May 26, 2026 PLANNING DEVELOPMENT AND ZONING MEETING

THE STATE OF TEXAS §
COUNTY OF BRAZORIA §
CITY OF MANVEL §

NOTICE OF A MEETING
MANVEL PLANNING DEVELOPMENT AND ZONING COMMISSION
May 26, 2026

NOTICE IS HEREBY GIVEN
6:00 P.M.

Pursuant to Chapter 551, Title 5 of the Texas Government Code, the Texas Open Meetings Act, notice is hereby given that the Planning Development and Zoning Commission will convene a regular meeting at the Manvel City Hall, located at **20031 Hwy 6, Manvel Tx 77578** for the purpose of discussing and if appropriate, take action with respect to the following items:

NOTE: The PD&Z Commission of the City of Manvel reserves the right to discuss any items in Closed Session whenever authorized under the Texas Open Meetings Act, Chapter 551, of the Texas Government Code. They may discuss the items on this agenda in any order.

This facility is wheelchair accessible and accessible parking spaces are available. Requests for accommodations or interpreter services must be made 48 hours prior to this meeting. Please contact the City Secretary at 281-489-0630 for further information.

CITY OF MANVEL MISSION STATEMENT

The City of Manvel is a safe and responsible community, embracing the values of our past, present, and future citizens.

Regular Session

Call to Order

Position #1 Ryan Miller, Chair 03/2027
Position #2 Kyle Marasckin, Vice-Chair 03/2027
Position #3 Mary Ann Atkinson 03/2027
Position #4 Kenneth Haynes 03/2027
Position #5 Christy Kennard 03/2028
Position #6 Delores Martin 03/2028
Position #7 Benterah Morton 03/2028

Pledge

Pledge of Allegiance and Texas Pledge: "Honor the Texas flag; I pledge allegiance to thee Texas, one state under God, one and indivisible.

Public Comments: "Comment Card" Required

o Members of the public with business before the board, NOT scheduled on the agenda as a public hearing (that have submitted a public comment card) may have three (3) minutes to address the board. o The board may not participate in any discussion and cannot vote on the subject you present unless it is listed on the agenda as an action item.

Staff Presentation on Public Hearing Item(s)

Public Hearing

TO HEAR INPUT FROM THE PUBLIC REGARDING AN ORDINANCE (2026-O-16) OF THE CITY OF MANVEL, TEXAS, AMENDING THE ZONING ORDINANCE (2007-O-26) OF THE CITY, BY CHANGING THE ZONING CLASSIFICATION OF A CERTAIN TRACT OF LAND CONSTITUTING APPROXIMATELY 394.232 ACRES FROM OPEN PLANNED USE DEVELOPMENT (O-PUD) DISTRICT TO PLANNED USE DEVELOPMENT (PUD) DISTRICT, SUCH TRACT IMMEDIATELY LOCATED ON THE EAST OF S.H. 288, EXTENDS ACROSS BOTH NORTH AND SOUTH SIDES OF S.H. 6, SOUTH OF DEL BELLO LAKES DEVELOPMENT, WEST OF IOWA LANE AND VALENCIA DEVELOPMENT, AND GENERALLY WITHIN THE BOUNDARIES OF BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NO. 30; PROVIDING FOR THE AMENDMENT OF THE CITY'S OFFICIAL ZONING MAP; PROVIDING FOR SEVERABILITY; AND PROVIDING A PENALTY IN AN AMOUNT NOT TO EXCEED $2,000 FOR EACH DAY OF VIOLATION OF ANY PROVISION HEREOF.

May 26, 2026 PLANNING DEVELOPMENT AND ZONING MEETING

Consent PDZ

All Consent Agenda items listed are considered to be routine by the Planning Development and Zoning Commission and will be approved by one motion. There will be no separate discussion of these items unless a Planning Development and Zoning Member so requests, in which event the item will be removed from the Consent Agenda and considered in sequence on the Agenda.

A. Approve the meeting minutes to date.

Regular Agenda

A. Consideration and possible action to forward a recommendation of approval to City Council, Ordinance 2026-O-16;
AN ORDINANCE AMENDING THE ZONING ORDINANCE (2007-O-26) OF THE CITY, BY CHANGING THE ZONING CLASSIFICATION OF A CERTAIN TRACT OF LAND CONSTITUTING APPROXIMATELY 394.232 ACRES FROM OPEN PLANNED USE DEVELOPMENT (O-PUD) DISTRICT TO PLANNED USE DEVELOPMENT (PUD) DISTRICT, SUCH TRACT IMMEDIATELY LOCATED ON THE EAST OF S.H. 288, EXTENDS ACROSS BOTH NORTH AND SOUTH SIDES OF S.H. 6, SOUTH OF DEL BELLO LAKES DEVELOPMENT, WEST OF IOWA LANE AND VALENCIA DEVELOPMENT, AND GENERALLY WITHIN THE BOUNDARIES OF BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NO. 30.

B. Consideration and possible action to forward a recommendation of approval to City Council; BEING A SUBDIVISION VARIANCE FOR PROPERTY LOCATED AT 2043 CR 206 (PID 170372), SEEKING TO VARY CHAPTER 62, SECTION 62-113, SIDEWALKS. TO ALLOW DEVELOPMENT OF THE SUBJECT SITE WITHOUT CONSTRUCTION OF SIDEWALKS.

C. Development Services Staff Update.

Adjourn

CERTIFICATION

I, Tammy Bell, City Secretary for the City of Manvel, do hereby certify that the foregoing Agenda of the Planning Development and Zoning Commission is true and correct and that I posted such notice on the bulletin board at the Manvel City Hall; a place convenient and readily accessible to the public on May 19, 2026 in accordance with the Texas Open Meetings Act (Tex. Gov't. Code §551.001 et.seq). Said notice remained posted for at least 3 business days preceding the scheduled day of the meeting.

TAMMY BELL, CITY SECRETARY
CITY OF MANVEL, TEXAS

MANVEL
PD&Z COMMISSION
DATA SHEET

MEETING DATE: May 26, 2026

TOPIC: Public Hearing followed by consideration of a request to change the zoning classification of an approximate 394.232 tract of land, generally located east of S.H. 288, extends across both north and south sides of S.H. 6, south of Del Bello Lakes Development, west of Iowa Lane and Valencia Development, from Open Planned Use Development (O-PUD) District to Planned Use Development (PUD) District.

BACKGROUND:

The subject site is generally bounded by S.H. 6 to the south, Del Bello Lakes Development to the north, Iowa Lane and Valencia Development to the west. The property, approximately 394.232 acres, is currently undeveloped and located within the City of Manvel. The applicant, LJA Engineering, on behalf of developers, Houston 118 LLC, Milestone, Scottsdale LLC, and Tharaldson Ethanol Plant I LLC, is requesting to change the zoning classification from Open Planned Use Development (O-PUD) District to Planned Use Development (PUD) District.

The proposed PUD, titled “Presidio PUD,” is proposed as a master-planned, mixed-use commercial development, including single family residential, medical, retail, services, office uses. The project is intended to incorporate coordinated architecture, a comprehensive land use table, landscaping requirements, pedestrian-friendly amenities, and internal circulation, including multiple access points from Highway 6, State Highway 288, Manvel Parkway, Charlotte Street, and Iowa Lane. Surrounding properties are a mix of underdeveloped acreage and commercial development to the south, State Highway 288 with commercial development on the other side of it to the west, and single-family residential developments to the north and east including Del Bello Lakes and Valencia Development. The applicant has provided a PUD document that will govern the land use allowances and development standard for the development. The proposed PUD document includes certain provisions that deviate from the current City standards but are necessary for the development according to the applicant.

The Notice of Public Hearing was published in the newspaper of general circulation and all property owners within 200 feet of the property were notified. At the time of writing this report, staff has received informational inquiries and is not aware of opposition.

Additional details and staff analysis are included in the attached staff report.

STAFF RECOMMENDATION: City staff recommends forwarding a Final Report to City Council indicating approval of the requested Rezoning with the conditions listed in the Staff Report.

ATTACHMENTS: Staff Report, proposed PUD document, proposed Traffic Impact Analysis

FUNDING ISSUES
_X_ Not applicable
___ Not budgeted
___ Full amount already budgeted
___ Funds to be transferred from Acct.#

SUBMITTING STAFF MEMBER	**FINANCE DIRECTOR APPROVAL** __NA___
Jesica Portie, Associate Planner	**CITY MANAGER APPROVAL** ___YES___

STAFF REPORT TO PLANNING, DEVELOPMENT, AND ZONING COMMISSION

Rezoning

Agenda of:	May 26, 2026	**Initiated By:**	Jose Abraham Director, Development Services
Subject:	Rezoning, O-PUD/SH6 to PUD/SH6	**Presented By:**	Jesica Portie Associate Planner
Recommended Action:	A Public Hearing followed by consideration and action to provide a recommendation to City Council.		

SUMMARY

This is a rezoning request pertaining to Presidio, a development previously approved as Open-Planned Unit Development (O-PUD). Presidio is approximately 394.232 acres in size, currently undeveloped and generally located along the east side of SH 288 with majority of the acreage on the north side of SH 6 and about 45.5 acres on the south side. Brazoria County Municipal Utility District (BCMUD) No. 30 was established to serve this proposed development. Even though this development was approved in 2007, the developer did not get Council approval to proceed with the development as required by the O-PUD ordinance. The applicant, LJA Engineering, on behalf of the developers, Houston 118 LLC, Milestone, Scottsdale LLC, and Tharaldson Ethanol Plant I LLC, is requesting to change the zoning classification from Open Planned Use Development District with State Highway 6 Overlay (O-PUD/SH6) to Planned Use Development District with State Highway 6 Overlay (PUD/SH6). Proposed PUD includes allowance for light commercial uses and single family residential. The proposed PUD document generally aligns with the city Ordinances with certain provisions that deviate from the current City standards but are necessary for the development according to the applicant. Several provisions also are similar to Manvel Town Center and Manvel Crossing PUD. Staff have provided input and comments on the PUD document for the applicant to consider prior to the meeting. The Notice of Public Hearing was published in the newspaper of general circulation and all property owners within 200 feet of the property were notified. At the time of writing this report, staff has received two informational inquiry and is not aware of any opposition to the request.

Staff Recommendation: Approval with conditions.

EXHIBITS

Zoning Vicinity Map, Major Thoroughfare Plan Map, Application Form, Development Summary Letter, Public Hearing Notice, 2007 O-PUD, Proposed PUD, Proposed PUD Exhibits, Presidio OPUD to PUD Changes, Deviations and Variances Table, DIA, and TIA.

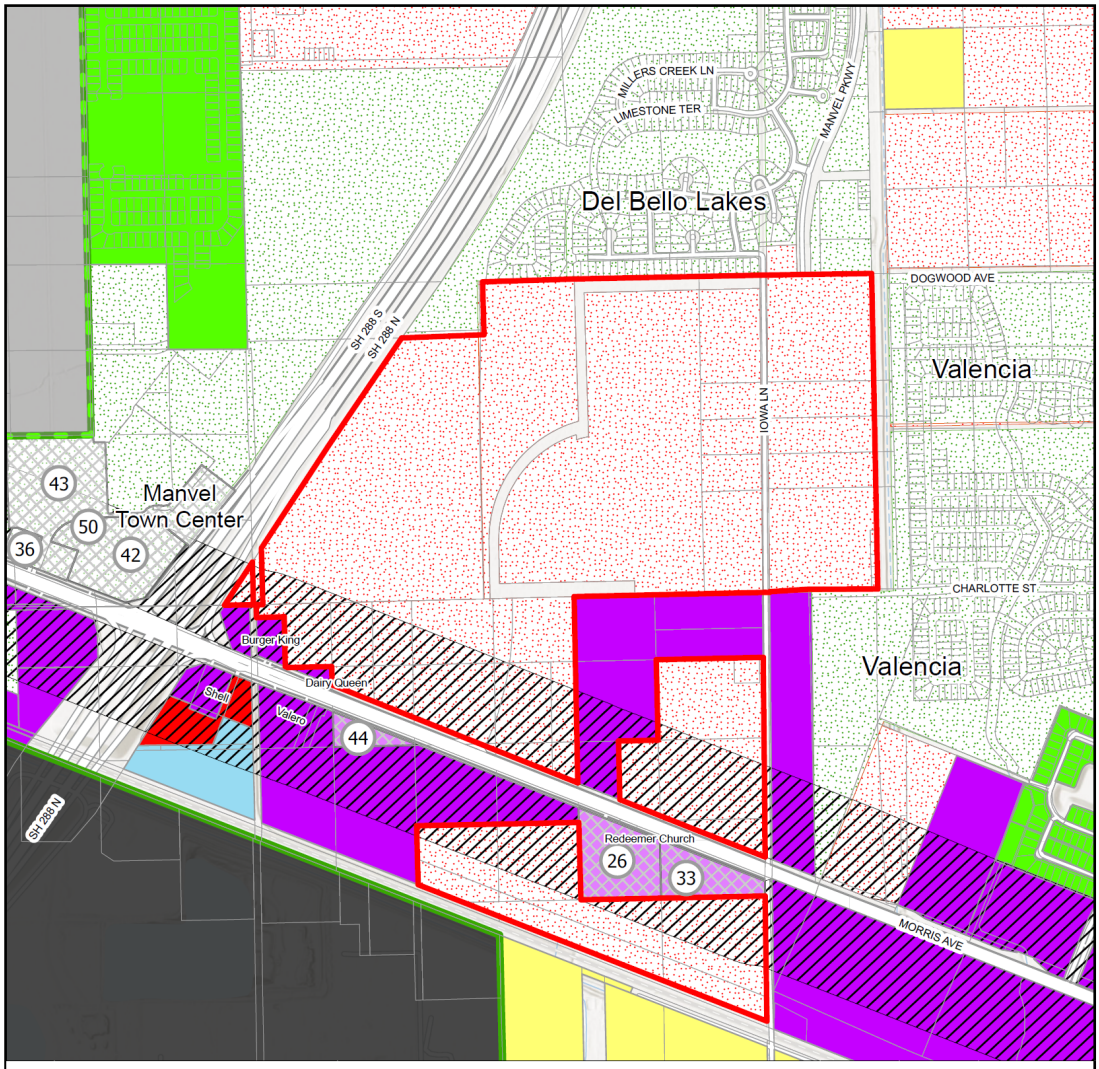
GENERAL SITE INFORMATION

The following is a summary of general site information.

Surrounding Property Zoning	**North:** Planned Unit Development (PUD) **South:** Light Commercial District (LC) / State Highway 6 Overlay District (SH6) **East:** PUD / LC / SH6 **West:** S.H 288/ PUD/ SH6
Surrounding Land Use	**North:** Del Bello Development **South:** Quick-service restaurants (Jack in the Box, Subway, Taco Bell, and Sonic Drive-In), Shell plc gas station, storage facility, future ambulatory health care services, church, and undeveloped land.

	East: Valencia Development **West:** Manvel Town Center
Major Thoroughfare	Subject site is located along both side of State Highway 6/Morris Avenue, Manvel Parkway, Charlotte Street, and Iowa lane. Subject site is located along east side of SH 288 and south side of Dogwood Avenue.

ZONING VICINITY MAP



SPECIFIC USE PERMITS LEGEND

Label No	Address	Specific Use Description	Ordinance No	Effective Date	Zoning Classification
26	18218 MORRIS AVE	NAICS Use 6111 RELIGIOUS ORGANIZATIONS AND NAICS USE 6111 ELEMENTARY AND SECONDARY SCHOOLS	2019-O-09	4/1/2019	LC/SH6
33	SOUTHWEST CORNER OF STATE HIGWAY 6 AND IOWA LANE	NAICS USE 721 ACCOMMODATIONS	EXPIRED		LC/SH6-SUP
36	17205 Highway 6/ Morris Ave	NACIS USE OFFICE OF DENTISTS	2023-O-15	3/20/2023	PUD/SH6-SUP
42	21708 Highway 288	NAICS USE 621493 "Ambulatory Health Care Services"	2024-O-17	5/6/2024	PUD/SH6-SUP
43	17221 State Highway 6, Suite 103	NAICS USE 812113 "Nail Salon"	2024-O-25	7/1/2024	PUD/SH6-SUP
44	17518 Morris Avenue	NAICS use 621493 "Ambulatory health Care Services"	2024-O-26	10/21/2024	LC/SH6-SUP

Presidio PUD

Presidio
Parcels
City of Manvel ETJ
City of Manvel City Limits
Specific Use Permits
State Highway 6 Overlay District
Heavy Commercial District
Light Commercial District
Multi-Family District
Planned Unit Development
Open Single-Family Residential District
Single-Family Residential District
Open - Planned Unit Development

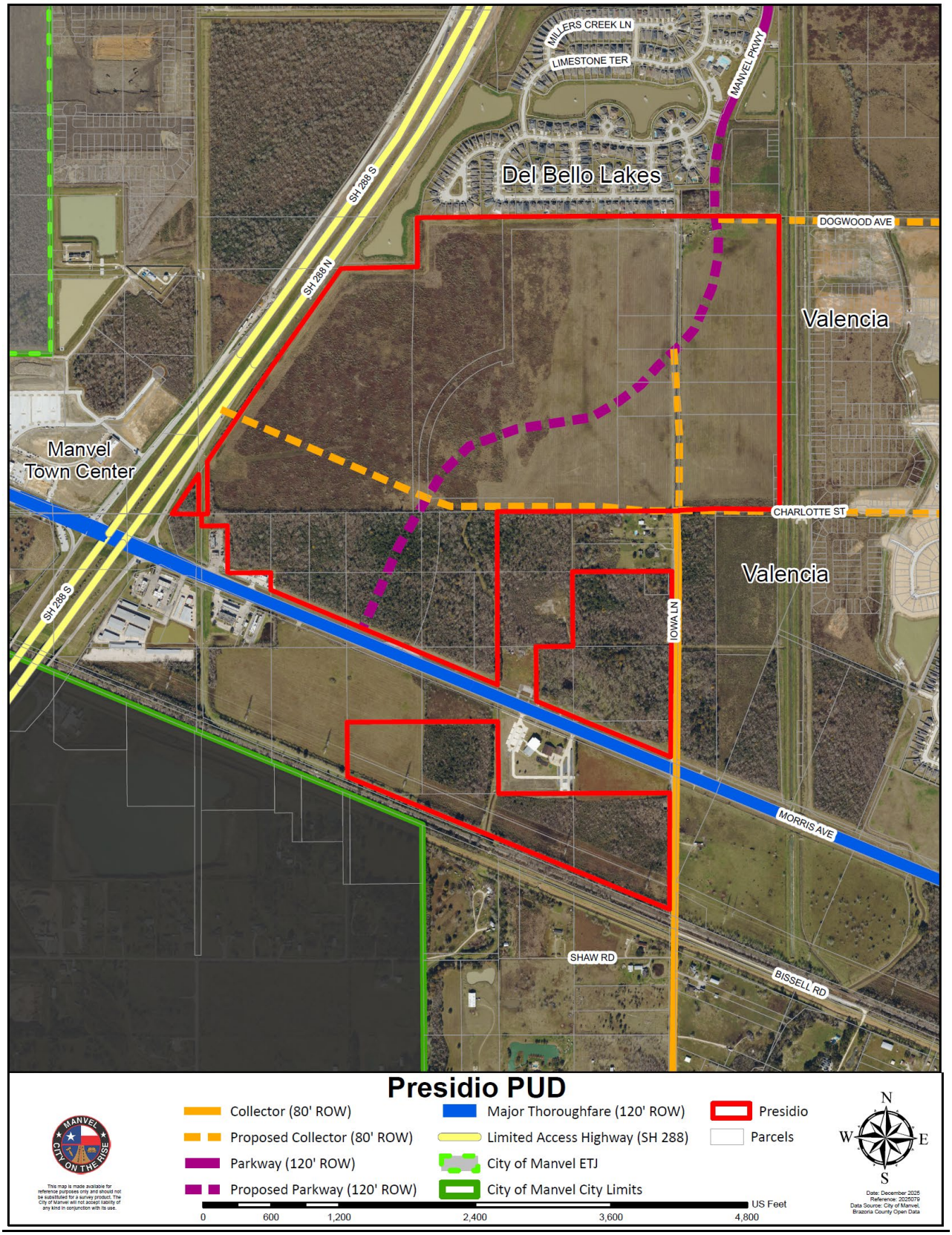
This map is made available for reference purposes only and should not be substituted for a survey product. The City of Manvel will not accept liability of any kind in conjunction with its use.

