CITY OF SEABROOK

2016 Thoroughfare Plan

Adopted on: July 19, 2016

CobbFendley

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1 INTRODUCTION

The transportation system is the heart of a community which is the portal to smart growth. Providing the necessary infrastructure for all road users ensures public safety and economic vitality. As such, City of Seabrook has initiated an update to the current City of Seabrook Thoroughfare Plan, with the goal of providing the City with a tool that can be used to manage, guide and design an efficient transportation system that accommodates new development and growth in the area. Alongside, the City has developed a Comprehensive Plan which will aid in establishing a future land use plan with community input. This Thoroughfare Plan has been developed in collaboration with the recommendations made in the Comprehensive Plan.

A Thoroughfare Plan is a long-range plan that identifies the location and type of roadway facilities that will be needed to meet the demands of projected growth and assists in guiding future development within an area. Along with a future land use plan, a Thoroughfare plan can form a long range statement of public policy which can aid a community in achieving their overall socio-economic development goals. Knowing the relationship between land use and transportation infrastructure is vital as an evolving land use dictates the transportation infrastructure needed to support and sustain viable long-term growth. In turn, the right transportation infrastructure is key in sustaining individual needs that arise from the different types of land uses. In detail, the benefits of developing and updating a Thoroughfare Plan includes:

- Provides for orderly development of an adequate transportation system as traffic grows and development occurs;
- Reduces travel and transportation costs by ensuring that thoroughfares effectively serve both regional and local traffic;
- Reduces the cost of major thoroughfare improvements through coordinated public and private improvements;
- Minimizes disruption and displacement of people and businesses by providing a long range plan for major thoroughfares;
- Reduces environmental impacts on air-quality, wetlands, historic sites, parks and other publicly used recreational areas, archaeological sites, endangered species, and neighborhoods;
- Provides opportunities for bicycles and pedestrians to safely share the right-of-way.

1.1 Previous Planning Efforts

1.1.1 2010 Thoroughfare Plan

The first City of Seabrook thoroughfare plan was adopted in 2010. This plan has aided in the growth of the City as well as ensured that the vision of the community was portrayed. The 2010 City of Seabrook Thoroughfare Plan was used as a starting point for the development of this thoroughfare plan.

1.1.2 Capital Improvement Projects (FY16-FY21+)

City of Seabrook's Capital Improvement Projects (CIP), is a list of short-range projects that identifies capital projects and equipment purchases, provides a planning schedule and identifies options for financing the plan. A CIP provides many benefits including:

The City's Capital Improvement Project (CIP) list will help solidify the City's thoroughfare network. While the City's CIP (2016-2020+) includes mostly water and wastewater projects and small improvements to local streets, it is important to take these projects into account when making recommendations to the City's thoroughfare network in order to ensure consistency and efficient use of the public funds. A summary of the City's 2016-2020 CIP is shown below. A copy of the detailed CIP is included in the Appendix.

WATER PROJECTS			
CIP #	PROJECT DESCRIPTION		PROJECT COST
W1	TODVILLE ROAD 12-INCH WATER LINE	$	1,495,920.00
W2	SHIPYARDS WATER SERVICE PHASE 1	$	655,420.00
W3	SHIPYARDS WATER SERVICE PHASE 2	$	721,280.00
W4	HUMBLE DRIVE WATER PLANT RELOCATION	$	2,618,758.00
W5	TAYLOR LAKE WATER LINE CROSSING	$	1,846,800.00
W6	OLD SEABROOK WATER LINE IMPROVEMENTS	$	256,820.00
W7	STATE HIGHWAY 146 WATER LINE ADJUSTMENTS	$	3,000,000.00
	TOTAL WATER PROJECTS	**$**	**10,594,998.00**

WASTEWATER PROJECTS			
CIP #	PROJECT DESCRIPTION		PROJECT COST
WW1	EAST MEYER PIPE BURSTING	$	1,547,800.00
WW2	SHIPYARDS SEWER SERVICE PHASE 1	$	1,246,200.00
WW3	SHIPYARDS SEWER SERVICE PHASE 2	$	565,400.00
WW4	TODVILLE SEWER LINE REPLACEMENT	$	2,128,000.00
WW5	WASTEWATER TREATMENT PLANT UPGRADES PHASE 1	$	506,400.00
WW6	WASTEWATER TREATMENT PLANT UPGRADES PHASE 2	$	1,617,300.00
WW7	RED BLUFF SANITARY SEWER EXTENSION	$	446,000.00
WW8	STATE HIGHWAY 146 SANITARY SEWER ADJUSTMENTS	$	2,500,000.00
WW9	LAKESIDE DRIVE SANITARY SEWER RELOCATION	$	331,139.00
	TOTAL WASTEWATER PROJECTS	**$**	**10,888,239.00**

DRAINAGE PROJECTS			
CIP #	**PROJECT DESCRIPTION**		**PROJECT COST**
D1	TODVILLE ROAD BRIDGE	$	2,038,000.00
D2	EL MAR DITCH	$	4,202,800.00
D3	RED BLUFF ROAD DRAINAGE CHANNEL	$	10,240,625.00
D4	WILDLIFE PARK DRAINAGE EXPANSION	$	527,000.00
D5	BAYBROOK SECTION 1 - DRAINAGE IMPROVEMENTS	$	988,200.00
D6	BAYWOOD BRIDGE	$	423,400.00
D7	HESTER'S GULLY	$	801,650.00
	TOTAL DRAINAGE PROJECTS	**$**	**19,221,675.00**

STREET PROJECTS			
CIP #	**PROJECT DESCRIPTION**		**PROJECT COST**
S1	BAYBROOK SECTION 1 - DELABROOK CT	$	225,676.00
S2	BAYBROOK SECTION 1 - CEDARBROOK CT	$	224,038.00
S3	BAYBROOK SECTION 1 - BROOKWOOD CT	$	220,819.00

TOTAL STREET PROJECTS	**$**	**670,533.00**

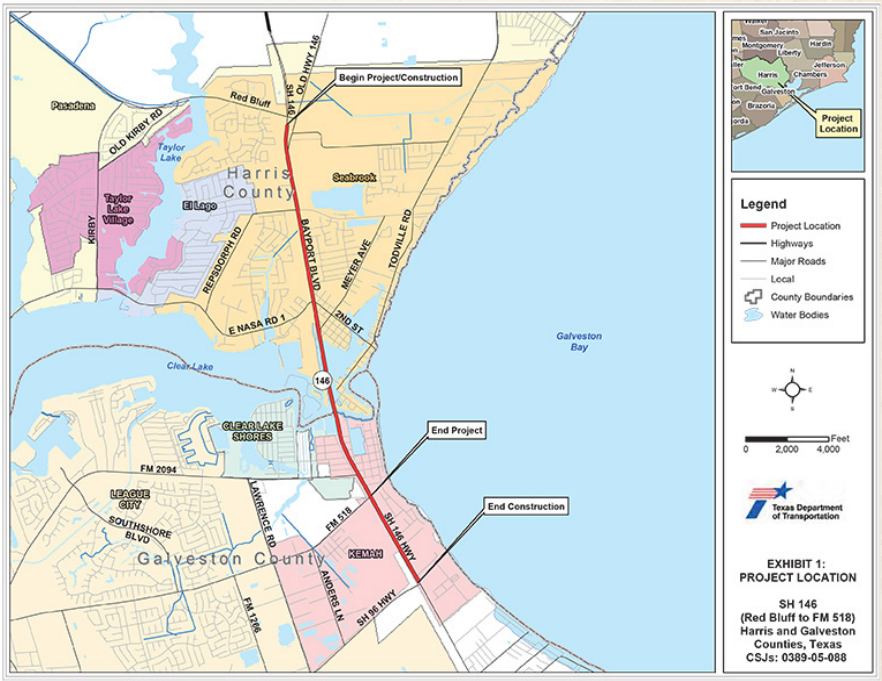
FACILITY PROJECTS			
CIP #	**PROJECT DESCRIPTION**		**PROJECT COST**
FAC1	CITY HALL PARKING LOT	$	159,027.00

TOTAL STREET PROJECTS	**$**	**159,027.00**

TOTAL WATER PROJECTS	**$**	**10,594,998.00**
TOTAL WASTEWATER PROJECTS	**$**	**10,888,239.00**
TOTAL DRAINAGE PROJECTS	**$**	**19,221,675.00**
TOTAL STREET PROJECTS	**$**	**670,533.00**
TOTAL FACILITY PROJECTS	**$**	**159,027.00**
TOTAL CIP 2014-2018	**$**	**41,375,445.00**

Costs highlighted in yellow are ballpark estimates based on current information from TxDOT.

1.1.3 State Highway (SH) 146 Expansion Project



Improvements to State Highway (SH) 146 have been proposed by the Texas Department of Transportation (TxDOT) in conjunction with the City of Seabrook. As per the information shown in the City's website, the expansion of SH 146 is greatly needed to alleviate daily traffic congestion. As the official hurricane evacuation corridor, the proposed improvements to SH 146 will increase mobility and safety during day-to-day operations and hurricane evacuations. In summary, the project will consist of the following:

- Widen and restructure the existing facility to a six- to 12-lane controlled access facility
- Add grade separations at major intersections
- Add access roads in selected locations
- Add express lanes over Clear Creek

The highway will be expanded south through Seabrook from Red Bluff Road to FM 518. A new expressway bridge will be built parallel and west of the Seabrook-Kemah Bridge. The current bridge will remain and serve as a frontage road for motorists.

It is important to note that the proposed TxDOT alignment will be consistent with the SH 146 improvements completed in the City of La Porte. Details of the proposed alignment are shown graphically in the City's website. Construction is expected to commence in 2017.

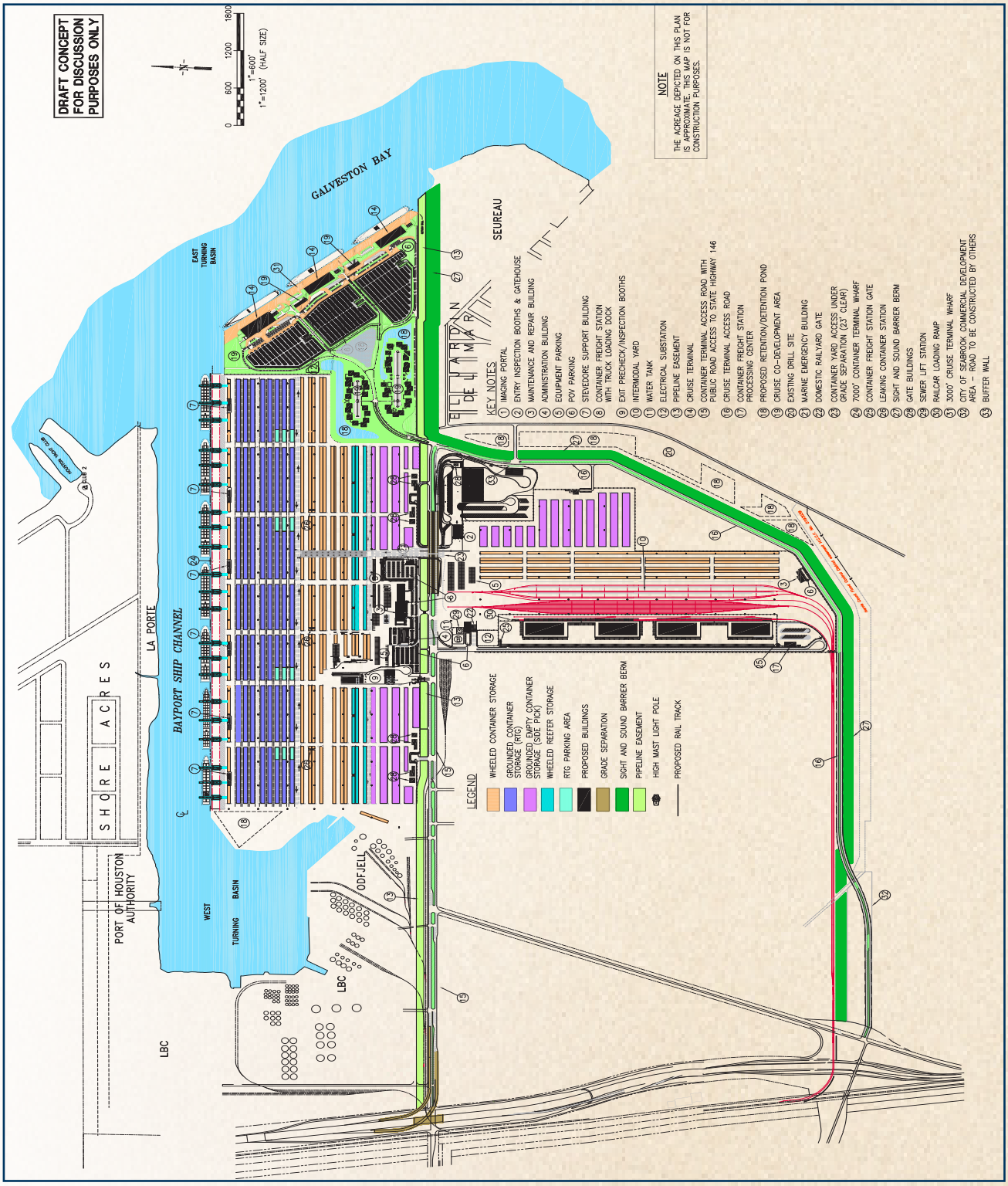
1.1.4 Comprehensive Plan

The City of Seabrook is developing a city-wide comprehensive plan which, along with this thoroughfare plan, will aid in developing the long-term vision of the community. Additionally the plan determines community goals and aspirations and dictates public policy in terms of transportation, utilities, land use, recreation, and housing.

