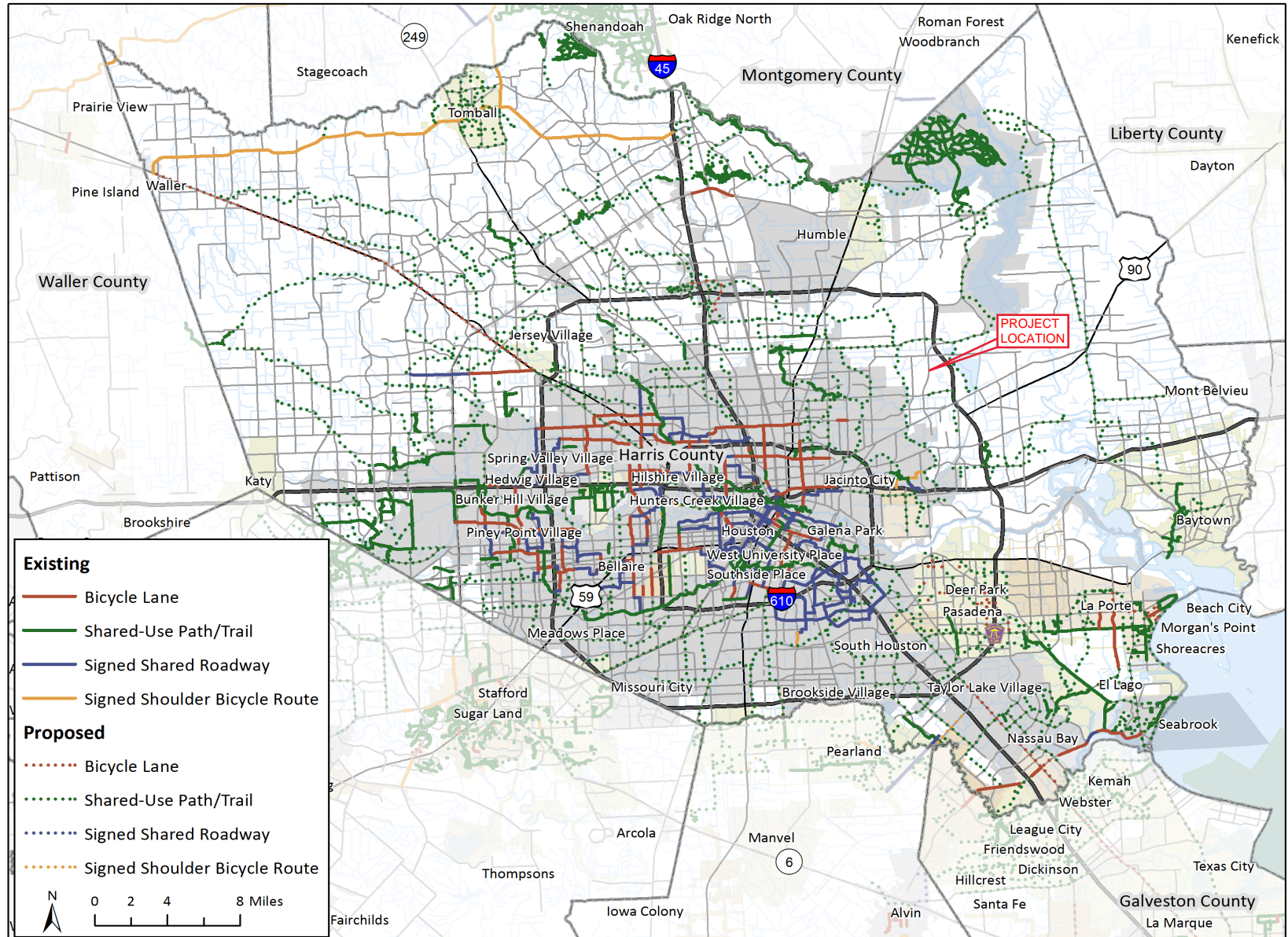


MODEL DATA FROM HGAC

Project	2018 PkPeriod Vol	2018 24Hr Vol	2018 PkPeriod Cap	2025 PkPeriod Vol	2025 24Hr Vol	2025 PkPeriod Cap	2045 PkPeriod Vol	2045 24Hr Vol	2045 PkPeriod Cap	Estimated FFSpd (2018)	Avg Corrdor Spd (2018)
CE King Blvd - from Tidwell Rd to Beltway 8	6,457	10,952	13,889	11,173	19,006	21,738	13,892	29,027	21,738	26	21

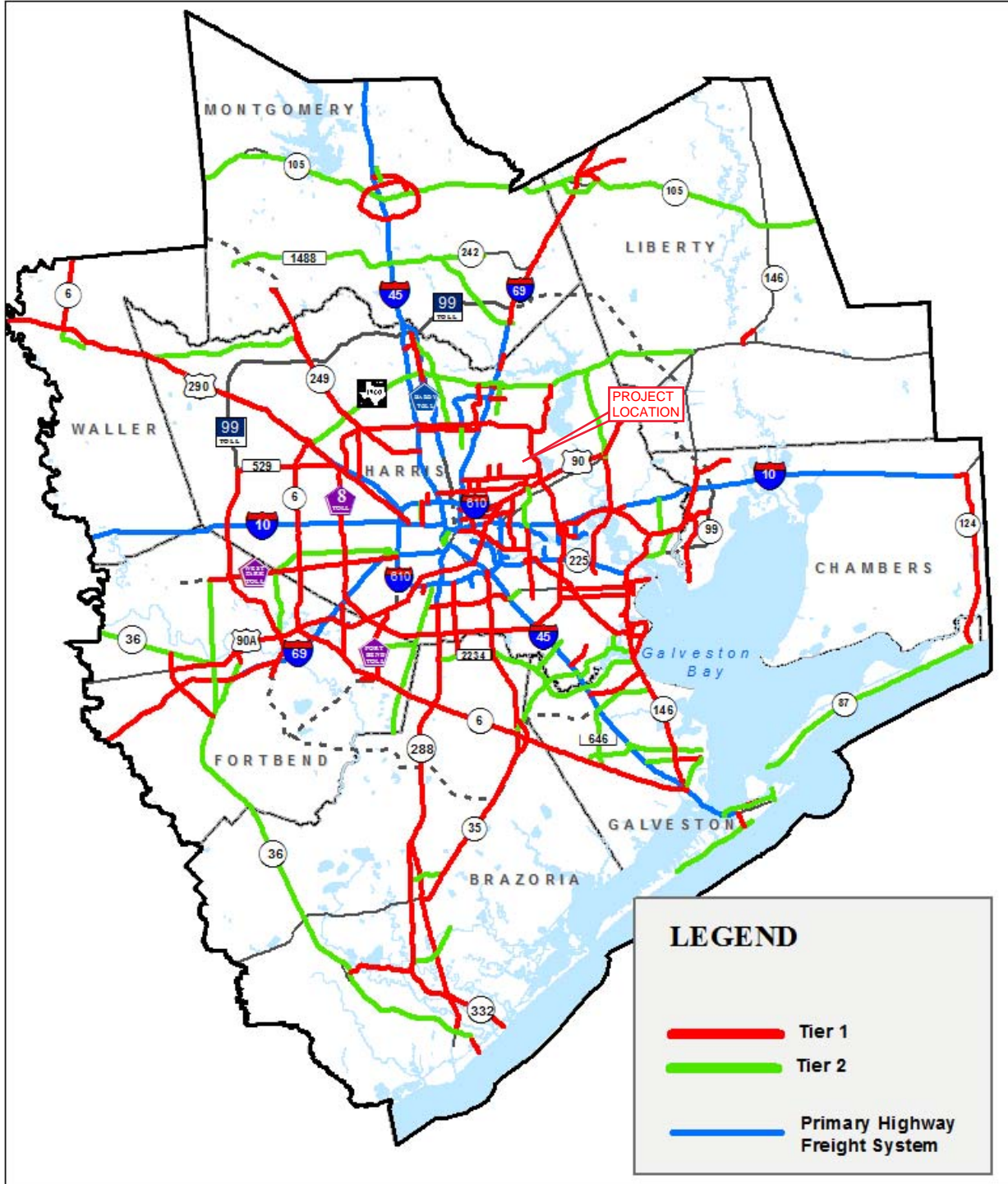
Bikeway Facilities in Harris County





3555 Timmons Ln, Suite 120
Houston, TX 77027
Phone: 713-627-3200
Web: www.h-gao.com

Greater Houston Freight System









Hurricane Evacuation Routes

H-GAC Region

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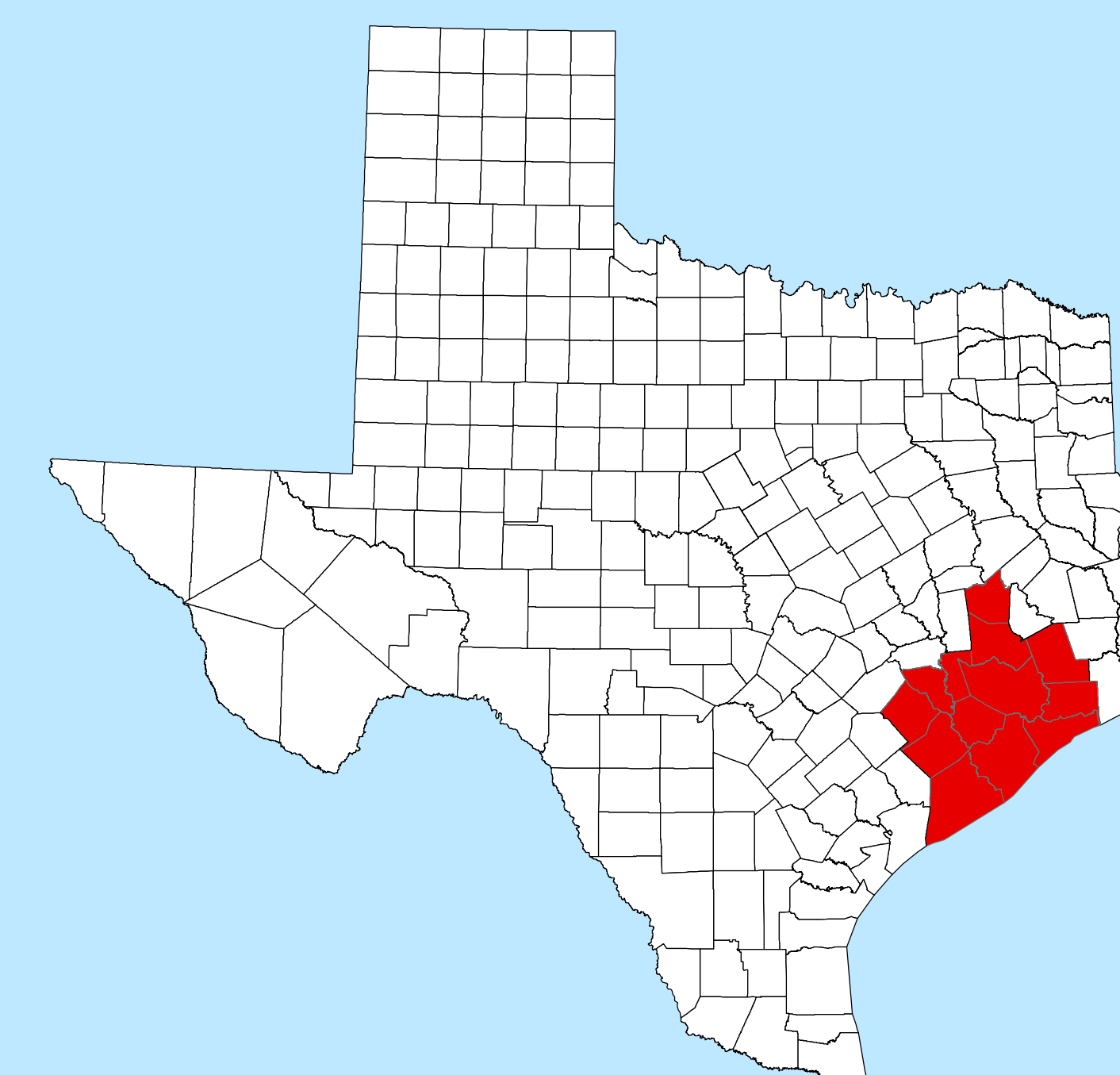
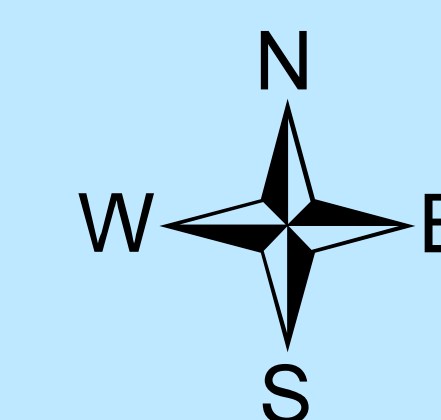
Route Designation

-  Evacuation Corridors
-  Evacuation Connections
-  Other Roads
-  County Boundary

0 5 10 20 Miles

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

Additional maps and information available at www.h-gac.com/taq/hurricane.