0 0.13 0.25 0.5 0.75 1 Miles

N W E S

Date: December 2025
Reference: 20250729
Data Source: City of Manvel, Brazoria County Open Data

MAJOR THOROUGHFARE PLAN MAP



PURPOSE AND INTENT OF THE PROPOSED ZONING DISTRICT

According to the section 77-29, *Planned Unit Development (PUD) district*, of the Zoning Ordinance purpose of PUD "*is to promote diversity and creativity in site design. The PUD process is provided as an option to encourage unique developments which may combine a mixture of residential and non-residential land uses and building functions. The PUD allows flexibility in the application of development standards by permitting departures from the conventional siting, setback, and density requirements of a particular zoning district in the interest of achieving site development not otherwise possible.*"

PROJECT DETAILS

The Presidio PUD is a mixed-use project that previously received O-PUD approval in 2007; and it intends to replace the previous of O-PUD based on provision of Section 77-29. The intent of the proposed PUD is to re-establish the original development framework while updating standards to reflect current market conditions, best practices, and the City's current ordinances. The previously approved O-PUD included approximately 394.232 acres. However, approximately 1.03 acres is being removed from the original tract after being sold to the Gulf Coast Water Authority (GCWA) in July 2020. As a result, the total acreage has been reduced to approximately 392.9 acres.

The subject site is located immediately east of S.H. 288 and extends across both the north and south sides of S.H. 6, south of the Del Bello Lakes development, west of Iowa Lane and the Valencia development, and generally within the boundaries of Brazoria County Municipal Utility District (BCMUD) No. 30. Approximately 45 acres located south of S.H. 6 are reserved for detention. Pursuant to the City's zoning ordinance, the project qualifies as a Large PUD Development based on its acreage and is proposed as a master-planned, mixed-use development consisting of commercial and traditional single-family residential uses.

The commercial component is intended to create an active corridor along S.H. 6 and will include a variety of retail, service, medical, and office uses that complement surrounding developments, including Manvel Town Center. A commercial tract located on the northwest boundary of the proposed PUD, consisting of approximately 50.3 acres, is identified for medical use (permitted use) and may be developed for general commercial uses without being subject to the 10 percent land use acreage adjustment limitation.

The residential component will consist of multiple neighborhoods connected by an internal street network with access provided from Manvel Parkway, Charlotte Street, S.H. 6, S.H. 288, and Iowa Lane. Residential lot widths are anticipated to be distributed on an approximate 50/50 basis between 50-foot and 60-foot lots with a minimum lot depth of 120 feet in response to market conditions and housing demand.

The development proposes an integrated circulation system with pedestrian connections, trails, landscaped public areas, and open space throughout the site. Approximately 21.96 percent of the gross acreage is dedicated to open space areas, including parks, landscape reserves, trails, natural open space areas, a Manvel Civic Center, lakes/detention areas, and drainage facilities.

The PUD establishes detailed architectural and site design standards to ensure high-quality development, including signage criteria and landscape buffering. All architectural standards and design guidelines for the residential and commercial portions of the development will be submitted separately for City review and approval.

The following table provides a comparison between the previously approved O-PUD and the proposed Presidio PUD:

Category	Previous O-PUD (2007)	Current PUD (2026)
Total Acreage	Approximately 394.232 acres	Approximately 392.9 acres
Acreage Difference	Included GCWA tract	Reduced by approximately 1.03 acres after sale to GCWA in July 2020
Development Type	Mixed-use O-PUD	Master-planned mixed-use PUD
Non-Residential Land Use	Included Pad, Office, Hotel, Water Plant and Wastewater Treatment Plant, Civic Center, detention, ROW	Includes traditional Commercial and Medical uses, Water Plant, Civic Center, detention, ROW, NAICS tables
Commercial Acreage	Approximately 165.2 acres	Approximately 200.2 acres
Commercial Uses	General commercial uses	Retail, service, medical, and office uses
Medical Use Tract	Not specified	Approximately 50.3-acre tract identified for medical use on northwest boundary of PUD
Residential Land Use	Traditional Single-Family Residential with minimum 60-foot lots and Urban Density Residential	Traditional Single-Family Residential ranging from approximately 50% 50-foot lots and 50% 60-foot lots; Urban Density Residential removed
Residential Acreage	Approximately 95.9 acres total	Approximately 57.5 acres total
Residential Types	77.5 acres Single-Family Detached Residential and 18.4 acres Urban Density Residential	Traditional Single-Family Residential only
Residential Lot Depth and Acreage	Depth not specified; Minimum 6,300 square feet	Minimum 120-foot depth; acreage not specified
Parks & Open Space	6-foot trails along Manvel Parkway and Iowa Lane; no dedicated park space	Variety of trail widths ranging from 6 feet to 12 feet along Manvel Parkway, Iowa Lane, Charlotte Street, and Street X; dedicated park space based on current City Park requirements
Open Space Percentage	Approximately 20.7%	Approximately 21.96%
Manvel Civic Site	Approximately 5.3 acres	Approximately 5 acres
Signage Standards	Unified signage program to be submitted separately and approved by City Council	Signage standards included within the PUD
Landscaping & Buffering	No specific screening or buffering requirements	Clear landscaping, buffering, and screening requirements provided
SH 6 Overlay District Compliance	Not addressed	Incorporates S.H. 6 Overlay District requirements
Definitions	Limited or not included	Comprehensive definitions section included

Portions of the development located within the S.H. 6 Overlay District will be required to comply with Section 77-36 of the City of Manvel Code of Ordinances. Stormwater management will be provided through on-site detention facilities designed to meet City and Brazoria County Drainage District No. 4 requirements. Utilities, drainage, and roadway infrastructure will be provided through the City of Manvel and BCMUD No. 30 and will be constructed in accordance with applicable City, County, and TCEQ standards.

Overall, the Presidio PUD is intended to provide expanded commercial amenities, residential opportunities, employment growth, and increased public amenities while maintaining the "town and country" character of Manvel through coordinated design and landscaping standards. The previously approved O-PUD did not include a NAICS Code table or detailed regulations pertaining to permitted land uses and building uses. The proposed PUD includes comprehensive land use tables identifying permitted uses, office-only uses, Special Use Permit (SUP) uses, and prohibited uses. Please note that gas station is allowed upon approval of an SUP. The proposed PUD includes the following permitted land uses:

1. Single Family
2. Retail Bakeries
3. Furniture and Home Furnishing Stores
4. Electronics and Appliance Stores
5. Building Material, Garden Equipment and Supplies Dealers
6. Food and Beverage Stores
7. Health and Personal Care Stores
8. 1 Gasoline Station in association with a Grocer
9. Clothing and Clothing Accessories Stores
10. Sporting Goods, Hobby, Book, and Music Stores
11. General Merchandise Stores
12. Misc. Store Retailers
13. Postal Service
14. Finance and Insurance
15. Real Estate
16. Lessors of Nonresidential Buildings (Except Mini \Warehouses)
17. Consumer Goods Rental
18. Professional, Scientific, and Technical Services
19. Accounting. Tax Preparation. Bookkeeping and Payroll
20. Veterinary Services
21. Management of Companies and Enterprises
22. Administrative and Support Services
23. Educational Support Services
24. Social Assistance
25. Child Care Services
26. Arts. Entertainment. and Recreation
27. Fitness and Recreational Sports Centers
28. Food Services
29. Electronic and Precision Equipment Repair and Maintenance
30. Automotive Glass Replacement Shop
31. Personal and Laundry Services

32. Specialty Trade Contractors
33. Printing and Related Support
34. Wholesale
35. Medical/ Hospital Uses (Tract H Only)
36. Convenience Retailers
37. Automotive Repairs and Replacement Shops

The proposed PUD also establishes separation and operational requirements for certain uses, including automotive uses, restaurants and retail uses, drinking places, hotel uses, freestanding ambulatory surgical and emergency centers, and personal care services.

The following sections provide staff's analysis of the requested rezoning and some key points to consider.

1. *The proposal is unique in design to warrant the use of a PUD and the development is not possible using the existing zoning regulation of the property:*

   The proposed PUD represents a master-planned, mixed-use development integrating traditional single-family residential neighborhoods with retail, office, medical, and service commercial uses within a unified development framework. The proposed development includes coordinated architecture, internal circulation systems, open space amenities, pedestrian connectivity, and comprehensive landscaping standards that cannot be effectively achieved through conventional zoning districts. The PUD is necessary to:

   - Integrate a mixture of residential and commercial uses within a cohesive master-planned development.
   - Allow flexibility in lot sizes, setbacks, circulation design, landscaping, and open space configuration.
   - Provide coordinated development standards and infrastructure planning across approximately 392.9 acres.
   - Accommodate phased development and interconnected roadway systems throughout the project area.

2. *The project depicts creative land development, providing a variety in the development patterns of the city which conform to the intended purpose of the city's comprehensive plan and vision statement*:

   The PUD introduces a Master-Planned Development pattern that provides more choice in housing and commercial development locations and types for the community. Overall, it supports the 2045 Plan and aligns with the recently adopted Future Land Use and Character Map.

   - Internal roadway connectivity between residential neighborhoods and commercial areas.
   - Coordinated architectural, landscaping, and design standards throughout the development.
   - Pedestrian trails, landscaped public spaces, and open space amenities that promote walkability and community interaction.
   - A development pattern intended to complement surrounding developments, including Manvel Town Center.

3. *Mixed uses and building functions if proposed shall be complementary, and pose minimal impact to adjacent uses or function*:

   The proposed residential and commercial land uses are designed to function cohesively while minimizing impacts on adjacent properties through buffering, landscaping, roadway planning, and transitional development patterns. The commercial areas along State Highway 6 are intended to serve surrounding residential neighborhoods and nearby developments.
   - Please note that an approximate 50.3-acre tract identified for medical use on northwest boundary of proposed PUD abut Del Bello Development that may be developed for general commercial uses, previously identified as an Urban Density Residential in the approved O-PUD.
   - NOTE: Per Texas Occupations Code section 455.005(b-1) and (c), the City may not adopt a zoning regulation that is more restrictive for massage therapists than for "other health care professionals" and "other health care establishments." So if an SUP is required for a state licensed massage therapist, we also require SUP for other healthcare professionals and establishments.
   - NOTE: The PUD document includes some reference to High Density Urban residential in error, which needs to be revised.
   - Additionally, please note that some of the sign regulation included in the PUD document deviate from the recently approved PUDs. (comparison table attached)

4. *Development within the PUD encourages the use of alternative transportation circulation between structures and open spaces, including pedestrian and bicyclist*:

   The PUD includes a comprehensive internal circulation network intended to provide connectivity throughout the development and to surrounding areas supported by an approved Traffic Impact analysis. The development proposes pedestrian connections, trails, landscaped pathways, and open space areas designed to encourage walkability and recreational activity. Additionally:
   - Multiple access points are proposed from State Highway 6, State Highway 288, Manvel Parkway, Charlotte Street, and Iowa Lane.
   - Internal sidewalks and trail systems are intended to connect residential neighborhoods, commercial areas, parks, and open spaces. The proposed PUD includes details and exhibits pertaining to trails.
   - Landscaped pedestrian corridors and public spaces are incorporated throughout the development to enhance connectivity and mobility.
   - Note: The PUD document may need minor revision to ensure that street and sidewalk design will comply with the requirements of the City's Major Thoroughfare plan and Subdivision Ordinance.

5. *Landscaping areas shall visually enhance the structures within the development and conform to the city's comprehensive plan and vision statement*:

   The PUD includes proposed landscaping and open space standards intended to create a cohesive development character and enhance the visual appearance of the project. Approximately 21.96 percent of the gross acreage is dedicated to parks and open space areas,

including trails, landscape reserves, detention features, and natural open space areas. Landscaping elements include:

- Street trees and enhanced landscape areas throughout the development.
- Landscaped buffers between residential and commercial uses.
- Open space amenities, trails, and pedestrian-oriented public spaces.
- Coordinated landscaping standards intended to preserve the "town and country" character of the City of Manvel.
- PUD indicates traditional, constant-level detention lakes.
- NOTE: The bufferyard requirement in the PUD document does not include specific planting requirements similar to the City's Ordinance.

6. *The proposed project is in compliance with the minimum development requirements described in the PUD Manual:*

   In general, the PUD demonstrates conformance with the City's PUD Manual and zoning ordinance requirements for a large-scale mixed-use development. The PUD includes proposed development standards, land use planning, circulation systems, open space provisions, and infrastructure coordination.

STAFF RECOMMENDATION

Staff supports the proposed rezoning from Open Planned Use Development (O-PUD) District to Planned Use Development (PUD) District. The proposed project generally aligns with the goals of the Comprehensive Plan, however, some of the details included in the PUD document need reconsideration prior to City Council action. Staff recommends forwarding a recommendation of approval with a condition that the PUD document shall be revised to address certain issues and/or that clarification on certain issues will be provided for items listed below. (Proposed Ordinance No. 2026-O-16).

1. Introduction Section: Revise the introduction section in the O-PUD where it mentions that the O-PUD approval has since expired pursuant to Sec. 77-29 of the Manvel Code of Ordinances to state that this is zoning change from O-PUD to PUD based on provision of Section 77-29.
2. Sidewalk: Revise Section III.4 (page 7) to add: "Except as expressly stated in the PUD, compliance with the City of Manvel's sidewalk requirements will be maintained……"
3. Trails: It appears that the document uses the terms trails and sidewalks interchangeably. Revise for consistency or include specific definitions for clarity.
4. Vesting: Revise section VI in the proposed PUD to add "Applicable International Code Council Codes adopted by the City of Manvel shall apply as amended from time to time."
5. Planting within Buffer yard: Revise Section VI. 5 to include the minimum requirements of Section 77-44(C)(6) of the City's Ordinance (Transitional buffer yard between residential and non-residential uses).
6. Street and Circulation System Section: Revise to reference Major Thoroughfare Plan compliance on Page 14. Additionally, there is a section called Streets on Page 16 which could be made part of Section VI.2. on page 14.
7. Utility Agreement: Provide clarification on why Section VI.4. includes a reference to the Utility Agreement. Also, include a definition for the Utility Agreement.
8. Miscellaneous Regulations: Revise the setback requirement regarding proximity to pipelines from 30 feet to 50 feet.

9. Trees within median: Include specific requirements pertaining to root barriers, maintenance requirements, etc., for tree planting allowance within medians.
10. Urban Corridor: Remove reference to Urban corridor and High-density urban corridor on page 26.
11. Phasing: Revise Phasing schedule section to indicate phasing of detention ponds. Additionally, revise to reference Exhibit H instead of I.
12. Commercial standards: A development standard comparison table was provided which includes standards for Light Commercial uses. However, these standards are not included in the PUD document.
13. Signage: Size restriction for off-premise signs is not provided. Sign area allowance for multi-tenant monument signs is significantly larger than city ordinance allowance. Multi-Tenant Highway Pylon sign doesn't include any spacing of number limit. Provide clarification to illustrate how this aligns with the overall spirit of the city's sign ordinance or other similar districts within Manvel.

PUBLIC HEARING

The Notice of Public Hearing was published in the newspaper of general circulation. All property owners within 200 feet of the property were notified. At the time of writing this report, staff has received two informational inquiry and is not aware of any opposition to the request.

PUBLIC HEARING NOTICE PUBLISHED ON SUNDAY 05/10/2026

A PUBLIC HEARING WILL BE HELD AT MANVEL CITY HALL, 20031 HWY 6, MANVEL, TX 77578 AT 6:00 P.M. ON TUESDAY, MAY 26, 2026 BEFORE THE MANVEL PLANNING, DEVELOPMENT, AND ZONING COMMISSION AND AT 6:00 P.M., ON MONDAY, JUNE 15, 2026 BEFORE THE MANVEL CITY COUNCIL TO HEAR INPUT FROM THE PUBLIC REGARDING AN ORDINANCE (2026-O-16) OF THE CITY OF MANVEL, TEXAS, AMENDING THE ZONING ORDINANCE (2007-O-26) OF THE CITY, BY CHANGING THE ZONING CLASSIFICATION OF A CERTAIN TRACT OF LAND CONSTITUTING APPROXIMATELY 394.232 ACRES FROM OPEN PLANNED USE DEVELOPMENT (O-PUD) DISTRICT TO PLANNED USE DEVELOPMENT (PUD) DISTRICT, SUCH TRACT IMMEDIATELY LOCATED ON THE EAST OF S.H. 288, EXTENDS ACROSS BOTH NORTH AND SOUTH SIDES OF S.H. 6, SOUTH OF DEL BELLO LAKES DEVELOPMENT, WEST OF IOWA LANE AND VALENCIA DEVELOPMENT, AND GENERALLY WITHIN THE BOUNDARIES OF BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NO. 30; PROVIDING FOR THE AMENDMENT OF THE CITY'S OFFICIAL ZONING MAP; PROVIDING FOR SEVERABILITY; AND PROVIDING A PENALTY IN AN AMOUNT NOT TO EXCEED $2,000 FOR EACH DAY OF VIOLATION OF ANY PROVISION HEREOF.. /S/ TAMMY BELL, CITY SECRETARY.

APPLICATION FORM

Staff Use Only:
Date Received: _____
Received by: _____
Date Complete: _____
Completeness Review by:
_____

Planned Unit Development (PUD) Application

Incomplete Applications will not be accepted. Please review application submittal requirements contained in the City of Manvel PUD Manual.

(Please Type or Print Clearly with Dark Ink)

[X] Master Plan PUD [ ] Small PUD [ ] Site Plan Only

General Information
PUD Name: Presidio PUD
Number of Units Proposed: 242 Current Zoning Designation: Open Planned Unit Development
Zoning District under Which PUD Will Be Designed: PUD-Single Family Residential and PUD- Light Commercial
Address/Location: North of State Highway 6 and East of State Highway 288
Brazoria County Parcel Number (s): Please see attached list. Acres: 392.9
Legal Description: Please see attached list.
_____

Applicant Information
Name: LJA Engineering, Inc. Daytime Phone: _____
Mailing Address: _____
City/State/Zip: _____
Contact Person: Katy Harris
Email Address: _____

Property Owner Information (If different from applicant; attach additional signature page or appropriate letter of consent/agreement if more than one property owner)
Name: Please see attached list. Daytime Phone: _____
Mailing Address: _____
City/State/Zip: _____
Email Address: _____

APPLICATION FORM

CITY OF MANVEL PLANNED UNIT DEVELOPMENT APPLICATION, PAGE 2

(Attach additional sheets if necessary to fully answer the following.)

1. Contiguous Land Ownership- Please specify if the owner(s) own any property that is directly adjacent to the proposed PUD and describe any future projects in adjacent property: Owners do not own property that is directly adjacent to the proposed PUD.

2. Concept Statement- Brief description of the project including proposed the use or uses: The project will consist of residential and commercial development. A variety of housing options (50s, 60s) are being offered in addition to pedestrian trails, open space, and amenitized ponds.

The proposed activities and uses shall be shown on an attached PUD plan based on the exhibit requirements for master plan and site plan review. Please refer to the City of Manvel PUD Manual for the master plan and site plan requirements.

3. Statement of Justification- Brief description outlining how the proposed PUD is consistent with the purpose of the Zoning Ordinance and all departures from the provisions of the underlying zoning district that are necessary to provide superior site development: The project is currently zoned to Open Planned Unit Development. The proposed PUD will consist of commercial development, and residential homes including some higher density that the adjacent major thoroughfares can accommodate.

4. Statement of Compliance with the Comprehensive Plan- Description of how the PUD meets or exceeds the City vision as described in the Comprehensive Plan: The proposed PUD complies with the comprehensive plan by proposing well-planned development with open space for safe recreation that protects the natural environment and offering a variety of housing for different needs.

5. Statement of Compatibility- Describe how the proposed project is compatible with the surrounding uses and will not have significant adverse impacts on the properties: The proposed PUD will consist of commercial development taking access from adjacent highways and a proposed major thoroughfare. This commercial development aligns with commercial uses existing along the adjacent highways west of the PUD. The PUD is also proposing traditional single-family residential lots that compatible with existing residential communities to the north and to the east of the PUD.

12/11/25
Date

Katy Harris
Applicant's Signature

12/11/25
Date

Manager
Owner's Signature (If different from Applicant)

The above signed property owners, certify that the above information is true and correct to the best of our knowledge and state that we are the legal owners of the property included in this application and/or designate the applicant to act as our agent with respect to this application. If there are more than one property owner(s), attach additional signature sheets or letter of consent to application.

