers; • Vehicle queue detection for accurate measurement of truck turn times; • Mobile phone app for truckers.	Freight Intelligent Transportation System (FITS)

Freight Initiative Resources (Continued)

Source, Contact	Description	Freight Initiatives
West Coast Clean Transportation Corridor (WCCTC) Jenna McDavid	The West Coast Clean Transit Corridor Initiative is an ongoing, collaborative effort among 16 utilities to support the development of electric vehicle charging facilities along I-5, from San Diego to British Columbia, for heavy- and medium-duty freight haulers and delivery trucks.	Zero emissions corridors
NCTCOG Freight Optimizations Services **Kent Kacir**	Because the freight industry is essential to North Texas and because the improved movement of trucks will not only assist with expedited deliveries but also reduce emissions, the NCTCOG initiated a Freight Optimization Study in 2022.	Freight Intelligent Transportation System (FITS)
Texas Connected Freight Corridors **TxDOT**	The Texas Connected Freight Corridors Project is a collaborative effort with public and private stakeholders to deploy connected vehicle technologies to more than 1,000 commercial vehicles to improve traveler information, asset condition management, and system performance.	Freight Intelligent Transportation System (FITS)
University of Washington Urban Freight Lab **Robert Ferrin**	The Urban Freight Lab (UFL), housed at the Supply Chain Transportation and Logistics Center at the University of Washington, is an innovative partnership bringing together private industry, academic researchers, and public transportation agencies to solve urban freight management problems that overlap private and public spaces and have wide-ranging benefits.	Various

Appendix I

CUFC Methodology Memorandum

Regional Goods Movement Plan

Critical Freight Corridors Evaluation Methodology

Prepared for:

Houston-Galveston Area Council

September 1, 2022

Submitted by

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1 Introduction

The Houston-Galveston Area Council (H-GAC) Houston District is working with HDR Engineering, Inc. (HDR) to develop the Regional Goods Movement Plan (RGMP) for the H-GAC eight-county region. As part of this project, the Critical Freight Corridors (CFC) are in the area. This memorandum describes the methodology adopted to designate a corridor as CFC.

2 Methodology

The following steps describe the methodology adopted to designate the CFC

1. Review the projects in H-GAC's Transportation Improvement Plan (TIP) Years 2021 – 2024 and eliminate projects identified as "Construction underway or begins soon" or "Construction begins within 4 years" in TxDOT Unified Transportation Plan (UTP) 2022., The eliminated projects are assumed to have funding assigned and hence do not require a Critical Freight Corridors (CFC) designation. The modified list of TIP projects is henceforth referred to as the TIP project list.

2. The projects identified as "ADDED CAPACITY" in the TIP project list are considered "Freight-Eligible" projects for CFC designation.

3. Identify "Freight-Eligible" projects in TxDOT UTP 2022 which are expected to be built in 5+ years. The shortlisted projects are henceforth referred to as the UTP project list.

4. Review projects in the previous Critical Urban Freight Corridors (CUFC) list published by H-GAC in 2017 and identify whether they are part of the TIP or UTP projects list. Such projects will be included for further consideration in the updated CFC list.

5. Review the roadway corridors that currently have TIP or UTP projects and apply the scoring (defined in the table below) using the following criteria:

    - Criticality-Vulnerability – Ranking based on H-GAC resiliency pilot. Only Moderate or High Criticality/Vulnerability are ranked. The others would score "0". A weighted average of the scores will be assigned if a corridor has multiple criticality/vulnerability attributes.
    - Project is included in UTP or TIP list
    - Corridors with high truck volumes and truck percentages
    - Heavy Truck Corridors – Corridors within a 30-mile radius around Ports designated as 'Heavy Haul' corridors

- CUFC Connection – Corridors that provide connections to other freight significant corridors, and freight clusters and provide alternative options for freight movement.

The table below describes the criteria, sub-criteria, and proposed scoring for the selection of the latest Critical Freight Corridors.

Criteria	Sub Criteria	Score
Criticality-Vulnerability	High criticality-High vulnerability	1.00
	Moderate criticality-High vulnerability	0.75
	High criticality-Moderate vulnerability	0.75
	Low criticality-High vulnerability	0.50
	High criticality-Low vulnerability	0.50
	Moderate criticality-Moderate Vulnerability	0.25
Truck Volumes (Average Annual Daily Truck Traffic)	0-250	0.25
	251-500	0.50
	501-1000	0.75
	>1000	1.00
	>2000	2.00
Truck Percentage (Average Annual Daily Truck Traffic)	0-2.5%	0.25
	2.6%-5.0%	0.50
	5.1%-10.0%	0.75
	10.1%-19.9%	1.00
	>20%	2.00
Heavy truck corridors	This will apply to highways within 30 miles of the ports	1.00
Connection	Connects an intermodal facility to the PHFS, the Interstate System, or an intermodal freight facility.	2.00
	Located within a corridor of a route on the PHFS and provides an alternative highway option important to goods movement	1.00
	Serves a major freight generator, logistic center, or manufacturing and warehouse industrial land	1.00

Criteria	Sub Criteria	Score
	Corridor that is important to the movement of freight within the region, as determined by the MPO or the State	0.50
Crash Rate	<413	0.25
	413 - 887	0.5
	887 - 1361	0.75
	1361 - 1835	1
	>1835	2