Revision Date: April 2, 2018
Expiration Date: December 31, 2018
Map Created by:
Houston-Galveston Area Council

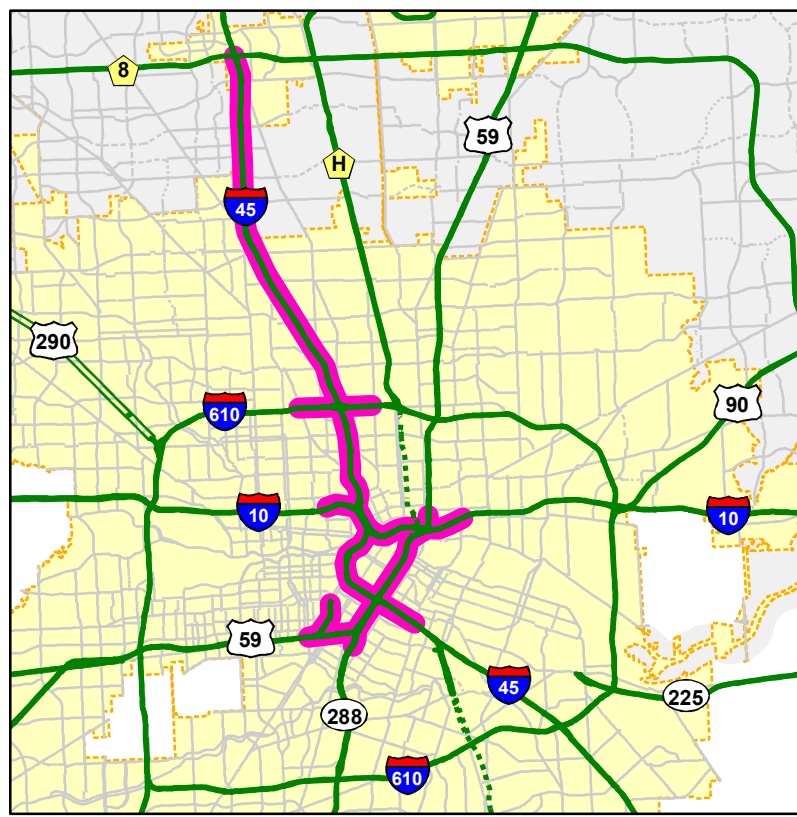
2017 MTFP LEGEND

- MAJOR THOROUGHFARE (R.O.W. ONLY)**
- SUFFICIENT WIDTH
 - TO BE WIDENED
 - TO BE ACQUIRED
- MAJOR COLLECTOR (R.O.W. ONLY)**
- SUFFICIENT WIDTH
 - TO BE WIDENED
 - TO BE ACQUIRED
- MINOR COLLECTOR (R.O.W. ONLY)**
- SUFFICIENT WIDTH
 - TO BE WIDENED
 - TO BE ACQUIRED
- FREEWAY / EXPRESSWAY (R.O.W. ONLY)**
- SUFFICIENT WIDTH
 - TO BE WIDENED
 - TO BE ACQUIRED
 - PROPOSED/SUGGESTED ALIGNMENT **
- TRANSIT CORRIDOR**
- TRANSIT CORRIDOR STREET
- OTHER DESIGNATIONS**
- COUNTY BOUNDARY
 - RAILROAD
 - HOUSTON CITY LIMITS
 - LIMITED PURPOSE ANNEXATION **
 - HOUSTON ETJ
 - RESERVOIR
 - WATERWAYS
 - SAM HOUSTON PARKWAY (BELTWAY 8)
 - HARDY TOLL ROAD
 - WESTPARK TOLL ROAD

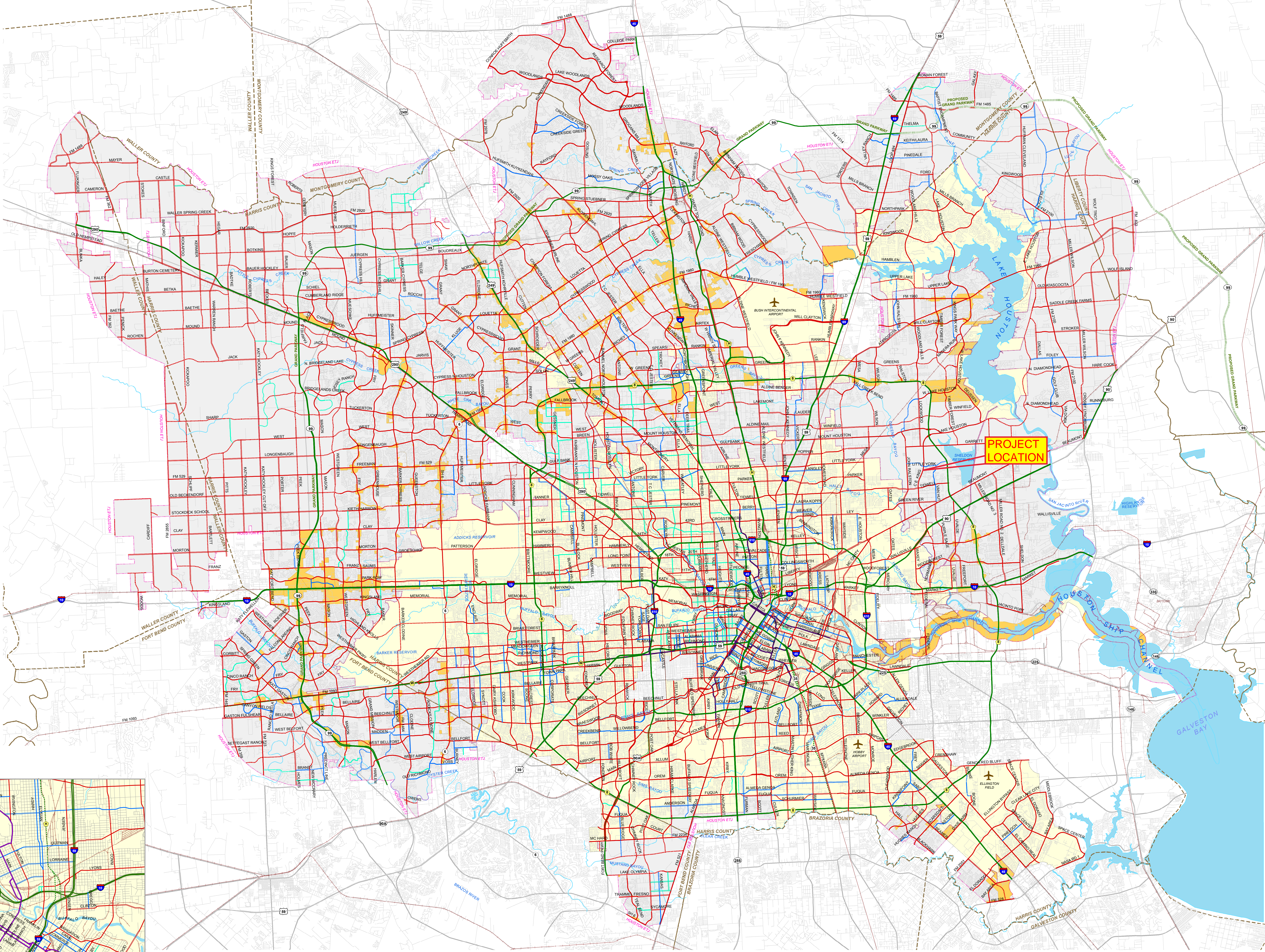
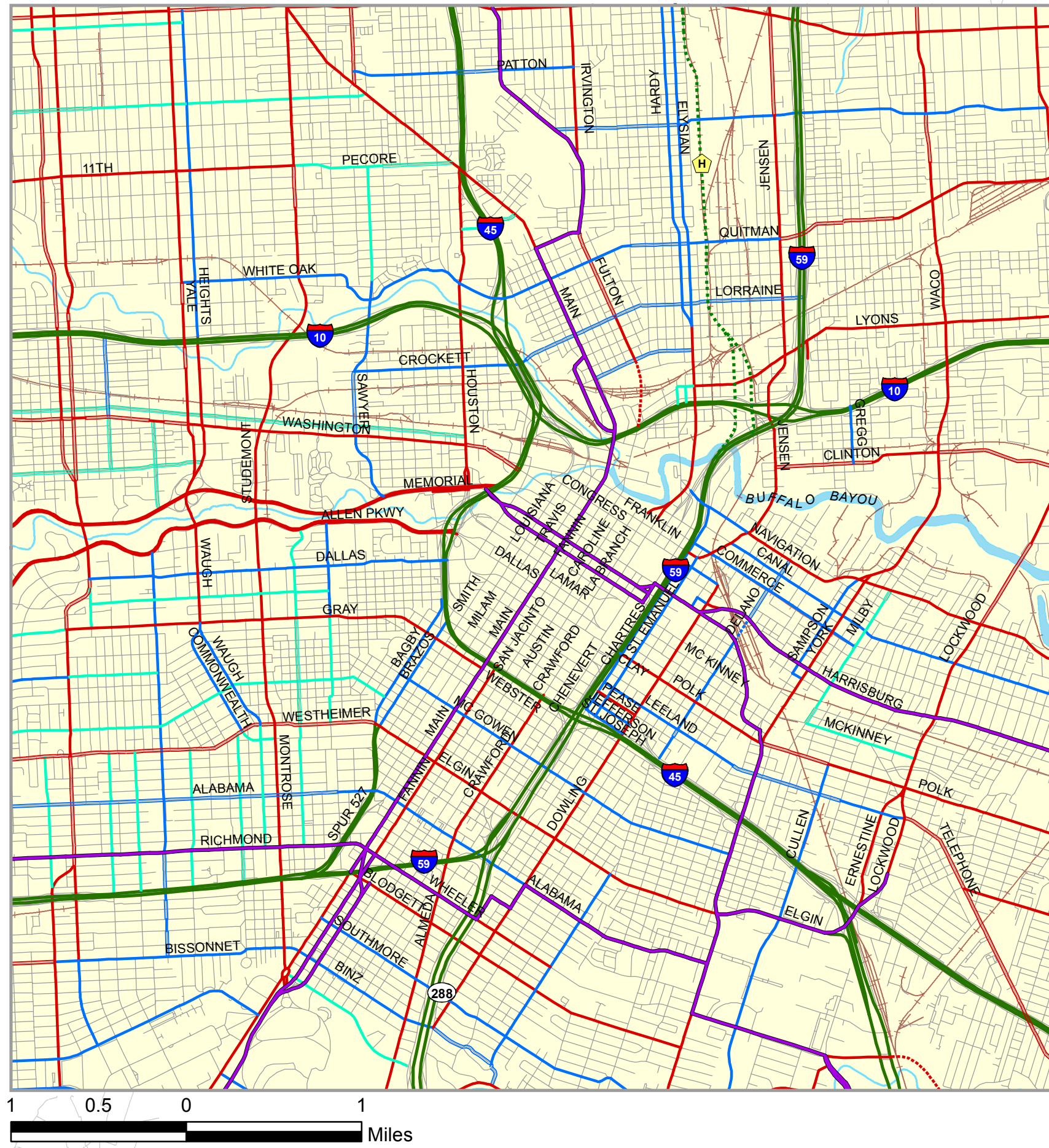
* THE ALIGNMENT FOR SH 35 AND THE GRAND PARKWAY AS REPRESENTED BY THE SCREEN DESIGNATION ARE CONCEPTUAL IN NATURE AND MAY BE SUBJECT TO MODIFICATION AS DEEMED NECESSARY BY THE FOLLOWING:
SH 35 - TEXAS DEPARTMENT OF TRANSPORTATION
GRAND PARKWAY - GRAND PARKWAY ASSOCIATION

** NOT ALL CITY REGULATIONS APPLY IN AREAS DESIGNATED AS LIMITED PURPOSE ANNEXATION.

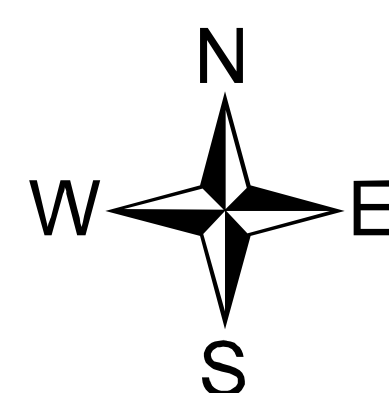
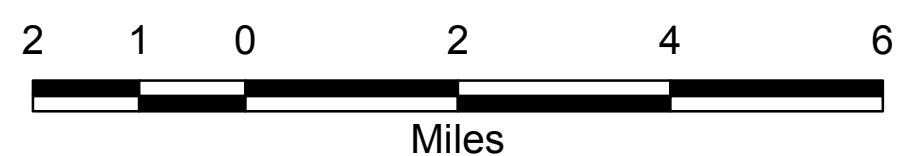
NORTH HOUSTON HIGHWAY IMPROVEMENT PROJECT



GENERAL DOWNTOWN AREA



2017 MAJOR THOROUGHFARE AND FREEWAY PLAN



ABOUT THE MTFP:

THIS PLAN SHOWS GENERAL LOCATIONS ONLY WHICH ARE SUBJECT TO MODIFICATION TO FIT LOCAL CONDITIONS. THE "TO BE ACQUIRED" SYMBOL REPRESENTS A 500 FOOT WIDE CORRIDOR. THE MTFP IS A SCHEMATIC REPRESENTATION OF ROW. IT IS A TOOL FOR GUIDING ROW DEDICATIONS, BUILDING SETBACKS, AND OTHER DEVELOPMENT ACTIONS AS OUTLINED IN CHAPTER 42 OF THE CODE OF ORDINANCES. ADDITIONAL ROW MAY BE REQUIRED AT INTERSECTIONS FOR TURNING LANES AND TRANSITIONS.

THE GENERAL DOWNTOWN INSERT MAP IS AN ENLARGEMENT OF THE CENTRAL BUSINESS DISTRICT MAJOR ROADWAY NETWORK.

EFFECTIVE APRIL 17, 1996, THE STREET HIERARCHY CLASSIFICATION SYSTEM SUPPLEMENTED THE MAJOR FREEWAY AND THOROUGHFARE PLAN (MTFP) BY DEFINING THE FUNCTION, PROJECTED NUMBER OF LANES, AND MINIMUM ROW WIDTH REQUIREMENT FOR STREET SEGMENTS.

THE CLASSIFICATION IS AS FOLLOWS:
EXAMPLE - "P-6-100"
"P", "T", "M", "MN" OR "TCS" - FUNCTIONAL CLASS (PRINCIPAL THOROUGHFARE, THOROUGHFARE, MAJOR COLLECTOR, MINOR COLLECTOR OR TRANSIT CORRIDOR STREET)
"6" - PROJECTED NUMBER OF LANES
"100" - MINIMUM ROW WIDTH

ON APRIL 29, 1998, CITY COUNCIL ADOPTED THE COLLECTOR AS AN ADDITIONAL STREET CATEGORY.

STREET ROW WIDTH REQUIREMENTS SHALL COMPLY WITH THE STREET HIERARCHY CLASSIFICATION TABLE. STREETS DESIGNATED ON THE MAJOR THOROUGHFARE AND FREEWAY PLAN THAT ARE NOT IDENTIFIED ON THE STREET HIERARCHY TABLE SHALL COMPLY WITH THE REQUIREMENTS OF CHAPTER 42 OF THE CODE OF ORDINANCES. THE STREET HIERARCHY ROW DEFINES THE GENERAL MINIMUM WIDTH OF STREET SEGMENTS. THE CITY OR COUNTY ENGINEERING DEPARTMENT RESERVES THE RIGHT TO REQUIRE ADDITIONAL ROW AT INTERSECTIONS OR OTHER LOCATIONS AS DEEMED NECESSARY TO ENHANCE MOBILITY.