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CITY OF MANVEL PLANNED UNIT DEVELOPMENT APPLICATION, PAGE 2

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DEVELOPMENT SUMMARY LETTER

713.953.5200
TBPELS 10194382
www.LJA.com
3600 West Sam Houston Parkway S, Suite 600, Houston, Texas 77042

May 13, 2025

City of Manvel
Planning Department
20025 Highway 6
Manvel, Texas 77578

Re: Presidio PUD – Development Summary Letter

To Whom It May Concern:

This letter provides an overview of the proposed Presidio Planned Unit Development (PUD) and summarizes anticipated build-out characteristics, land use allocation, and the planned approach to public and private service provision, as requested.

Project Overview

The Presidio PUD consists of approximately 392.9 acres located east of State Highway 288, north of State Highway 6, and west of Pollard Boulevard. The PUD establishes a balanced mix of residential, commercial, roadway, drainage, and open space uses consistent with the City's development objectives and the Comprehensive Plan.

Residential Development

The PUD includes one residential product:

- Traditional Single-Family Residential: Approximately 57.5 acres, developed with a range of lot sizes (50'–60' lots) to respond to market demand.

Commercial Development

The PUD includes 200.2 acres of commercial land distributed throughout the site with access from State Highway 288, State Highway 6, Manvel Parkway, Charlotte Street, and Iowa Lane. These areas are intended to accommodate a broad mix of retail, service, medical, and office uses.

At this stage of planning, specific building programs, tenant mix, and gross floor area projections for the commercial tracts have not yet been determined. These elements will be refined as market conditions evolve and as individual end users are identified. Final site development details, including building square footage, parking, and site circulation, will be provided through subsequent site plan and platting submittals in accordance with City requirements.

DEVELOPMENT SUMMARY LETTER

Land to Be Developed, Preserved, or Dedicated

Acreage allocation within the PUD includes the following:

- Residential: 57.5 acres
- Commercial: 200.2 acres
- Mobility Corridors: 32.4 acres
- Drainage & Detention: 78.3 acres
- Parks & Open Space: 86.3 acres

Parks and open space, representing approximately 21.96% of the gross acreage, will be developed and dedicated in accordance with the City's parkland dedication requirements, including trail connectivity and the potential use of detention amenities.

Provision of Public and Private Services

Utilities, drainage, roadway improvements, and related infrastructure will be provided through a combination of public and private systems in coordination with the City of Manvel and Brazoria County MUD 30. A full water, wastewater, and storm drainage system will be designed and constructed in accordance with applicable City, County, and TCEQ standards. All dry utilities will be provided by private utility companies serving the region.

Maintenance responsibilities for parks, open space, trails, and landscaping will be performed by the Homeowners Association, MUD, and/or the Commercial Property Owners Association, depending on location and use.

Phasing

The development is anticipated to occur in two phases over a 5–15 year period, beginning with major roadway construction and entry features. Residential and commercial phases will be constructed based on market conditions and infrastructure availability.

Please let us know if any additional detail or clarification is needed. We appreciate the City's review and look forward to continuing to coordinate throughout the entitlement process.

Sincerely,

Katy Harris, AICP
Principal, Planning
LJA Engineering

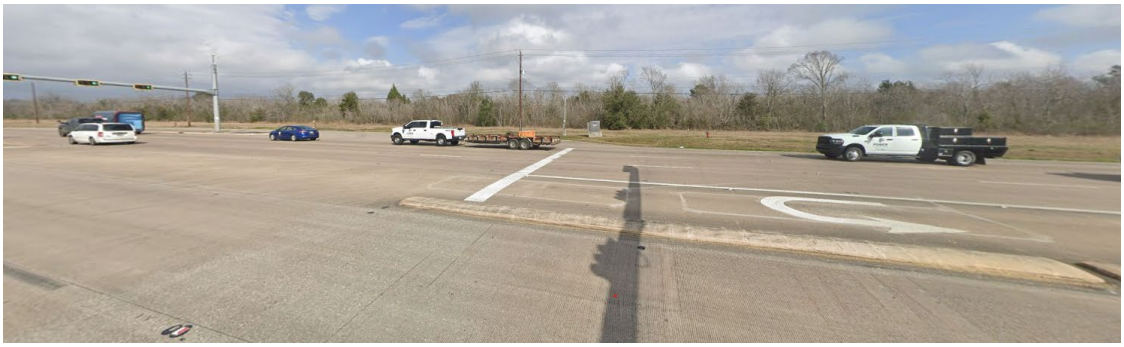
SITE PICTURES



View of the property to the south from Morris Avenue/SH6 (Sonic and Valero Gas Station)



View of the subject site from Morris Avenue/SH6 (Dairy Queen), looking north.



View of the subject site from Morris Avenue/SH6 (Trafic light), looking north.

SITE PICTURES



View of the subject site from southern Iowa Ln (after Highway 6), looking west.



View of the subject site from northern Iowa Ln, looking west.



View of the subject site from S.H 288, looking east.

SITE PICTURES



View of the subject site from southern Iowa Lane (before Highway 6), looking north



View of the subject site from north Iowa Lane (north of Highway 6 within the Del Bello development), looking south.

MANVEL
PD&Z COMMISSION
DATA SHEET

MEETING DATE: May 26, 2026

TOPIC: Public Hearing followed by consideration of a request to change the zoning classification of an approximate 394.232 tract of land, generally located east of S.H. 288, extends across both north and south sides of S.H. 6, south of Del Bello Lakes Development, west of Iowa Lane and Valencia Development, from Open Planned Use Development (O-PUD) District to Planned Use Development (PUD) District.

BACKGROUND:

The subject site is generally bounded by S.H. 6 to the south, Del Bello Lakes Development to the north, Iowa Lane and Valencia Development to the west. The property, approximately 394.232 acres, is currently undeveloped and located within the City of Manvel. The applicant, LJA Engineering, on behalf of developers, Houston 118 LLC, Milestone, Scottsdale LLC, and Tharaldson Ethanol Plant I LLC, is requesting to change the zoning classification from Open Planned Use Development (O-PUD) District to Planned Use Development (PUD) District.

The proposed PUD, titled “Presidio PUD,” is proposed as a master-planned, mixed-use commercial development, including single family residential, medical, retail, services, office uses. The project is intended to incorporate coordinated architecture, a comprehensive land use table, landscaping requirements, pedestrian-friendly amenities, and internal circulation, including multiple access points from Highway 6, State Highway 288, Manvel Parkway, Charlotte Street, and Iowa Lane. Surrounding properties are a mix of underdeveloped acreage and commercial development to the south, State Highway 288 with commercial development on the other side of it to the west, and single-family residential developments to the north and east including Del Bello Lakes and Valencia Development. The applicant has provided a PUD document that will govern the land use allowances and development standard for the development. The proposed PUD document includes certain provisions that deviate from the current City standards but are necessary for the development according to the applicant.

The Notice of Public Hearing was published in the newspaper of general circulation and all property owners within 200 feet of the property were notified. At the time of writing this report, staff has received informational inquiries and is not aware of opposition.

Additional details and staff analysis are included in the attached staff report.

STAFF RECOMMENDATION: City staff recommends forwarding a Final Report to City Council indicating approval of the requested Rezoning with the conditions listed in the Staff Report.

ATTACHMENTS: Staff Report, proposed PUD document, proposed Traffic Impact Analysis

FUNDING ISSUES
_X_ Not applicable
___ Not budgeted
___ Full amount already budgeted
___ Funds to be transferred from Acct.#

SUBMITTING STAFF MEMBER	**FINANCE DIRECTOR APPROVAL** __NA___
Jesica Portie, Associate Planner	**CITY MANAGER APPROVAL** ___YES___

STAFF REPORT TO PLANNING, DEVELOPMENT, AND ZONING COMMISSION

Rezoning

Agenda of:	May 26, 2026	**Initiated By:**	Jose Abraham Director, Development Services
Subject:	Rezoning, O-PUD/SH6 to PUD/SH6	**Presented By:**	Jesica Portie Associate Planner
Recommended Action:	A Public Hearing followed by consideration and action to provide a recommendation to City Council.		

SUMMARY

This is a rezoning request pertaining to Presidio, a development previously approved as Open-Planned Unit Development (O-PUD). Presidio is approximately 394.232 acres in size, currently undeveloped and generally located along the east side of SH 288 with majority of the acreage on the north side of SH 6 and about 45.5 acres on the south side. Brazoria County Municipal Utility District (BCMUD) No. 30 was established to serve this proposed development. Even though this development was approved in 2007, the developer did not get Council approval to proceed with the development as required by the O-PUD ordinance. The applicant, LJA Engineering, on behalf of the developers, Houston 118 LLC, Milestone, Scottsdale LLC, and Tharaldson Ethanol Plant I LLC, is requesting to change the zoning classification from Open Planned Use Development District with State Highway 6 Overlay (O-PUD/SH6) to Planned Use Development District with State Highway 6 Overlay (PUD/SH6). Proposed PUD includes allowance for light commercial uses and single family residential. The proposed PUD document generally aligns with the city Ordinances with certain provisions that deviate from the current City standards but are necessary for the development according to the applicant. Several provisions also are similar to Manvel Town Center and Manvel Crossing PUD. Staff have provided input and comments on the PUD document for the applicant to consider prior to the meeting. The Notice of Public Hearing was published in the newspaper of general circulation and all property owners within 200 feet of the property were notified. At the time of writing this report, staff has received two informational inquiry and is not aware of any opposition to the request.

Staff Recommendation: Approval with conditions.

EXHIBITS

Zoning Vicinity Map, Major Thoroughfare Plan Map, Application Form, Development Summary Letter, Public Hearing Notice, 2007 O-PUD, Proposed PUD, Proposed PUD Exhibits, Presidio OPUD to PUD Changes, Deviations and Variances Table, DIA, and TIA.

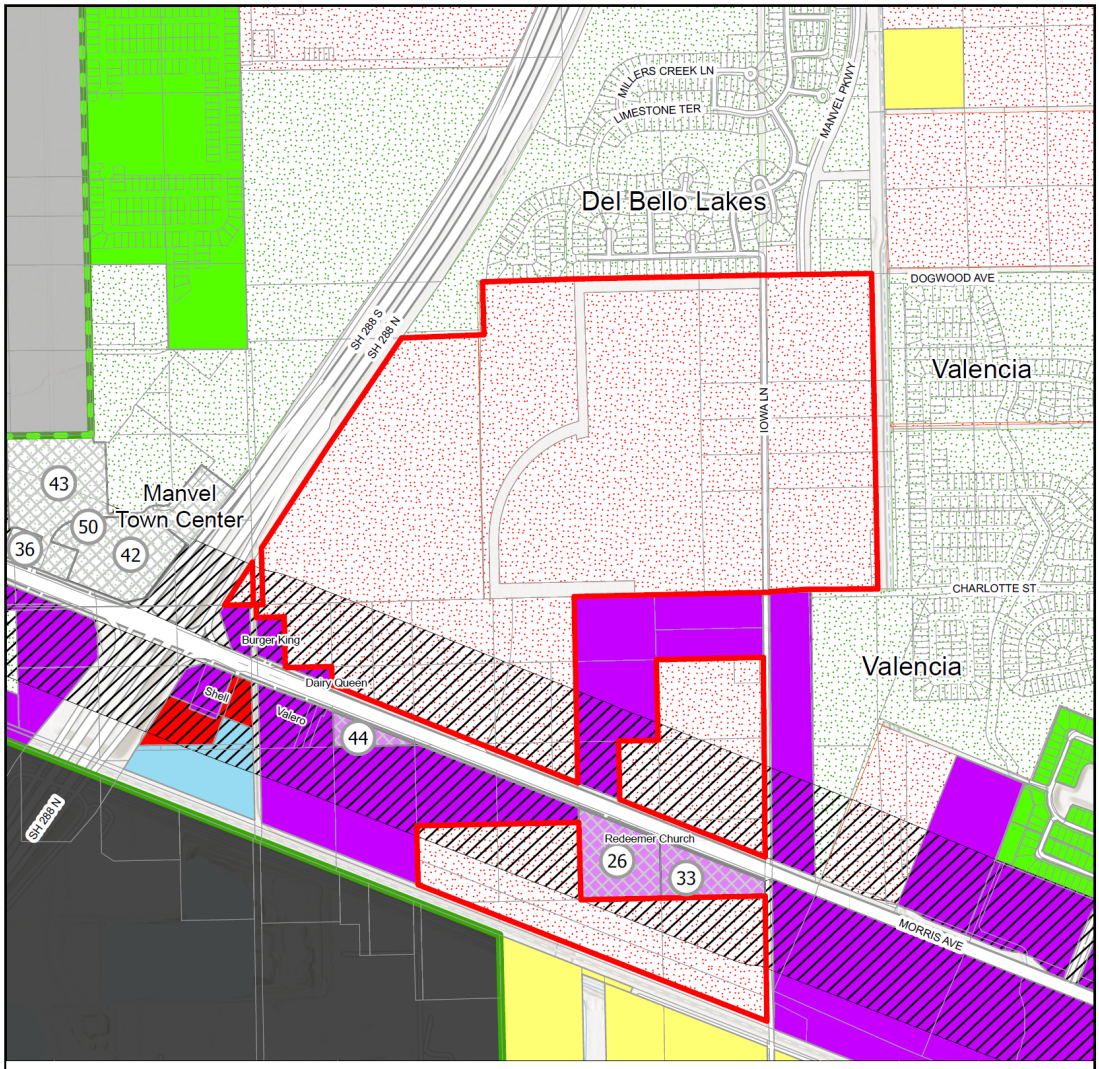
GENERAL SITE INFORMATION

The following is a summary of general site information.

Surrounding Property Zoning	**North:** Planned Unit Development (PUD) **South:** Light Commercial District (LC) / State Highway 6 Overlay District (SH6) **East:** PUD / LC / SH6 **West:** S.H 288/ PUD/ SH6
Surrounding Land Use	**North:** Del Bello Development **South:** Quick-service restaurants (Jack in the Box, Subway, Taco Bell, and Sonic Drive-In), Shell plc gas station, storage facility, future ambulatory health care services, church, and undeveloped land.

	East: Valencia Development **West:** Manvel Town Center
Major Thoroughfare	Subject site is located along both side of State Highway 6/Morris Avenue, Manvel Parkway, Charlotte Street, and Iowa lane. Subject site is located along east side of SH 288 and south side of Dogwood Avenue.

ZONING VICINITY MAP



SPECIFIC USE PERMITS LEGEND

Label No	Address	Specific Use Description	Ordinance No	Effective Date	Zoning Classification
26	18218 MORRIS AVE	NAICS Use 6111 RELIGIOUS ORGANIZATIONS AND NAICS USE 6111 ELEMENTARY AND SECONDARY SCHOOLS	2019-O-09	4/1/2019	LC/SH6
33	SOUTHWEST CORNER OF STATE HIGWAY 6 AND IOWA LANE	NAICS USE 721 ACCOMMODATIONS	EXPIRED		LC/SH6-SUP
36	17205 Highway 6/ Morris Ave	NACIS USE OFFICE OF DENTISTS	2023-O-15	3/20/2023	PUD/SH6-SUP
42	21708 Highway 288	NAICS USE 621493 "Ambulatory Health Care Services"	2024-O-17	5/6/2024	PUD/SH6-SUP
43	17221 State Highway 6, Suite 103	NAICS USE 812113 "Nail Salon"	2024-O-25	7/1/2024	PUD/SH6-SUP
44	17518 Morris Avenue	NAICS use 621493 "Ambulatory health Care Services"	2024-O-26	10/21/2024	LC/SH6-SUP

Presidio PUD

Presidio
Parcels
City of Manvel ETJ
City of Manvel City Limits
Specific Use Permits
State Highway 6 Overlay District
Heavy Commercial District
Light Commercial District
Multi-Family District
Planned Unit Development
Open Single-Family Residential District
Single-Family Residential District
Open - Planned Unit Development

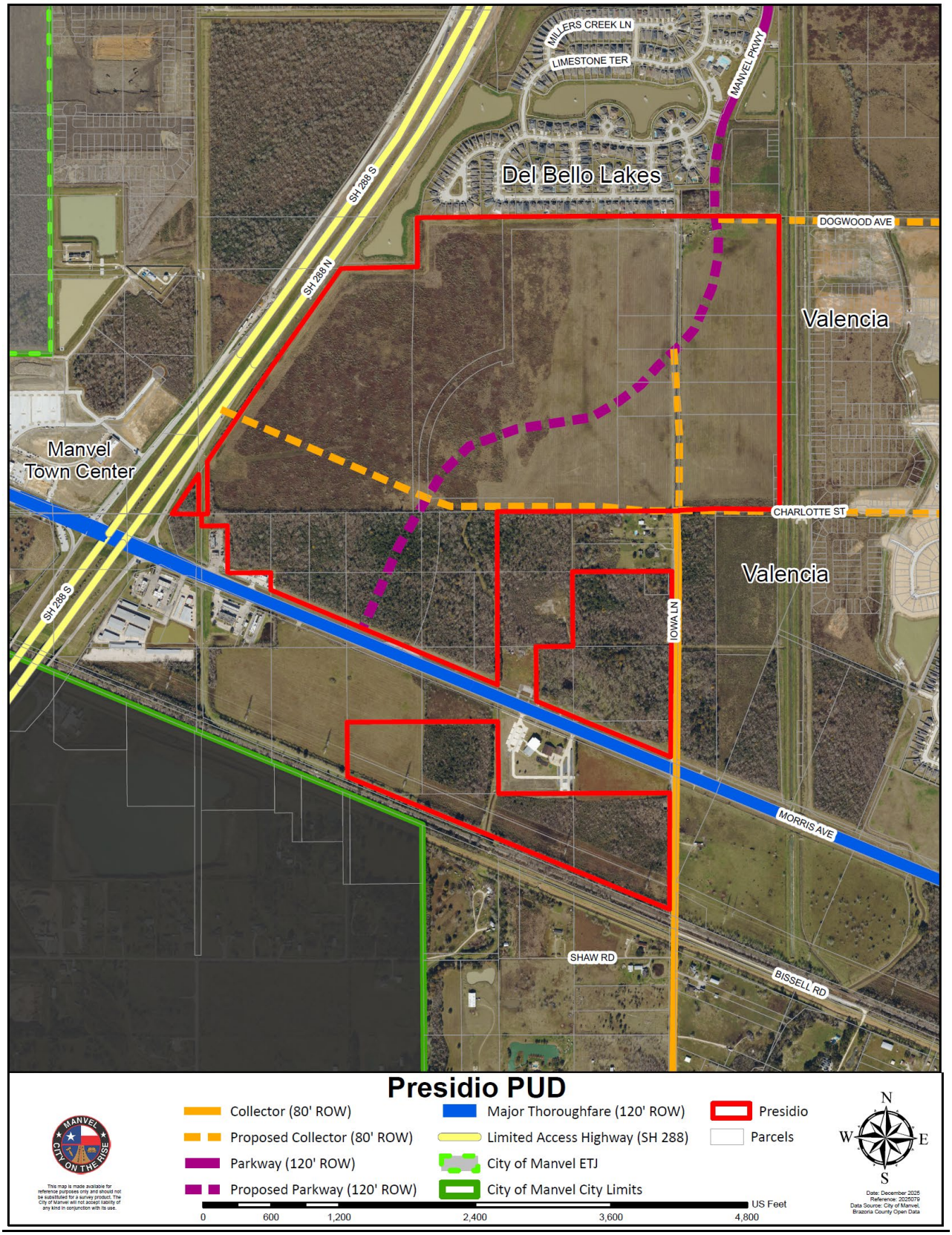
This map is made available for reference purposes only and should not be substituted for a survey product. The City of Manvel will not accept liability of any kind in conjunction with its use.