1.1.5 Other Planning Efforts

1.1.5.1 Bayport Master Plan

While not a City of Seabrook effort, the Bayport Master Plan was developed with input from City of Seabrook staff. As road users from the Port use City of Seabrook's transportation network to access TX 146 and other regional thoroughfares, City involvement was necessary. Negotiations between City of Seabrook staff and the Port resulted in the creation of an industrial street typical section to be used for "Commercial Road." This typical section can be seen in Chapter 4 of this plan.



1.1.5.2 Freight Mobility Plan

The Texas Department of Transportation (TxDOT) is developing a Freight Mobility Plan which identifies Texas' freight transportation challenges and outlines investment strategies and policies needed to address them. The plan also provides a vision for a safe, reliable, and efficient freight transportation system for Texas that supports economic growth and economic competitiveness. A critical component for the development of the Draft Freight Plan has been a continued, robust, and meaningful engagement of all freight stakeholders and the general public throughout the state. The draft Freight Plan was developed through a collaborative effort between TxDOT and the Texas Freight Advisory Committee as well as input gathered from extensive stakeholder outreach over the last two years.

Due to City of Seabrook's proximity to the Port, it is of the utmost importance to be informed of the recommendations and decisions proposed in the Freight Mobility Plan. This will ensure that the Seabrook community will be aware of decisions that may or may not impact land uses and roadway functionality. Currently, TxDOT is seeking input from public and private sectors including: air cargo, shippers, receivers, rail, ports, trucking, energy, manufacturing, retail, agriculture, pipelines, freight forwarders, transporters, organizations involved in freight movement, the general public, community leaders, and local, regional, state, and federal entities throughout the state.

1.2 Need for Thoroughfare Plan Update

As new developments occur in the City of Seabrook, the area's changing needs require an update to the Thoroughfare Plan in order to ensure that the community's demands are being met. In order to understand the wants and needs of the community, public opinion was obtained during the Comprehensive Plan's public involvement meeting. The overall findings of the public involvement meeting are detailed in the Comprehensive Plan. Some of the key issues that the public would like for this thoroughfare plan to address are as follows:

- Improve mobility & safety
- Improve corridor operations & enhance
- Improve signal timings, signage and striping
- Adopt alternative transportation modes (bicycle, water taxi, trolley system)
- Improve & install sidewalks
- Access Management

Detailed documentation and pictures of the final community input boards obtained at the transportation station during the public meeting are included in the Appendix of this report.

2 GOALS & OBJECTIVES

After obtaining input from the public, City, County and TxDOT staff, a guiding principle and specific goals and objectives concerning City of Seabrook's transportation system were determined. These were used as the overall vision of this Thoroughfare Plan.

The goals described below are the vision of what City of Seabrook foresees the transportation network to be in the long term. The objectives are action-oriented tasks to be used as the framework to achieve the stated goals.

Goal 1 Preserve adequate rights-of-way for future expansion and connectivity.

Objectives:

1. Define typical sections
2. Define Roadway Functional Classifications
3. Develop a long-term Thoroughfare Map with the functional classifications of major roadways defined

Goal 2 Develop a safe, well-connected transportation system to, from, and within local communities that complement the regional transportation network.

Objectives:

1. Establish a Traffic Generator Map which includes announced developments to aid in establishing the need for connections.
2. Define the Thoroughfare Map to establish necessary connections.
3. Identify high incident locations in the City and use them when making roadway recommendations.

Guiding Principle

Designing livable communities requires employing multi-modal transportation planning guidelines that support a community's natural resources and land uses. The vision of the City of Seabrook Thoroughfare Plan is to establish context-sensitive guidelines for the development of a safe and efficient multi-modal transportation system that provides regional connections between destinations and neighborhoods and provides all road users with opportunities to drive, walk, bike and take transit. In order to maximize the economic vitality of the community and promote smart growth throughout the City, this plan establishes guidelines consistent with federal, state, and local standards that highlight the best practices for context-sensitive roadway design. The desired outcome of this plan is to inspire a consistent approach to roadway design that embraces the concept of establishing a balance between all modes of transportation, ensuring that all roads are safe and aesthetically pleasing for all users, and enhances the efficiency of roadways throughout City of Seabrook.

3 Goal

Establish design standards that enhance the safety and mobility of all roadway users consistent with regional planning efforts.

Objectives:

1. Review Access Management Standards established in the Comprehensive Plan
2. Define Traffic Impact Guidelines

4 Goal

Institute policies and procedures to coordinate and optimize transportation investments in the City.

Objectives:

1. Establish comprehensive and adaptable implementation policy approaches that aid in fostering the principles defined in this Thoroughfare Plan including complete streets, context sensitive design, access management, etc.

3 EXISTING TRANSPORTATION NETWORK

City of Seabrook's existing transportation network is an extensive system comprised of multi-modal roadways with different functional classifications. The City is mostly located in Harris County with 5.7 square miles (sq. mi) of land area and 15.8 sq. mi of water area (21.5 sq. mi total). Additional demographics for the City are detailed in the Comprehensive Plan.

The 2010 City of Seabrook Thoroughfare plan defined the functional classifications for the City's transportation network as existing and future major thoroughfares, as shown in Map 1. In order to further understand the needs of the City's transportation network, the existing thoroughfare system was evaluated in order to develop a thoroughfare plan that accurately addresses the City's needs. During this analysis, existing data was evaluated which included identifying the City's major traffic generators, speed limits, maintenance responsibility, existing flood plain, land use, zoning and incident locations.

3.1 Roadway Network

Currently, Seabrook has a roadway network that serves a variety of land uses. The roadway system consists of a conventional grid pattern in the heart of the City (Main Street area) that is surrounded by a curvilinear roadway network that was designed to serve the newer developments and provide regional connectivity from the northern to southern most point in the City.

The current transportation network could be summarized into three categories:

1

Major Thoroughfares

- Provides service to trips of substantial statewide or interstate travel.
- Provides links to cities and or regions which form an integrated network providing interstate and inter-county service.
- Higher controlled access and higher speeds.

2 City-Wide Thoroughfares

- Provides service to trips of moderate length.
- Provides both land access and traffic circulation.
- Do not penetrate directly into neighborhoods.

3 Local Thoroughfares

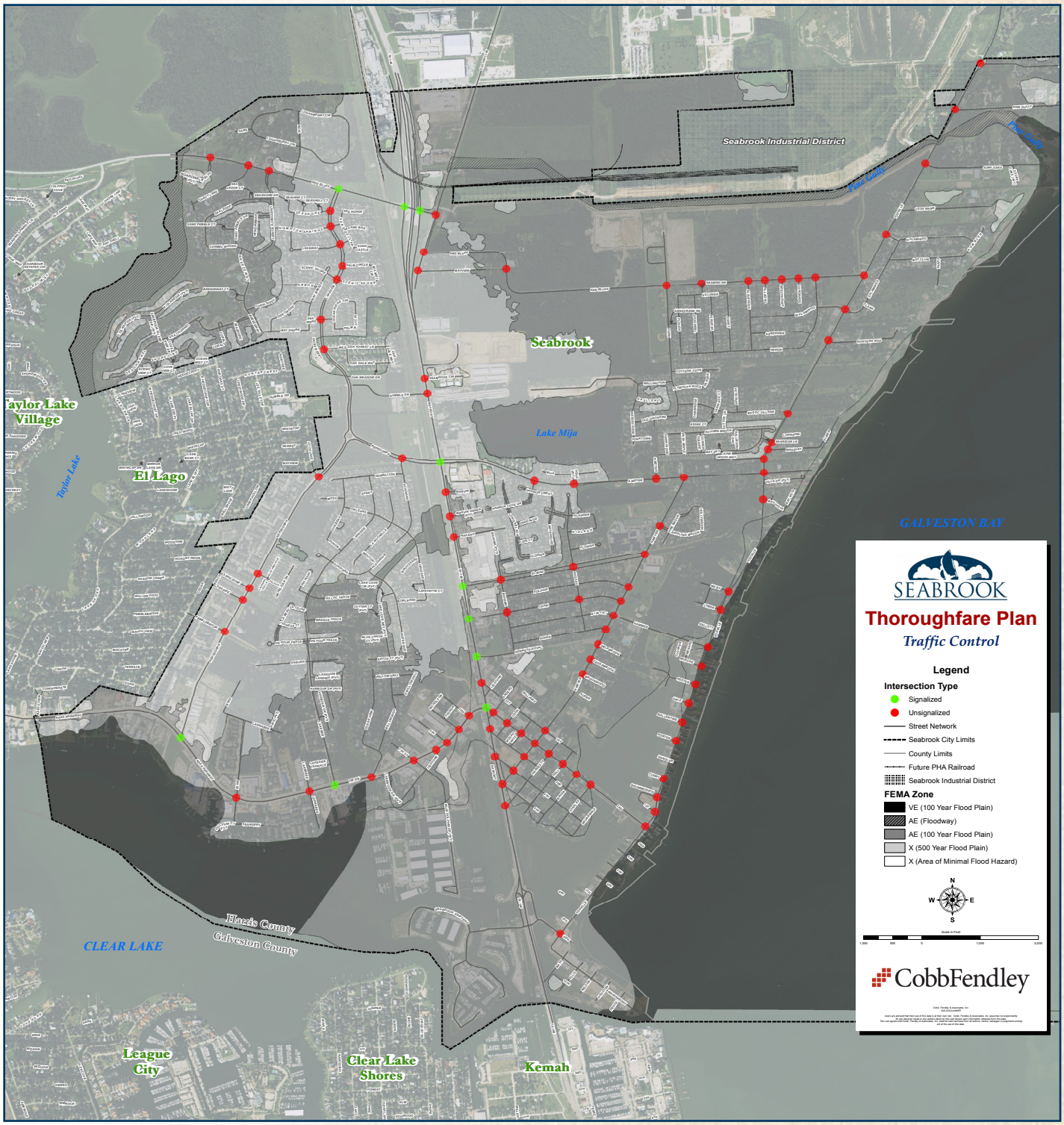
- Provides service to trips smaller in length.
- Provides access to neighborhoods and commercial areas.

Some of the currently identified thoroughfares in the City are as follows:

State Highway (SH) 146 is the most prevalent thoroughfare that provides connectivity from Galveston to SH 225. SH 146 runs through the City and extends beyond the northern and southern City limits. This connection has aided in the economic development and population increase of the City. The improvement plans for SH 146 will be essential in hurricane evacuations and the economic growth of the City.