HOUSTON PLANNING COMMISSION
MARTY STEIN, CHAIR
PATRICK WALSH, P.E., SECRETARY
APPROVED BY HOUSTON PLANNING COMMISSION ON AUGUST 17, 2017
ADOPTED BY HOUSTON CITY COUNCIL ON OCTOBER 18, 2017
COUNCIL MOTION 2017-0643



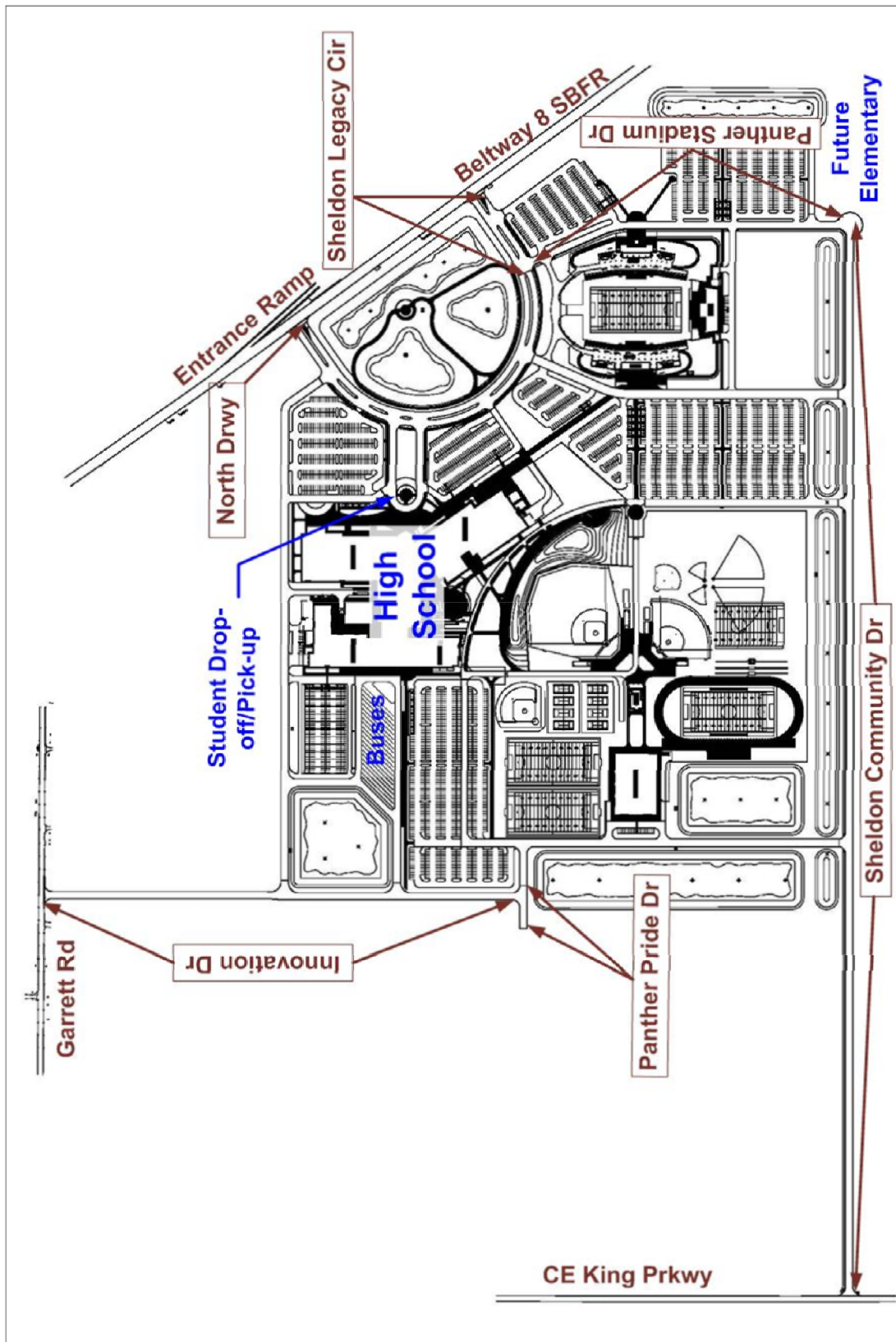


FIGURE 1 TOTAL TRACT SITE PLAN



Traffic Study

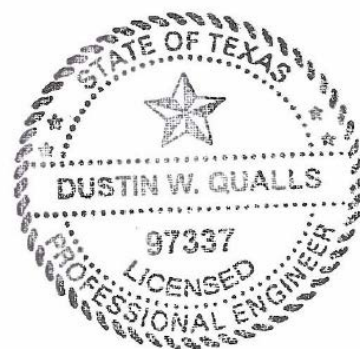
Sheldon ISD New High School and District Stadium

Prepared for

Huckabee

Prepared by

Traffic Engineers, Inc.



Dustin W. Qualls, PE, PTOE

Revised

March
2018

EXECUTIVE SUMMARY

STUDY AREA

Sheldon ISD is constructing a new High School and District Stadium adjacent to the Beltway 8 Southbound Frontage Road (SBFR), south of Garrett Road. As illustrated in **Figure 1**, the site extends between the Beltway 8 SBFR and C.E. King Parkway. The new High School and District Stadium will replace existing C.E. King High School and the District Stadium, which are located on Crenshaw Boulevard, east of C.E. King Parkway. Both facilities will open in August 2019.



FIGURE 1 SITE LOCATION

An elementary school will open on the site in 2019; however, the elementary school has not been designed. Once the contract for design of the elementary school is let, a separate Traffic Study will be prepared for the Elementary School. The Elementary School will start 50 minutes later than the High School and dismissal will be an hour and five minutes after the High School; thus, no Elementary School traffic is expected to be generated during the High School peak hours.

A network of local public streets will be constructed in conjunction with the High School and Stadium to improve north-south and east-west circulation in the area. The new public streets include Innovation Drive, which will extend between Garrett Road and Panther Pride Drive, as well as Sheldon Community Drive, Panther Stadium Drive and Sheldon Legacy Circle, which will extend between C.E. King Parkway and Beltway 8 SBFR.

Direct public street access to the High School and District Stadium will be from the Beltway 8 SBFR, Sheldon Legacy Circle, Innovation Drive, Panther Stadium Drive and Sheldon Community Drive. Indirect access will be provided from C.E. King Parkway and Garrett Road. The distance between site access connections along the Beltway 8 SBFR (North Driveway and Sheldon Legacy Circle) is 800 feet, which exceeds the TxDOT connection spacing criteria of 450 feet.

Sidewalks will be constructed on, or adjacent to, the Sheldon ISD tract along Sheldon Community Drive, Panther Stadium Drive, Sheldon Legacy Circle and C.E. King Parkway to facilitate future pedestrian connections as the surrounding area develops. Additionally, an extensive internal network of sidewalks is planned to provide access between the High School building, Stadium and the site parking lots and other athletic facilities. A sidewalk will not be constructed along Garrett Road because the school site does not front on Garrett Road; site access to Garrett Road is limited to a 100-foot easement.

The purpose of this study is to document the traffic impacts associated with the construction of the new Sheldon ISD High School, assuming full capacity with 3,500 students, including completion of the built-in shell expansion. Additionally, Traffic Management Plans were developed for vehicles entering the District Stadium prior to a football game and vehicles discharging from the District Stadium after a game, assuming a full capacity event at the Stadium where all parking lots are full.

FINDINGS AND RECOMMENDATIONS

The following is a summary of findings and recommendations based on analyses of 2019 traffic operations at the study intersections during the School AM and PM Peak Hours (6:15-7:15 AM 1:45-2:45 PM) and the Stadium Entering and Exiting peak hours (6:30-7:30 PM and 9:30-10:30 PM):

High School AM and PM Peak Hours

- A westbound left turn-lane will be constructed on Garrett Road to accommodate the left-turn movements at Innovation Drive. Based upon the 95th percentile queue length analysis conducted at the intersection, a 150-foot storage length would accommodate the left-turns at Innovation Drive.
- A southbound left turn-lane will be constructed on C.E. King Parkway to accommodate the left-turn movements at Sheldon Community Drive. Based upon the 95th percentile queue length

analysis conducted at the intersection, a 150-foot storage length would accommodate the left-turns at Sheldon Community Drive.

- Sheldon Community Drive and Panther Stadium Drive will both be constructed with a center left-turn lane, accommodating the left-turns turns from these streets onto the school driveways.
- The intersection of Garrett Road and C.E. King Parkway currently has one shared left-turn/through/right-turn lane at all approaches of the intersection. With the construction of the High School, the intersection is expected to operate with long delays during the AM peak hour. If left-turn lanes are constructed at all approaches, the intersection is projected to operate at LOS C and LOS B during the school AM and PM peak hours, respectively.
- All-way stop control is recommended at the intersection of Panther Stadium Drive and Sheldon Legacy Circle based on the Texas Manual on Uniform Traffic Control Devices (TMUTCD) Option Criteria D: “An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.” Although, Panther Stadium Drive and Sheldon Legacy Circle are not residential neighborhood collectors, they are collectors that will have the same cross-section and will function the same.
- Delays are expected at the unsignalized intersections of the North Driveway and Sheldon Legacy Circle at Beltway 8 SBFR and at the unsignalized intersection of Sheldon Community Drive at C.E. King Parkway. No mitigation was identified.
- Sidewalk connections are provided between Innovation Drive and the school building and Panther Stadium Drive and the school building; however, a sidewalk/ramp/crosswalk connection should be provided between the sidewalks along the student drop-off/pick-up entrance driveway and the sidewalks along the outdoor instructional area inside the semi-circle formed by North Driveway/ Sheldon Legacy Circle.
- Sidewalk gaps (on the site plan) that should be eliminated include:
 - Along Beltway 8 SBFR
 - Along C.E. King Parkway
 - Along east side of Innovation Drive
 - Along Sheldon Legacy Circle between the Beltway 8 SBFR and the nearest parking lot driveway
 - Along North Driveway between the Beltway 8 SBFR and the nearest parking lot driveway
- Roadways with sidewalks should be constructed between the Sheldon ISD tract and existing and future subdivisions south of the school site to facilitate future vehicular and pedestrian access between the residential areas and the High School and Elementary School.
- According to Sheldon ISD Transportation, students living across C.E. King Parkway, Garrett Road and Sam Houston Tollway will likely be eligible to be bused to school because these are major roadways. Existing conditions near the High School are not amenable to pedestrian activity; thus, School Speed Zones are not currently recommended along C. E. King Parkway, Garrett Road or the Beltway 8 SBFR. School Speed Zones should be established along the streets providing access between the Sheldon ISD tract and the subdivisions to the south, as street and sidewalk connections are provided.

Stadium Entering and Exiting Peak Hours

- Innovation Drive should operate under normal two-way conditions before and after a full capacity event, e.g., varsity football game. Temporary signage should be installed to facilitate parking-lot destinations.
- Sheldon Community Drive will also operate under normal two-way conditions before and after a full capacity event. The center turn lane should operate under reversible traffic operations before and after a game. Temporary signage should be installed to facilitate reversible traffic operations on Sheldon Community Drive and parking-lot destinations.
- After a full capacity event, the through traffic and Stadium exiting traffic on Beltway 8 SBFR should be channelized (see **Figure 16**). Traffic cones should be installed on the Beltway 8 SBFR to channelize the through traffic into the eastern travel lane of the Beltway 8 SBFR. Cones should also be installed to channelize vehicles exiting the North Driveway into the middle travel lane of the Beltway 8 SBFR and vehicles exiting Sheldon Legacy Circle into the western travel lane.
- Police officers should direct traffic at the following intersections after a full capacity event to minimize the time it will take for all motorists to exit the Stadium:
 - Beltway 8 SBFR at the North Driveway
 - Beltway 8 SBFR at Sheldon Legacy Circle
 - Garrett Road at Innovation Drive
 - C.E King Parkway at Sheldon Community Drive
 - C.E King Parkway at Garrett Road
- Implementation of the Stadium Discharge Plan utilizing two-way operations on Innovation Drive could increase the discharge times from a football game that is at capacity. However, the vehicles will be queued in the parking lots and should not impact traffic flow on Innovation Drive.
- In addition to the sidewalk gaps identified for High School circulation, a sidewalk connection is missing on the north-south driveway providing access to the Home side of the Stadium between Sheldon Community Drive and the North Driveway.

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INTRODUCTION

This report presents an analysis of the traffic impacts associated with the construction of the new Sheldon ISD High School and provides a Traffic Management Plan for a full capacity event, such as a sold-out Friday night football game, at the new District Stadium. Both facilities are located on a site that extends between the Beltway 8 SBFR and C.E. King Parkway, south of Garrett Road. The new High School and District Stadium will open in August 2019. The new High School will continue to be the sole Sheldon ISD High School, replacing existing C.E. King High School.

In addition to the new High School and District Stadium, the complex will include an elementary school. Although the elementary school will also open in 2019, the school has not been designed and will be the subject of a separate Traffic Study.

Access to the site will be from the Beltway 8 SBFR and a network of local streets that will be constructed in conjunction with the High School and Stadium including Innovation Drive, Sheldon Legacy Circle, Panther Stadium Drive and Sheldon Community Drive.

STUDY AREA

EXISTING AND FUTURE LAND USE

Land uses adjacent to the Sheldon ISD tract include undeveloped property west and north of the site. Beltway 8 Southbound Frontage Road (SBFR) is located east of the site and residential development is located south of the site.

Future development includes additional residential development to the south. Sheldon ISD is considering selling a portion of the site located south of Sheldon Community Drive to a homebuilder. If this happens, Sheldon ISD should work with the homebuilder to ensure that there are pedestrian connections between the residential development and the school site.

Generation Park, a 4,000-acre planned commercial park, located north of Garrett Road, is currently being developed north of the Sheldon ISD boundaries.