0 0.13 0.25 0.5 0.75 1 Miles

N W E S

Date: December 2025
Reference: 20250729
Data Source: City of Manvel, Brazoria County Open Data

MAJOR THOROUGHFARE PLAN MAP



PURPOSE AND INTENT OF THE PROPOSED ZONING DISTRICT

According to the section 77-29, *Planned Unit Development (PUD) district*, of the Zoning Ordinance purpose of PUD "*is to promote diversity and creativity in site design. The PUD process is provided as an option to encourage unique developments which may combine a mixture of residential and non-residential land uses and building functions. The PUD allows flexibility in the application of development standards by permitting departures from the conventional siting, setback, and density requirements of a particular zoning district in the interest of achieving site development not otherwise possible.*"

PROJECT DETAILS

The Presidio PUD is a mixed-use project that previously received O-PUD approval in 2007; and it intends to replace the previous of O-PUD based on provision of Section 77-29. The intent of the proposed PUD is to re-establish the original development framework while updating standards to reflect current market conditions, best practices, and the City's current ordinances. The previously approved O-PUD included approximately 394.232 acres. However, approximately 1.03 acres is being removed from the original tract after being sold to the Gulf Coast Water Authority (GCWA) in July 2020. As a result, the total acreage has been reduced to approximately 392.9 acres.

The subject site is located immediately east of S.H. 288 and extends across both the north and south sides of S.H. 6, south of the Del Bello Lakes development, west of Iowa Lane and the Valencia development, and generally within the boundaries of Brazoria County Municipal Utility District (BCMUD) No. 30. Approximately 45 acres located south of S.H. 6 are reserved for detention. Pursuant to the City's zoning ordinance, the project qualifies as a Large PUD Development based on its acreage and is proposed as a master-planned, mixed-use development consisting of commercial and traditional single-family residential uses.

The commercial component is intended to create an active corridor along S.H. 6 and will include a variety of retail, service, medical, and office uses that complement surrounding developments, including Manvel Town Center. A commercial tract located on the northwest boundary of the proposed PUD, consisting of approximately 50.3 acres, is identified for medical use (permitted use) and may be developed for general commercial uses without being subject to the 10 percent land use acreage adjustment limitation.

The residential component will consist of multiple neighborhoods connected by an internal street network with access provided from Manvel Parkway, Charlotte Street, S.H. 6, S.H. 288, and Iowa Lane. Residential lot widths are anticipated to be distributed on an approximate 50/50 basis between 50-foot and 60-foot lots with a minimum lot depth of 120 feet in response to market conditions and housing demand.

The development proposes an integrated circulation system with pedestrian connections, trails, landscaped public areas, and open space throughout the site. Approximately 21.96 percent of the gross acreage is dedicated to open space areas, including parks, landscape reserves, trails, natural open space areas, a Manvel Civic Center, lakes/detention areas, and drainage facilities.

The PUD establishes detailed architectural and site design standards to ensure high-quality development, including signage criteria and landscape buffering. All architectural standards and design guidelines for the residential and commercial portions of the development will be submitted separately for City review and approval.

The following table provides a comparison between the previously approved O-PUD and the proposed Presidio PUD:

Category	Previous O-PUD (2007)	Current PUD (2026)
Total Acreage	Approximately 394.232 acres	Approximately 392.9 acres
Acreage Difference	Included GCWA tract	Reduced by approximately 1.03 acres after sale to GCWA in July 2020
Development Type	Mixed-use O-PUD	Master-planned mixed-use PUD
Non-Residential Land Use	Included Pad, Office, Hotel, Water Plant and Wastewater Treatment Plant, Civic Center, detention, ROW	Includes traditional Commercial and Medical uses, Water Plant, Civic Center, detention, ROW, NAICS tables
Commercial Acreage	Approximately 165.2 acres	Approximately 200.2 acres
Commercial Uses	General commercial uses	Retail, service, medical, and office uses
Medical Use Tract	Not specified	Approximately 50.3-acre tract identified for medical use on northwest boundary of PUD
Residential Land Use	Traditional Single-Family Residential with minimum 60-foot lots and Urban Density Residential	Traditional Single-Family Residential ranging from approximately 50% 50-foot lots and 50% 60-foot lots; Urban Density Residential removed
Residential Acreage	Approximately 95.9 acres total	Approximately 57.5 acres total
Residential Types	77.5 acres Single-Family Detached Residential and 18.4 acres Urban Density Residential	Traditional Single-Family Residential only
Residential Lot Depth and Acreage	Depth not specified; Minimum 6,300 square feet	Minimum 120-foot depth; acreage not specified
Parks & Open Space	6-foot trails along Manvel Parkway and Iowa Lane; no dedicated park space	Variety of trail widths ranging from 6 feet to 12 feet along Manvel Parkway, Iowa Lane, Charlotte Street, and Street X; dedicated park space based on current City Park requirements
Open Space Percentage	Approximately 20.7%	Approximately 21.96%
Manvel Civic Site	Approximately 5.3 acres	Approximately 5 acres
Signage Standards	Unified signage program to be submitted separately and approved by City Council	Signage standards included within the PUD
Landscaping & Buffering	No specific screening or buffering requirements	Clear landscaping, buffering, and screening requirements provided
SH 6 Overlay District Compliance	Not addressed	Incorporates S.H. 6 Overlay District requirements
Definitions	Limited or not included	Comprehensive definitions section included

Portions of the development located within the S.H. 6 Overlay District will be required to comply with Section 77-36 of the City of Manvel Code of Ordinances. Stormwater management will be provided through on-site detention facilities designed to meet City and Brazoria County Drainage District No. 4 requirements. Utilities, drainage, and roadway infrastructure will be provided through the City of Manvel and BCMUD No. 30 and will be constructed in accordance with applicable City, County, and TCEQ standards.

Overall, the Presidio PUD is intended to provide expanded commercial amenities, residential opportunities, employment growth, and increased public amenities while maintaining the "town and country" character of Manvel through coordinated design and landscaping standards. The previously approved O-PUD did not include a NAICS Code table or detailed regulations pertaining to permitted land uses and building uses. The proposed PUD includes comprehensive land use tables identifying permitted uses, office-only uses, Special Use Permit (SUP) uses, and prohibited uses. Please note that gas station is allowed upon approval of an SUP. The proposed PUD includes the following permitted land uses:

1. Single Family
2. Retail Bakeries
3. Furniture and Home Furnishing Stores
4. Electronics and Appliance Stores
5. Building Material, Garden Equipment and Supplies Dealers
6. Food and Beverage Stores
7. Health and Personal Care Stores
8. 1 Gasoline Station in association with a Grocer
9. Clothing and Clothing Accessories Stores
10. Sporting Goods, Hobby, Book, and Music Stores
11. General Merchandise Stores
12. Misc. Store Retailers
13. Postal Service
14. Finance and Insurance
15. Real Estate
16. Lessors of Nonresidential Buildings (Except Mini \Warehouses)
17. Consumer Goods Rental
18. Professional, Scientific, and Technical Services
19. Accounting. Tax Preparation. Bookkeeping and Payroll
20. Veterinary Services
21. Management of Companies and Enterprises
22. Administrative and Support Services
23. Educational Support Services
24. Social Assistance
25. Child Care Services
26. Arts. Entertainment. and Recreation
27. Fitness and Recreational Sports Centers
28. Food Services
29. Electronic and Precision Equipment Repair and Maintenance
30. Automotive Glass Replacement Shop
31. Personal and Laundry Services

32. Specialty Trade Contractors
33. Printing and Related Support
34. Wholesale
35. Medical/ Hospital Uses (Tract H Only)
36. Convenience Retailers
37. Automotive Repairs and Replacement Shops

The proposed PUD also establishes separation and operational requirements for certain uses, including automotive uses, restaurants and retail uses, drinking places, hotel uses, freestanding ambulatory surgical and emergency centers, and personal care services.

The following sections provide staff's analysis of the requested rezoning and some key points to consider.

1. *The proposal is unique in design to warrant the use of a PUD and the development is not possible using the existing zoning regulation of the property:*

   The proposed PUD represents a master-planned, mixed-use development integrating traditional single-family residential neighborhoods with retail, office, medical, and service commercial uses within a unified development framework. The proposed development includes coordinated architecture, internal circulation systems, open space amenities, pedestrian connectivity, and comprehensive landscaping standards that cannot be effectively achieved through conventional zoning districts. The PUD is necessary to:

   - Integrate a mixture of residential and commercial uses within a cohesive master-planned development.
   - Allow flexibility in lot sizes, setbacks, circulation design, landscaping, and open space configuration.
   - Provide coordinated development standards and infrastructure planning across approximately 392.9 acres.
   - Accommodate phased development and interconnected roadway systems throughout the project area.

2. *The project depicts creative land development, providing a variety in the development patterns of the city which conform to the intended purpose of the city's comprehensive plan and vision statement*:

   The PUD introduces a Master-Planned Development pattern that provides more choice in housing and commercial development locations and types for the community. Overall, it supports the 2045 Plan and aligns with the recently adopted Future Land Use and Character Map.

   - Internal roadway connectivity between residential neighborhoods and commercial areas.
   - Coordinated architectural, landscaping, and design standards throughout the development.
   - Pedestrian trails, landscaped public spaces, and open space amenities that promote walkability and community interaction.
   - A development pattern intended to complement surrounding developments, including Manvel Town Center.

3. *Mixed uses and building functions if proposed shall be complementary, and pose minimal impact to adjacent uses or function*:

   The proposed residential and commercial land uses are designed to function cohesively while minimizing impacts on adjacent properties through buffering, landscaping, roadway planning, and transitional development patterns. The commercial areas along State Highway 6 are intended to serve surrounding residential neighborhoods and nearby developments.
   - Please note that an approximate 50.3-acre tract identified for medical use on northwest boundary of proposed PUD abut Del Bello Development that may be developed for general commercial uses, previously identified as an Urban Density Residential in the approved O-PUD.
   - NOTE: Per Texas Occupations Code section 455.005(b-1) and (c), the City may not adopt a zoning regulation that is more restrictive for massage therapists than for "other health care professionals" and "other health care establishments." So if an SUP is required for a state licensed massage therapist, we also require SUP for other healthcare professionals and establishments.
   - NOTE: The PUD document includes some reference to High Density Urban residential in error, which needs to be revised.
   - Additionally, please note that some of the sign regulation included in the PUD document deviate from the recently approved PUDs. (comparison table attached)

4. *Development within the PUD encourages the use of alternative transportation circulation between structures and open spaces, including pedestrian and bicyclist*:

   The PUD includes a comprehensive internal circulation network intended to provide connectivity throughout the development and to surrounding areas supported by an approved Traffic Impact analysis. The development proposes pedestrian connections, trails, landscaped pathways, and open space areas designed to encourage walkability and recreational activity. Additionally:
   - Multiple access points are proposed from State Highway 6, State Highway 288, Manvel Parkway, Charlotte Street, and Iowa Lane.
   - Internal sidewalks and trail systems are intended to connect residential neighborhoods, commercial areas, parks, and open spaces. The proposed PUD includes details and exhibits pertaining to trails.
   - Landscaped pedestrian corridors and public spaces are incorporated throughout the development to enhance connectivity and mobility.
   - Note: The PUD document may need minor revision to ensure that street and sidewalk design will comply with the requirements of the City's Major Thoroughfare plan and Subdivision Ordinance.

5. *Landscaping areas shall visually enhance the structures within the development and conform to the city's comprehensive plan and vision statement*:

   The PUD includes proposed landscaping and open space standards intended to create a cohesive development character and enhance the visual appearance of the project. Approximately 21.96 percent of the gross acreage is dedicated to parks and open space areas,

including trails, landscape reserves, detention features, and natural open space areas. Landscaping elements include:

- Street trees and enhanced landscape areas throughout the development.
- Landscaped buffers between residential and commercial uses.
- Open space amenities, trails, and pedestrian-oriented public spaces.
- Coordinated landscaping standards intended to preserve the "town and country" character of the City of Manvel.
- PUD indicates traditional, constant-level detention lakes.
- NOTE: The bufferyard requirement in the PUD document does not include specific planting requirements similar to the City's Ordinance.

6. *The proposed project is in compliance with the minimum development requirements described in the PUD Manual:*

   In general, the PUD demonstrates conformance with the City's PUD Manual and zoning ordinance requirements for a large-scale mixed-use development. The PUD includes proposed development standards, land use planning, circulation systems, open space provisions, and infrastructure coordination.

STAFF RECOMMENDATION

Staff supports the proposed rezoning from Open Planned Use Development (O-PUD) District to Planned Use Development (PUD) District. The proposed project generally aligns with the goals of the Comprehensive Plan, however, some of the details included in the PUD document need reconsideration prior to City Council action. Staff recommends forwarding a recommendation of approval with a condition that the PUD document shall be revised to address certain issues and/or that clarification on certain issues will be provided for items listed below. (Proposed Ordinance No. 2026-O-16).

1. Introduction Section: Revise the introduction section in the O-PUD where it mentions that the O-PUD approval has since expired pursuant to Sec. 77-29 of the Manvel Code of Ordinances to state that this is zoning change from O-PUD to PUD based on provision of Section 77-29.
2. Sidewalk: Revise Section III.4 (page 7) to add: "Except as expressly stated in the PUD, compliance with the City of Manvel's sidewalk requirements will be maintained……"
3. Trails: It appears that the document uses the terms trails and sidewalks interchangeably. Revise for consistency or include specific definitions for clarity.
4. Vesting: Revise section VI in the proposed PUD to add "Applicable International Code Council Codes adopted by the City of Manvel shall apply as amended from time to time."
5. Planting within Buffer yard: Revise Section VI. 5 to include the minimum requirements of Section 77-44(C)(6) of the City's Ordinance (Transitional buffer yard between residential and non-residential uses).
6. Street and Circulation System Section: Revise to reference Major Thoroughfare Plan compliance on Page 14. Additionally, there is a section called Streets on Page 16 which could be made part of Section VI.2. on page 14.
7. Utility Agreement: Provide clarification on why Section VI.4. includes a reference to the Utility Agreement. Also, include a definition for the Utility Agreement.
8. Miscellaneous Regulations: Revise the setback requirement regarding proximity to pipelines from 30 feet to 50 feet.

9. Trees within median: Include specific requirements pertaining to root barriers, maintenance requirements, etc., for tree planting allowance within medians.
10. Urban Corridor: Remove reference to Urban corridor and High-density urban corridor on page 26.
11. Phasing: Revise Phasing schedule section to indicate phasing of detention ponds. Additionally, revise to reference Exhibit H instead of I.
12. Commercial standards: A development standard comparison table was provided which includes standards for Light Commercial uses. However, these standards are not included in the PUD document.
13. Signage: Size restriction for off-premise signs is not provided. Sign area allowance for multi-tenant monument signs is significantly larger than city ordinance allowance. Multi-Tenant Highway Pylon sign doesn't include any spacing of number limit. Provide clarification to illustrate how this aligns with the overall spirit of the city's sign ordinance or other similar districts within Manvel.

PUBLIC HEARING

The Notice of Public Hearing was published in the newspaper of general circulation. All property owners within 200 feet of the property were notified. At the time of writing this report, staff has received two informational inquiry and is not aware of any opposition to the request.

PUBLIC HEARING NOTICE PUBLISHED ON SUNDAY 05/10/2026

A PUBLIC HEARING WILL BE HELD AT MANVEL CITY HALL, 20031 HWY 6, MANVEL, TX 77578 AT 6:00 P.M. ON TUESDAY, MAY 26, 2026 BEFORE THE MANVEL PLANNING, DEVELOPMENT, AND ZONING COMMISSION AND AT 6:00 P.M., ON MONDAY, JUNE 15, 2026 BEFORE THE MANVEL CITY COUNCIL TO HEAR INPUT FROM THE PUBLIC REGARDING AN ORDINANCE (2026-O-16) OF THE CITY OF MANVEL, TEXAS, AMENDING THE ZONING ORDINANCE (2007-O-26) OF THE CITY, BY CHANGING THE ZONING CLASSIFICATION OF A CERTAIN TRACT OF LAND CONSTITUTING APPROXIMATELY 394.232 ACRES FROM OPEN PLANNED USE DEVELOPMENT (O-PUD) DISTRICT TO PLANNED USE DEVELOPMENT (PUD) DISTRICT, SUCH TRACT IMMEDIATELY LOCATED ON THE EAST OF S.H. 288, EXTENDS ACROSS BOTH NORTH AND SOUTH SIDES OF S.H. 6, SOUTH OF DEL BELLO LAKES DEVELOPMENT, WEST OF IOWA LANE AND VALENCIA DEVELOPMENT, AND GENERALLY WITHIN THE BOUNDARIES OF BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NO. 30; PROVIDING FOR THE AMENDMENT OF THE CITY'S OFFICIAL ZONING MAP; PROVIDING FOR SEVERABILITY; AND PROVIDING A PENALTY IN AN AMOUNT NOT TO EXCEED $2,000 FOR EACH DAY OF VIOLATION OF ANY PROVISION HEREOF.. /S/ TAMMY BELL, CITY SECRETARY.

APPLICATION FORM

Staff Use Only:
Date Received: _____
Received by: _____
Date Complete: _____
Completeness Review by:
_____

Planned Unit Development (PUD) Application

Incomplete Applications will not be accepted. Please review application submittal requirements contained in the City of Manvel PUD Manual.

(Please Type or Print Clearly with Dark Ink)

[X] Master Plan PUD [ ] Small PUD [ ] Site Plan Only

General Information
PUD Name: Presidio PUD
Number of Units Proposed: 242 Current Zoning Designation: Open Planned Unit Development
Zoning District under Which PUD Will Be Designed: PUD-Single Family Residential and PUD- Light Commercial
Address/Location: North of State Highway 6 and East of State Highway 288
Brazoria County Parcel Number (s): Please see attached list. Acres: 392.9
Legal Description: Please see attached list.
_____

Applicant Information
Name: LJA Engineering, Inc. Daytime Phone: _____
Mailing Address: _____
City/State/Zip: _____
Contact Person: Katy Harris
Email Address: _____

Property Owner Information (If different from applicant; attach additional signature page or appropriate letter of consent/agreement if more than one property owner)
Name: Please see attached list. Daytime Phone: _____
Mailing Address: _____
City/State/Zip: _____
Email Address: _____

APPLICATION FORM

CITY OF MANVEL PLANNED UNIT DEVELOPMENT APPLICATION, PAGE 2

(Attach additional sheets if necessary to fully answer the following.)

1. Contiguous Land Ownership- Please specify if the owner(s) own any property that is directly adjacent to the proposed PUD and describe any future projects in adjacent property: Owners do not own property that is directly adjacent to the proposed PUD.

2. Concept Statement- Brief description of the project including proposed the use or uses: The project will consist of residential and commercial development. A variety of housing options (50s, 60s) are being offered in addition to pedestrian trails, open space, and amenitized ponds.

The proposed activities and uses shall be shown on an attached PUD plan based on the exhibit requirements for master plan and site plan review. Please refer to the City of Manvel PUD Manual for the master plan and site plan requirements.

3. Statement of Justification- Brief description outlining how the proposed PUD is consistent with the purpose of the Zoning Ordinance and all departures from the provisions of the underlying zoning district that are necessary to provide superior site development: The project is currently zoned to Open Planned Unit Development. The proposed PUD will consist of commercial development, and residential homes including some higher density that the adjacent major thoroughfares can accommodate.

4. Statement of Compliance with the Comprehensive Plan- Description of how the PUD meets or exceeds the City vision as described in the Comprehensive Plan: The proposed PUD complies with the comprehensive plan by proposing well-planned development with open space for safe recreation that protects the natural environment and offering a variety of housing for different needs.

5. Statement of Compatibility- Describe how the proposed project is compatible with the surrounding uses and will not have significant adverse impacts on the properties: The proposed PUD will consist of commercial development taking access from adjacent highways and a proposed major thoroughfare. This commercial development aligns with commercial uses existing along the adjacent highways west of the PUD. The PUD is also proposing traditional single-family residential lots that compatible with existing residential communities to the north and to the east of the PUD.

12/11/25
Date

Katy Harris
Applicant's Signature

12/11/25
Date

Manager
Owner's Signature (If different from Applicant)

The above signed property owners, certify that the above information is true and correct to the best of our knowledge and state that we are the legal owners of the property included in this application and/or designate the applicant to act as our agent with respect to this application. If there are more than one property owner(s), attach additional signature sheets or letter of consent to application.

APPLICATION FORM

CITY OF MANVEL PLANNED UNIT DEVELOPMENT APPLICATION, PAGE 2

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DEVELOPMENT SUMMARY LETTER

713.953.5200
TBPELS 10194382
www.LJA.com
3600 West Sam Houston Parkway S, Suite 600, Houston, Texas 77042

May 13, 2025

City of Manvel
Planning Department
20025 Highway 6
Manvel, Texas 77578

Re: Presidio PUD – Development Summary Letter

To Whom It May Concern:

This letter provides an overview of the proposed Presidio Planned Unit Development (PUD) and summarizes anticipated build-out characteristics, land use allocation, and the planned approach to public and private service provision, as requested.