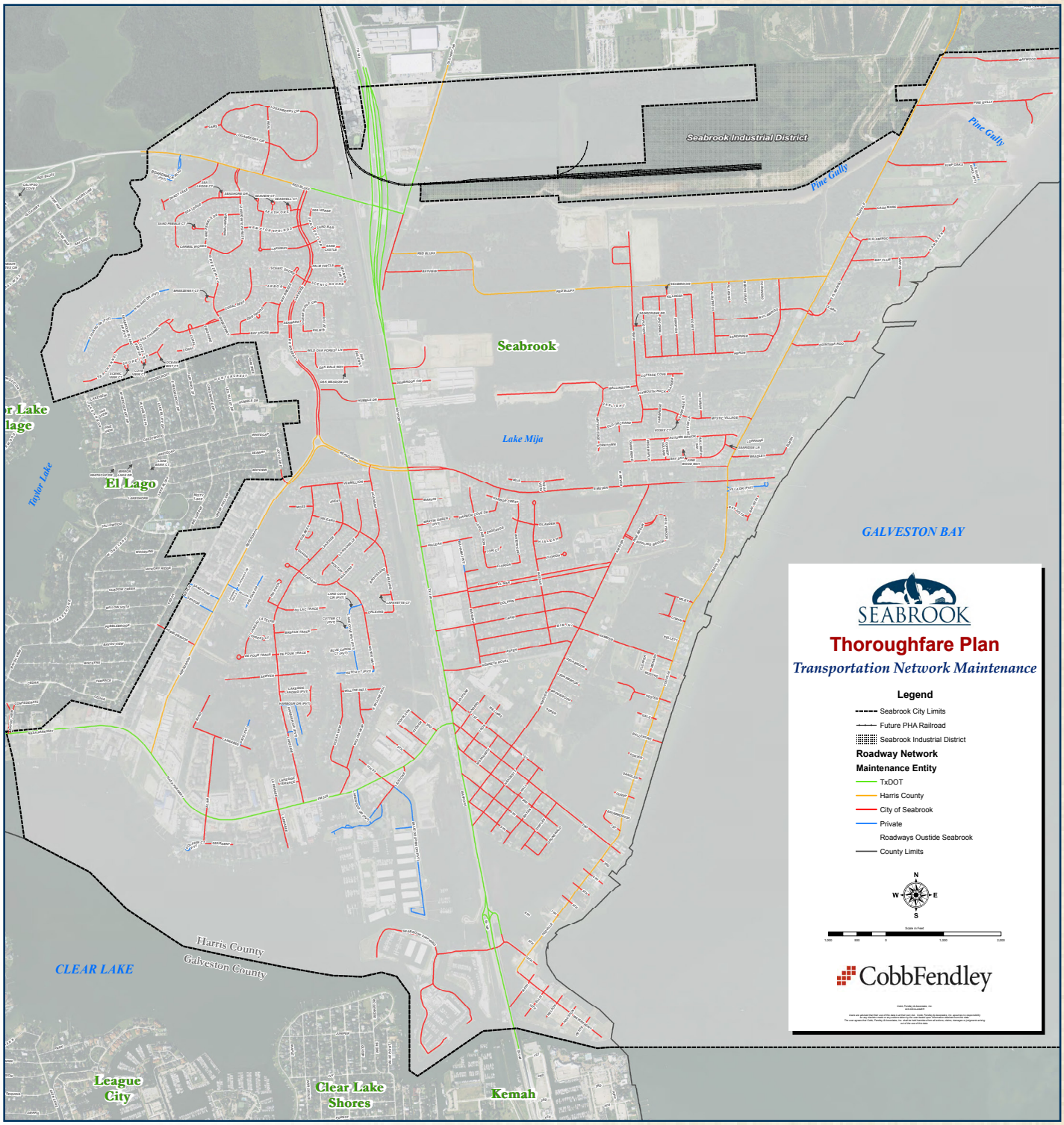
In an effort to understand the operations of the roadway system within the City limits, a roadway inventory of the area was performed. The inventory gathered data such as locations and type of traffic control devices, speed limits and maintenance responsibilities. The data gathered aided in developing and defining the recommended functional classifications specified in Chapter 4. The information gathered is presented in Maps 2-4.

Map 2: Traffic Control



Map 3: Speed Limits

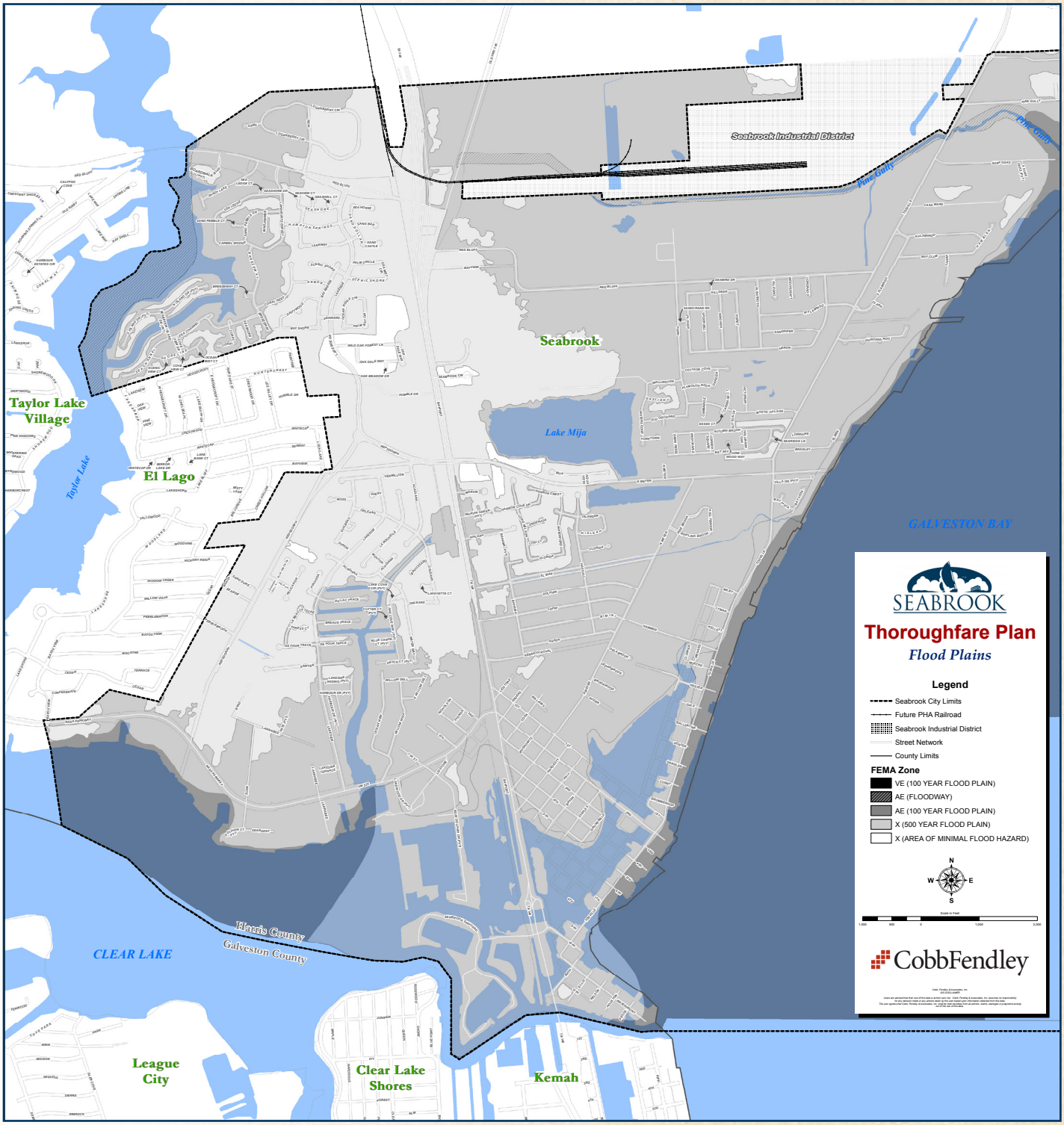
Map 4: Transportation Network Maintenance



3.1.1 Flood Plains

City of Seabrook is located on the coast of Galveston Bay. As such, it is important to understand the flood plains in the area and analyze how these could impact roadway recommendations.

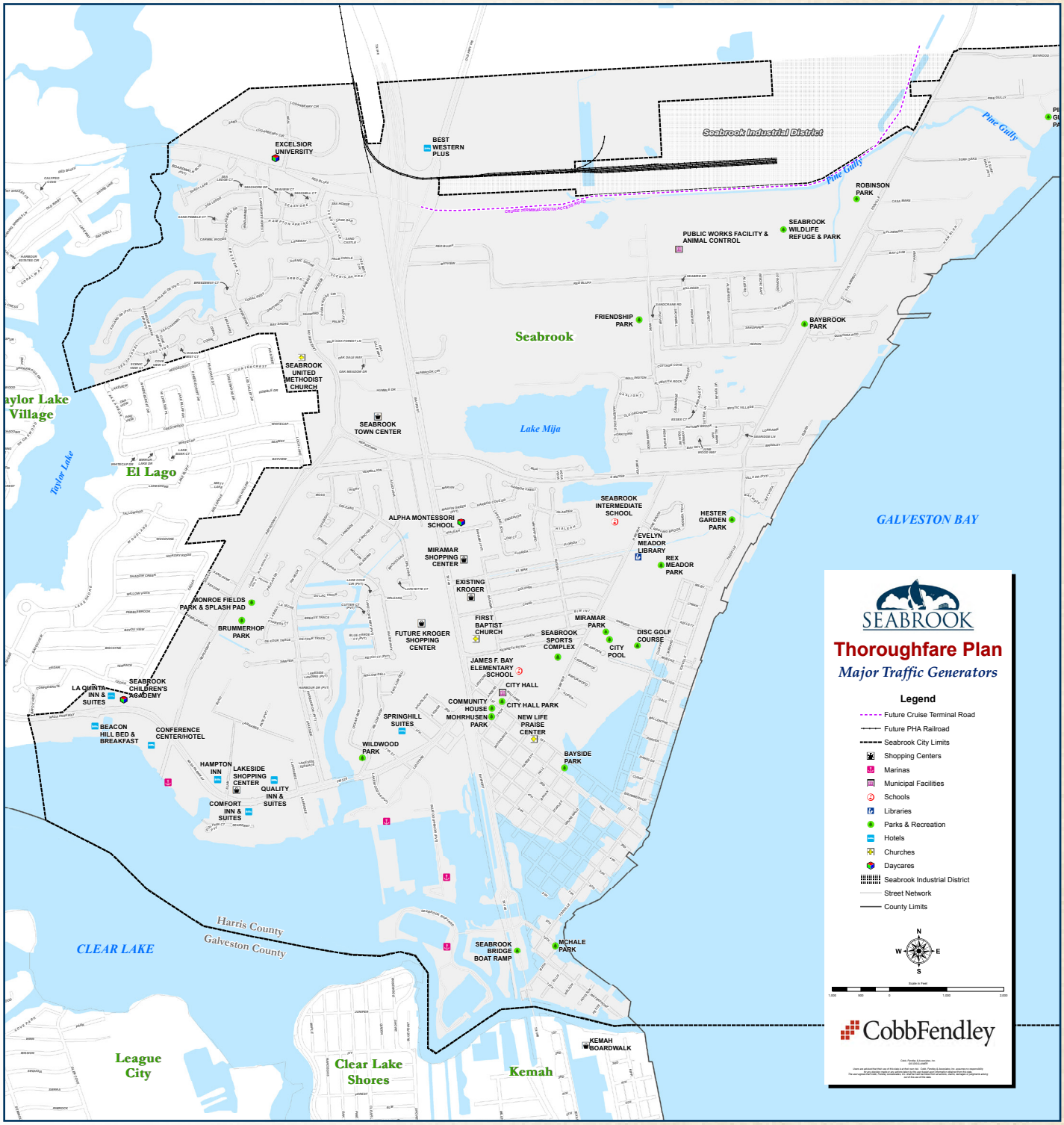
Map 5: Flood Plains



3.1.2 Major Traffic Generators

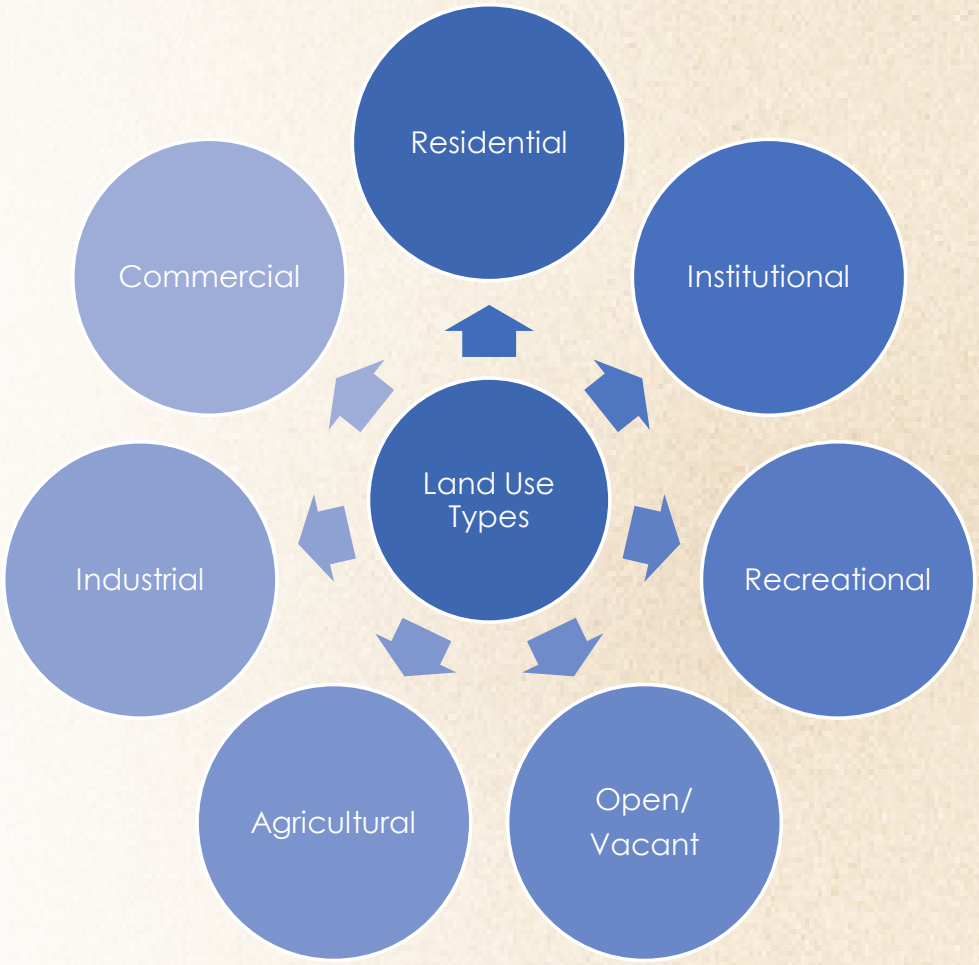
Traffic generators consist of developments and/or land uses that attract traffic to a certain area. It is crucial to understand the location of these traffic generators in order to determine the need for capacity/operation improvements as well as to ensure that recommendations are appropriate. The types of traffic generators shown in Map 6, include shopping centers, marinas, municipal facilities, schools, libraries, parks & recreational areas, hotels, churches and daycares.