EXISTING ROADWAY CONDITIONS

Beltway 8, an 83-mile loop around Houston, is the system of frontage roads serving Sam Houston Tollway. The Beltway 8 SBFR, is a three-lane frontage road adjacent to the Sheldon ISD site. The posted speed limit on the frontage road is 50 mph.

Adjacent to the High School and Stadium site, C. E. King Parkway is typically a two-lane roadway with open ditches. Near the southern boundary of the site, the road begins to widen to provide a southbound left-turn lane at a driveway for Sheldon ISD Carroll Elementary. The posted speed limit on C.E. King Parkway is 45 mph.

Garrett Road is also typically a two-lane roadway with open ditches. The roadway widens to a four-lane divided cross-section at the Beltway 8 Frontage Roads. The posted speed limit is 45 mph.

The lane assignments and traffic control at the existing study area intersections are provided in **Figure 2**.

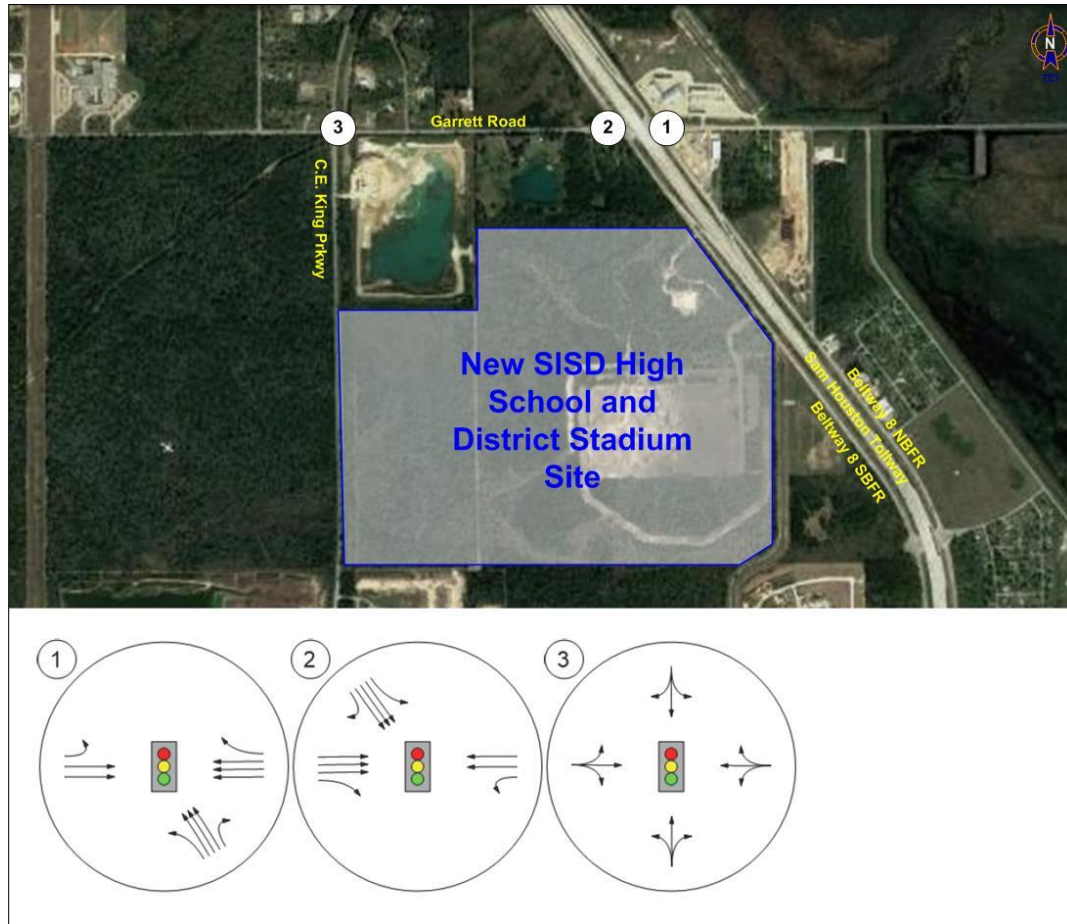


FIGURE 2 EXISTING LANE ASSIGNMENTS/TRAFFIC CONTROL

TRAFFIC COUNTS

The following traffic counts were conducted during the week to analyze traffic operations during daily arrival and dismissal at the High School and on a Friday night to analyze traffic operations during Sheldon ISD Varsity High School Football game peak hours:

24-Hour Bidirectional or Directional (Beltway 8 Frontage Road) Counts

- Beltway 8 Northbound Frontage Road, south of Garrett Road (north of exit ramp)
- Beltway 8 Southbound Frontage Road, south of Garrett Road (south of entrance ramp)
- Garrett Road, between Holley Court and C.E. King Parkway
- C.E. King Parkway between Garrett Road and E. Little York Road

Turning Movement Counts (TMCs)

- Beltway 8 Northbound Frontage Road
- Beltway 8 Southbound Frontage Road
- Garrett Road at C.E. King Parkway

The traffic counts are provided in **Appendix A**. Based on a comparison of the TMC at Beltway 8 SBFR at Garrett Road with the 24-hour directional counts conducted on Beltway 8 SBFR, as well as field observations, the Beltway 8 SBFR lanes adjacent to the site function as de facto Tollway main lanes. Most motorists choose to travel on the Beltway 8 SBFR, which is not tolled, instead of accessing the Sam Houston Tollway, which is tolled, at the entrance ramp south of Garrett Road.

FUTURE ROADWAY CONDITIONS

A network of public streets that will provide direct access to the Sheldon ISD site will be built in conjunction with the construction of the High School and Stadium, as illustrated in **Figure 3**. The new local streets will have the following cross-sections:

- Sheldon Community Drive, a 36-foot, two-lane street with a continuous left-turn lane. An 8-foot shared-use path will be constructed on the north side.
- Panther Stadium Drive, a 36-foot, two-lane street with a continuous left-turn lane. An 8-foot shared-use path will be constructed on the west side.
- Innovation Drive, a 28-foot, two-lane street from Sheldon Community Drive to approximately 300 feet south of Garrett Road where it will transition to a 36-foot wide street to provide a two-lane approach (left-turn lane and right-turn lane) at Garrett Road. Sidewalks are not shown on the site plan; an 8-foot shared-use path is recommended along the east side.
- Sheldon Legacy Circle, a four-lane divided street, with an 8-foot shared-use path on the south side. As shown in **Figure 3**, Sheldon Legacy Circle only extends between Panther Stadium Drive and the Beltway 8 SBFR. The site North driveway aligns with Sheldon Legacy Circle at Panther Stadium Drive and extends between Panther Stadium Drive and the Beltway 8 SBFR.

A westbound left-turn lane will be constructed on Garrett Road at Innovation Drive in conjunction with construction of the new High School and Stadium. Additionally, a southbound left-turn lane will be constructed on C.E. King Parkway at Sheldon Community Drive. The cross-sections for Sheldon Community Drive and Panther Stadium Drive include a continuous left-turn lane to accommodate left-turns from the streets onto the school driveways. Left-turn lanes will not be constructed on Sheldon Legacy Circle at the intersections with the school driveways because it is a four-lane divided roadway, or on Innovation Drive at the intersections with the school driveways because the vehicles on the street should be limited to High School/Stadium generated traffic and delays to turn left from the streets onto the site driveways are expected to be minimal.

Right-turn lanes are not recommended on the Beltway 8 SBFR at either the North Driveway or Sheldon Legacy Circle because the SBFR is a three-lane frontage road and the projected volumes turning right onto the North Driveway and Sheldon Legacy Circle are less than 275 vehicles during the High School Peak hours. The volumes will be higher during the Varsity Football pregame peak hour; however, there are only 13 varsity football games each year.

Harris County is installing traffic signals at the intersections of C. E. King Parkway at E. Little York Road and at Stonefield Manor Drive, approximately 0.2 miles and 0.7 miles south of the High School/Stadium site southern property line. E. Little York Road and Stonefield Manor Drive are both identified on **Figure 1**.

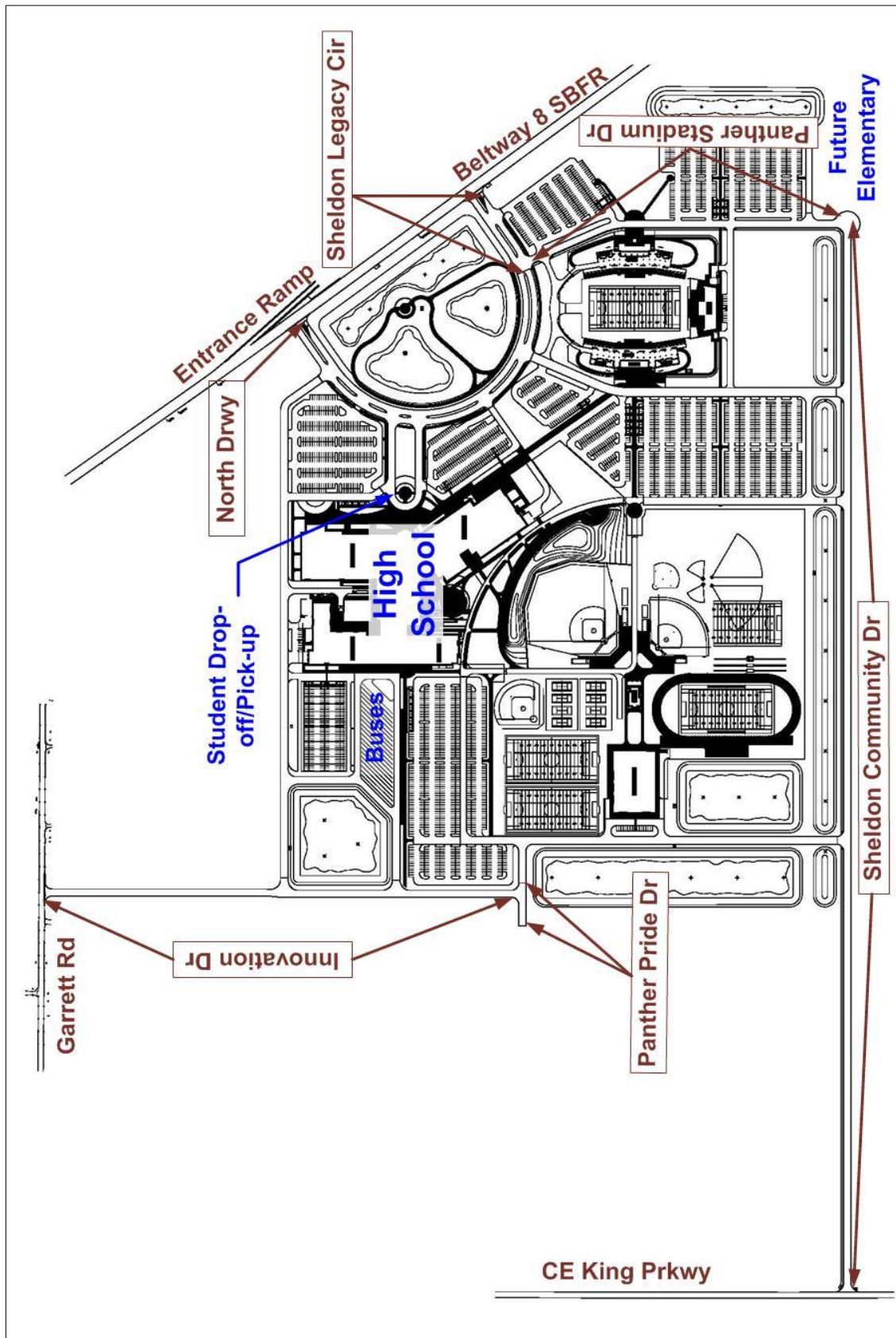


FIGURE 3 SITE PLAN

SITE PLAN

The site plan for the High School and District Stadium is shown in **Figure 3**. Although the site plan for the Sheldon ISD Elementary School, which will be constructed near the southeast corner of the site, has not been developed, a placeholder Elementary School is shown in **Figure 3**.

One site driveway (North Driveway) and Sheldon Legacy Circle will intersect the Beltway 8 SBFR. The North Driveway and Sheldon Legacy Circle will provide access to the student drop-off/pick-up driveway; however, parents will be instructed not to enter from the Beltway 8 SBFR to drop-off students because there is inadequate on-site stacking provided for parents. Some parents exiting the school site are expected to use Sheldon Legacy Circle on Beltway 8 SBFR. Conversely, direct access is not provided to the bus parking lot, but some High School buses are expected to enter and exit the North driveway on Beltway 8. The vehicles expected to enter and exit the High School from the North Driveway and Sheldon Legacy Circle on the Beltway 8 SBFR are shown in **Table 1**. Although the North Driveway and Sheldon Legacy Circle will be constructed with two exiting lanes, the driveways will operate with a one-lane, right-turn only approach at the Beltway 8 SBFR.

TABLE 1 CIRCULATION PATTERNS

Street/Driveway	Enter Site	Exit Site
North Drwy on Beltway 8 SBFR	Buses, Student Drivers, Staff	Buses, Student Drivers, Staff
Sheldon Legacy Cir on Beltway 8 SBFR	NA	Parents, Student Drivers, Staff
Innovation Dr on Garrett Road	Buses, Staff	Buses, Staff
Sheldon Community Dr on C.E. King Prkwy	Parents, Student Drivers	Parents, Student Drivers

The location of the North Driveway and Sheldon Legacy Circle on the Beltway 8 SBFR are in accordance with the TxDOT access management criteria. TxDOT requires 450 feet between driveways and or street connections on a one-way frontage road with a posted speed limit of 50 mph, such as the Beltway 8 SBFR. The North Driveway and Sheldon Legacy Circle are approximately 800 feet apart. Additionally, Garrett Road and Little York Road are the nearest connections along the Beltway 8 SBFR north and south of the Sheldon ISD tract. Both Garrett Road and Little York Road are much greater than 450 feet from the North Driveway and Sheldon Legacy Circle, respectively. The civil engineer for the project also confirmed that the North Driveway is not within a control of access area on the Beltway 8 SBFR.

Access to the site will also be provided by Innovation Drive, accessible from Garrett Road, and Sheldon Community Drive, accessible from C.E. King Parkway. Both streets are designed with one entering and two exiting lanes. The vehicles expected to enter and exit the High School from Innovation Drive and Sheldon Community Drive are shown in **Table 1**.