Project Overview

The Presidio PUD consists of approximately 392.9 acres located east of State Highway 288, north of State Highway 6, and west of Pollard Boulevard. The PUD establishes a balanced mix of residential, commercial, roadway, drainage, and open space uses consistent with the City's development objectives and the Comprehensive Plan.

Residential Development

The PUD includes one residential product:

- Traditional Single-Family Residential: Approximately 57.5 acres, developed with a range of lot sizes (50'–60' lots) to respond to market demand.

Commercial Development

The PUD includes 200.2 acres of commercial land distributed throughout the site with access from State Highway 288, State Highway 6, Manvel Parkway, Charlotte Street, and Iowa Lane. These areas are intended to accommodate a broad mix of retail, service, medical, and office uses.

At this stage of planning, specific building programs, tenant mix, and gross floor area projections for the commercial tracts have not yet been determined. These elements will be refined as market conditions evolve and as individual end users are identified. Final site development details, including building square footage, parking, and site circulation, will be provided through subsequent site plan and platting submittals in accordance with City requirements.

DEVELOPMENT SUMMARY LETTER

Land to Be Developed, Preserved, or Dedicated

Acreage allocation within the PUD includes the following:

- Residential: 57.5 acres
- Commercial: 200.2 acres
- Mobility Corridors: 32.4 acres
- Drainage & Detention: 78.3 acres
- Parks & Open Space: 86.3 acres

Parks and open space, representing approximately 21.96% of the gross acreage, will be developed and dedicated in accordance with the City's parkland dedication requirements, including trail connectivity and the potential use of detention amenities.

Provision of Public and Private Services

Utilities, drainage, roadway improvements, and related infrastructure will be provided through a combination of public and private systems in coordination with the City of Manvel and Brazoria County MUD 30. A full water, wastewater, and storm drainage system will be designed and constructed in accordance with applicable City, County, and TCEQ standards. All dry utilities will be provided by private utility companies serving the region.

Maintenance responsibilities for parks, open space, trails, and landscaping will be performed by the Homeowners Association, MUD, and/or the Commercial Property Owners Association, depending on location and use.

Phasing

The development is anticipated to occur in two phases over a 5–15 year period, beginning with major roadway construction and entry features. Residential and commercial phases will be constructed based on market conditions and infrastructure availability.

Please let us know if any additional detail or clarification is needed. We appreciate the City's review and look forward to continuing to coordinate throughout the entitlement process.

Sincerely,

Katy Harris, AICP
Principal, Planning
LJA Engineering

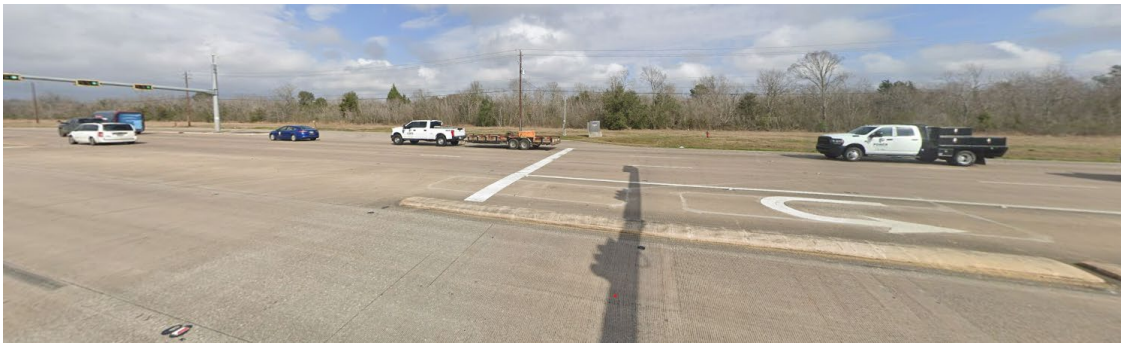
SITE PICTURES



View of the property to the south from Morris Avenue/SH6 (Sonic and Valero Gas Station)



View of the subject site from Morris Avenue/SH6 (Dairy Queen), looking north.



View of the subject site from Morris Avenue/SH6 (Trafic light), looking north.

SITE PICTURES



View of the subject site from southern Iowa Ln (after Highway 6), looking west.



View of the subject site from northern Iowa Ln, looking west.



View of the subject site from S.H 288, looking east.

SITE PICTURES



View of the subject site from southern Iowa Lane (before Highway 6), looking north



View of the subject site from north Iowa Lane (north of Highway 6 within the Del Bello development), looking south.

Presidio
Planned Unit Development

Prepared for:

Diversified Real Estate Group

Prepared by:

LJA

PLANNING &
LANDSCAPE
ARCHITECTURE

May 2026

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Exhibit C – Survey
Exhibit D - Legal Description
Exhibit E - Conceptual Land Use Exhibit
Exhibit F - Conceptual Roadway Exhibit
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Exhibit H - Phasing Exhibit
Exhibit I – Conceptual Project Signage Exhibit
Exhibit J – 100 Year Floodplain Exhibit

I. INTRODUCTION

This application was prepared on behalf of Diversified Real Estate Group pursuant to the City of Manvel's zoning ordinance Sec. 77-29 Planned Unit Development (PUD) district. The purpose of a PUD District is to provide a high level of amenities, encourage a pedestrian friendly environment, and provide flexibility in the development of land subject to the development standards coordinated with the necessary public services and facilities.

This property previously received OPUD approval in 2007; however, that approval is no longer valid pursuant to Sec. 77-29 of the Manvel Code of Ordinances. The intent of this new PUD is to re-establish the original development framework while updating the standards to reflect current market conditions, best practices, and the City's expectations today. Although the technical standards have been modernized, the overall vision and development intent remain consistent with what was previously approved.

The Presidio PUD is primarily a commercial project that consists of approximately 392.9 acres of land and is located immediately east of State Highway 288, north of Highway 6, generally south of Del Bello Boulevard, and generally west of Pollard Boulevard, with roughly forty-five acres south of Highway 6 reserved for detention. The project is immediately south of the Del Bello Development and west of the Valencia development. The Area Location Map (Exhibit A) located in the Exhibits section of this document illustrates the location of the property.

The property is generally flat with elevations ranging from 60 feet to 80 feet above mean sea level (MSL) and is largely comprised of prairie land and agricultural fields. The property is encumbered by several pipeline easements and an existing access easement.

Generally, the surrounding land use is a mix of underdeveloped acreage and commercial development to the south, State Highway 288 with commercial development on the other side of it to the west, and single-family residential developments to the north and east including Del Bello Lakes and Valencia. Surrounding commercial developments include an HEB, several restaurants, retail, dental and medical offices, and gas stations.

The surrounding area can be seen on the Area Location Map and the Project Aerial map (Exhibit A and B).

II. DEFINITIONS

Abandoned signage – Any sign which does not display any advertisement, copy or message or any sign which identifies or advertises a business, lessor, service, owner, product, or activity, which is no longer available at the indicated location or no longer available on the premises for which no legal owner can be found.

Anchor Tenant – A large retail establishment (up to three tenants) within a multi-tenant development that occupies the greatest amount of floor area.

Building – A structure used for or supporting any use or occupancy that requires a building permit.

Canopy Signage – Any sign attached to a freestanding canopy or onto an entrance canopy.

Collector Street – A public street designated as a "minor corridor" on the City's Major

Thoroughfare Plan.

Concrete – A composite material made of cement, water, sand, and aggregates.

Directional/Informational Signage – An attached or freestanding on-premise sign giving directions, instructions, or facility information, i.e., entrance or exit signs, one-way location of parking, etc. which may contain the name or logo of an establishment but no other advertising.

Electronic Changeable Message Sign – An electronic sign or portion of a sign that uses light emitting diode (LED) technology to form a sign message or messages in text form, with or without fixed images, wherein the sequence of messages and the rate of change is electronically programmed and can be modified by electronic processes.

Flashing Sign – A directly or indirectly illuminated sign which contains an intermittent flashing light source. This does not include electronic changeable message or time/temperature signs.

Frontage – Frontage shall mean that portion of any lot or tract that abuts a street or approved common area. A single family residential lot abutting more than one (1) street shall have frontage on only one (1) street which shall be deemed to be the side having the shortest dimension unless otherwise indicated on the subdivision plat.

Fuel Station Signage – A changeable sign advertising gasoline prices.

Gross Floor Area – Gross floor area (GFA) shall be defined as the sum in square feet of all floors of the building measured from the exterior face of the exterior walls. The gross floor area shall include all enclosed habitable space, including elevators, hallways, and stairwells on stories containing habitable space.

Illuminated Sign – A sign that has characters, letters, fixtures, designs, or outlines illuminated externally by electric lights or internally by luminous tubes or other internal illumination device.

Landscaping – Planting and related improvements for the purpose of beautifying and enhancing a portion of land and for the control of erosion and the reduction of glare, dust and noise. Rocks and/or gravel, by itself shall not constitute landscaping.

LED Signage – Any sign that uses light-emitting diodes (LEDs) as its illumination source. LED signage is energy efficient, durable, and low maintenance.

Lot – An undivided tract of land having frontage on a public or private street which is designated as a separate and distinct tract and identified by numerical identification on a duly and properly recorded subdivision plat.

Major Thoroughfare Plan – A long-range planning document that maps out the primary roadways and transportation corridors in a city or region.

Monument Sign – A low-profile, ground-mounted sign or sign supported by one or more columns, uprights, or braces anchored in the ground, but not elevated above the ground by any device that holds the sign off the ground and not attached to any building, including reader panels, often with a solid base made of masonry, stone, or concrete.

Multi-Tenant Sign – A free-standing sign that lists multiple businesses located within the same property or shopping center, often placed at entrances to plazas or office complexes.

NAICS – North American Industry Classification System (NAICS), which is a number code assigned by the NAICS Association to simplify the process of identifying what category a specific land use falls under.

Off-Premise Signage – Any sign advertising a business, person, activity, goods, products, or services not usually located on the premises where the sign is installed and maintained, or which directs persons to any location not on the premises.

Parapet – A low protective wall or barrier that extends above the edge of a roof, balcony, terrace, or bridge.

Parkway – A right-of-way with a total width of 120 feet, designed for higher traffic transportation.

Private Park – A park which is privately maintained (such as by the HOA or the MUD) instead of maintained by the City.

Pylon Sign – A tall, freestanding sign supported by one or more poles where the support structure is enclosed, widened or architecturally treated. A Pylon Sign shall not be a Pole Sign or any sign supported by only one column, pole, or brace anchored in the ground and not attached to any building.

Residential Use – A premise used for 1 or more dwellings for ordinary domestic use, and does not include any commercial, industrial, or institutional uses except as specifically permitted under the land use regulations.

Retail – Retail sales of any article, substance, or commodity within a building or structure.

Setback – The required distance a structure or improvement must be placed from another specified structure, improvement, or location.

Sexually Oriented Businesses – Establishments that provide adult entertainment or sell adult products, such as strip clubs, adult bookstores, or adult video stores.

Shade Tree – A shade tree is a tree planted or valued primarily for the shade it provides, rather than for fruit, beauty, or other purposes.

Shrub – A woody plant smaller than a tree, usually with multiple stems growing from the base.

Sign Area – The entire advertising area of a sign, excluding any framing, trim or molding and the supporting structure, with wording in either permanent or removable letter form. This definition also includes the LED portion of an electronic changeable message sign.

Sign Structure – A structure, device, or system, which supports or is capable of supporting a sign.

Single-Tenant Monument – A freestanding, ground-mounted sign advertising a single use.

Single-Tenant Sign – A sign identifying one business or tenant on a property.

Small or Ornamental Tree – A tree that is grown for its aesthetic appeal, such as attractive flowers, fall foliage, or unique bark, rather than for practical purposes like fruit or wood

Stone – Natural rock material used in construction for walls, facades, and landscaping.

Street – Any public or private thoroughfare, other than an alley, designed to be used by motor vehicles.

Structure – A building or constructed improvement permanently affixed to the ground and intended for human occupancy or use, including any improvement that provides enclosed or occupiable space.

Subdivision – The division of a lot, tract, or parcel of land into two or more lots, plats, sites or other divisions of land for the purpose of industrial, office, and business development or other uses

Temporary Signage - Any sign, banner, pennant, or other advertising display constructed of cloth, canvas, light fabric, cardboard, or other light materials, with or without frames, with or without words, intended to be displayed for a limited period of time on the property of the business.

Wall-Mounted Sign – A sign attached or anchored directly to the exterior wall of a building.

Window/Door Signage – A temporary business sign placed on, affixed to, painted on or located within the frame of a transparent opening in the wall or door of a building.

Yard – The open space of a lot at grade that lies between the lot lines and the required building setback.

III. PROJECT DESCRIPTION

1. Compliance with Comprehensive Plan

In Manvel's 2045 Comprehensive Plan, drafted in 2026, the proposed Future Land Use and Character Plan classifies the land within the Presidio Development area as "Master-Planned Development" with a small part classified as "commercial". The Presidio PUD complies with the Manvel Comprehensive Plan by adhering to the development principles outlined in the plan. This is accomplished by encouraging well-planned quality residential and non-residential development, while providing open space for recreation and protecting the natural environment. The Development is primarily commercial and residential and will serve as a regional commercial center for the community and surrounding region. The Presidio PUD has a well-defined network of both vehicular and pedestrian circulation systems that provide connectivity.

2. Justification

The intent of the PUD District is to encourage high quality development in the City by providing additional flexibility to take advantage of special site characteristics, location, and land uses. This document establishes certain development standards that exceed the minimum Manvel zoning regulation requirements for properties specifically located within the boundaries of the Presidio PUD.

The PUD will meet or exceed the minimum requirements of Manvel's zoning regulations through specific architectural design and engineering standards such as:

- Creating a PUD district which will respond to market conditions and maintain the flexibility necessary to address changes in the future;

- Incorporating diverse single-family products that will provide a variety of housing stock to ensure residents of all ages and lifestyles can fulfill their housing needs;
- Establishing areas for retail, office, and other commercial uses that will offer goods, services, and employment opportunities, thereby supporting the daily needs of residents and contributing to the City's economic vitality;
- Providing parks, amenitized detention areas, and a well-defined trail system;
- Providing a 5-acre civic center site for the City of Manvel to use for the community.

3. Residential

The traditional single-family residential component that will be found in the Presidio PUD will be a collection of individual neighborhoods that take access from Manvel Parkway, Charlotte Street, and/or an internal local street system that provides connections within the neighborhood and to the surrounding areas. The traditional single-family residential neighborhoods will be developed with lot widths that may range from 50 feet to 60 feet to respond to market conditions. All residential development standards can be found on page thirteen, section three.

4. Amenities, Parks, and Open Space

Parks and open space account for approximately 21.96% of the gross acreage within the Presidio PUD. The open space calculation includes parks, landscape reserves, trails, natural open space areas, a Manvel Civic Center, lakes/detention areas, and drainage facilities. The Presidio PUD Conceptual Amenities and Open Space Plan (Exhibit H) show lake/detention areas and open space areas all connected via a pedestrian trail system. The various parks and trails will be developed as the adjacent residential sections are developed.

A pedestrian trail system is intended to connect the open spaces and residential tracts to the commercial district. The pedestrian trail system will be comprised of a hierarchy of trail widths ranging from 12 feet in width to 6 feet in width; all sidewalks located in front of homes will be 5 feet in width. This pedestrian pathway is a single "serpentine" pathway along the collector street system where necessary, but may follow traditional back of curb style sidewalk. Sidewalks will be on both sides of Manvel Parkway, Iowa Lane, Charlotte Street up to Street Y and Street X up to Street Y. Compliance with the City of Manvel's sidewalk requirements will be maintained throughout the overall pedestrian network.

The lakes within the Presidio PUD will maintain a constant water level while also serving as detention facilities for the project and provide a significant amount of open space. The lake/detention areas will not only enhance the aesthetic quality of the development but will provide numerous opportunities for the enjoyment of the residents. Detention facilities will be comprised of both wet and dry facilities.

City of Manvel requires one acre of land to be dedicated for parks and open space for every 100 proposed dwelling units. Compliance with the Parks and Open Space Requirements for land dedication will be achieved by the provision of a minimum of 2.4 acres of common open space, ultimately dependent on the total number of housing units, including the possibility of amenities within detention ponds. The Homeowners Association (HOA), MUD, and/or Commercial Property Owners Association (CPOA) shall be responsible for the maintenance of all landscape and open space areas utilized by the development.

5. Other Land Uses

The Presidio PUD has fifteen proposed commercial sites located throughout the development. The commercial sites will take access from Manvel Parkway, Charlotte Street, Iowa Lane, Highway 6, and State Highway 288. It is anticipated that the commercial developments will largely be commercial or medical facilities, typically found near Highway interchanges.

IV. Land Use Classification

1. Proposed Land Use Classification

1. To implement the conceptual master plan as currently proposed, each of the proposed land uses has been assigned a zoning district consistent with the current City of Manvel zoning regulations as shown on the Composition of Land Use Table below. The various land uses will follow the development requirements for their assigned zoning district as described in the Zoning Ordinance, in effect when this PUD is approved, unless otherwise noted in this PUD. Notwithstanding the foregoing, no amendment shall impact the project's vested rights. When there is a conflict between the requirements in the regulations listed below and this PUD Document, this PUD Document will govern.

   Land use shall be regulated on a total acreage basis. Each Land Use may be increased or decreased by up to 10% of the land use acreage in Section IV.2. The percentage land use area change is required to ensure the success of the Presidio PUD by maintaining the flexibility to modify land use sizes in response to changes in economic and market conditions. This will allow Presidio PUD to remain competitive in the real estate market over the life of the project and the ability to adjust as necessary to accommodate specific end users in a timely manner.

   The land uses may be relocated within the boundaries of the PUD, as necessary to address economic and market conditions or future modification of roadway and drainage alignments. The Land Use Comparison table below provides a detailed tabulation of each land use within the development as shown on the Conceptual Land Use Exhibit, Exhibit E. All acreages shown below are subject to change as development occurs within the boundaries of the PUD and as allowed by this document.

   Following approval of the Presidio PUD, land uses may be adjusted or relocated within the boundaries of the PUD in accordance with the allowable percentage modifications established herein without requiring a formal PUD amendment. Compliance with the permitted land use acreage adjustments shall be demonstrated at the time of preliminary plat submittal through an updated Master Plan and accompanying land use acreage table identifying the acreage established by the PUD, the proposed revised acreage, and the percentage increase or decrease associated with each land use category. The purpose of this process is to document compliance with the allowable land use flexibility provisions of the PUD while allowing the development to respond to changing market conditions, roadway alignments, drainage requirements, and end-user needs over the life of the project.

   Notwithstanding the provisions above, Tract H, which is currently identified for medical use, may be developed for general commercial uses without being subject to the 10% land use acreage adjustment limitation. This allowance is intended to provide flexibility to respond to market conditions and end-user demand. Any such change shall be consistent with the overall intent of the PUD and shall not require a formal amendment to the PUD, provided

all other applicable development standards are met.

2. Acreage per Land Use Summary

Land Use	Land Use Designation	Approximate Acreage	% Gross Acreage
Constraints			
Major Thoroughfare & Collector Roadways	PUD-SFR	32.4	
Drainage & Detention	PUD-SFR	78.3	
Lift Station/Water Plant/Utility Easement	PUD-SFR	16.5	
Subtotal		**127.2**	**32.4%**
Community Elements			
Parks	PUD-SFR	2.4	
Landscape/Open Space	PUD-SFR	0.6	
Manvel Civic Site	PUD-LC	5.0	
Subtotal		**8.0**	**2.0%**
Non Residential			
Commercial	PUD-LC	149.9	
Medical	PUD-LC	50.3	
Subtotal		**200.2**	**51.0%**
Residential			
Traditional Single-Family Residential	PUD-SFR	57.5	
Subtotal		**57.5**	**14.6%**
Totals		**392.9**	**100%**

A. Single-Family Residential Lot Distribution Table

Lot Size	Allowable Percentage of Total Lots	Approximate Acreage	Estimated Lot Count
50' X 120' (Typical)	50%	28.8	134
60' X 120' (Typical)	50%	28.7	108
Gross Residential Total	**100%**	**57.5**	**242**

Please refer to the Conceptual Land Use Exhibit, Exhibit E, for the general location of residential areas. Specific lot types are not assigned to individual locations or pods and may be distributed throughout the residential areas of the PUD as needed to respond to market conditions, provided the overall percentage limitations established herein are maintained. Refer to Section IV.VI.3 of this document for a listing of lot sizes and applicable standards for the various single-family residential products. The percentage of 60-foot lots may be increased by up to 10% as provided in this document.