Map 6: Major Traffic Generators



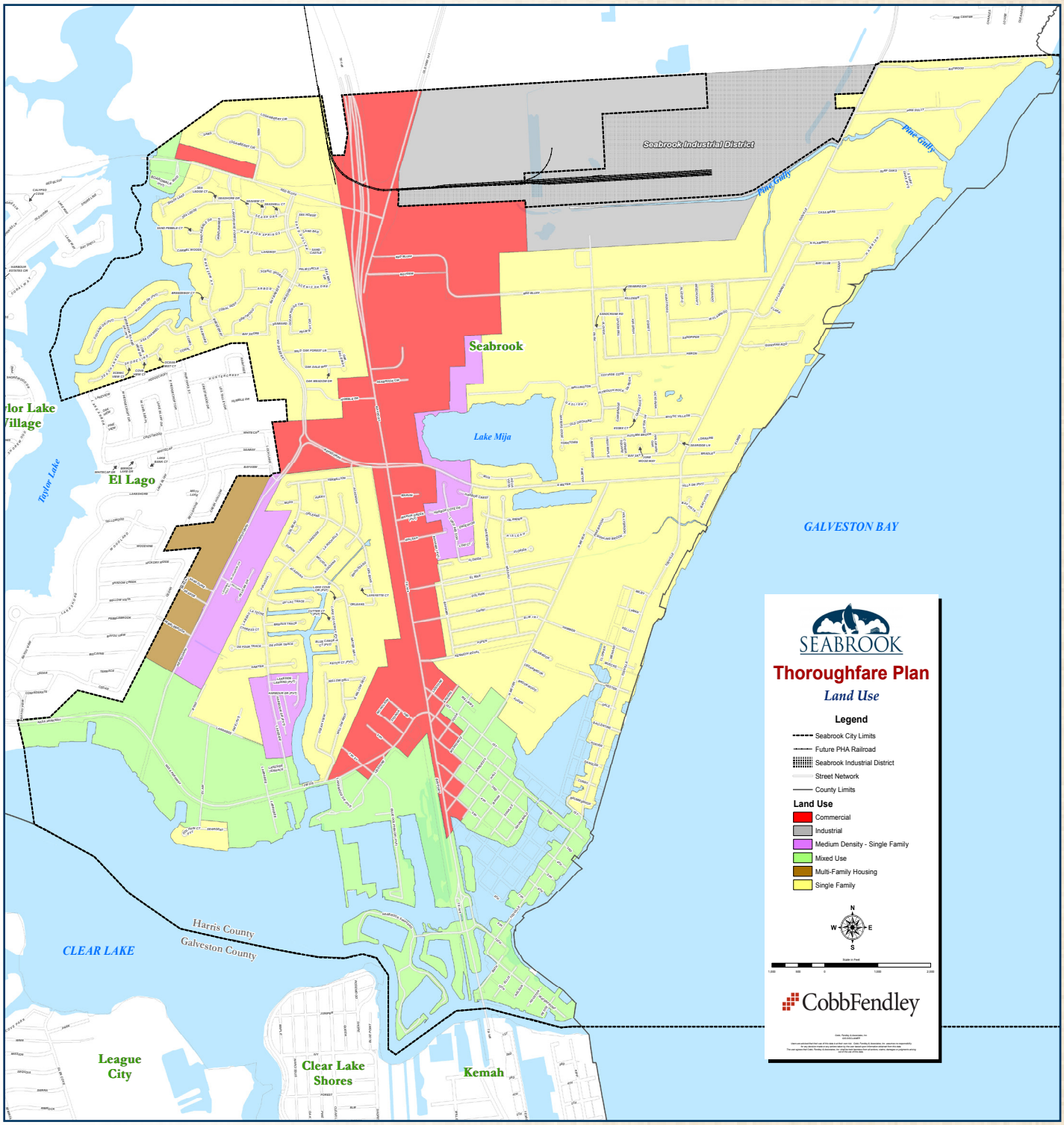
3.1.3 Existing Land Use and Zoning

Land use and zoning information is valuable when evaluating the transportation system in order to understand traffic origin-destination patterns and roadway usage. This information can be used to determine the future needs of a roadway to accommodate the trips it will generate.

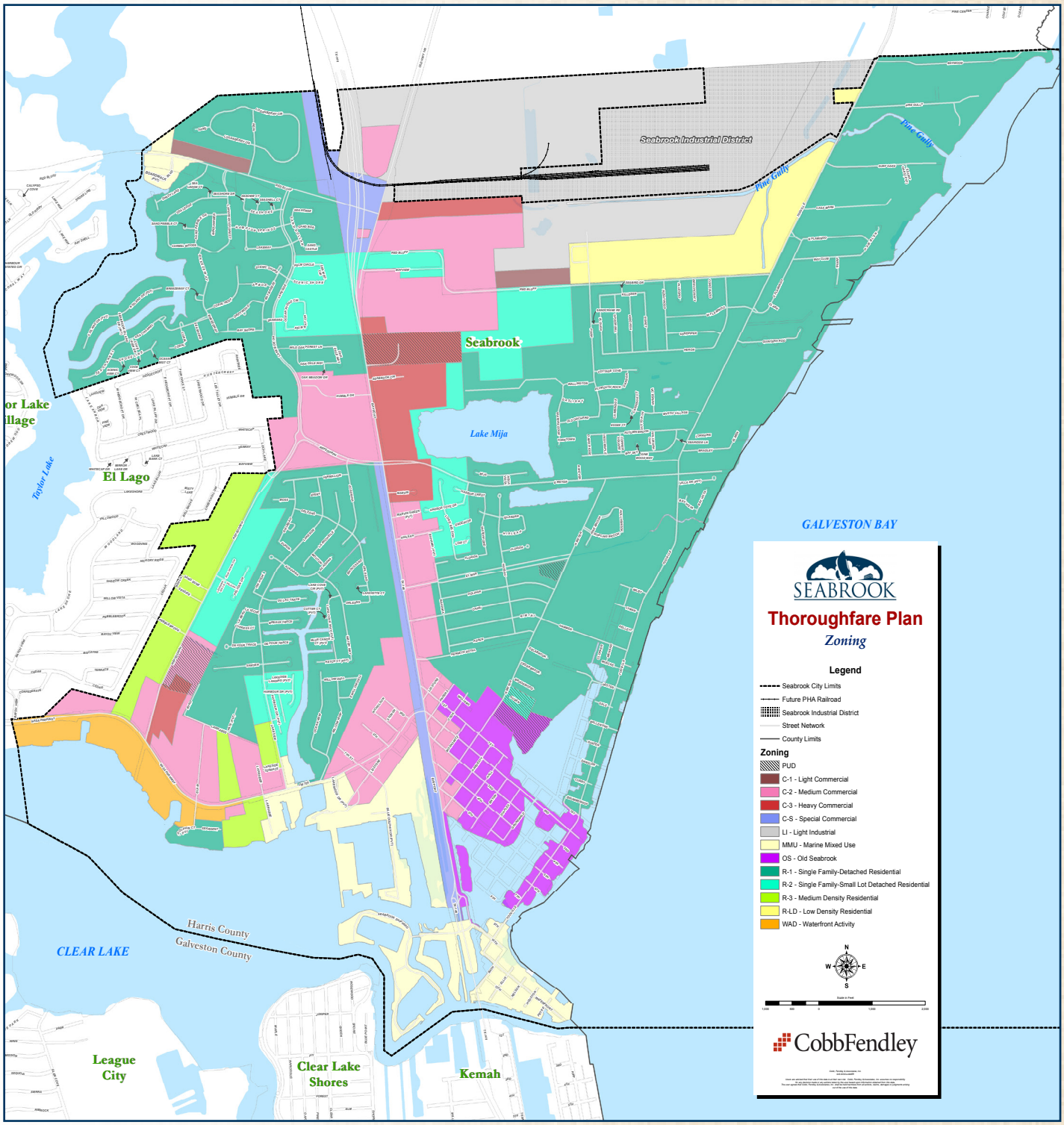


The Comprehensive Plan further details the existing zoning and land uses. As part of the efforts of this study, the current land use and zoning maps in the City were studied in order to understand the existing capacity and/or operational needs for accommodating road users that each land use attracts. The existing land use and zoning maps have been included in the following pages:

Map 7: Land Use



Map 8: Zoning


Seabrook Industrial District
Pine Gully
Seabrook
Lake Mija
El Lago
Taylor Lake
GALVESTON BAY
CLEAR LAKE
Harris County
Galveston County
League City
Clear Lake Shores
Kemah
SEABROOK
Thoroughfare Plan
Zoning
Legend
Seabrook City Limits
Future PHA Railroad
Seabrook Industrial District
Street Network
County Limits
Zoning
PUD
C-1 - Light Commercial
C-2 - Medium Commercial
C-3 - Heavy Commercial
C-S - Special Commercial
LI - Light Industrial
MMU - Marine Mixed Use
OS - Old Seabrook
R-1 - Single Family-Detached Residential
R-2 - Single Family-Small Lot Detached Residential
R-3 - Medium Density Residential
R-LD - Low Density Residential
WAD - Waterfront Activity
N
W
E
S
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3.1.4 Safety

A key function of any transportation system is to not only move vehicles efficiently, but to do so while providing for the safety of all travelers. While roadway design standards go a long way toward maximizing the safety of the traveling public, they cannot anticipate the complex interaction of variables with which travelers are confronted. Therefore, it is necessary to identify safety issues that may arise on existing roadways.

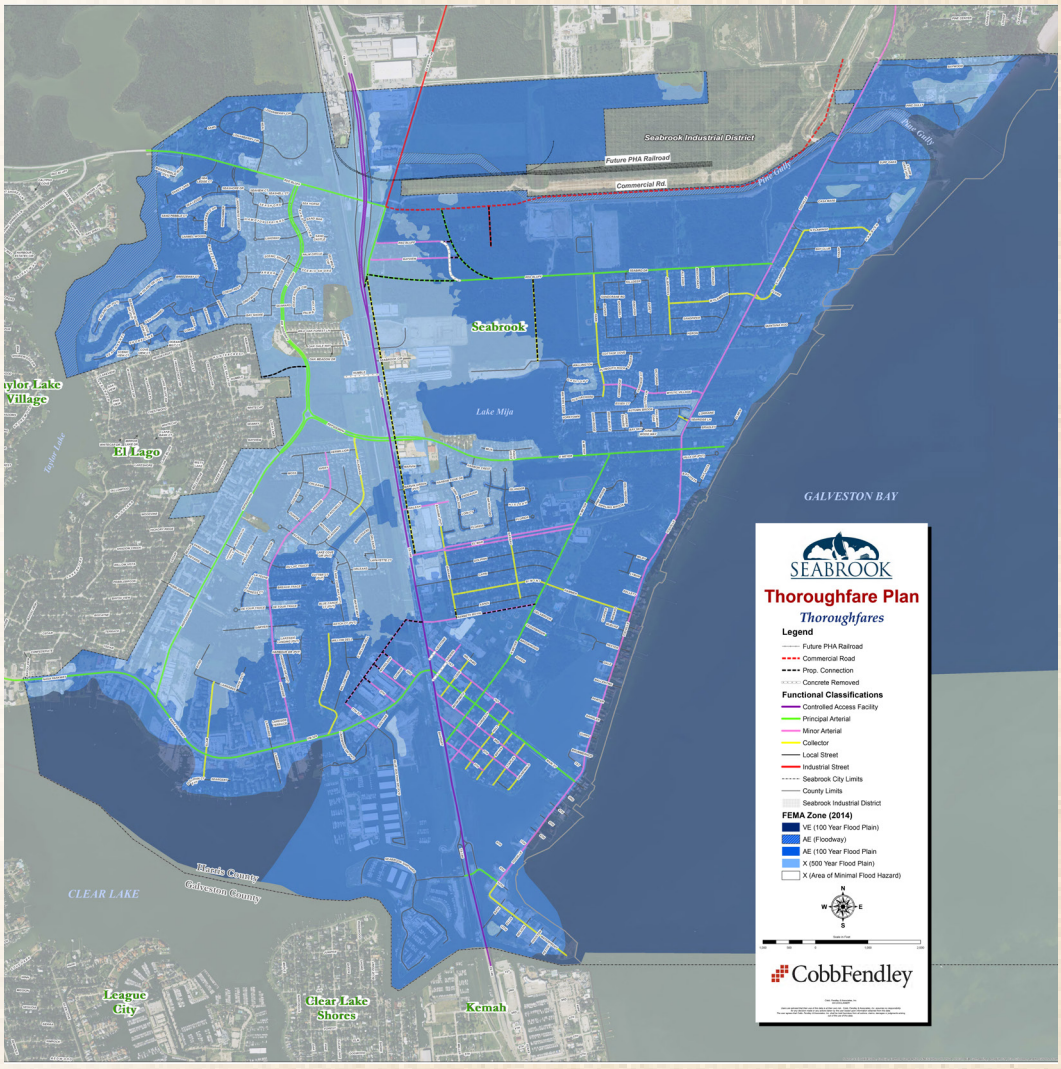
Map 9: Safety Concerns

Data obtained from law enforcement officials and the general public aided in identifying high incident locations, as seen in Map 9. Identifying high incident locations aided in understanding congestion and operational issues within the City. Locations with high crash frequencies, usually intersections, are generally selected for closer examination as it is important to prioritize resource allocation to locations that may have greater opportunities for safety improvement. Some safety improvements could be accomplished through engineering measures such as signing, pavement markings, illumination, median treatments, signalization, removal of roadside obstacles, or roadway alignment adjustments.