ANALYSIS – NEW HIGH SCHOOL

TRIP GENERATION

Except for the staff number below, Sheldon ISD provided the following information about the High School:

- School Hours: 7:10 AM – 2:20 PM

- Ultimate enrollment: 3,500 students, with completion of the building shell expansion
- Ultimate number of staff: 300
- Ultimate number of buses: 60
- Ultimate number of student drivers: 250

The number of staff was estimated by Traffic Engineers, Inc. based on a review of Traffic Studies conducted for high schools of a similar size in other school districts. Currently, there are approximately 90 student drivers at C.E. King High School, which is low compared to most other Houston area high schools.

To determine the number of parent vehicles at the future High School, data was collected at existing C.E. King High School in Spring 2017. By the time enrollment at the High School reaches ultimate capacity (3,500 students), students living in subdivisions south of the site should be able to walk to school; however, the number of students within walking distance of the new High School is expected to be less than the number of students living within walking distance of existing C.E. King High School. According to the Transportation Department at Sheldon ISD, most students will likely be eligible to ride the bus at the new High School because the streets surrounding the school are major streets. The exceptions might be students living in the subdivisions south of the school that should ultimately have connections to the campus from the south. The increase in the number of students eligible for busing at the new High School is expected to offset the decrease in the number of students walking to school, thus, the percentage of parent vehicles generated by the new High School is expected to remain approximately the same as at existing C.E. King High School (see **Table 2**). However, even if the percentage of parent vehicles is higher, there is adequate capacity on-site for additional parent vehicles (see analysis provided in **Table 4**).

TABLE 2 PM PEAK PARENT VEHICLES AT ULTIMATE ENROLLMENT

School	Total Enrollment	Total Parent Vehicles	Percent of Enrollment ¹	Maximum Parent Queue	Percent of Enrollment ¹
C.E. King High School	1,800	97	5.5%	70	4.0%
New Sheldon ISD High School	3,500	193	5.5%	140	4.0% ¹

¹ Percentages are rounded up to the nearest 0.05%.

Trip generation for the new High School was estimated based on data provided by Sheldon ISD and observations conducted by Traffic Engineers, Inc. The trip generation for parent vehicles assumes completion of the built-in shell, which will accommodate an additional 500 students. According to historical arrival/dismissal data collected by Traffic Engineers, Inc. at schools in other ISDs, the number of parent vehicles dropping-off students during the AM peak is approximately two times the number of parent vehicles picking-up students during the PM peak. The estimated trip generation developed for the new High School during the AM and school PM peak hours is illustrated in **Table 3**.

TABLE 3 TRIP GENERATION FOR ULTIMATE ENROLLMENT

Sheldon ISD New High School	AM Peak Hour 6:15-7:15 AM		PM Peak Hour 1:45-2:45 PM	
	Enter	Exit	Enter	Exit
Parent Vehicles	386	386	193	193
Student Drivers	250	0	0	250
Staff (90% of Total)	270	0	0	270
Buses	60	60	60	60
Total	966	446	253	773

Based upon hours at existing Sheldon ISD elementary schools, the peak hours of the elementary school that will be constructed near the southeast corner of the site (7:15-8:15 and 2:45-3:45 PM) should not overlap with the high school peak hours. Therefore, elementary school generated traffic is not included in the trip generation for the High School peak hours.

TRIP DISTRIBUTION

The new High School will replace C. E. King High School as the only High School in Sheldon ISD. The trip distribution for the High School, illustrated in **Figure 4** was developed based on existing residential development within the District boundaries and future residential development within the District boundaries through Academic year 2023-24 as projected in the demographic study conducted for Sheldon ISD in 2014 (*Sheldon ISD Demographic Update*, Population and Survey Analysts, June 2014). A figure showing the projected growth in Sheldon ISD is included in **Appendix B**. The 2014 study is the most recent demographic study for the District and, while the information included in the study may not exactly reflect current development plans, it should be directionally correct.



FIGURE 4 TRIP DISTRIBUTION

PROJECTED SITE TURNING MOVEMENT COUNTS

Traffic projections were developed at the study area intersections for 2019 Background and Ultimate Enrollment conditions. Background traffic volumes include existing traffic counts increased five percent annually between 2017 and 2019 to reflect natural growth in through traffic. Ultimate Enrollment traffic volumes include Background volumes, as well as estimated trips expected to be generated by the new High School at ultimate enrollment. Projected AM peak hour Background and Site Generated traffic volumes are provided in **Figure 5**, while AM Ultimate Enrollment traffic volumes are illustrated in **Figure 6**. Projected PM peak hour Background and Site Generated traffic volumes are provided in **Figure 7** and PM Ultimate Enrollment traffic volumes are illustrated in **Figure 8**.