3. Permitted, Special Use Permit, and Prohibited Land Uses

The proposed fifteen (15) commercial tracts are intended to provide neighborhood-scaled commercial development with retail, service, and office uses. In addition to the commercial tracts, one (1) medical tract and three (3) single-family tracts are proposed. Below is a list of allowed uses within these tracts. Anything not specifically listed here is prohibited.

a. Permitted Uses:

Permitted	
NAICS Code	**Classification**
	Single Family
311811	Retail Bakeries
4491	Furniture And Home Furnishing Stores
44921	Electronics And Appliance Stores
444	Building Material, Garden Equipment And Supplies Dealers
445	Food And Beverage Stores
4561	Health And Personal Care Stores
4571	1 Gasoline Station in association with a Grocer
458110	Clothing And Clothing Accessories Stores
459	Sporting Goods, Hobby, Book, And Music Stores
455	General Merchandise Stores
4599	Misc. Store Retailers
491110	Postal Service
52	Finance And Insurance
531	Real Estate
531120	Lessors Of Nonresidential Buildings (Except Mini Warehouses)
5322	Consumer Goods Rental
541	Professional, Scientific, And Technical Services
54121	Accounting, Tax Preparation, Bookkeeping And Payroll
54194	Veterinary Services
55	Management Of Companies And Enterprises
561	Administrative And Support Services
611710	Educational Support Services
624	Social Assistance
624410	Child Care Services
71	Arts, Entertainment, And Recreation
713940	Fitness And Recreational Sports Centers
722	Food Services
8112	Electronic And Precision Equipment Repair And Maintenance
811122	Automotive Glass Replacement Shop
812	Personal And Laundry Services
238	Specialty Trade Contractors
3231	Printing And Related Support
42	Wholesale
622110	Medical / Hospital Uses (Tract H Only)
445131	Convenience Retailers
811111	Automotive Repairs And Replacement Shops

b. Office functions only:

Office Functions Only	
NAICS Code	**Classification**
31-33	Any Manufacturing Or Industrial Related Uses
115	Support Activities For Agriculture And Forestry
236	Construction Of Buildings
48-49	Transportation And Warehousing
5324	Commercial And Industrial Machinery And Equipment Rental

c. Special Use Permit required:

Special Use Permit Required	
NAICS Code	**Classification**
7224	Drinking Places (Alcoholic Beverages)
3121	Beverage Manufacturing
51	Information
53	Automotive And Equipment Rental
713	Amusement, Gambling, Recreation Industries
532284	Recreational Goods Rental
811192	Colleges, Universities, Professional, And Business Schools
623	Nursing And Residential Care Facilities
6239	Other Residential Care Facilities
622110	Medical / Hospital Uses (All Other Tracts Besides Tract H)
621493	Ambulatory Health Care Services
3363	Motor And Vehicle Parts Manufacturing
4571	Gasoline Stations (except for 1 in association with a grocer)
721191	Bed And Breakfast Inns
7139	All Other Amusement And Recreational Industries
722330	Mobile Food Services
8114	Personal And Household Goods Repair And Maintenance
812199	Other Personal Care Services
813110	Religious Organizations
813410	Civic And Social Organizations
454	Non-Store Retailers
61151	Technical And Trade Schools
6116	Other Schools And Instruction
721	Accommodations
6116	Adult Entertainment Business
713290	Other Gambling Industries
22	Utilities
23713	Power And Communication Line And Related Structures Construction

d. Prohibited:

Prohibited	
NAICS Code	**Classification**
493190	Other Warehousing And Storage
238990	All Other Specialty Trade Contractors
812220	Cemeteries And Crematories
512132	Drive-In Motion Picture Theaters
424910	Farm Supplies Merchant Wholesalers
812910	Pet Care (Except Veterinary) Services
531130	Lessors Of Mini Warehouses And Self-Storage Units
522299	International, Secondary Market, And All Other Nondepository Credit
	Sexually Oriented Businesses
459510	Flea Markets, Used Merchandise, Permanent
811192	Car Washes
812199	Tattoo Parlors
115210-17	Support Activities For Animal Production
811121	Automotive Upholstery Shops
459991	Vape Shops
455219	All Other Dollar Store Retailers

e. Separation Requirements

a. **Automotive Uses** – Only one (1) nationally or regionally recognized automotive-oriented use shall be permitted for each of the following categories:

- **811111 General Automotive Repair:**
  Includes, but is not limited to: Take 5, Valvoline, Firestone, Jiffy Lube, or other similar nationally recognized vehicle maintenance or repair concepts.

- **441340 Automotive Tire Dealers:**
  Includes, but is not limited to: Discount Tire, Mavis, NTB, or other similar nationally recognized tire retail concepts primarily engaged in the sale of tires and related accessories.

- **441330 Automotive Parts and Accessories Retailers:**
  Includes, but is not limited to: Advance Auto Parts, AutoZone, O'Reilly Auto Parts, NAPA Auto Parts, or other similar nationally recognized retail concepts primarily engaged in the sale of automotive parts and accessories.

  All approved automotive-related uses shall be restricted to locations within the westernmost eight hundred (800) feet of Highway 6 frontage.

b. **Restaurant and Retail Uses** – Specific restaurant and retail concepts/franchises shall not locate or operate a site within The Presidio development if they own, lease, or control another site within a two-mile radius of the Project.

c. **Drinking Places (Alcoholic Beverages)** – Following TABC regulations, all drinking

places shall not be located within 300 feet of religious institutions, day care centers designated as Alcohol-Free Zones, public hospitals, or schools.

d. **Hotel Use** – Nationally or regionally recognized hotel flags shall be permitted within the PUD, and such hotel use shall be restricted to the Manvel Parkway Frontage. Hotel uses may include, but are not limited to, the following nationally or regionally recognized brands or similar concepts:

- **Full-Service and Select-Service Hotels:**
  Marriott, Hilton, Hyatt, Sheraton, Westin, Embassy Suites, DoubleTree, Renaissance, or other comparable full-service or select-service hotel brands.

- **Limited-Service Hotels:**
  Hampton Inn, Holiday Inn Express, Fairfield Inn & Suites, Courtyard by Marriott, Hilton Garden Inn, Best Western Plus, La Quinta, Comfort Suites, or other comparable limited-service hotel brands.

  All approved hotel uses shall be subject to City Ordinances regarding Hotel Licensing, Operations, and Hotel human trafficking training and other provisions found in Section 77-50.(g)1.a. of the City of Manvel Code of Ordinances.

e. **Freestanding Ambulatory Surgical and Emergency Centers** – Freestanding Ambulatory Surgical and Emergency Centers as defined by NAICS No. 621493, Permitted Uses, shall include the following conditions:

i. Unless otherwise required by state law or regulation, the facility is only permitted to operate during the hours of 7:00 a.m. to 10:00 p.m. each day;

ii. All waiting and/or lobby areas shall maintain an unobstructed view from the outside; and

iii. All doors shall remain unlocked and accessible during normal business hours.

iv. Only one (1) major hospital and only one (1) freestanding ambulatory surgical and emergency center shall be permitted within the PUD.

f. **Other Personal Care Services** – Other Personal Care Services as defined by NAICS No. 812199 shall be subject to the conditions of Section 77.50.(g)(10) of the City of Manvel Code of Ordinances.

V. PARKS

To meet the parks dedication requirement, there shall be a minimum of one acre of parkland dedicated for every 100 proposed single-family residential lots. Based upon the estimated number of 242 single-family residential lots, the Presidio PUD will be required to provide approximately ±2.4 acres of parkland. In the event that the number of single-family residential lots exceeds the acreage listed above, the requirement of a minimum of one acre of parkland dedicated for every 100 proposed single-family residential lots shall apply.

Parkland Dedication will be credited based on the following criteria:

a. Parks maintained by the HOA, CPOA, or MUD: Up to 100% of the required parkland dedication acreage may be comprised of private parkland.

b. Trails: No more than 50% of the required parkland dedication acreage may be comprised of trails. To qualify for credit as trails, the following requirements must be met:

   i. All-weather hike/bike paths, landscaping and sodding installed according to the construction standards of the city for trails;

   ii. Have connections to surrounding private parks, public parks, open space, recreation areas, school and/or other trails/sidewalks;

   iii. Reserves dedicated as parkland acreage for trails shall have an average minimum width of 25 feet.

The acreages and locations of the various parks shown on the above table may be adjusted and/or moved within the boundaries of the PUD as allowed by this document. A well-defined trail system will be constructed throughout the development as depicted on the Conceptual Amenities and Open Space Plan (Exhibit H). The Homeowners Association (HOA), MUD, and/or Commercial Property Owners Association (CPOA) shall be responsible for the maintenance of all landscape and open space areas utilized by the development.

VI. DEVELOPMENT REGULATIONS

Unless otherwise outlined in this document, all City of Manvel regulations, as amended from time to time, shall apply to this PUD. If any provision of a future amended zoning or subdivision regulation imposes a higher standard than that provided for in this PUD document, then the provisions of this PUD document shall control. If any provision of any city regulation not contained in this PUD document imposes a higher standard, that regulation shall control. Notwithstanding the foregoing, no amendment shall impact the project's vested rights. When there is a conflict between the requirements in the development regulations listed below and this PUD Document, this PUD document will govern.

1. Architectural Standards

Architectural standards and guidelines for single-family residential and commercial uses will be prepared separately from this document for the development. The criteria will be submitted to the City for review and approval to ensure compliance with the zoning ordinance at the time of final plat approval for the residential commercial developments. Copies of deed restrictions and covenants shall be submitted as part of the final plat submittal and will be provided to the City for review at least 30 days prior to filing.

The State Highway 6 (SH-6) Overlay District extends along both sides of State Highway 6 at a depth of 700 feet from the right-of-way. For parts of the Presidio Development located within the Overlay District, development will comply to the requirements specified in Sec. 77-36. – State Highway 6 overlay (SH-6) district of the City of Manvel Code of Ordinances.

2. Street and Circulation System

The Presidio PUD will have sufficient mobility through the construction of several proposed roadways:

- Iowa Lane, a 80-foot local road ROW running north-south through the property;
- Manvel Parkway, a 120-foot thoroughfare ROW running north-south.
- Street X, an 80-foot R.O.W. collector road that runs east-west providing access from state Highway 288 to Manvel Parkway.
- Street Y, a 60-foot local road ROW that runs east/west and north/south providing access to the commercial tracts.
- Street Z, a 60-foot local road ROW that runs north/south to provide additional access from Highway 6 to the commercial development.
- Charlotte Street, an 80-foot-wide collector road ROW that runs east–west through the property and connects to State Highway 288. Charlotte will maintain an 80-foot width west of Manvel Parkway and transition to a 60-foot width east of Manvel Parkway to align with the existing section within the Valencia development.
- Dogwood Avenue, an 80-foot-wide collector road ROW that runs east-west in the northeast corner of the development and ends at Manvel Parkway.

Setback Requirements

- Major Thoroughfare — 25’ feet from edge of ROW (inclusive of landscaping)
- Collector — 15’ from edge of ROW (inclusive of landscaping)
- Local road — 10’ from edge of ROW (inclusive of landscaping)

The thoroughfare and circulation plan for Presidio PUD and the surrounding vicinity is illustrated on the Conceptual Roadway Exhibit (Exhibit G). Refer to the Utility agreement and any amended agreements thereafter for applicable regulations and details regarding paving width, sidewalk width, and phasing of these roadways.

3. Traditional Single-Family

Lot Sizes and Standards:

a. 50’ lots:
   i. Minimum lot size area: 6,000 square feet
   ii. Minimum width – 50 feet (measured at the front yard setback)
   iii. Front yard setback – 20 feet along cul-de-sacs/knuckles; 25 feet otherwise
   iv. Side yard setback – 5 feet minimum
   v. Corner side yard setback – 10 feet minimum
   vi. Garage Front yard setback – 25 feet minimum
   vii. Rear yard setback – 15 feet minimum
   viii. Building height – 40 feet maximum
   ix. Accessory building front setback – 20 feet minimum
   x. Accessory building corner setback – 10 feet minimum
   xi. Accessory building rear setback – equivalent to utility easement width or 5 feet (greater of the two)

b. 60’ lots:
   i. Minimum lot size area: 6,300 square feet
   ii. Minimum width – 60 feet (measured at the front building line)
   iii. Front yard setback – 20 feet along cul-de-sacs/knuckles; 25 feet otherwise
   iv. Side yard setback – 5 feet minimum
   v. Corner side yard setback – 10 feet minimum
   vi. Garage Front yard setback – 25 feet minimum
   vii. Rear yard setback – 15 feet minimum

viii. Building height – 40 feet maximum
ix. Accessory building front setback – 20 feet minimum
x. Accessory building corner setback – 10 feet minimum
xi. Accessory building rear setback – equivalent to utility easement width or 5 feet (greater of the two)

If the rear property line of a corner parcel abuts the side property line of a neighboring parcel, the street side setback of the corner parcel must be a minimum of 15 feet

A minimum ten (10) foot wide landscaping buffer will be provided between commercial and traditional single-family residential zoning districts. Landscaping and screening requirements can be found on page sixteen, Section 5.

4. Streets

In the event that there is a conflict between the Presidio PUD and the Utility Agreement and any amended agreements thereafter, the Utility Agreement shall control. The development will provide points of access as required by Streets, Section 62-104(5). Multiple access points with the following modifications:

a. Two points of access. There shall be a minimum two points of access from a collector street into a subdivision or subdivision phase, up to a maximum of 75 platted lots.

b. Three points of access. There shall be a minimum of three points of access from a collector street in a subdivision or subdivision phase for 76 to 175 platted lots.

c. Four points of access. There shall be a minimum of four points of access from a collector street in a subdivision or subdivision phase for 176 platted lots or greater.

d. Boulevard entries. A boulevard entry may only be considered as two points of access when a third or fourth point of access is triggered under subsections 5.b. and 5.c. above.

5. Landscaping, Buffering, and Screening

Landscaping for the commercial area of the Presidio development will adhere to Sec. 77-44. - Tree preservation, landscaping, fencing, and screening of the City of Manvel Code of Ordinances, in addition to the standards below:

a. Minimum 10% of site (excluding building footprint) must be landscaped. Minimum 5% of the site must be distributed as street, building, and parking lot landscaping. Specific tree and shrub spacing and screening requirements apply.

b. Presidio shall design, construct, and install a detention and drainage system that incorporates landscaping, and pedestrian trails with continuous connectivity to internal sidewalks and surrounding developments. These enhancements shall be integrated into the detention areas to improve connectivity, promote aesthetic quality, and create a welcoming and enjoyable environment for the community. The berms and areas with aesthetic improvements in these areas shall count toward the 10% landscaping requirement.

c. Landscaping and/or decorative fences shall screen outside storage areas, loading docks,

garbage collection bins and delivery entrances from adjacent property and public street right of way.

d. A minimum ten (10) foot wide landscaping buffer will be provided between commercial and traditional single-family residential zoning districts. This buffer shall include a continuous screening element, such as an opaque fence or wall, with a minimum height of six (6) feet. Supplemental landscaping, including trees, and shrubs, shall be provided within the buffer to enhance visual screening and compatibility between uses. Loading docks, service areas, and outdoor storage areas sharing a property line with residential uses shall be oriented away from residential properties where feasible and shall be screened from view.

e. No landscaping shall be required within twenty (20) feet of a commercial structure's entrance.

f. Street Trees

    i. A minimum of one (1) street tree is required for every thirty (30) feet of street frontage.
    ii. No street tree shall be less than two and a half (2.5) inch caliper

g. Parking lot landscaping

    i. In addition to the Street Trees noted above, a tree of minimum one and a half (1.5) inch caliper shall be provided within or adjacent to the parking area at tree islands that:

        1. Are at least nine (9) feet wide (back of curb to back of curb).

        2. Each have a square footage of minimum one-hundred eighty (180).

        3. Are located so that no parking space is further than one hundred feet (100) feet from a tree island.

    ii. Shrub planting shall be placed along the perimeter of a parking lot in order to screen the parking lot. The shrubs shall be maintained at a maximum height of thirty-six (36) inches.

    iii. At entrance and exits, shrubs shall be no higher than twelve (12) inches in height.

h. Trees Along Highway 6

    i. Trees along Highway 6 will be staggered, with small and ornamental trees closest to Highway 6, and shade trees set back per distances listed below for a more natural look, as well as a precaution from unnecessary trimming near the power line.

        1. Small and Ornamental Trees: May be planted up to ten (10) feet from any power lines and may constitute up to 60% of the trees planted on site.

            a. Of small or ornamental trees, crape myrtles may constitute up to 30% of the trees planted.

2. Shade trees: May be planted up to twenty (20) feet from the powerline.

    a. Evergreen trees shall constitute a minimum of 40% of trees planted.

6. Signage

All Signage within the development shall comply with the City of Manvel Ordinance except for the items below. When there is a conflict between the requirements in the sign ordinance and this PUD Document, this PUD document will govern.

The following regulations shall apply:

a. General Signage Requirements

    i. All signage must be composed of materials and colors compatible with the associated use and the overall development. LED front, side, or backlit signage is recommended within the development for all business types.

    ii. All signage shall be located at a minimum of ten (10') feet from the property line, except for along Highway 288 and Highway 6. No setbacks shall be required along those property lines.

    iii. All signage must be perpendicular to the right of way.

    iv. A commercial tract with a multi-tenant monument sign is also allowed one (1) single tenant monument sign per tenant, not to be located within seventy-five feet (75') of any other single tenant monument sign or thirty feet (30') of any multi-tenant monument sign.

    v. Off-premise signage, when located within the Presidio Development, is permitted for uses located within Tracts A, F, G, and H.

    vi. Directional/informational signs within the Presidio project indicating the location of a business, street or facility within the project are permitted up to six (6) signs, six (6) feet in height and eighteen (18) square feet in area per side.

    vii. Temporary Signage: Temporary signage shall be subject to the regulations listed in Section 53-10 of the City of Manvel Code of Ordinances in effect January 16, 2024, as amended.

    viii. Prohibited Signage: Unless specifically permitted in the above regulations, all signage listed in 53-11 of the City of Manvel Code of Ordinances in effect January 16, 2024, is prohibited.

b. Window and Door Signage – Window and Door signage is defined as a temporary business sign placed on, affixed to, painted on or located within the frame of a transparent opening in the wall or door of a building.

    i. *Size.* Window and Door Signs shall not exceed 25% of the total window and door area of the building elevation identified for placement of the sign.

ii. *Location.* Window and Door Signs are limited to the ground floor of a building. Window and Door Signs must be affixed to the interior face of the window surface. Signs affixed to the exterior face of a window or door are Wall Signs.

iii. *Materials.* Window and Door Signs include any material painted, etched, or affixed to the interior side of a window or door. Window and Door Signs include Electronic and Illuminated Signs hanging within the interior space and viewable from the public Street through the window or door.

iv. *Permits.* A Sign permit is not required for the placement or use of Window and Door Signs.

v. Within 60 days of the date a Window and/or Door Sign becomes an Abandoned Sign, the sign must be removed.

c. Multi-Tenant Highway Pylon Signs - A multi-tenant highway pylon sign is defined as a freestanding sign supported by one or more poles where the structural poles or pylons are concealed using architectural design features.

i. State Highway 288 Frontage

1. *Maximum Height*. Fifty feet (50').

2. *Maximum Width.* Twenty-five feet (25').

3. *Minimum Clearance.* The bottom of the sign structure shall be no less than ten feet (10') above finished grade.

4. *Location*. Signs shall be located at primary entrances to the development along State Highway 288.

5. *Number of Signs*. One (1) sign permitted at each primary entrance from State Highway 288.

ii. State Highway 6 Frontage

1. *Maximum Height*. Forty feet (40').

2. *Maximum Width*. Twenty-five feet (25').

3. *Minimum Clearance.* The bottom of the sign structure shall be no less than ten feet (10') above finished grade.

4. *Location.* Signs shall be located at major entrances to the development along State Highway 6.

5. *Number of Signs.* Up to three (3) signs may be permitted along State Highway 6 frontage where access points warrant.

iii. Tract H Highway 288 Frontage

1. *Maximum Height.* Fifty feet (50').

2. *Maximum Width.* Twenty-five feet (25').