4 THOROUGHFARE PLAN

The proposed thoroughfare plan is shown in Map #10 below. Design criteria recommendations for the functional classification system are described and highlighted in the following sections. As per the established goals, objectives, guiding principle and comments received from the general public during the Comprehensive Plan public meeting, the design criteria are based on community goals to achieve a well-connected safe thoroughfare system with access management principles in place.

Map 10: Thoroughfare Plan

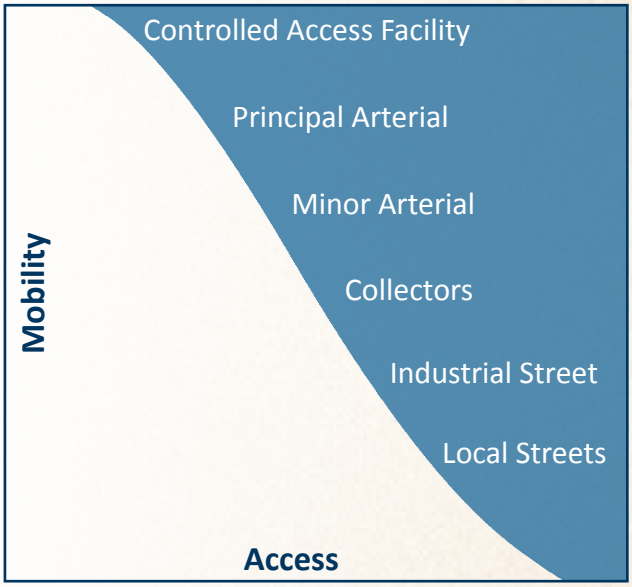


High incident locations, announced projects, traffic generators, flood plains and land uses were all considered in the recommendations for the transportation system. However, the recommendations are high level, and more detailed studies may be necessary to refine the alignments and the design cross sections as the growth pattern becomes more certain. Development of subdivision site plans that include thoroughfares should be done in collaboration and under the review of the appropriate agencies.

4.1 Functional Classification

Functional classification is the process by which local and regional roadways are grouped into hierarchal categories according to the transportation objectives they are intended to provide. This process identifies the role each roadway serves in the context of the larger transportation system and facilitates planning for logical and efficient routing of traffic through the roadway network. Transportation systems are designed to serve a diverse range of travel needs, from long-distance travel between cities to local trips between home and commercial land uses. Assigning a functional class to each roadway in the system helps ensure that the transportation system can serve the diverse travel needs of users in a logical and efficient manner. Additionally they provide a basis for selecting appropriate speeds and geometric design criteria for a given roadway. However, this does not mean that the functional classification for a given roadway prescribes specific design criteria. Instead, the actual configuration of roadways is subject to review to ensure facility design is coordinated with adjacent development and takes into account other community goals and objectives, often referred to as context sensitive design. For roadways maintained by the County, City of Seabrook will work project by project on roads maintained by the County when necessary.

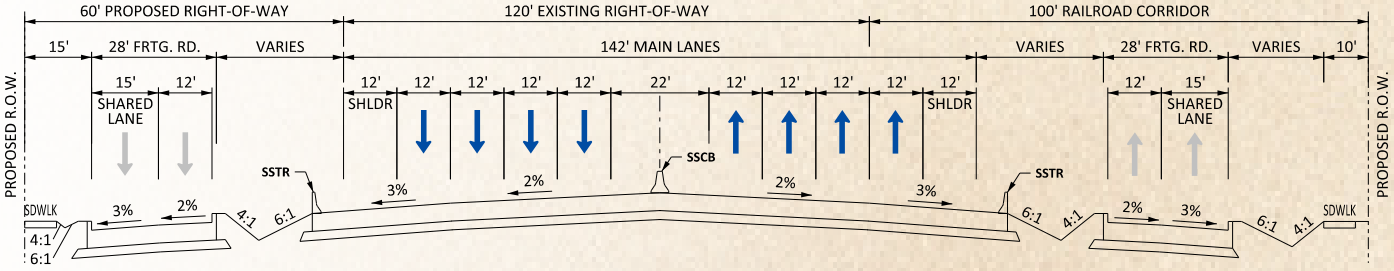
4.1.1 Mobility vs. Access



The two primary travel needs served by roadways are mobility, or the ability to move people or goods efficiently between locations, and access, or the ability to reach numerous desired destinations. While all roadways serve these two needs, by design certain types of roadways serve one need over the other. For example, freeways, provide a high degree of mobility, facilitating long-distance travel between destinations by providing minimal traffic conflicts and few opportunities to enter/exit the roadway. Such roadways are classified as Controlled Access Facilities under the City of Seabrook functional classification system. Neighborhood streets, on the other hand, provide a high degree of access (to homes, shopping centers, etc.), but offer lower mobility due to the presence traffic signals, lower speeds and other design characteristics. These roadways are classified as Local Streets under the City of Seabrook functional classification system. In order for synergy to exist in a transportation network, a combination of different roadway classes must exist. A variety of roadways are needed to make a network functional and creates a different densities of roadways and intersections.

The proposed City of Seabrook Functional Classification System has six functional classes. The proposed typical sections and functional classifications are presented in the sections below and summarized in Table 4-1.

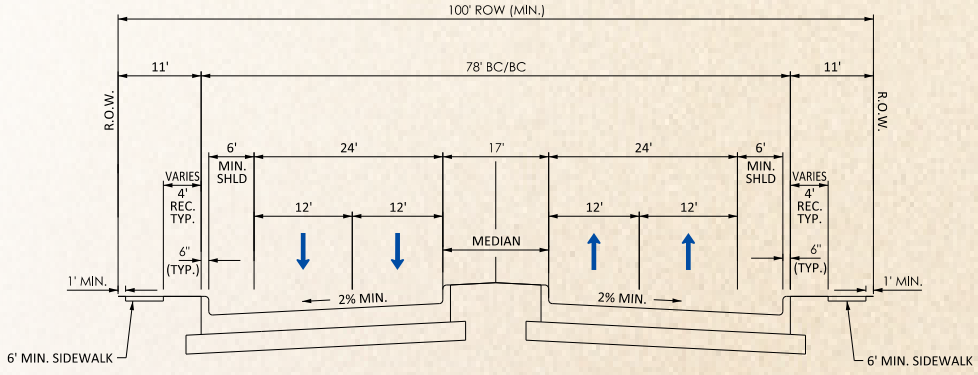
- *Controlled Access Facility (F)* roadways provide a high degree of mobility by serving travel between major destinations, as well as long-distance traffic that goes through or bypasses an area. They are designed to minimize travel time by providing high posted speed limits, offering physical separation from other roadways (e.g. no at-grade intersections, sidewalks, or bicycle lanes) and providing a limited number of access/egress points (e.g. entrance and exit ramps). These high-volume thoroughfares often have more than two lanes in each direction, no medians, and at least 300 feet of right-of-way.



CONTROLLED ACCESS FACILITY
> 28,000 VEH/DAY

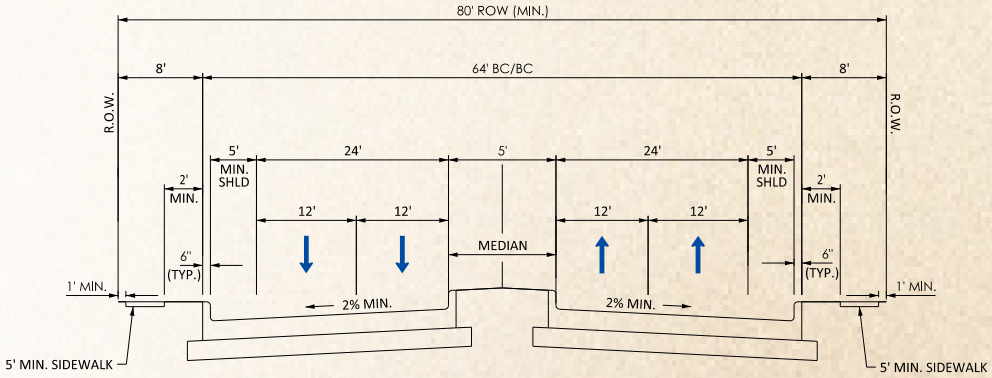
*SOURCE: TXDOT 146 SCHEMATICS

- *Principal Arterials (PA)* provide a high degree of regional mobility by serving travel between major destinations, activity centers, as well as long-distance traffic that goes through or bypasses an area. They also connect traffic into and between interstate and freeway thoroughfares. Medians are large, the number of lanes can vary between two and eight lanes in each direction, and there are infrequent median openings. There are limited driveway and street intersections, and no on-street parking. There is no grade separation between principal arterials and smaller intersecting roadways. Large (greater than 6 feet) sidewalks and bicycle lanes can be found on Principal Arterials.



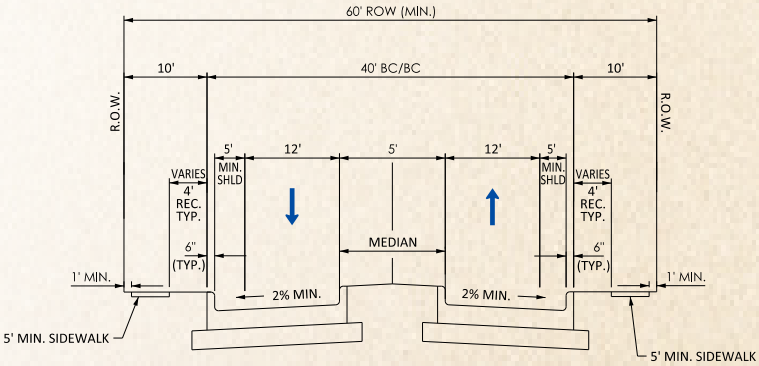
PRINCIPAL ARTERIAL
15,000 - 35,000 VEH/DAY

- *Minor Arterials (MA)* are intended to connect traffic into and between the principal arterial systems. They can serve trips of moderate length by connecting smaller geographic areas. While minor arterials provide slightly less mobility benefit than principal arterials, overall they are characterized by relatively high travel speeds, low interference from cross traffic and provide greater local accessibility. Typically, there is no grade separation between Minor Arterials and intersecting roadways of similar class. When present, medians are wide and may contain turn lanes. On-street parking, large 6 foot sidewalks and bicycle lanes can be found on Minor Arterials.



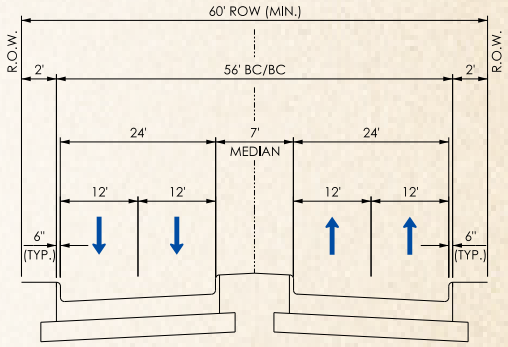
MINOR ARTERIAL
10,000 - 25,000 VEH/DAY

- *Collectors (C)* provide a balance between mobility and access, primarily serving to collect traffic from local streets and provide connections to arterials. In urban areas, collectors provide traffic circulation in residential areas or commercial districts, while in rural areas they primarily serve travel within the county (i.e. trips shorter than those served by arterials). Collectors specifically provide access to and from local communities and activity centers. They are characterized by more frequent median openings than previously mentioned roadways, and more driveway and street intersections.