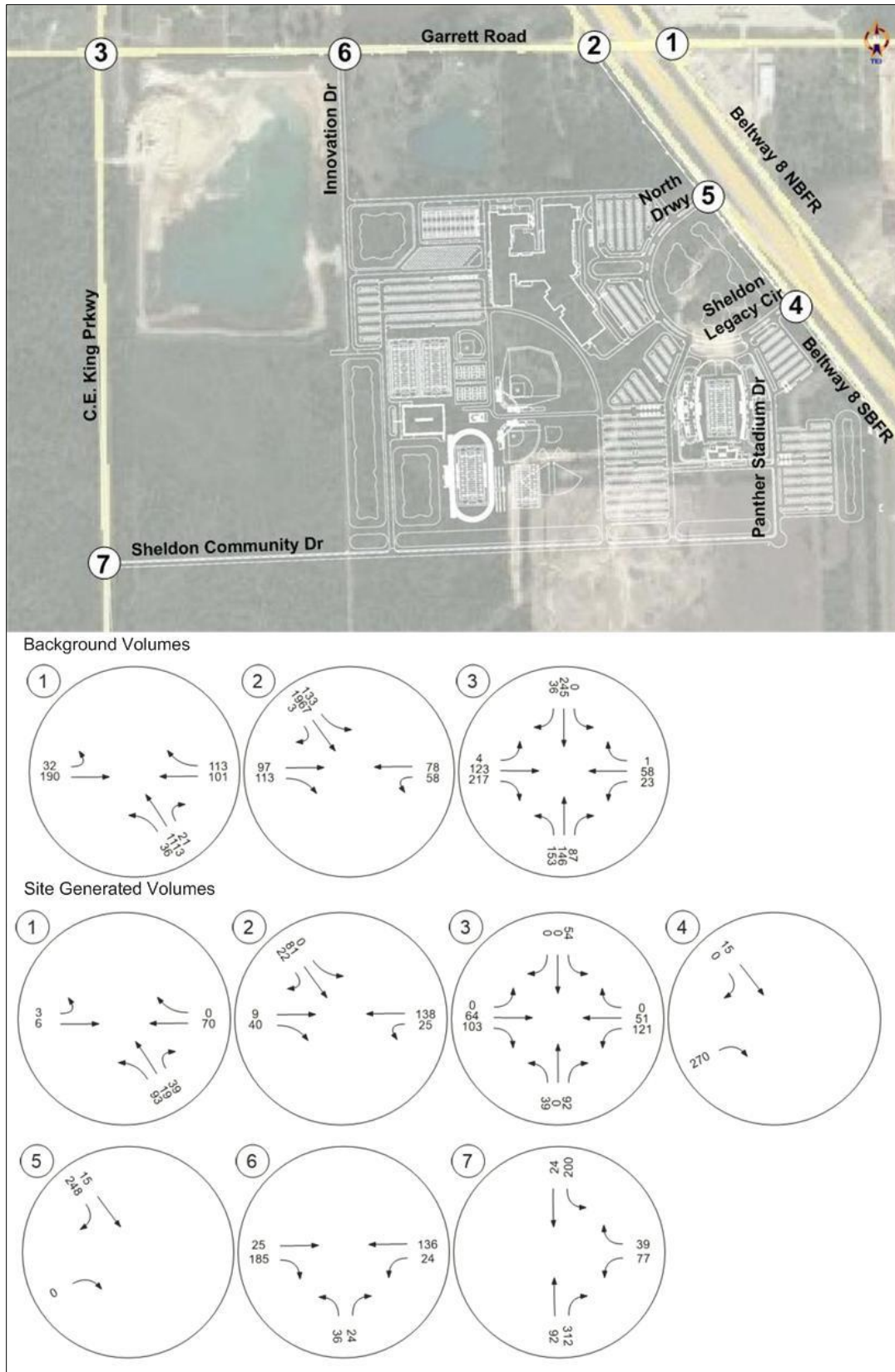


FIGURE 5 2019 AM BACKGROUND AND SITE VOLUMES

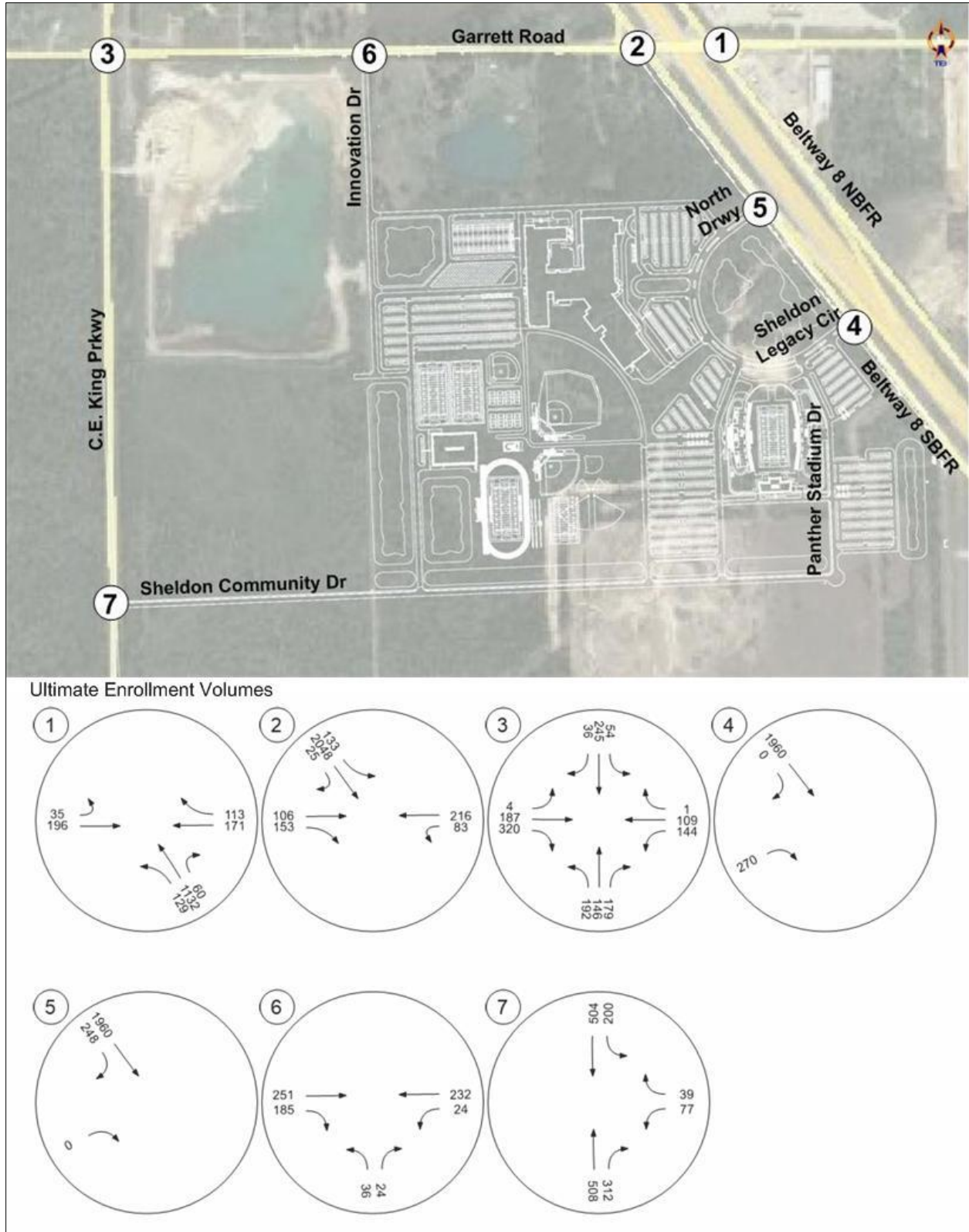


FIGURE 6 2019 AM ULTIMATE ENROLLMENT VOLUMES

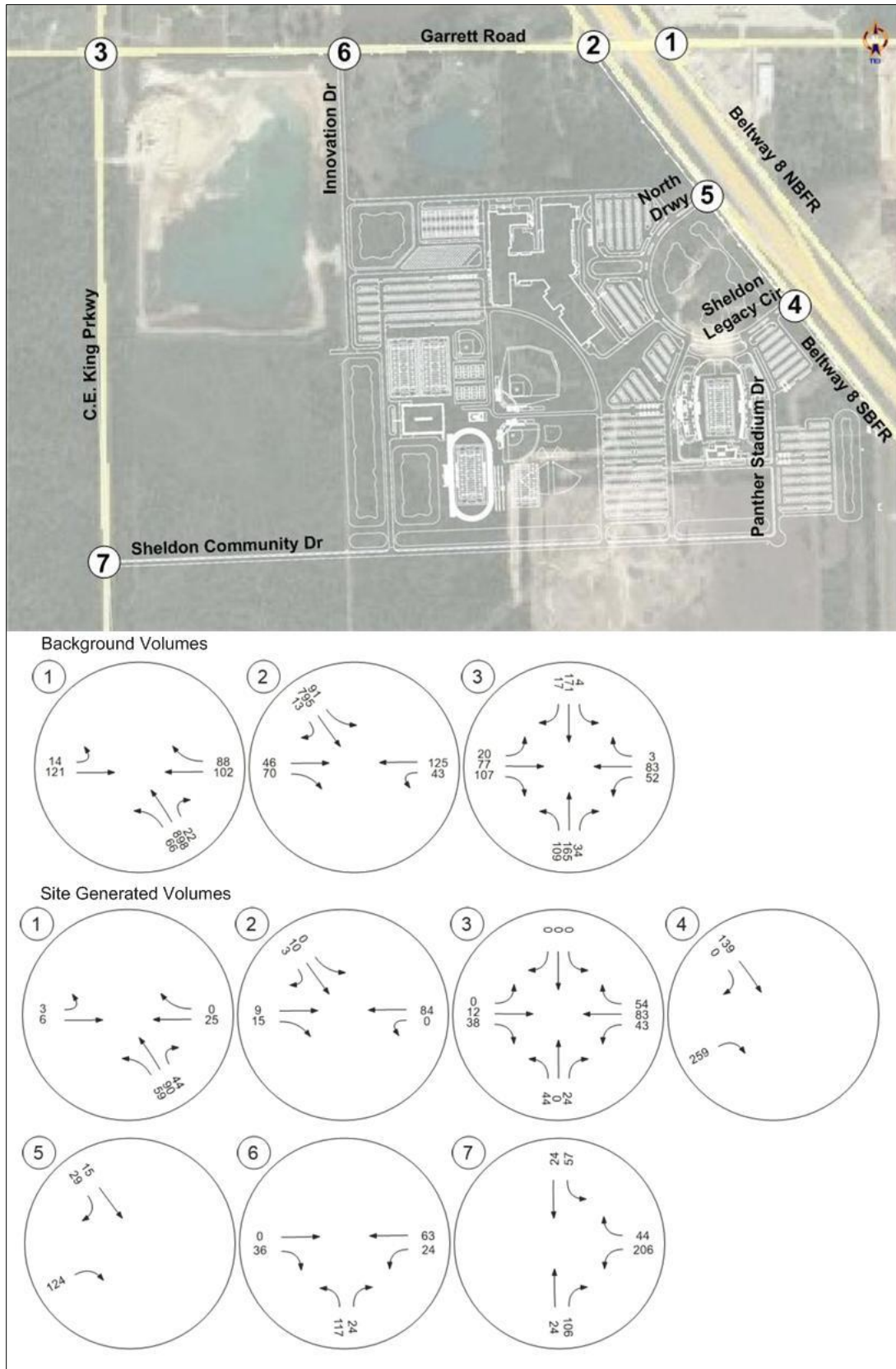


FIGURE 7 2019 PM BACKGROUND AND SITE VOLUMES

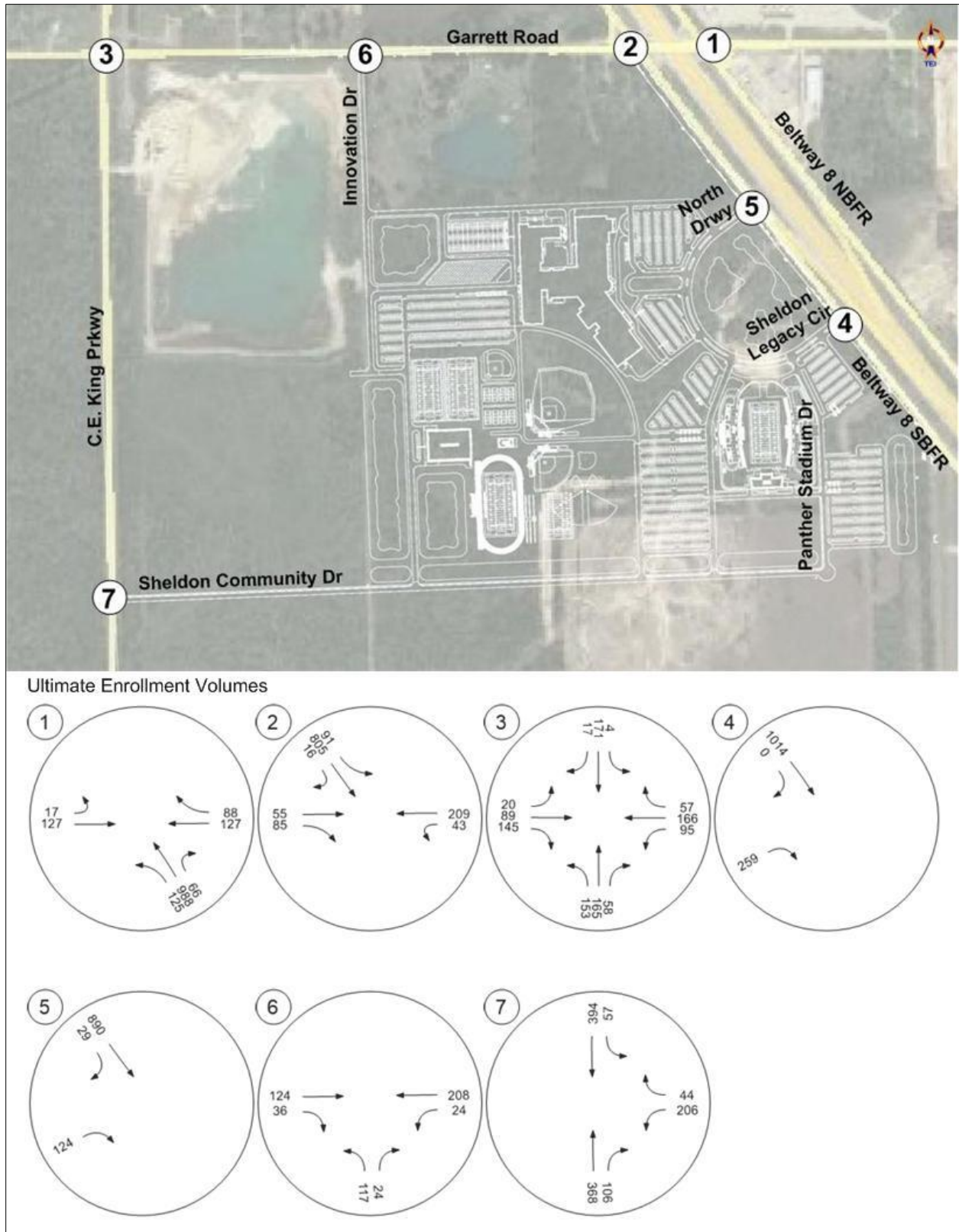


FIGURE 8 2019 PM ULTIMATE ENROLLMENT VOLUMES

ON-SITE CIRCULATION

The “exit” trips in the morning and the “enter” trips in the afternoon represent the parents and buses. It is desirable for the school to have adequate on-site storage space to accommodate these trips. Storage space is evaluated in terms of the afternoon entering trips because the queue of vehicles is typically greater during the school PM peak than the AM peak. In the morning, the arrival and departure time of parents is dispersed with little wait time or accumulation of vehicles; however, in the afternoon the arrival of parents is concentrated after dismissal. The on-site storage and parking provided and required for vehicles and buses is summarized in **Table 4**.

TABLE 4 ESTIMATED ON-SITE STORAGE

PM Peak	On-Site Storage Provided	On-Site Storage Required
Parents (140 vehicles)	126 vehicles single stacked on-site. Many parents are expected to park in Stadium parking lots instead of queue.	140 vehicles ¹
Student Drivers	250 parking spaces	250 parking spaces ²
Buses (60 buses)	80 buses	60 buses ²
Staff (300 vehicles)	350 parking spaces will be designated for staff ²	300 parking spaces ¹

¹ Calculated by Traffic Engineers, Inc. based on ultimate enrollment of 3,500 students (capacity with expansion).

² Provided by Sheldon ISD based on enrollment of 3,000 students (opening day capacity).

The anticipated on-site stacking needed for 140 parent vehicles (single-stacked) during the school PM peak hour, with an ultimate enrollment of 3,500 students, is illustrated in **Figure 9**. The parents will be queued along the portion of the North Driveway that will not be used by other school generated traffic and driveways primarily used for Stadium traffic; thus, the queuing will not be disruptive to other site generated traffic. An estimated 126 vehicles can queue on-site and approximately 14 vehicles will be queued on Sheldon Community Drive. Through traffic on Sheldon Community Drive will not be impacted by the queue of parent vehicles because Sheldon Community Drive will be constructed with a continuous left-turn lane. Also, based on observations at existing C.E. King High School, many parents will opt to park in the parking lots designed for Stadium parking; thus, the amount of on-site stacking and parking is expected to far exceed the estimated 140 parent vehicles picking-up students.

The amount of bus parking provides for growth in the number of buses, as well. Additionally, the amount of on-site parking (estimated 3,074 spaces initially, 3,236 ultimately) is more than adequate to accommodate an increase in staff and student drivers, if needed, and demand for parking during non-athletic special events at the school.

Cones, or other means, should be used to block-off the median opening where parents will be exiting the student drop-off/pick-up driveway. Blocking-off the median opening will force vehicles to turn right from the student drop-off/pick-up driveway onto the circular drive, eliminating conflicts between vehicles entering and exiting the student drop-off/pick-up driveway. The right-turn only from the student drop-off/pick-up driveway is reflected in **Figure 9**.

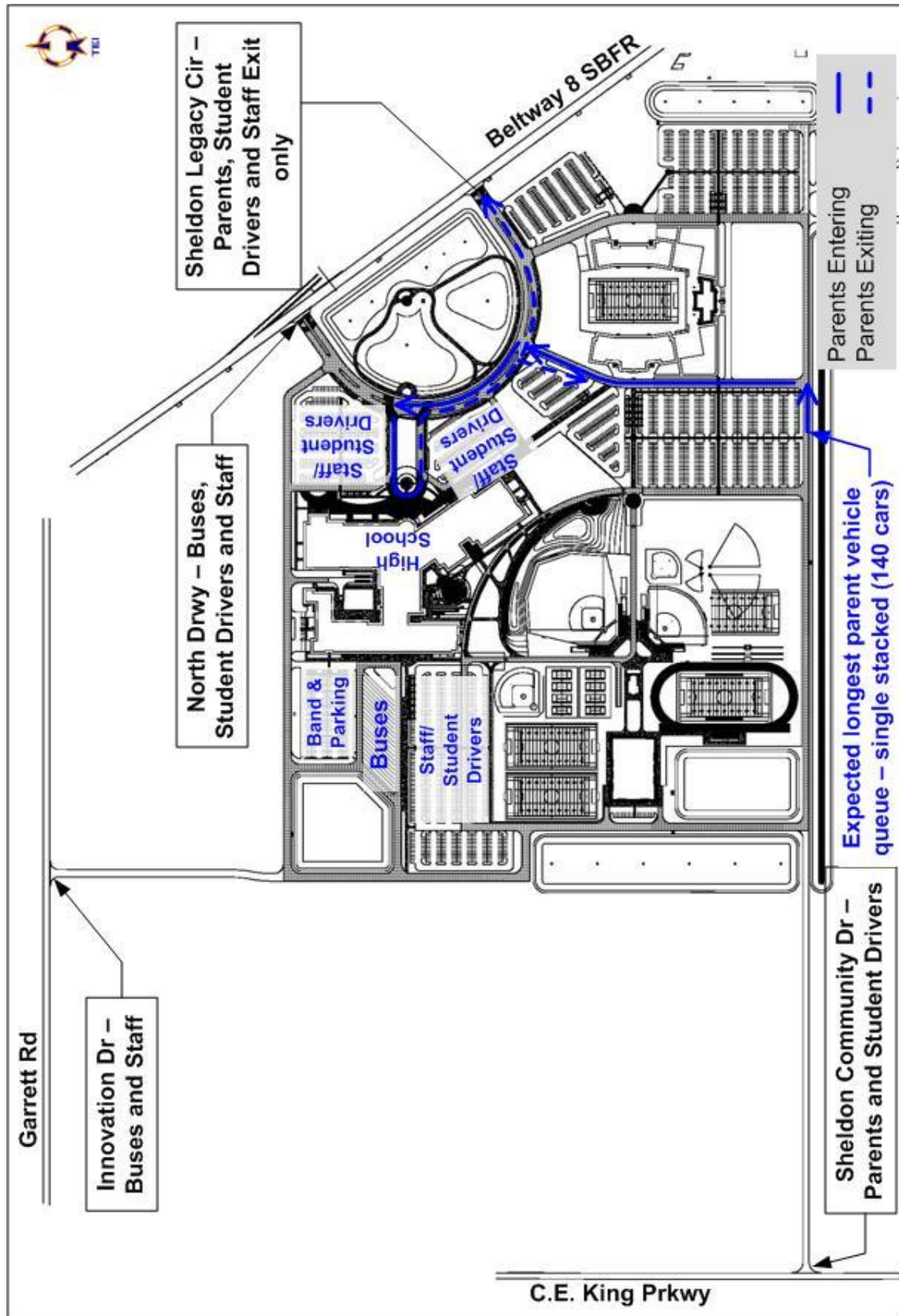


FIGURE 9 ON-SITE STACKING/PARKING

CAPACITY ANALYSES

Capacity analyses were conducted for 2019 Background and Ultimate Enrollment conditions using the 2019 traffic projections at the study area intersections. Capacity analysis provides information regarding traffic operations at an intersection and is expressed in terms of the level-of-service (LOS). The level-of-service indicates the average seconds of delay experienced by a motorist at a signalized intersection or at the stop controlled approaches of an unsignalized intersection. As a frame of reference, intersection levels-of-service range from A to F, with LOS A representing free flow conditions and LOS F representing highly congested conditions.

Capacity analyses were conducted using the intersection geometry and traffic control at the study intersections illustrated in **Figure 10**. A summary of the 2019 AM peak hour capacity analyses at study area intersections for Background and Ultimate Enrollment conditions are provided in **Table 5**; details regarding AM peak hour traffic operations are provided in **Appendix C** (Background) and **Appendix D** (Ultimate Enrollment).