3. *Minimum Clearance.* The bottom of the sign structure shall be no less than ten feet (10') above finished grade.

4. *Number of Signs.* One (1) sign permitted at each primary entrance to the development.

d. Multi-tenant Monument Signs – A multi-tenant monument sign is defined as a low-profile, free-standing sign that is not elevated above the ground and lists multiple businesses located within the same property or shopping center, often placed at entrances to plazas or office complexes.

   i. *Maximum Height*. Twelve feet (12').

   ii. *Maximum Width*. Thirteen feet (13').

   iii. *Maximum Sign Area (exclusive of development name)*. Ninety (90) square feet.

   iv. *Location*. Signs shall be located adjacent to the public street right-of-way.

   v. *Setbacks*. Minimum ten feet (10') from property line.

   vi. *Spacing.* Minimum one hundred feet (100') between monument signs.

   vii. *Number of Signs*. One (1) monument sign per commercial tract, unless on a corner tract. Corner tracts may have one sign per street frontage.

e. Single-Tenant Monument Signs – A single-tenant monument sign is defined as a freestanding, ground mounted sign advertising a single use.

   i. *Maximum Height*. Eight feet (8').

   ii. *Maximum Width*. Eleven feet (11').

   iii. *Maximum Sign Area*: Fifty (50) square feet.

   iv. *Location*. Signs shall be located adjacent to the public street right-of-way.

   v. *Setbacks*. Minimum ten feet (10') from property line.

   vi. *Spacing.* Minimum seventy-five feet (75') between signs.

   vii. *Number of Signs*. One (1) monument sign per commercial tract

f. Fuel Station Signs

   i. Electronic fuel price signs are permitted.

   ii. Face of electronic fuel price signs shall not exceed one hundred (100) square feet.

iii. Display information shall be limited to fuel price and grade information.

iv. Electronic displays shall remain static and shall not flash or rapidly change.

v. Canopy Signage

1. Signage may be placed on all sides of the canopy.

2. Sign area shall not exceed fifty percent (50%) of the canopy face

3. Letter Heights:

a. Twenty-four inches (24”) maximum for one line of text.

b. Eighteen inches (18”) maximum for two lines of text.

g. Wall Signs (Building Mounted) – A wall sign is defined as a sign anchored to a wall elevation of a business.

i. Buildings thirty Feet (30’) or Less in Height (Per Elevation)

1. Maximum Letter Height:

a. Thirty-six inches (36”) for one line of text.

b. Eighteen inches (18”) for two lines of text.

2. Maximum Sign Height:

a. Thirty-six inches (36”) for one line.

b. Forty-two inches (42”) for two lines.

3. Maximum Sign Face: Eighty percent (80%) of storefront width.

4. Wall Signs shall not exceed fifteen percent (15%) of the building elevation with a maximum sign area of two hundred (200) square feet.

ii. Buildings Greater Than 30 Feet in Height (Per Elevation)

1. Letter height may increase twelve inches (12”) for every six feet (6’) of building height above thirty feet.

2. Maximum Sign Height: Seventy-two inches (72”).

3. Sign face shall not exceed eighty percent (80%) of storefront width.

4. Wall signs shall not exceed twenty-five percent (25%) of the building elevation with a maximum sign area of four hundred (400) square feet.

iii. Anchor Tenant Signage

1. Anchor Tenants Greater Than 80,000 Square Feet

a. Wall Signage may have letter heights up to one hundred twenty inches (120”).

2. Anchor Tenants Greater Than 120,000 Square Feet

a. Wall signage may have an overall height up to one hundred thirty inches (130”).

b. Wall-mounted logos or branding elements may be permitted up to one hundred ninety-eight inches (198”) in height.

h. Illumination

i. Electronic reader boards/led screens are not permitted along public ROW except when used at fuel stations. When used in other areas of The Development, then:

1. No internal or external illumination of LED screens permitted between 10 PM and 6 AM.

2. Max illumination will be the difference between ambient light and full wattage cannot be more than .2 foot-candles at 75 ft.

3. Max wattage will be 6500.

4. Electrical components such as ballasts, transformers, and conduits shall be fully concealed.

i. Residential Entry Signage

i. Primary Entry Monument: The overall primary entry monument shall consist of a primary monument sign, an attached sign blade wall, and an optional attached covered structure. The primary monument sign shall not exceed a sign area of 200 square feet. The sign blade wall shall attach the primary monument sign and the attached covered structure. The attached covered structure shall be open on three sides and shall contain roof signage that shall not exceed 200 square feet. The combined sign area of the primary monument sign and structure roof sign shall not exceed 400 square feet. The overall building envelope including the primary monument sign, attached sign structure, and attached covered structure shall be no greater than twenty feet (20’) in height, sixty feet (60’) in length, and twenty feet (20’) in depth. These signs will be placed at the major entry point to the project.

ii. Secondary Entry Monument: The secondary entry monument building envelope shall be no greater than twenty-five feet (25’) in height, forty feet (40’) in length, and fifteen feet (15’) in depth. A water cistern twenty-five feet (25’) in height by fifteen (15’) in length shall contain signage on two walls of the water cistern. An ornamental/decorative fence may be provided as part of the overall design of the secondary entry monument and shall not be measured as part of the building envelope. The combined sign area of the tower and secondary monument sign shall not exceed 400 square feet. These signs will be placed at the secondary entry points to the project.

iii. Village/Park Entry Monument: Six feet (6') tall with a six-foot by six-foot (6'x6') tower footprint and an attached or isolated sign blade wall with a maximum size of six feet tall by twenty feet in length (6'x20'). The sign area shall not be greater than 64 square feet. These signs will be placed at the entry points to residential subdivisions within the project.

iv. Model Home Monument: Used to identify different builder model homes to potential home buyers. The monuments shall be a maximum of 60 square feet in size and shall not exceed five feet (5') in height. These monuments may be installed at model homes at various locations within the development. All model home monuments must be removed when the model home is purchased and used as a private home.

v. Temporary Construction Signs/For Sale Signs: To be used during construction of the development. These signs recognize builders, architects, engineers, leasing representatives, lenders, and other associated with the project. There shall be one sign per parcel of land and the sign shall have a maximum of 64 square feet in size and not to exceed eight feet (8') in height and eight feet (8') in width per parcel of land. All temporary signs must be removed when the principle building on the applicable building site is occupied.

7. Trails

The pedestrian pathway system, which is illustrated on the Conceptual Amenities and Open Space Plan (Exhibit H), will use a combination of 12 foot wide and 6 foot wide primary trails, and additional trails of not less than five feet in width to serve the residents of the project and provide multiple pedestrian connections. The trails system will provide easy and safe pedestrian access to public parks, private parks, open space, commercial tracts, and single-family residential areas located within the project.

8. Utilities

The Presidio PUD will be wholly included within the boundaries of Brazoria County Municipal Utility District 30.

a. Proposed Improvements

i. A complete utility system is planned to include a water distribution system, a wastewater collection system, and a storm drainage system including proposed detention and outfall channel improvements. Design and construction of these facilities will be in conformance with criteria published by the City of Manvel and the Texas Commission of Environmental Quality (TCEQ).

ii. The District is planned to serve a total of approximately 392.9 acres. The construction of the water distribution system, wastewater collection, and storm drainage for the District will be achieved by phasing construction of the improvement to coincide with the overall rate of development. The District will construct its internal water distribution system, wastewater collection system, and storm drainage. All utilities will be designed in accordance with the criteria established by the City of Manvel, Brazoria County, Brazoria Drainage District

No. 4, TCEQ and the Texas Department of Health.

b. Existing Utilities and Easements

i. There is a 22' H.L.&P. easement and a 250' H.L.&P. easement running northwest to southeast through the south region of the District between State Highway 6 and the Topeka and Santa Fe Railroad. The Brazos River Authority Canal property runs north to south along the eastern boundary of the District.

c. Water Supply and Distribution System

i. This section describes the water supply and distribution system necessary to serve the District at full development. At full development, the District will 1,900 equivalent single-family connections (ESFC).

ii.

i. Design Criteria:

1. All water distribution facilities will be designed to meet or exceed the City of Manvel and 30 TAC 290.45 (b) (1) (D) requirements.

ii. Proposed Water Supply and Distribution Facilities:

1. The water distribution facilities required by the design criteria listed above and as described in 30 TAC 290.45(b) (1) (D) will be constructed in phases to coincide with the rate of development. The water distribution system for the District will be looped where feasible to provide alternate service routes during emergencies and maintenance periods, and to equalize pressure in the system.

2. The District intends to connect to the City facilities along SH 6 and Iowa Lane. A new water treatment plant site is to be provided in Tract O along Iowa Lane.

d. Wastewater Collection System

i. General:

i. The wastewater generated by the development within the District will flow by gravity through internal sanitary sewer lines. It will be conveyed to the City's trunk facilities located along State Highway 6 by a combination of gravity trunk lines and force mains where necessary.

ii. At full development, the ultimate ESFC's of the District will be 1,900. The wastewater generated by this development is estimated as 665,000 gpd (average dry weather flow) and 2,660,000 gpd (maximum wet weather flow).

iii. The district intends to connect to the City trunk sewer line along State Highway 6. No new wastewater treatment plant is proposed.

iv. Proposed Wastewater Collection System:

i. The wastewater collection system for full development of the District will consist of gravity sewer lines ranging in diameter size. Refer to Exhibit 10

– Wastewater Collection System.

v. Wastewater Treatment:

i. The District intends to connect to the City trunk sewer line along State Highway 6. No new wastewater treatment plants are proposed.

e. Storm Drainage System

i. General:

i. The storm water runoff within the District will be routed through a curb and gutter street system to collector lines that will outfall into detention lakes throughout the District and ultimately into Chocolate Bayou. The District will construct all stormwater trunk lines and detention facilities for stormwater collection.

ii. Design Criteria:

i. All storm drainage improvements will be designed in accordance with criteria established by the City of Manvel and Brazoria County Drainage District No. 4.

ii. The U.S Army Corps of Engineers HEC-HMS computer models were used to generate storm runoff hydrographs while the XP-SWMM computer model was used to analyze the proposed drainage and detention system. The proposed internal detention lake system was sized to contain the difference between the developed and undeveloped run-off resulting from a 24-hour 100-year frequency rainfall event while maintaining a minimum freeboard of one foot.

iii. Proposed Storm Sewer System:

i. The District's internal storm sewer system will consist of a concrete curb and gutter street system with inlets and reinforced concrete pipe and box culverts. Reinforced concrete storm sewer pipe will range in size from 24'' RCP to sizes necessary to convey the applicable runoff. The storm sewers will discharge directly into the detention lake within the development.
ii. The District will provide concrete storm sewer trunk lines ranging in size form 24 inches in diameter reinforced concrete pipe to various reinforced concrete boxes. In addition, it also has approximately 76 acres of lakes for amenity and detention purposed. Box culverts and pipes are designed to connect all the lakes together.

f. Other Utilities

i. Dry utilities are available from the local public utility companies that serve the area. A list of the utility companies and the services to be provided are as follows:

i. Telephone service – AT&T Telephone
ii. Electrical service – Centerpoint Energy
iii. Gas Service – Centerpoint Energy

iv. Cable Service – Texas Mid Gulf Cable Vision

9. Miscellaneous Regulations

i. Fencing - Fences in any traditional single-family residential district may not exceed seven (7') feet in height.

ii. Proximity of structures to pipelines - No structure shall be erected or moved to a location closer than 30 feet to any existing pipeline, except as may be allowed for low pressure distribution system pipeline as defined in section 62-2 of the Manvel Code of Ordinances.

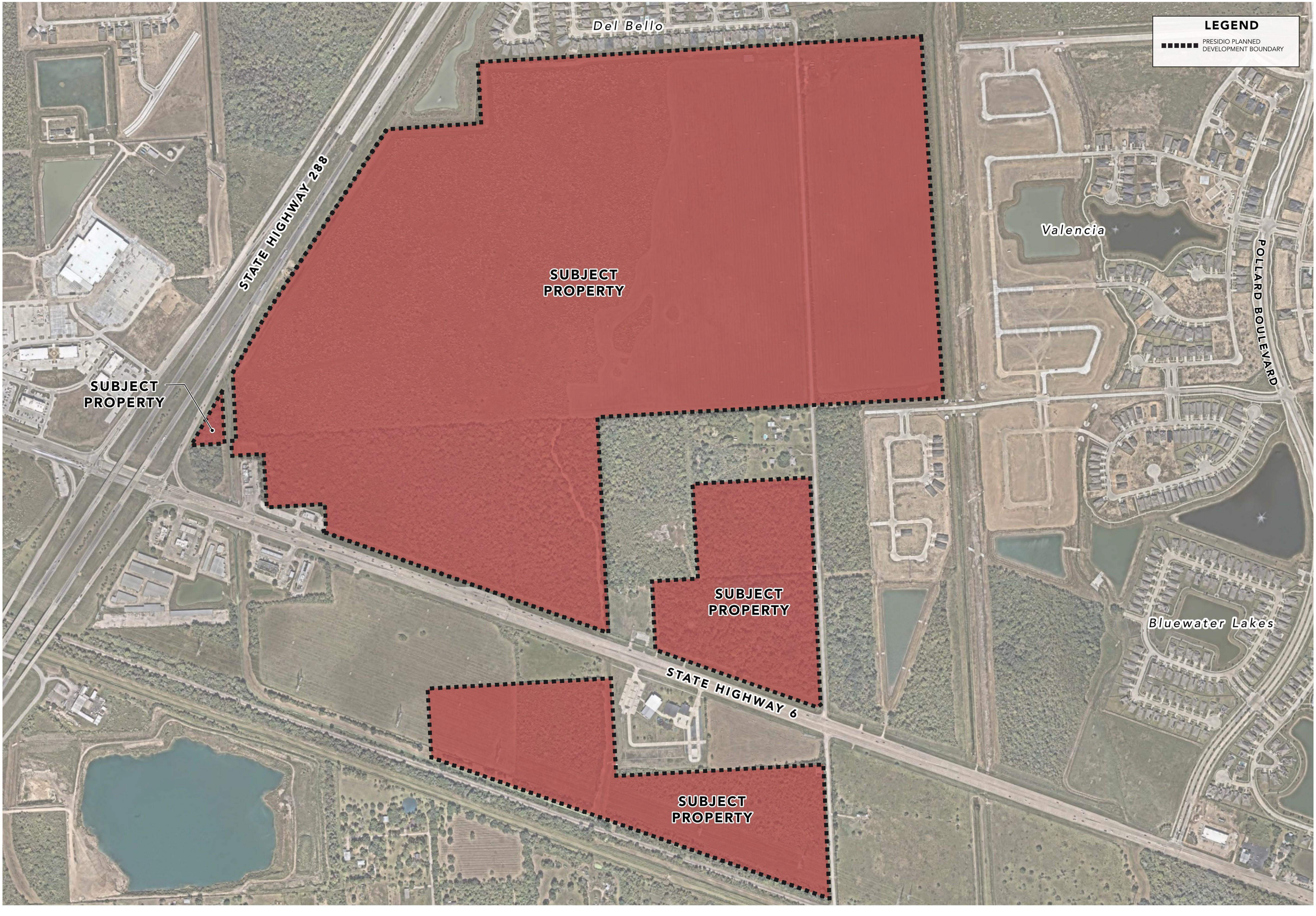
iii. Trees – Trees may be planted within right-of-way medians to enhance the overall landscape plan for the development. Trees shall be planted at a minimum spacing of 50 feet and located within the center of the right-of-way median. They may be located within other areas of the right-of-way in a limited manner to address physical or other constraints that exist in various areas throughout the development. In the event that there are utilities located within the future drip line of the tree, a suitable root barrier shall be used.

iv. On-street parking areas – Along the proposed high-density urban corridor portion of Charlotte Street, on-street diagonal parking spaces may be provided for the use of adjacent commercial establishments & apply toward minimum parking requirements.

v. Where an urban corridor is proposed within a public right-of-way (such as along Charlotte Street), 60-degree diagonal on-street parking may be provided to serve adjacent or nearby commercial tenants.

VII. PHASING / DEVELOPMENT SCHEDULE

It is anticipated that the Presidio PUD will be developed in two phases over a 5 to 15 year period. The construction of the initial phases of the project is estimated to begin approximately 24 months from PUD approval date. The initial phases of the project will include portions of Manvel Parkway, Charlotte Street, Street Y, Street X, project entry statements and monumentation, as well as landscaping. The implementation of infrastructure to the residential development will be tied to the residential development schedule as shown on the Phasing Exhibit (Exhibit I). The location and timing of future phases will be dependent upon market conditions and is subject to change. Commercial development will be driven by market conditions.



± 392.9 Ac. PRESIDIO - AREA LOCATION EXHIBIT

EXHIBIT A

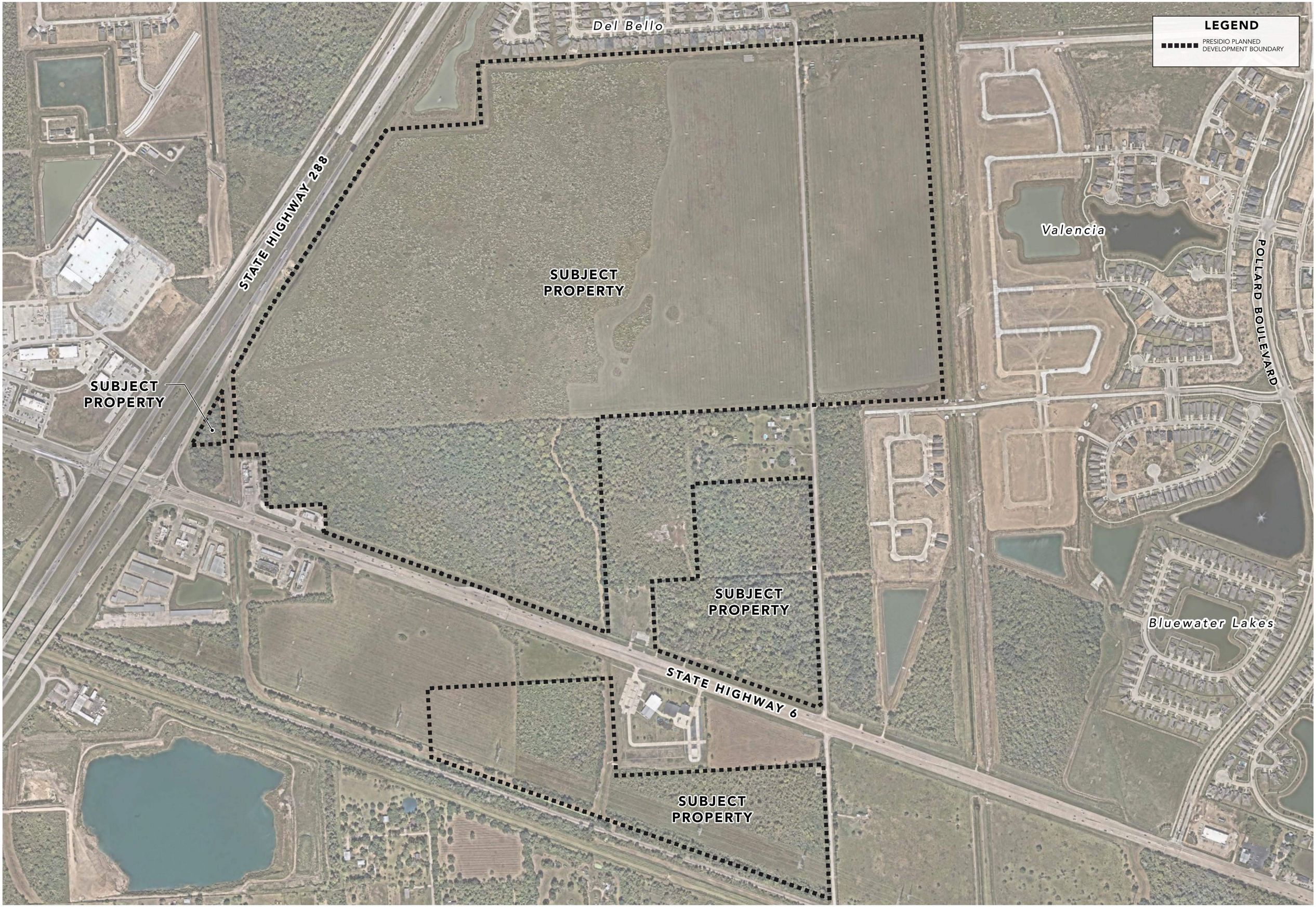
0 100 200 400

LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

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± 392.9 Ac. PRESIDIO - PROJECT AERIAL EXHIBIT