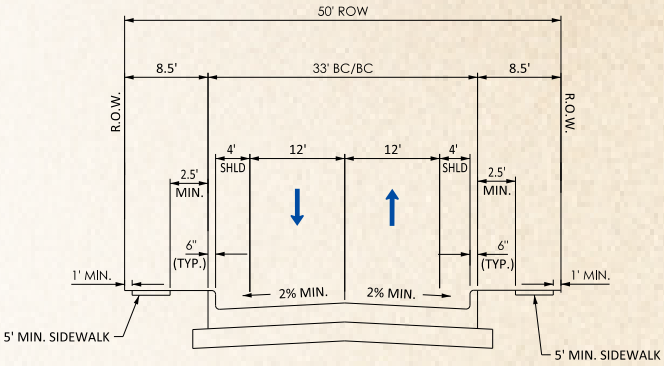
COLLECTOR
1,000 - 15,000 VEH/DAY

- *Industrial Streets (I)* provide access to industrialized areas. These streets are designed to withstand heavy vehicle loads and discourage the use of regular vehicular traffic and non-motorist road users. As such, bike lanes and pedestrian crosswalks are not found in these streets.



INDUSTRIAL STREET

- *Local Streets (L)* provide direct access to local destinations (neighborhoods, commercial uses, schools, etc.) They are no intended for use in long distance travel and are often designed to discourage through traffic. Pedestrian and bike safety as well as aesthetics are a high priority for this type of street.



LOCAL STREET
100 - 3,000 VEH/DAY

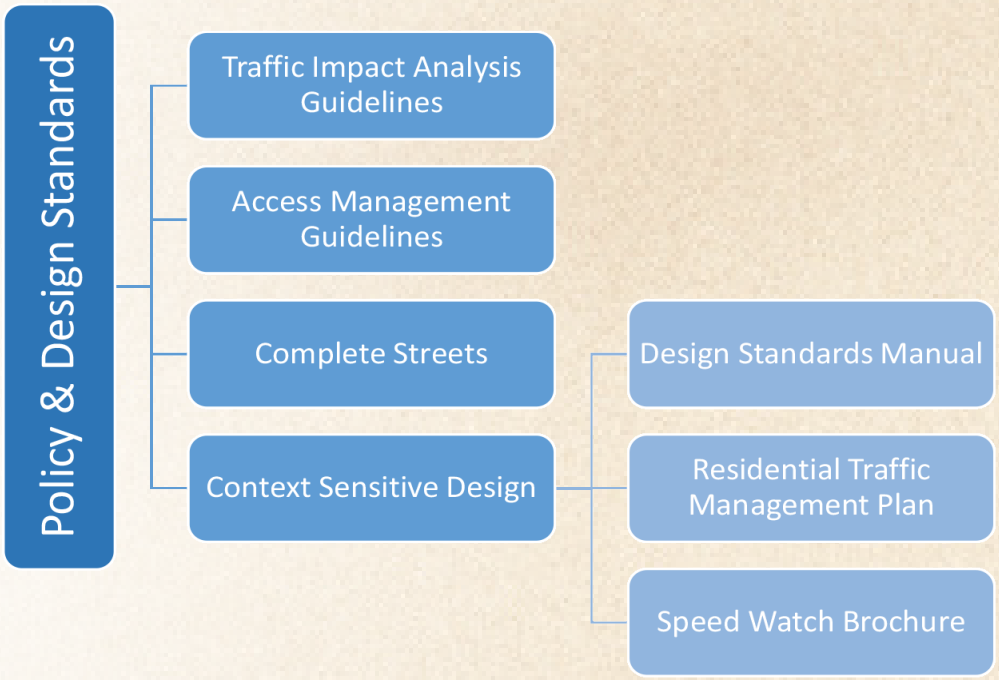
Thoroughfare Type	Abbreviation	Character Area	Number of Lanes (one direction)	Minimum Right of Way	Design Speed	Vehicles per Day	Minimum Median Spacing	Desirable Spacing	Minimum Shoulder Width	Typical Characteristics
Controlled Access Facility *	F	Urban	>2	300 ft	> 50 mph	> 28,000	No medians present	N/A	8 - 12 ft	- Includes Interstate Highways, Freeways, Expressways and Tollways - High Degree of Access Control - All interchanges are grade seperated - No Sidewalks - No Bicycle Lanes
Principal Arterial	PA	Urban	>2 and <8	100 ft	30-50 mph	15,000 - 35,000	- If intersecting with a PT, 500 ft. - If intersecting with a ST, 350 ft. - If intersection with MC or MIC, 300 ft	2 miles or more	6 - 10 ft	- Higher speeds and regional mobility - Infrequent median openings. - Limited driveway and street intersections - No On Street Parking - > 6 ft Sidewalks - Bicycle Lanes
Minor Arterial	MA	Urban	>2 and <6	80 ft	30-45 mph	10,000 - 25,000	- If intersecting with a PT, 400 ft. - If intersecting with a ST, 300 ft. - If intersection with MC or MIC, 250 ft	1 to 2 miles	6 - 10 ft	- Greater local accesibility - Infrequent median openings. - Limited driveway and street intersections - Permitted Street Parking - 6 ft Sidewalks - Bicycle Lanes
Collectors	C	Urban	>2 and <4	60 ft	20-40 mph	1,000 - 15,000	- If intersecting with a PT, 350 ft. - If intersecting with a ST, 300 ft. - If intersection with MC or MIC, 250 ft	1/4 to 2 miles	4 - 8 ft	- Accesibility to and from local commuities and activity centers. - Frequent median openings, driveway and street intersections - Permitted Street Parking - Sidewalks may not be present - Bicycle Lanes - Landscape/Beautification
Industrial Street	I	Urban	>2 and <4	60 ft	20-40 mph	1,000 - 15,000	- If intersecting with a PT, 350 ft. - If intersecting with a ST, 300 ft. - If intersection with MC or MIC, 250 ft	1/4 to 2 miles	< 4 ft	- To be used in Industrial areas - No pedestrian activity
Local Streets	L	Urban	Undesignated	50 ft	20-30 mph	100 - 3,000	- No medians present	Min. 125 ft	< 4 ft	- Influenced by local access and community - Involve short trips - Unlimited driveway and street intersections - Pedestrian safety, bicycle safety and aesthetics are high priority.

Notes:

* Interstate/Freeway/Toll Roads
* Min. Shoulder Width based on the TxDOT Roadway Manual
* AADT's based on the TxDOT 2013 Counts of the area
* Median Spacing based on TxDOT Access Management

5 POLICY & DESIGN STANDARDS

City of Seabrook's existing and future transportation system is a significant infrastructure component that shapes land uses, the environment, and quality of life. Policy and Standards enable government officials, engineers, planners and local stakeholders to ensure that the guiding principle and goals (Chapter 2) of the City's thoroughfare plan are enforced as development occurs. This section discusses the following comprehensive and adaptable implementation policy and design standards that aid in enforcing the goals set forth in this plan.



5.1 Traffic Impact Analysis (TIA) Guidelines

The City of Seabrook may require a Traffic Impact Analysis (TIA) if it is determined that a proposed site development is expected to have a significant impact on the transportation system. Additionally, the City may require any and all public improvements, recommended as necessary by the TIA, to provide accommodation of traffic generated by the proposed development. These guidelines detail the requirements, process and format of a TIA. The guidelines have been developed to ensure that a TIA will include the necessary information in a format that will allow City staff to review and make informed decisions in a timely manner.

5.1.1 Purpose of a TIA

A Traffic Impact Analysis is conducted to assist the City and partner agencies in coordinating land use, transportation development and in Identifying potential impacts of a proposed development on the existing and planned street network. A TIA should be conducted during the early stages of a site development approval process in order to help identify current and future traffic problems and their solutions. The results of the analysis should:

1. Compare the traffic generated by the proposed development to street network capacity.
2. Address the City's requirements.
3. Establish appropriate mitigation measures for the identified impacts.
4. Balance a safe and efficient transportation system with the development needs of the City.

5.1.2 Determining the Need for a TIA

Not every proposed development will have a significant impact on vehicle travel to require a TIA. The following criteria are not absolute, but guidelines. The City Engineer and the Planning and Zoning Commission have the right to require or not require a TIA as they deem necessary. At a minimum, a TIA may be required if the proposed development meets one of the following conditions:

- Generates 1,000 vehicle trips/day
- Generates 50 vehicle trips/peak hour of adjacent street network
- Larger than 100 acres
- Zoning/Rezoning requests
- Amendments to City Thoroughfare Plan

In order to assist City staff in determining whether a TIA should be performed, the applicant must first fill out the Trip Generation Worksheet, which is included in the following page. This worksheet shall be submitted with each plat and/or site plan for developments that do not have an approved TIA on file. The worksheet shall be filled out using the latest edition of the Institute of Transportation Engineers Trip Generation Manual. If the development land use is not known at the time of the submittal then the applicant should make assumptions based on the worst-case scenario for the site. Should this be the case, at a minimum, the following items need to be evaluated:

- The type of land use allowed by the city's zoning criteria for the site.
- The maximum amount of developable land based on setbacks and other restrictions (detention, easements, etc.)
- Logical assumptions by the applicant
- Adjacent land uses

If the proposed land use is not listed in the Trip Generation Manual, the City shall require a letter from a licensed engineer, in lieu of the trip generation worksheet, documenting the type of development proposed and identify the number of trips generated based on either:

- A trip generation study performed for a similar land use
- Their professional opinion if no such study is available.

This letter should be signed and sealed by a registered professional engineer in the State of Texas.

CITY OF SEABROOK
TRAFFIC IMPACT ANALYSIS
TRIP GENERATION WORKSHEET

SITE INFORMATION:

_____

_____

Street Address (Primary Access)

_____

_____

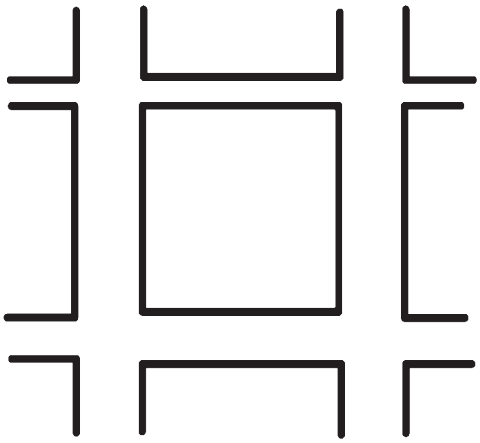
_____

Legal Description (if no street address)

_____

Zip Code

Location Map



The dimensions of the private property, and the type and location of improvements thereon or to be placed thereon:

Tract Size (Sq Ft or Acres): _____

Current Land Use (include # of units, square footage of improvements, etc.):

_____

_____

Proposed Trip Generation Rates (Based on latest version of the ITE Trip Generation Handbook)

ITE Land Use Classification:_____AM Trip Rate: _____ PM Trip Rate:_____
(Code & Description)

AM Peak Hour Trips: _____PM Peak Hour Trips: _____ Average DailyTraffic :_____
(Provide Trip Generation supporting documentation as applicable. Must include which equations or rates were used.)

Proposed use to be made of the private property (include proposed # of units sq. ft. of improvements, etc.):

_____

_____

Notes:_____

_____

_____

_____

_____

_____

_____

Version 1- April 2016

5.1.3 Preliminary Scoping Meeting

The applicant's consulting engineer shall meet with City staff to determine the scope and requirements for the TIA. Items to be agreed to by City staff and the engineer include, but are not limited to:

- Study area and intersections
- Applicable standards and methodologies
- Ultimate analysis year
- Growth rate methodologies
- Nearby proposed developments to be accounted for

It is strongly recommended that this meeting occur before any work is done on the TIA, as work completed without the City's knowledge or input is at the applicant's risk and is subject to a request for revision from the City without formal review or comments.

5.1.4 TIA Format

The analysis shall be presented in a straightforward and logical sequence, leading the reader step-by-step through the various stages of the process and the resulting conclusions and recommendations. The analysis shall be presented in a manner that allows the reviewer to easily duplicate the calculations. The report should be organized according to the subject areas listed below:

I. Executive Summary
- Study purpose
- Key findings
- Recommendations

II. Introduction
- Description of proposed development
- Definition of study area
- Study purpose, objectives and methodology

III. Existing Conditions
- Study area roadway network
- Existing land use
- Existing traffic volumes
- State roadway functional classification as per the City's Thoroughfare Plan

IV. Trip Generation and Distribution (use a new section for each phase if development has multiple phases)
- Details of proposed development
- Trip generation
- Projection of existing traffic volumes to ultimate analysis year
- Trip adjustments (pass-by trips, shared trips)
- Nearby proposed developments
- Trip distribution methodology
- Future background (no-build) traffic volumes

V. Operational Analysis (use a new section for each phase if development has multiple phases)
- Existing Level of Service
- Future background Level of Service
- Projected Level of Service
- Traffic signal warrant analysis
- Mitigation measures and their Level of Service
- For new roadways, recommendation on speed limits based on functional classification shall be stated as referenced in the plat.