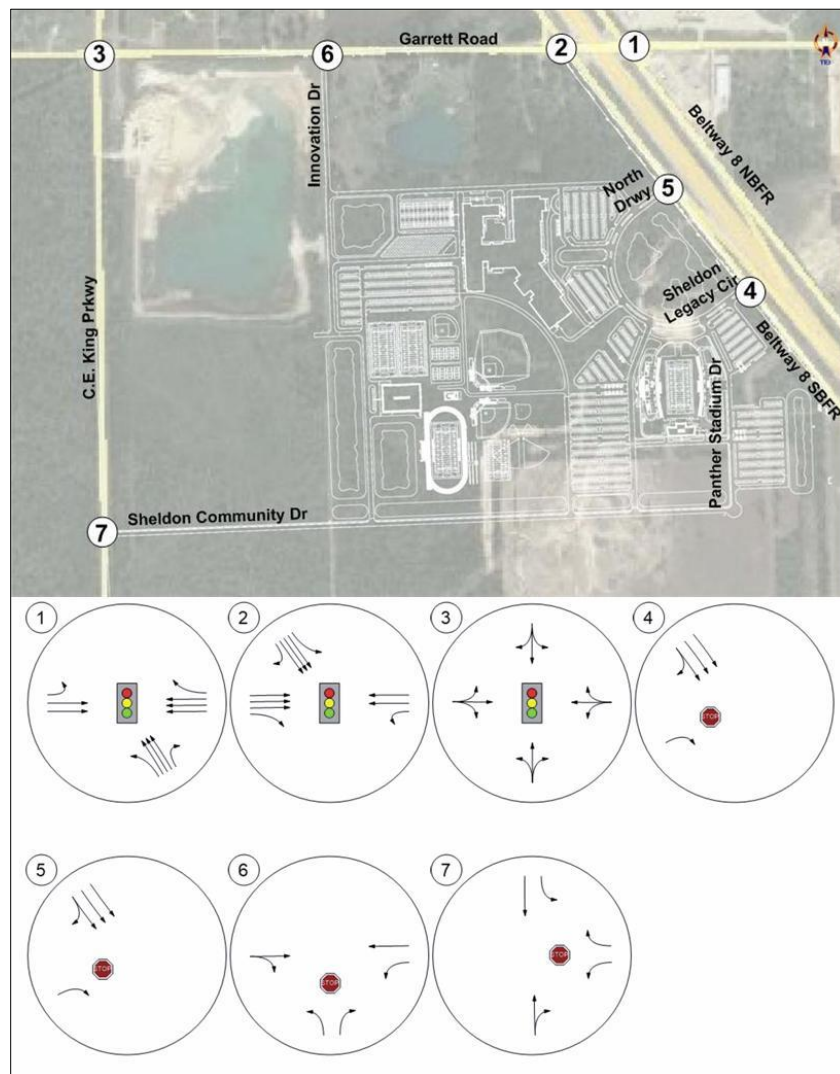


FIGURE 10 FUTURE LANE ASSIGNMENTS

TABLE 5 2019 AM PEAK BACKGROUND AND ULTIMATE ENROLLMENT LEVEL OF SERVICE

2019 Ultimate Enrollment	AM Peak Background Delay/LOS				AM Peak Ultimate Enrollment Delay/LOS			
		Delay (sec/vehicle)		LOS	Delay(sec/vehicle)		LOS	
Signalized Intersection								
Beltway 8 NBFR at Garrett Rd	13.4		B		13.8		B	
Beltway 8 SBFR at Garrett Rd	10.9		B		14.4		B	
C.E. King Prkwy at Garrett Rd	24.1		C		73.7/34.9 ¹		E/C ¹	
Unsignalized Intersection	EB	WB	NB	SB	EB	WB	NB	SB
Beltway 8 SBFR at Sheldon Legacy Cir	-	-	-	-	F	-	-	-
Beltway 8 SBFR at North School Drwy	-	-	-	-	F	-	-	-
Garrett Road at Innovation Dr	-	-	-	-	A ¹	-	B	-
C.E. King Parkway at Sheldon Community Dr	-	-	-	-	-	F	-	B ¹

¹ Without left-turn lanes at all approaches of intersection/with left-turn lanes at all approaches of intersection

² Left-turn Lane LOS

A summary of the 2019 PM peak hour capacity analyses for Background and Ultimate Enrollment conditions are provided in **Table 6**; details regarding PM peak hour traffic operations are provided in **Appendix C and Appendix D**.

TABLE 6 2019 PM PEAK BACKGROUND AND ULTIMATE ENROLLMENT LEVEL OF SERVICE

2019 Ultimate Enrollment	PM Peak Background Delay/LOS				PM Peak Ultimate Enrollment Delay/LOS			
	Delay (sec/vehicle)		LOS		Delay(sec/vehicle)		LOS	
Signalized Intersection								
Beltway 8 NBFR at Garrett Rd	12.3		B		11.9		B	
Beltway 8 SBFR at Garrett Rd	11.6		B		13.6		B	
C.E. King Prkwy at Garrett Rd	20.9		C		26.0/13.7 ¹		C/B ¹	
Unsignalized Intersection	EB	WB	NB	SB	EB	WB	NB	SB
Beltway 8 SBFR at Sheldon Legacy Cir	-	-	-	-	F	-	-	-
Beltway 8 SBFR at North School Drwy	-	-	-	-	D	-	-	-
Garrett Road at Innovation Dr	-	-	-	-	A ²	-	B	-
C.E. King Parkway at Sheldon Community Dr	-	-	-	-	-	F	-	A ²

¹ Without left-turn lanes at all approaches of intersection/with left-turn lanes at all approaches of intersection

² Left-turn Lane LOS

The traffic operations at the intersections of Garrett Road at Innovation Drive and C.E. King Parkway at Sheldon Community Drive reflect the construction of left-turn lanes on Garrett Road and C.E. King Parkway.

Delays are expected to increase significantly at the intersection of Garrett Road and C.E. King Parkway for Ultimate Enrollment conditions during the AM peak hour only. The intersection has one approach lane in each direction; thus, the capacity of the intersection is limited. Capacity analyses was conducted to evaluate traffic operations with a left-turn lane at all approaches of the intersection. As shown in **Tables 5 and 6** and **Appendix E**, the intersection of Garrett Road and C.E. King Parkway will operate at LOS C and LOS B during the AM and PM peak hours, respectively, if left-turn lanes are constructed at all approaches of the intersection.

The stop controlled approaches at the future intersections of Beltway 8 SBFR and the North Driveway, Beltway 8 SBFR and Sheldon Legacy Circle and C.E. King at Sheldon Community Drive are projected to

operate with delays. Delays are common at minor streets or driveways at their intersection with a major roadway; however, potential improvements were considered at the unsignalized intersections, including the following:

- The Beltway 8 SBFR is a three-lane frontage road and the highest projected southbound right-turn peak hour volume at the North Driveway and Sheldon Legacy Circle is less than 275 vehicles. A southbound right-turn lane is not recommended on the Beltway 8 SBFR at either location.
- The projected 2019 Ultimate Enrollment traffic volumes at the intersection of C.E. King Parkway at Sheldon Community Drive was reviewed to determine if the volumes would satisfy the peak hour warrant for the installation of a traffic signal. The school peak hour volumes at the intersection are expected to satisfy the peak hour warrant, assuming ultimate capacity of 3,500 students, which includes completion of the built-in shell expansion. The current enrollment at C.E. King High School is 1,800 students. Although growth is projected in the District, enrollment at the High School should not reach 3,000 students on opening day (capacity of High School when it opens in 2019). The projected 2019 intersection volumes with an enrollment of 3,000 students would barely satisfy the peak hour warrant at the intersection. In summary, the volumes at the intersection of Sheldon Community Drive at C.E. King Parkway should satisfy the Peak Hour Warrant at some point in the future; however, not in 2019 when the High School opens.

Although capacity analyses were not conducted at the intersection of Panther Stadium Drive and Sheldon Legacy Circle during the school peak hours, review of the traffic volumes at the intersections of C.E. King Parkway at Sheldon Community Drive and Sheldon Legacy Circle at Beltway 8 SBFR indicate that the intersection would not operate efficiently with stop control at the northbound approach of Panther Stadium Drive and free flow on Sheldon Legacy Circle. All-way stop control is recommended at the intersection of Panther Stadium Drive and Sheldon Legacy Circle based on the *Texas Manual on Uniform Traffic Control Devices (TMUTCD)* Option Criteria D: “An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.” Panther Stadium Drive and Sheldon Legacy Circle are not residential neighborhood collectors, however, they are collectors that will have the same cross-section and will function the same. Thus, all-way stop control is recommended at the intersection.

QUEUE LENGTH ANALYSES

Queue length analyses for 2019 Ultimate Enrollment conditions were conducted for the future westbound left-turn movements on Garrett Road at Innovation Drive and for the future southbound left-turn movements on C.E. King Parkway at Sheldon Community Drive; the 95th percentile queue lengths are provided in **Appendix D**. The longest queue lengths of the AM and school PM peak hours are provided in **Table 7**.

TABLE 7 2019 95TH PERCENTILE QUEUE LENGTH

Intersection	Southbound Left-Turn ¹
Garrett Road at Innovation Dr	20 ft
C.E. King Parkway at Sheldon Community Dr	45 ft

¹ Queue length shown is the longest of the AM and PM peak hour.
Queues shorter than 20 feet are shown as 20 feet

Based upon the 95th percentile queue length analyses in **Table 7**, a storage length of 150 feet would be adequate to accommodate the westbound left-turns on Garrett Road at Innovation Drive and the southbound left-turns on C.E. King Parkway at Sheldon Community Drive. Oftentimes, a longer storage length is recommended due to the amount of on-site stacking that is provided at a school; however, in this case, there is adequate on-site stacking/parking for parent vehicles and buses; thus, 150 feet should be adequate storage to accommodate left-turns at both intersections.

PEDESTRIAN FACILITIES

According to Sheldon ISD Transportation Department, the District is expected to bus students living across C.E. King Parkway, Garrett Road and Sam Houston Tollway because they are major roadways. Due to the lack of sidewalks and residential development in the vicinity of the school site, few if any students are expected to walk to/from school when the school opens; however, sidewalks should be constructed to facilitate future pedestrian connections when the surrounding area develops. The site plan includes eight-foot wide sidewalks along Sheldon Community Drive, Panther Stadium Drive and Sheldon Legacy Circle. Sidewalks are also recommended at the following locations:

- Along Beltway 8 SBFR
- Along C.E. King Parkway
- Along east side of Innovation Drive
- Along Sheldon Legacy Circle between the Beltway 8 SBFR and the nearest parking lot driveway
- Along North Driveway between the Beltway 8 SBFR and the nearest parking lot driveway

A sidewalk is not recommended along Garrett Road because the school site does not have frontage on Garrett Road, except for a 100 foot wide access easement.

A network of on-site sidewalks and pedestrian pathways, shown in **Figure 3**, facilitate pedestrian movements between the school parking lots and the High School building, and between the High School and the surrounding athletic facilities/parking lots. Sidewalk/ramp and crosswalk connections should be provided between the sidewalks along the student drop-off/pick-up driveway and the outdoor instructional area inside the semi-circle formed by the North Driveway and Sheldon Legacy Circle.

Roadway and sidewalk connections should also be provided as development occurs between the Sheldon ISD tract and existing and future subdivisions south of the school site to facilitate vehicular and pedestrian access to/from the High School and the Elementary School.

Currently, students should not be encouraged to walk along or across C.E. King Parkway, Garrett Road or Beltway 8 SBFR when the school opens; thus, no crosswalks or School Speed Zones are recommended along these roads. School Speed Zones and crosswalks should be installed when roadway and sidewalk connections are provided between the subdivisions to the south and the Sheldon ISD tract.

ANALYSIS – NEW DISTRICT STADIUM

Sheldon ISD will construct a new 10,000 seat District Stadium on the same site as the new High School, as illustrated in **Figure 11**. The stadium will open in 2019. The Varsity Football games are currently scheduled on Friday nights at 7:00 PM and the time should remain the same at the new Stadium.

Traffic Management Plans were prepared for arrival and discharge after a Friday night varsity football game, assuming all parking lots are full (full capacity event).

STADIUM ACCESS AND PARKING

The public streets and driveways providing access to the High School will also provide access to the Stadium. The Beltway 8 SBFR North Driveway should be used by motorists using the Home parking lots and overflow parking lots, while Sheldon Legacy Circle should be used primarily by the visiting team motorists. The Home and Visitor parking lots are identified on the site plan in **Figure 11**; the remainder of the parking will be used for overflow parking by both teams.

Innovation Drive will primarily be used to access overflow parking lots, while Sheldon Community Drive will primarily be used by motorists accessing the Home and Visitor lots.

Approximately 748 spaces will be provided in the designated Visitors parking lots and 985 spaces will be provided in the designated Home parking lots. However, a total of approximately 3,074 parking spaces will be constructed initially on the High School/Stadium site. The 162-space parking lot along the western boundary of the site is proposed for future construction (see **Figure 11**), resulting in an ultimate total of 3,236 parking spaces.

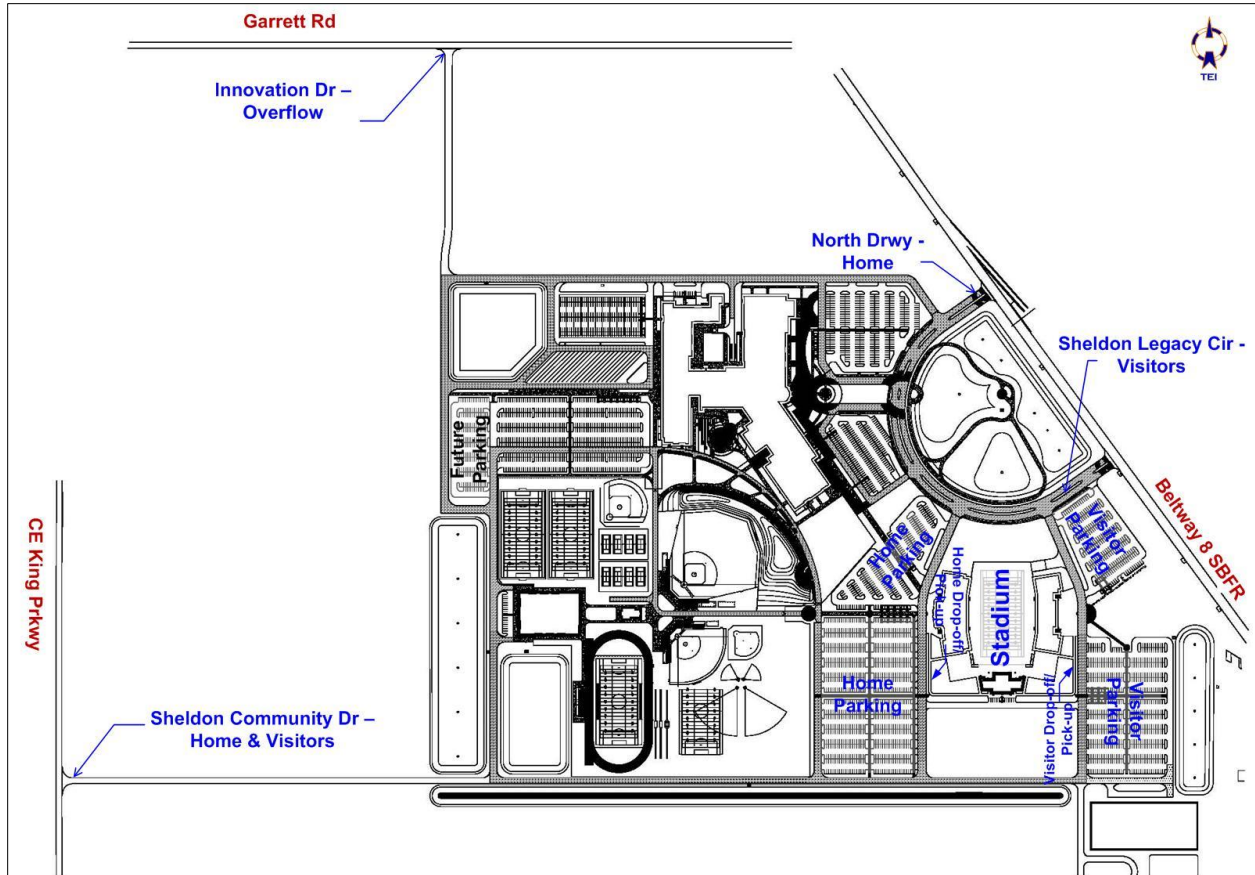


FIGURE 11 STADIUM SITE PLAN

In addition to the sidewalks gaps identified in the High School pedestrian analysis, a sidewalk should be constructed along the driveway providing access to the Home side of the Stadium between Sheldon Community Drive and the North Driveway. A sidewalk is planned along Panther Stadium Drive. Sidewalk connections should also be provided between the existing and future subdivisions south of the Sheldon ISD tract.