VI. Conclusions
- Key findings
- Recommendations

VII. Appendices
- Response to City staff comments (resubmittals only)
- Detailed site plan
- Existing 24-hour directional counts
- Existing AM & PM peak hour turning movement counts
- All Synchro (or similar software) reports
- Traffic signal warrant analysis
- Attached CD with Synchro (or similar software) files

The following exhibits should be provided, at a minimum, in the applicable sections of the TIA:

- Show and distinguish between all existing, proposed and future facilities on the site
- Clearly show all proposed traffic improvements
- Show all existing, generated, future background and proposed traffic volumes within the existing and proposed street networks

The TIA shall be prepared under the supervision of, and sealed by, a Professional Engineer registered in the State of Texas.

5.1.5 TIA Standards & Data Sources

In order to provide consistency in the evaluation process and to ensure that the TIA is performed according to commonly accepted methodologies, the following standards, software, and data sources should be used:

1. *Trip Generation Rates* – The trip generation rates used in the TIA must be either from the latest edition of the ITE Trip Generation Manual or from a local study of corresponding land uses approved by City staff.

2. *Pass-By Trips and/or Shared Trips* – Reduction in trips generated by the development land uses due to pass-by trips and/or shared trips must be based either on the latest edition of the ITE Trip Generation Handbook or local studies from similar land uses.

3. *Future Background Traffic Volumes* – Estimates of background traffic for the ultimate analysis year shall be based on either trends in the City's traffic growth rates or projected area traffic volumes from the Houston-Galveston Area Council travel demand model.

4. *Capacity Analysis* – Capacity analysis must be performed at all intersections, signalized and unsignalized, within the study area, and at all project site access points. The analysis methodologies should be based on the latest edition of the Transportation Research Board's Highway Capacity Manual (HCM). Use of Synchro or other software based on HCM methodologies is recommended.

5. *Traffic Signal Warrant Analysis* – Traffic signal warrant analyses shall be performed based on the procedures outlined in the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

6. *Required Levels of Service* – If existing Levels of Service on study area streets are currently LOS A or B, traffic generated by the proposed development shall not deteriorate them beyond LOS C. If the existing Levels of Service are LOS C or worse, they shall be maintained at their current level.

5.2 Access Management Guidelines

Establishing access management policies ensures that the transportation system develops in a manner that maintains safety, preserves mobility and aligns with the City's vision and goals. Access management encompasses the physical improvements, ordinances, and policies that regulate roadway access. It is recommended that access management strategies and policies be adopted to ensure that roadway investments maintain their value as areas begin to develop.

To aid regulating access to jurisdictional roadways, physical improvements or modifications can be implemented. Depending on the severity of current or future congestion in the region one or more physical modifications may be needed to improve the corridor. The following physical improvements in concurrence with access management principles, include medians, turn lanes, driveway spacing consolidation, freeway access management, signal modifications, and driveway permitting.

5.2.1 Medians

Raised medians are barriers between opposite travel directions used to prevent vehicles from crossing onto oncoming traffic. Raised medians restrict driveway and cross-street access and direct motorists to specific property access points. These increased restrictions increase mobility along main roadways and increase safety due to conflict point reduction.

In order to maintain mobility and safety intact along the City's thoroughfares, access management principles should be enforced for the design of roadways and/or raised medians. The TxDOT Roadway Design Manual (RDM) suggests that median openings should be provided approximately every ¼ mile for high speed facilities, and typically at intersections or prominent driveways.

As a center lane improvement, raised medians are alternatives to two-way left-turn lanes (TWLTL's). Two-way left turn lanes are often confusing or misused by motorists which may lead to vehicle conflicts. The RDM suggests the use of raised medians where the Average Daily Traffic (ADT) exceeds or is anticipated to exceed 20,000 vehicles per day (VPD).

Depending on congestion, crash rates and volumes along thoroughfares, median openings may not always allow every movement. For example, a median opening may not allow a left turn from a side street. For this case, U-turn accommodations must be provided for those road users.

5.2.2 Turn Lanes & Auxiliary Lanes

Adding turn or auxiliary lanes may be one way to improve mobility at locations experiencing significant delays. Turn or auxiliary lanes are used by left turning, right turning, accelerating and decelerating motorists traveling along a thoroughfare. In order to provide adequate storage space for vehicles in queue, an existing turn lane may be extended or an additional turn lane added. In an effort to increase safety, accel/decel lanes may be added to a location in order to aid motorists in merging scenarios. It should be noted that these efforts may require additional right-of-way (ROW) acquisition which may increase costs. Guidelines for incorporating auxiliary and turn lanes are available in the TxDOT Access Management Manual.

5.2.3 Driveway Spacing & Permitting

Access point density refers to the number of driveways along a length of road which is a major factor in determining roadway functionality. Roadways with high point density typically experience decreased mobility and travel time with an increase in crash rates.

Driveway spacing for new developments or roadways, is typically achieved through ordinance and development guidelines that mandate factors such as minimum spacing and cross parcel access. Driveway consolidation, which may be concurrent with an improvement to an existing roadway, can address the overabundance of driveways on existing corridors or properties. Consolidating or removing specific driveways may be considered for the following reasons:

- A driveway is located close to the functional area of an intersection.
- A driveway provides redundant parcel access and does not meet spacing criteria as defined in the local access management ordinance or the TxDOT Access Management Manual.

Existing driveways typically cannot be closed without property owner consent, and often require agreements among adjacent parcel owners for shared maintenance and cross parcel access. Providing accessibility using alternate roadways may increase public acceptance for driveway consolidation. Over time, the City may enforce more stringent access management criteria as parcels redevelop and effect closures.

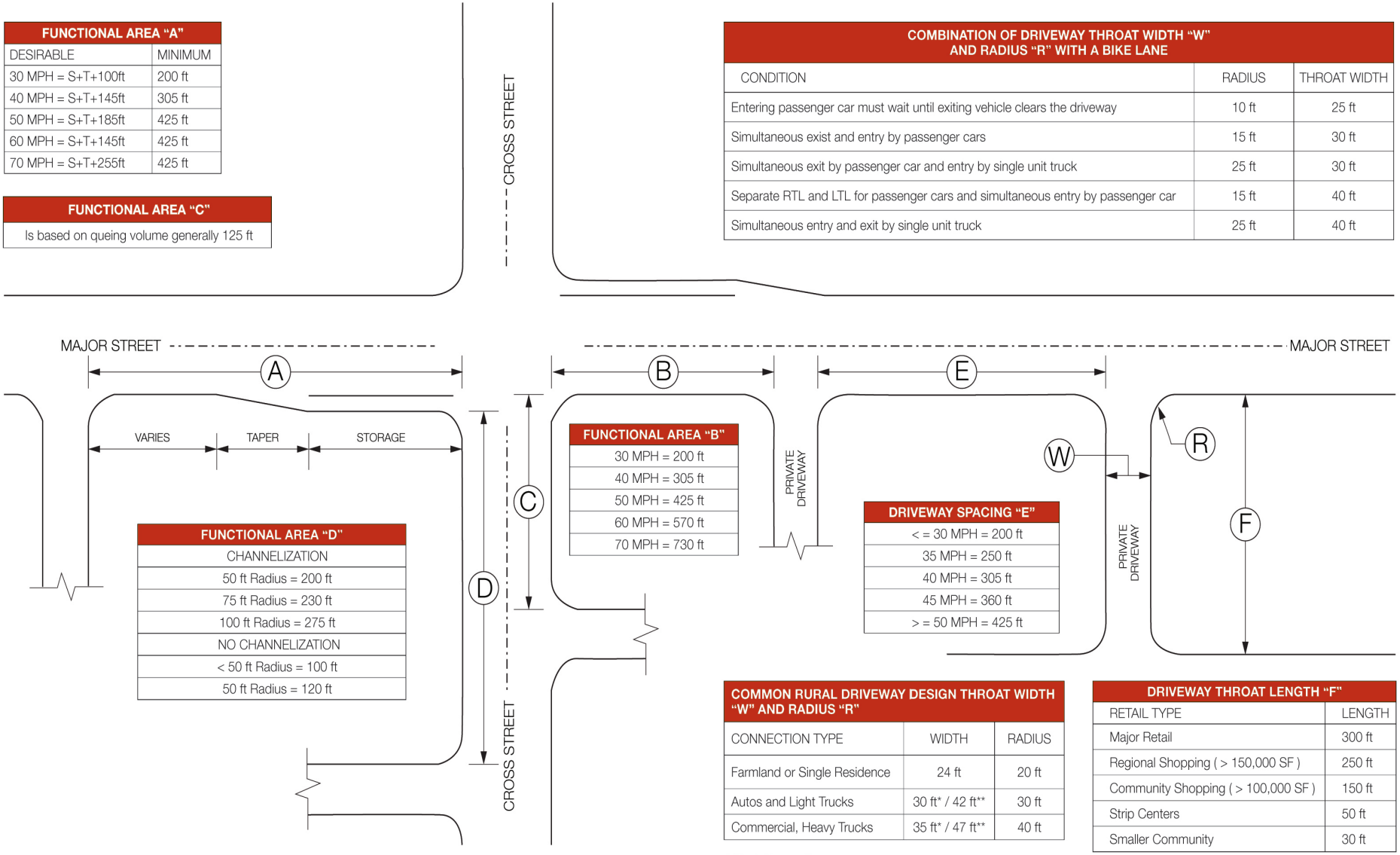
Typically when a new or improved driveway is proposed at a property, an application is made to the City during the plating process, accompanied by a drawing of the driveway geometry, driveway spacing with respect to adjacent driveways/intersections, parking and other relevant information. Limiting or regulating the number of allowed driveways can be an effective tool in access management. While a community's access needs are unique, the Texas Department of Transportation and the Transportation Research Board have established driveway spacing guidelines. Using those guidelines as a starting point, the graphic shown in the following page shall be used in determining driveway spacing.

Access Management Recommended Guidelines

FUNCTIONAL AREA "A"	
DESIRABLE	MINIMUM
30 MPH = S+T+100ft	200 ft
40 MPH = S+T+145ft	305 ft
50 MPH = S+T+185ft	425 ft
60 MPH = S+T+145ft	425 ft
70 MPH = S+T+255ft	425 ft

FUNCTIONAL AREA "C"
Is based on queing volume generally 125 ft

COMBINATION OF DRIVEWAY THROAT WIDTH "W" AND RADIUS "R" WITH A BIKE LANE		
CONDITION	RADIUS	THROAT WIDTH
Entering passenger car must wait until exiting vehicle clears the driveway	10 ft	25 ft
Simultaneous exist and entry by passenger cars	15 ft	30 ft
Simultaneous exit by passenger car and entry by single unit truck	25 ft	30 ft
Separate RTL and LTL for passenger cars and simultaneous entry by passenger car	15 ft	40 ft
Simultaneous entry and exit by single unit truck	25 ft	40 ft



FUNCTIONAL AREA "D"
CHANNELIZATION
50 ft Radius = 200 ft
75 ft Radius = 230 ft
100 ft Radius = 275 ft
NO CHANNELIZATION
< 50 ft Radius = 100 ft
50 ft Radius = 120 ft

FUNCTIONAL AREA "B"
30 MPH = 200 ft
40 MPH = 305 ft
50 MPH = 425 ft
60 MPH = 570 ft
70 MPH = 730 ft

DRIVEWAY SPACING "E"
< = 30 MPH = 200 ft
35 MPH = 250 ft
40 MPH = 305 ft
45 MPH = 360 ft
> = 50 MPH = 425 ft

COMMON RURAL DRIVEWAY DESIGN THROAT WIDTH "W" AND RADIUS "R"		
CONNECTION TYPE	WIDTH	RADIUS
Farmland or Single Residence	24 ft	20 ft
Autos and Light Trucks	30 ft* / 42 ft**	30 ft
Commercial, Heavy Trucks	35 ft* / 47 ft**	40 ft

* Single lane exit
** Two lane exit

DRIVEWAY THROAT LENGTH "F"	
RETAIL TYPE	LENGTH
Major Retail	300 ft
Regional Shopping (> 150,000 SF)	250 ft
Community Shopping (> 100,000 SF)	150 ft
Strip Centers	50 ft
Smaller Community	30 ft

Source: TxDOT Access Management Manual
TRB Access Management Manual

CobbFendley

5.3 Complete Streets

City of Seabrook's Thoroughfare Plan is based on a strategic framework to develop a transportation network that maximizes the economic vitality of the community, promotes smart growth and fully considers the community's desires by providing all road users with opportunities to drive, walk, bike and take transit. Historically, conventional transportation planning and roadway design have placed its focus on mobility rather than pedestrian and non-motorized travel. This resulted in roadways with wide traffic lanes that have the capacity to service a maximum amount of vehicles traveling at high speeds.

Recent transportation planning and design approaches shift design priorities from reaching destinations quickly to increasing the number of accessible places within established access management, roadway and traffic engineering guidelines. Known as Complete Streets, this new standard defines principles and policies that transportation advocates, urban planners, traffic and highway engineers, public health practitioners, and community members can use to plan and design roadways/facilities that consider each transportation mode. Complete Streets allows for safe travel by those walking, cycling, driving automobiles, riding public transportation, or delivering goods.

Complete streets principles work best when the entire transportation network is planned and designed with safety and accessibility at the forefront. Single individual projects, arranged in piecemeal ways are not likely to result in a connected network accessible by the greatest number of users. Instead, a system planned and designed comprehensively has the potential to meet a broader range of community objectives, reduce costs by avoiding costly future retrofits, and reduce congestion on roadways by providing travelers with alternate modes of transportation. An established Thoroughfare plan, like the one presented here, and Comprehensive Plan are at the epicenter of this effort.

It is recommended that complete streets policies be implemented as part of the continued planning of the thoroughfare corridors. Complete Streets projects may include the following improvements:

- Sidewalks and Crosswalks: Adding sidewalks and crosswalks to existing or new infrastructure increases pedestrian accessibility and can reduce the chance of conflict between pedestrian and motor vehicles. Generally, a wider separation between roadways and sidewalks increases pedestrian comfort, which can lead to a greater number of trips taken by walking or in combination with transit. During the Comprehensive Plan's public meeting, in the Transportation station, the public expressed the need for sidewalks throughout the City, including E. Meyer.

- Bike Lanes: Bike lanes increase the options system users have and increases mobility for individuals who prefer non-motorized modes of travel. Dedicated bike lanes may increase cyclist perception of safety and increase non-motorized travel, thereby reducing congestion on roadways. Another added benefit of bike lanes is the removal of cyclist from sidewalks and potential conflict with pedestrians. During the Comprehensive Plan's public meeting, in the Transportation station, the public expressed the need for a bike path/lane on Todville, Red Bluff and connection to access Kemah.

- Accessible Public Transportation: Many individuals who rely on public transportation may delay or eliminate trips due to poor accessibility to the public transportation stops. Providing accessible transit can support economic vitality by allowing more people to effectively participate in the economy. This in turn reduces automobile congestion as more trips are accomplished by using transit. When possible, public transportation stops should be designed with adequate sidewalks, curb cuts, shelters and adequate lighting. This will increase the accessibility for non-motor vehicle travelers and therefore increase the number of road users choosing public transportation as their travel mode. During the Comprehensive Plan's public meeting, in the Transportation station, the public expressed the desire for public transportation in the form of community shuttles, a trolley system, park and rides as well as water taxis.

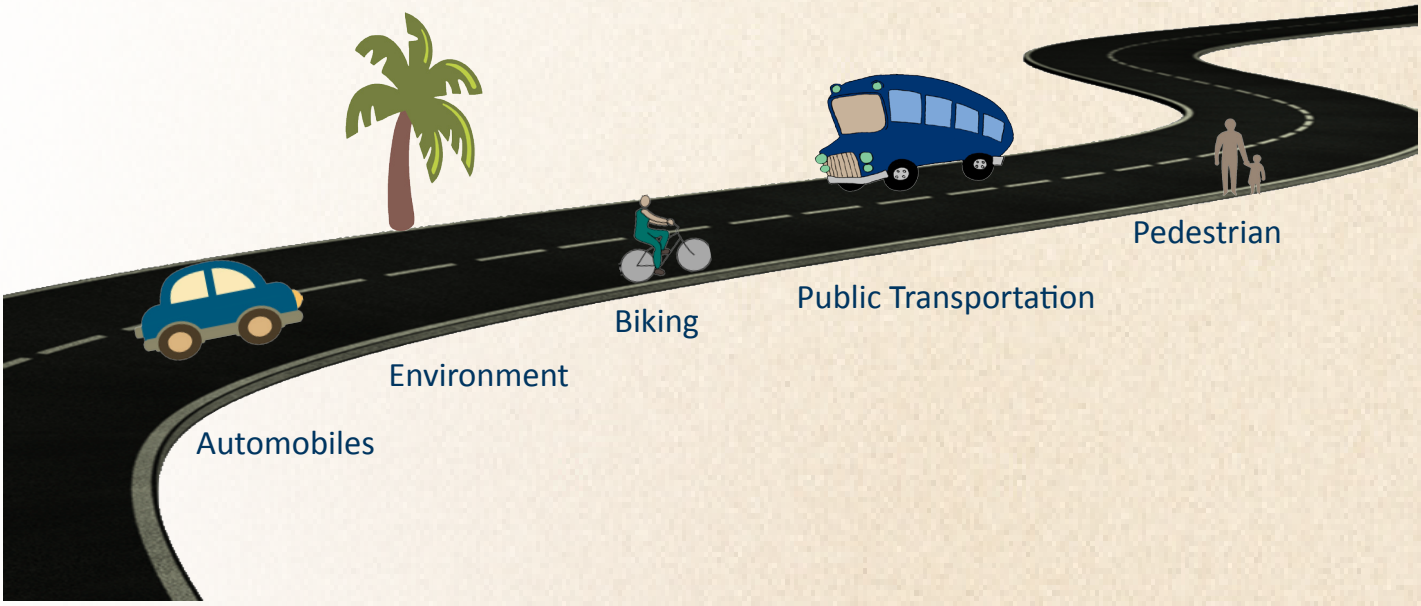
It should be noted that the City of Seabrook is currently working on establishing a Master Plan for Hike and Bike Trails which will help satisfy the needs for non-motorized travel as expressed by the public. A summary of the public's needs expressed during the Comprehensive Plan public meeting, has been included in the Appendix of this report.

5.4 Context Sensitive Design

As City of Seabrook continues the transition from a mostly rural area to one marked by increasing urbanization, the interaction between transportation system users, communities, and the surrounding land uses, plays a significant role in how transportation projects are designed and implemented. Context Sensitive Design is a model for transportation project development that proposes transportation projects to be designed not only for their physical aspects as a facility serving specific transportation objectives, but also for its effects on the aesthetic, social, economic and environmental values of a community. Projects with context sensitive designs, include the following:

- Safety for all users and the community regardless of mode.
- Solves transportation problems through a comprehensive collaboration with a wide range of stakeholders.
- Ensures harmony with the community, and preserves the environmental, scenic, aesthetic, historic, and natural resource values of the area.
- Minimizes the disruption to the community.
- Provides context sensitive solutions (CSS).
- Involves efficient and effective use of the resources (time, budget, community) of all involved parties.

This thoroughfare plan considers the significance of Context Sensitive Design policies to merge individual and community needs, while maintaining mobility and the community's aesthetic quality. City of Seabrook may use context sensitive design principles to effectively merge the past aesthetics of the community with the new development patterns in ways that maintain the local rural character, but does not sacrifice efficiency or impede accessibility to new area destinations.



The City has established design standards that are used for new developments and facilities. Some of these include City of Seabrook Design Standards Manual, Residential Traffic Management Plan and Speed Watch Brochure.

5.4.1 City of Seabrook Subdivision Design Standards

The City of Seabrook has Subdivision Design Standards in order to describe the general requirements for the preparation of construction plans and the supporting documents required for approval by the City. Specific design requirements such as standards provided in this document, in addition to these Standards, may be required. All projects that are required to conform to these Standards shall also be in compliance with all applicable ordinances in the City, including the following:

- Subdivision
- Zoning
- Flood Plain Management
- Traffic
- Sign
- Water and Sewer

The latest version of these design standards can be found in the City of Seabrook's website.

5.4.2 Residential Traffic Management Plan

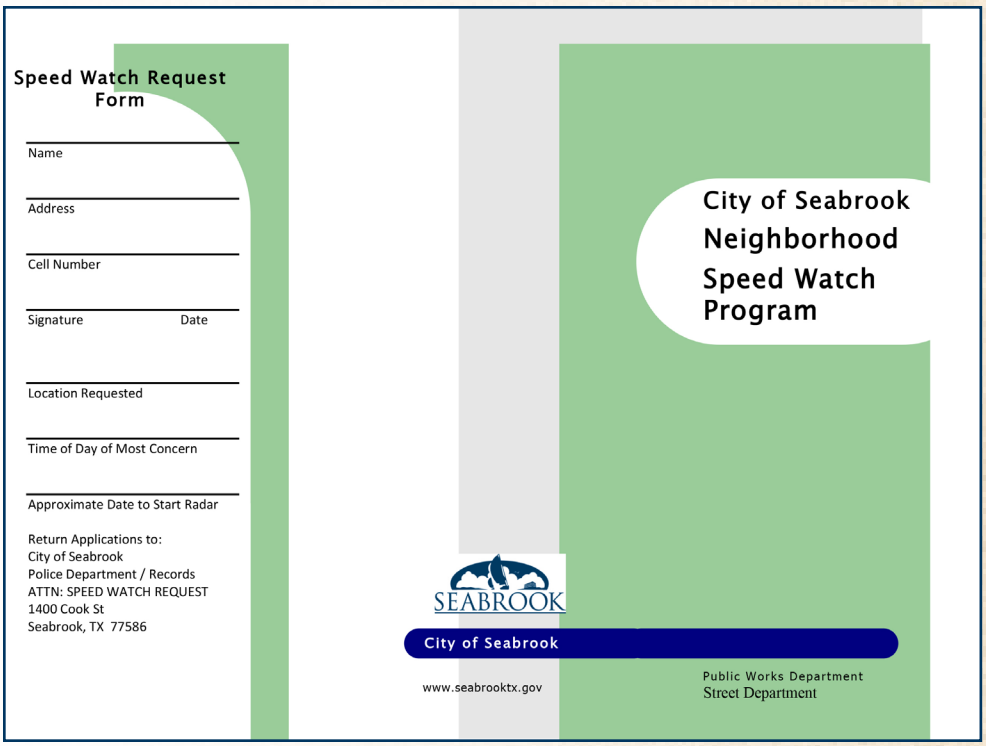
This policy establishes consistent procedures for addressing the traffic-related issues that may occasionally arise along roadways within or nearby residential areas in the city. Neighborhood traffic issues specifically addressed in this policy include the following:

- No Parking Zone Implementation Requests
- Resident Only Restricted Parking Requests
- Cut Through Traffic Mitigation Requests
- Pedestrian Treatment Requests
- School Zone Safety Requests
- Speed Control Requests
- Intersection Control Requests (Multi-way Stops, Traffic Signals, and Roundabouts)
- Other Advisory or Advanced Warning Sign Requests
- Other Public Safety and Traffic Issue Requests

Other neighborhood traffic issues not specifically addressed in this policy may be presented to staff for review by any citizen, business, or group. The Seabrook Public Works-Streets Department staff will work with those parties to review their situation and formulate an appropriate response as necessary.

5.4.3 City of Seabrook Speed Watch Brochure

City of Seabrook has developed a brochure in which the "Neighborhood Speed Watch Program" is presented to the community. The program has three-parts designed to address the concerns of our community. The brochure presents a form that may be filled out by community members that want to request law enforcement to "speed watch." This has aided the City in fulfilling the needs and safety concerns of the community.



Speed Watch Request Form

Name

Address

Cell Number

Signature Date

Location Requested

Time of Day of Most Concern

Approximate Date to Start Radar

Return Applications to:
City of Seabrook
Police Department / Records
ATTN: SPEED WATCH REQUEST
1400 Cook St
Seabrook, TX 77586

City of Seabrook Neighborhood Speed Watch Program

SEABROOK

City of Seabrook

www.seabrooktx.gov

Public Works Department
Street Department

Neighborhood Speed Watch Program

Speeding drivers on neighborhood streets is one of the most common complaints received by the Seabrook Police Department and the Street Department in Public Works. Neighborhood Speed Watch is a three-part program designed to address the concerns of our community. The program is a partnership between the Seabrook Police Department and our citizens and is initiated by citizens concerned about speeding vehicles in their neighborhood.

The "Shield 12" speed monitoring device is what is utilized by the Seabrook Police Department on busy streets as well as in subdivisions. The Shield 12 is a self-contained speed display unit that can either be placed on a permanent speed limit sign or some other type of solid pole structure. These are specifically designed to promote speed awareness. The Shield 12 uses a radar unit to determine the speed of vehicles approaching or driving away from the unit. The speed is displayed on the front of the device and a strobe feature can be turned on to catch the attention of oncoming traffic.

WHAT GOOD DOES THIS DO?

Educating both drivers and residents is important. Residents are, after all, the primary travelers in their own neighborhoods.

POLICE ENFORCEMENT

The use of this trailer has shown to significantly reduce the speed of vehicle traffic. Many drivers do not realize how fast they drive on residential streets. The radar device is a tool that helps educate the public. In conjunction with the radar device use on residential streets, the Police Department can follow up with increased enforcement. Residents may contact the City of Seabrook's Traffic Hotline at 281-291-5775 to request that the device be put on their street.

WE WANT TO HELP

The City of Seabrook's priority is keeping streets and neighborhoods safe and accessible. The Speed Watch Program can help drivers slow down.

HAVE OTHER TRAFFIC CONCERNS?

The City of Seabrook has a ***Residential Traffic Management Program*** that addresses additional concerns such as:

- No Parking Sign Requests
- Cut Through Traffic Requests
- Pedestrian Crossing Requests
- School Zone Safety Requests
- Speed Control Requests
- Traffic Calming Measures

For more information, visit
www.seabrooktx.gov/trafficpolicy