TRIP GENERATION AND DISTRIBUTION

The trip generation in **Table 8** is based on worst case conditions, with all 3,236 site parking spaces occupied and all vehicles entering and exiting within one hour. Additionally, an estimated 25 Home vehicles and 25 Visitor vehicles will drop-off students before a game and pick-up students after a game.

TABLE 8 STADIUM TRIP GENERATION

Vehicles	Arrival Peak 6:30-7:30 PM		Discharge Peak Hour 9:30-10:30 PM	
	Enter	Exit	Enter	Exit
Game Attendees	3,236	0	0	3,236
Drop-offs/Pick-ups	50	50	50	50
Total	3,286	50	50	3,286

The Home generated traffic was distributed using the trip distribution used for the High School. The distribution of visiting team traffic will differ from week to week. For purposes of this study, the Visitor generated traffic was distributed based on the assumption that the visiting team was Channelview High School. Channelview High School is C.E. King High School's biggest rival; thus, the attendance at the Channelview game is more likely to fill the Stadium and parking lots. Like Sheldon ISD, Channelview ISD has one high school. The Channelview ISD boundary is directly south of the portion of the Sheldon ISD boundary located east of Sam Houston Tollway (see **Appendix B** for Sheldon ISD boundaries), thus, for purposes of this study, the Visitor traffic is projected to travel 100 percent to/from the south.

STADIUM ARRIVAL TRAFFIC OPERATION PLAN

OFF-SITE CIRCULATION

Vehicles destined to the Stadium will enter from the North Driveway and Sheldon Legacy Circle on Beltway 8 SBFR and from Sheldon Community Drive on C.E. King Parkway. Turning movements will not be restricted at intersections providing access to the Stadium or near the site. The traffic volumes before a football game, shown in **Figure 12**, include Background through volumes on Beltway 8 SBFR, C.E. King Parkway, and Garrett Road, as well as site generated traffic volumes. Background and site generated traffic volumes are not shown separately from the total intersection volumes.

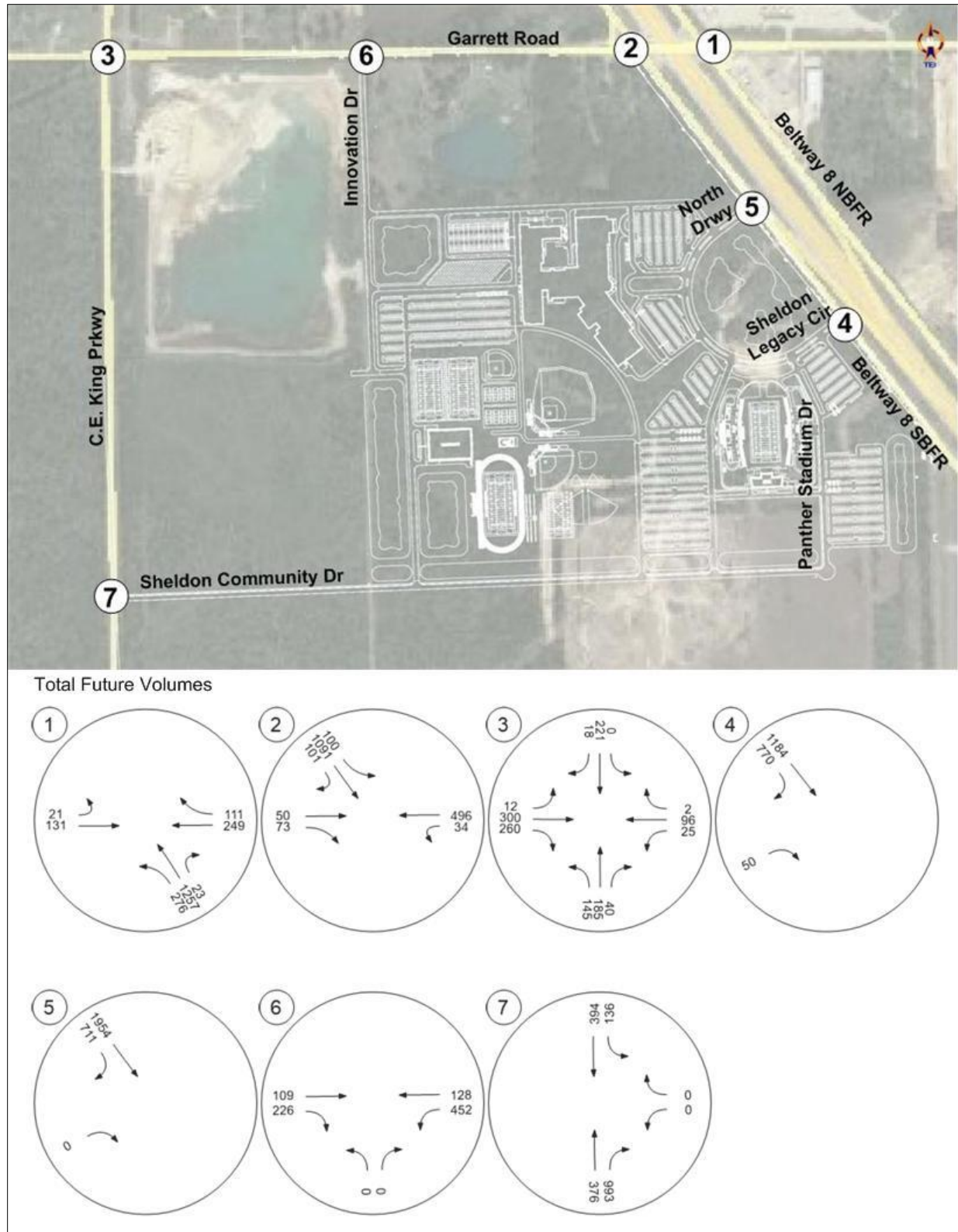


FIGURE 12 STADIUM PREGAME VOLUMES

ON-SITE CIRCULATION

The on-site circulation patterns for motorists destined to the Home and Visitor parking lots are illustrated in **Figure 13**. Circulation patterns for undesignated Home or Visitor parking lots are not illustrated; these lots will be used by both Home and Visitor motorists during a full capacity event.

Innovation Drive should operate under normal two-way conditions before a full capacity event, e.g., varsity football game. Temporary signage should be installed to facilitate parking-lot destinations.

Sheldon Community Drive will operate under two-way conditions before a full capacity event. The center left-turn lane on Sheldon Community Drive can operate as a reversible lane providing two lanes inbound before a game. Temporary signage should be installed to facilitate reversible lane operations on Sheldon Community Drive and parking-lot destinations.

The North Driveway and Sheldon Legacy Circle on Beltway 8 should operate normally prior to a full capacity event.

Where possible, vehicles should be directed to the back of the designated Home and Visitor parking lots (see **Figure 13**), reducing the number of vehicles traveling on the driveway located between the Stadium and the Home parking lots and on Panther Stadium Drive located between the Stadium and Visitor parking lots. Pedestrians need to cross the driveway between the Stadium and the Home parking lot and Panther Stadium; thus, reducing the number of vehicles traveling on the driveway and Panther Stadium Drive will minimize vehicular/pedestrian conflicts. A robust network of sidewalks/protected pedestrian paths is planned to further reduce vehicular/pedestrian conflicts.

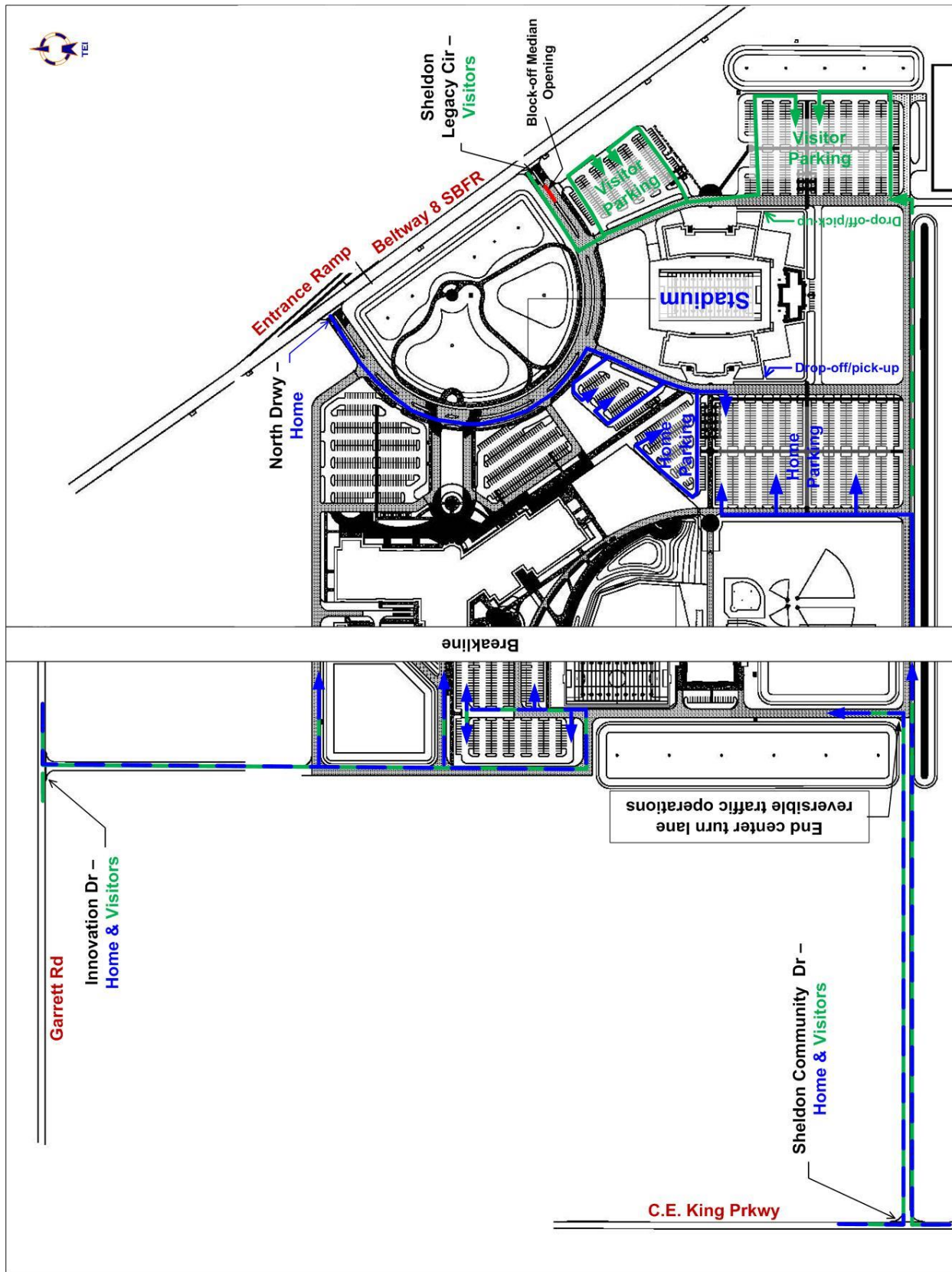


FIGURE 13 PREGAME ON-SITE CIRCULATION

STADIUM DISCHARGE TRAFFIC OPERATIONS PLAN

ON-SITE CIRCULATION

The Discharge Traffic Operations Plan for a full capacity event is illustrated in **Figure 14**. Turning movements will not be restricted at intersections providing access to the Stadium or near the site. Internally, the northbound lane (only) of the driveway adjacent to the Home side of the Stadium should be coned-off to encourage most home team motorists to use Sheldon Community Drive and C.E. King Parkway to exit the site. The southbound lane should remain open to maintain access to the drop-off/pick-up area for the Home side of the Stadium.

Sheldon Community Drive, Innovation Drive, North Driveway and Sheldon Community Drive will all operate under normal, two-way traffic operations after a full capacity event.

Just as before a game, vehicles should be directed to the back of the designated Home and Visitor parking lots (see **Figure 13**), reducing the number of vehicles traveling on the driveway located between the Stadium and the Home parking lots and on Panther Stadium Drive located between the Stadium and Visitor parking lots. Pedestrians need to cross the driveway between the Stadium and the Home parking lot and Panther Stadium Drive; thus, reducing the number of vehicles traveling on the driveway and Panther Stadium Drive will minimize vehicular/pedestrian conflicts. A robust network of sidewalks/protected pedestrian paths is planned to further reduce vehicular/pedestrian conflicts.