EXHIBIT B

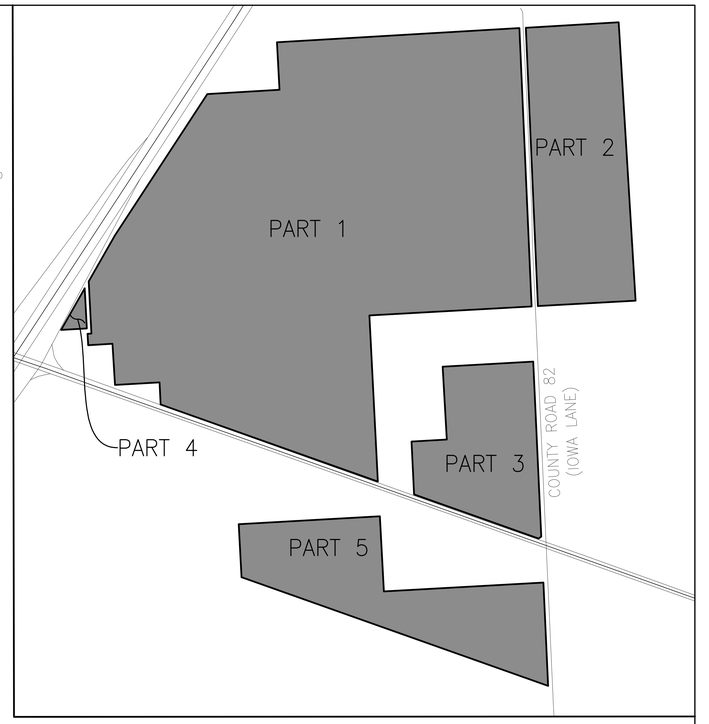
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LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

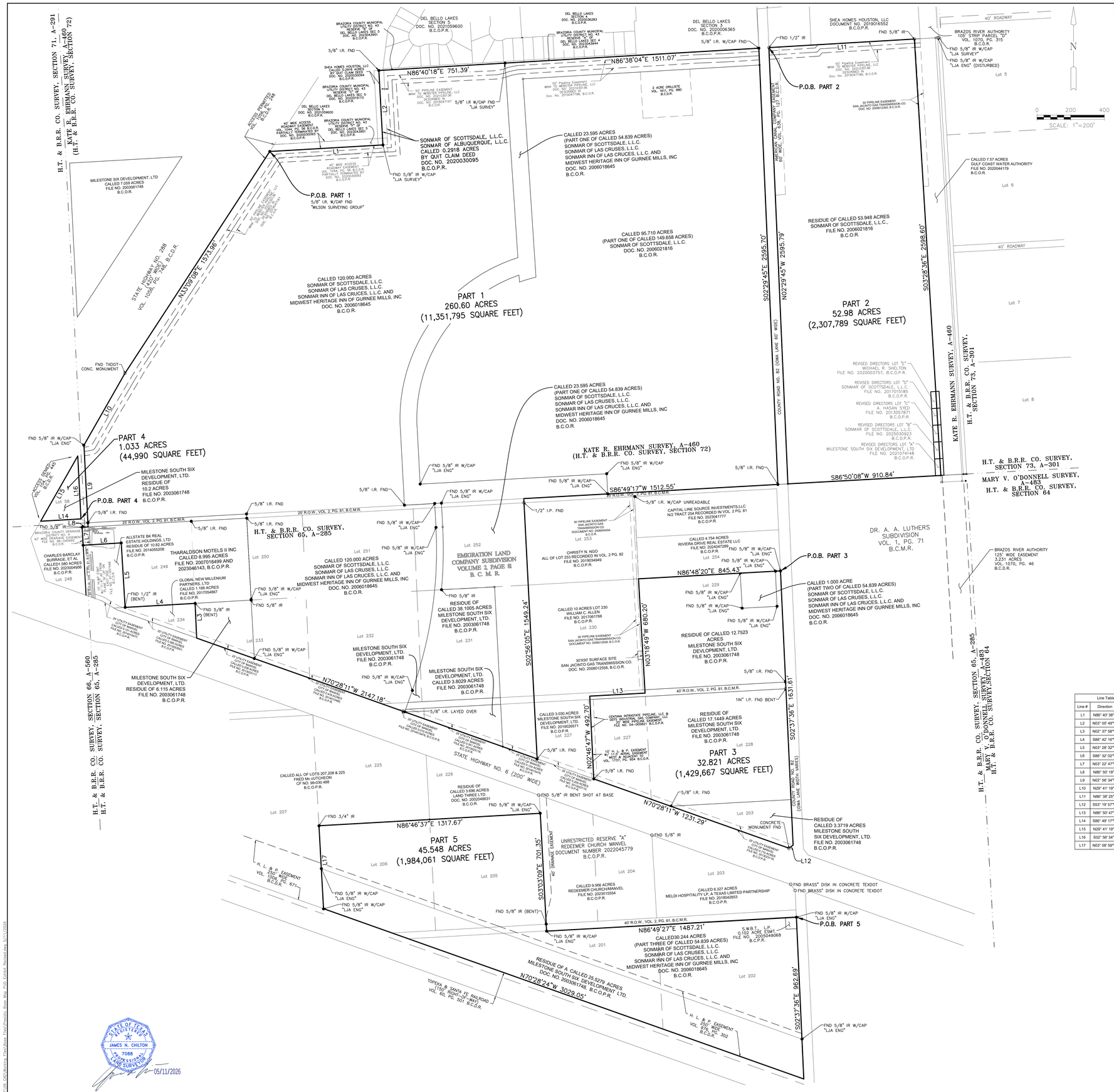
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VICINITY MAP 1" = 500'


H.T. & B.R.R. CO. SURVEY, SECTION 71, A-291
KATE R. EHRMANN SURVEY, A-460
(H.T. & B.R.R. CO. SURVEY, SECTION 72)
PART 1
260.60 ACRES
(11,351,795 SQUARE FEET)
PART 2
52.98 ACRES
(2,307,789 SQUARE FEET)
PART 3
32.821 ACRES
(1,429,667 SQUARE FEET)
PART 4
1.033 ACRES
(44,990 SQUARE FEET)
PART 5
45.548 ACRES
(1,984,061 SQUARE FEET)
P.O.B. PART 1
5/8" I.R. W/CAP FND
"WILSON SURVEYING GROUP"
P.O.B. PART 2
P.O.B. PART 3
P.O.B. PART 4
P.O.B. PART 5
N86°40'18"E 751.39'
N86°38'04"E 1511.07'
N03°09'08"E 1573.98'
S02°29'45"E 2595.70'
N02°29'45"W 2595.79'
S03°28'36"E 2598.60'
S86°50'08"W 910.84'
S86°49'17"W 1512.55'
N86°48'20"E 845.43'
S02°56'05"E 1549.24'
N03°18'49"W 680.20'
S02°37'36"E 1631.61'
N70°28'11"W 2147.18'
N02°46'47"W 492.70'
N70°28'11"W 1231.29'
N86°46'37"E 1317.67'
S03°03'09"E 701.35'
N86°49'27"E 1487.21'
N70°28'24"W 3029.05'
S02°37'56"E 962.69'
SHEA HOMES HOUSTON, LLC
DOCUMENT NO. 2019016552
B.C.O.P.R.
DEL BELLO LAKES
SECTION 3
DOC. NO. 2020006365
B.C.O.P.R.
DEL BELLO LAKES
SECTION 5
DOC. NO. 2021059600
B.C.O.P.R.
BRAZORIA COUNTY MUNICIPAL
UTILITY DISTRICT NO. 43
RESERVE "A"
DEL BELLO LAKES SEC. 5
DOC. NO. 2023043091
B.C.O.P.R.
SONMAR OF SCOTTSDALE, L.L.C.
SONMAR OF ALBUQUERQUE, L.L.C.
CALLED 0.2918 ACRES
BY QUIT CLAIM DEED
DOC. NO. 2020030095
B.C.O.P.R.
CALLED 23.595 ACRES
(PART ONE OF CALLED 54.839 ACRES)
SONMAR OF SCOTTSDALE, L.L.C.
SONMAR OF LAS CRUSES, L.L.C.
SONMAR INN OF LAS CRUCES, L.L.C. AND
MIDWEST HERITAGE INN OF GURNEE MILLS, INC
DOC. NO. 2006018645
B.C.O.R.
CALLED 95.710 ACRES
(PART ONE OF CALLED 149.658 ACRES)
SONMAR OF SCOTTSDALE, L.L.C.
DOC. NO. 2006021816
B.C.O.R.
RESIDUE OF CALLED 53.948 ACRES
SONMAR OF SCOTTSDALE, L.L.C.,
FILE NO. 2006021816
B.C.O.R.
CALLED 120,000 ACRES
SONMAR OF SCOTTSDALE, L.L.C.
SONMAR OF LAS CRUSES, L.L.C.
SONMAR INN OF LAS CRUCES, L.L.C. AND
MIDWEST HERITAGE INN OF GURNEE MILLS, INC
DOC. NO. 2006018645
B.C.O.R.
CALLED 7.57 ACRES
GULF COAST WATER AUTHORITY
FILE NO. 2020044179
B.C.O.R
BRAZOS RIVER AUTHORITY
105' STRIP PARCEL "D"
VOL. 1070, PG. 315
B.C.O.R.
BRAZOS RIVER AUTHORITY
125' WIDE EASEMENT
3.231 ACRES
VOL. 1070, PG. 46
B.C.O.R.
MILESTONE SIX DEVELOPMENT, LTD
CALLED 7.059 ACRES
FILE NO. 2003061748
B.C.O.R.
STATE HIGHWAY NO. 288
(100' WIDE)
VOL. 1035, PG. 748, B.C.O.R.
FND TXDOT
CONC. MONUMENT
COUNTY ROAD NO. 82 (IOWA LANE 60' WIDE)
AMERICAN CANAL COMPANY EASEMENT
60' WIDE - VOL. 434, PG. 275, B.C.D.R.
KATE R. EHRMANN SURVEY, A-460
H.T. & B.R.R. CO. SURVEY,
SECTION 73, A-301
H.T. & B.R.R. CO. SURVEY,
SECTION 64
MARY V. O'DONNELL SURVEY,
A-483
H.T. & B.R.R. CO. SURVEY,
SECTION 65, A-285
H.T. & B.R.R. CO. SURVEY, SECTION 66, A-560
H.T. & B.R.R. CO. SURVEY, SECTION 65, A-285
DR. A. A. LUTHERS
SUBDIVISION
VOL. 1, PG. 71
B.C.M.R.
EMIGRATION LAND
COMPANY SUBDIVISION
VOLUME 2, PAGE 81
B. C. M. R.
H.T. & B.R.R. CO. SURVEY,
SECTION 65, A-285
H.T. & B.R.R. CO. SURVEY,
SECTION 66, A-560
RESIDUE OF CALLED 12.7523
ACRES
MILESTONE SOUTH SIX
DEVELOPMENT, LTD.
FILE NO. 2003061748
B.C.O.P.R.
RESIDUE OF CALLED 17.1449 ACRES
MILESTONE SOUTH SIX
DEVELOPMENT, LTD.
FILE NO. 2003061748
B.C.O.P.R.
RESIDUE OF
CALLED 3.3719 ACRES
MILESTONE SOUTH
SIX DEVELOPMENT, LTD.
FILE NO. 2003061748
B.C.O.P.R.
CALLED 1.000 ACRE
(PART TWO OF CALLED 54.839 ACRES)
SONMAR OF SCOTTSDALE, L.L.C.
SONMAR OF LAS CRUSES, L.L.C.
SONMAR INN OF LAS CRUCES, L.L.C. AND
MIDWEST HERITAGE INN OF GURNEE MILLS, INC
DOC. NO. 2006018645
B.C.O.R.
CALLED 10 ACRES LOT 230
WILLIAM C. ALLEN
FILE NO. 2017061766
B.C.O.P.R.
CALLED 4.754 ACRES
RIVIERA DRIVE REAL ESTATE LLC
FILE NO. 2024047288
B.C.O.P.R.
CAPITAL LINE SOURCE INVESTMENTS,LLC
N/2 TRACT 254 RECORDED IN VOL. 2 PG. 81
FILE NO. 2023041777
B.C.O.P.R.
CHRISTY N. NGO
ALL OF LOT 253 RECORDED IN VOL. 2 PG. 82
FILE NO. 2019034949
B.C.O.P.R.
CALLED 120.000 ACRES
SONMAR OF SCOTTSDALE, L.L.C.
SONMAR OF LAS CRUSES, L.L.C.
SONMAR INN OF LAS CRUCES, L.L.C. AND
MIDWEST HERITAGE INN OF GURNEE MILLS, INC
DOC. NO. 2006018645
B.C.O.R.
RESIDUE OF
CALLED 38.1005 ACRES
MILESTONE SOUTH SIX
DEVELOPMENT, LTD.
FILE NO. 2003061748
B.C.O.P.R.
MILESTONE SOUTH SIX
DEVELOPMENT, LTD.
CALLED 3.8029 ACRES
FILE NO. 2003061748
B.C.O.P.R.
MILESTONE SOUTH SIX
DEVELOPMENT, LTD.
RESIDUE OF 6.115 ACRES
FILE NO. 2003061748
B.C.O.P.R.
CALLED 3.030 ACRES
MILESTONE SOUTH SIX
DEVELOPMENT, LTD.
FILE NO. 2019029571
B.C.O.P.R.
RESIDUE OF
CALLED 3.696 ACRES
LAND THREE LTD.
DOC. NO. 2020048631
B.C.O.R.
CALLED ALL OF LOTS 207,208 & 225
FRED Mc cUTCHEON
CF NO. 99-030.488
B.C.O.P.R.
UNRESTRICTED RESERVE "A"
REDEEMER CHURCH MANVEL
DOCUMENT NUMBER 2022045779
B.C.O.P.R.
CALLED 9.566 ACRES
REDEEMER CHURCH/MANVEL
FILE NO. 2023031554
B.C.O.P.R.
CALLED 6.327 ACRES
MELDI HOSPITALITY LP, A TEXAS LIMITED PARTNERSHIP
FILE NO. 2018042653
B.C.O.P.R.
CALLED30.244 ACRES
(PART THREE OF CALLED 54.839 ACRES)
SONMAR OF SCOTTSDALE, L.L.C.
SONMAR OF LAS CRUSES, L.L.C.
SONMAR INN OF LAS CRUCES, L.L.C. AND
MIDWEST HERITAGE INN OF GURNEE MILLS, INC
DOC. NO. 2006018645
B.C.O.R.
RESIDUE OF A CALLED 25.5279 ACRES
MILESTONE SOUTH SIX DEVELOPMENT, LTD
DOC. NO. 2003061748, B.C.O.P.R.
ALLSTATE BK REAL
ESTATE HOLDINGS, LTD
RESIDUE OF 10.82 ACRES
FILE NO. 2014055208
B.C.O.P.R.
THARALDSON MOTELS II INC
CALLED 8.995 ACRES
FILE NO. 2007018499 AND
2023046143, B.C.O.P.R.
GLOBAL NEW MILLENIUM
PARTNERS, LTD
CALLED 1.168 ACRES
FILE NO. 2017054867
B.C.O.P.R.
CHARLES BARCLAY
BURRAGE, ET AL
CALLED1.580 ACRES
FILE NO. 2023004956
B.C.O.P.R.
MILESTONE SOUTH SIX
DEVELOPMENT, LTD.
FILE NO. 2003061748
B.C.O.P.R.
TOPEKA & SANTA FE RAILROAD
150' RIGHT OF WAY
VOL. 60, PG. 501 B.C.D.R.
H. L. & P. EASEMENT
VOL. 700, PG. 671
B.C.D.R.
H. L. & P. EASEMENT
VOL. 850, PG. 302
B.C.D.R.
BRAZORIA COUNTY DRAINAGE
DISTRICT NO. 4 EASEMENT
42' WIDE, VOL. 434, PG. 275
FILE NO. 2-545592
ACCESS EASEMENT
VOL. 1035, PG. 748
B.C.D.R.

DESCRIPTION OF
392.98 ACRES

Being 392.98 acres (17,118,302 square feet) of land located in the H.T. & B.R.R. Company Survey, Section 72, also known as Kate R. Ehrmann Survey, Abstract Number 460, the H.T. & B.R.R. Company Survey, Section 71, Abstract Number 291 and the H.T. & B.R.R. Company Survey, Section 65, Abstract Number 285 Brazoria County, Texas, a portion of which being out of and a part of Emigration Land Company Subdivision, a subdivision of record under Volume 2, Page 81 of the Map Records of Brazoria County, Texas (B.C.M.R.) and being all of that certain called 120.000 acre tract (exhibit "A"), all of that certain called certain called 23.595 acre tract (exhibit "B", part one), all of that certain called 1.000 acre tract (exhibit “B”, part two), and all of that certain called 30.244 acre tract (exhibit "B", part three), conveyed to Sonmar of Scottsdale L.L.C., Sonmar of Las Cruses LLC, Sonmar Inn of Las Cruces L.L.C., and Midwest Heritage Inn of Gurnee Mills Inc. by an instrument of record under Document Number 2006018645 of the Official Records of Brazoria County, Texas (B.C.O.R.), all of that certain called 95.710 acre tract described as part one of a called 149.658 acre tract and all of the residue of that certain called 53.948 acre tract conveyed to Sonmar of Scottsdale, L.L.C., by an instrument of record under Document Number 2006021816, B.C.O.R., all of that certain called 0.2918 acre tract conveyed to Sonmar of Scottsdale L.L.C., Sonmar of Albuquerque L.L.C., by and instrument of record under Document Number 2020030095 of the Official Public Records of Brazoria County, Texas (B.C.O.P.R.), all of the residue of that certain called 3.8029 acre tract, all of the residue of that certain called 38.1005 acre tract, all of the residue of that certain called 6.115 acre tract, all of the residue of that certain called 10.2 acre tract, all of the residue of that certain called 17.1449 acre tract, all of the residue of that certain called 12.7523 acre tract, all of that certain called 3.3719 acre tract and all of the residue of that certain called 25.5279 acre tract conveyed to Milestone South Six Development, LTD. by an instrument of record under Document Number 2003061748, B.C.O.P.R., all of that certain called 8.995 acre tract conveyed to Tharaldson Motels II Inc by an instrument of record under Document Numbers 2007018499 and 2023046143, B.C.O.P.R., all of that certain called 0.115 acre tract, Directors Lot “A” conveyed to Milestone South Six Development, LTD by an instrument of record under Document Number 2021074148, B.C.O.P.R., all of that certain called 0.115 acre tract, Directors Lot “B” conveyed to Sonmar of Scottsdale, L.L.C. by an instrument of record under Document Number 2025030923, B.C.O.P.R., all of that certain called 0.115 acre tract, Directors Lot “C” conveyed to A. Hasan Syed by an instrument of record under Document Number 2013057871, B.C.O.P.R., all of that certain called 0.115 acre tract, Directors Lot “D” conveyed to Sonmar of Scottsdale, L.L.C. by an instrument of record under Document Number 2017015185, B.C.O.P.R. and all of that certain 0.115 acre tract, Directors Lot “E” conveyed to Sonmar of Scottsdale,

L.L.C. by an instrument of record under Document Number 2020003757, B.C.O.P.R., said 392.98 acre tract being more particularly described by metes and bounds, in five (5) parts, as follows (all bearings referenced to the Texas Coordinate System, South Central Zone, NAD 83):

PART 1

BEGINNING at a 5/8-inch iron rod with cap stamped "WILSON SURVEYING GROUP", found, for the southwest corner of Reserve "F" of Del Bello Lakes Section 5, a subdivision of record under Document Number 2021059600, B.C.O.P.R., said Reserve "F" conveyed to Brazoria County Municipal Utility District Number 43 by an instrument of record under Document Number 2023043951, B.C.O.P.R., same being the northwest corner of said called 120.000 acre tract and lying on the east right of way line of State Highway 288, called 420 feet wide, conveyed to the State of Texas by an instrument of record under Volume 1056, Page 748 of the Deed Records of Brazoria County, Texas (B.C.D.R.);

Thence, North 86° 40' 38" East, departing said east right-of-way line of State Highway 288, with a south line of said Reserve "F", same being the north line of said called 120.000 acre tract, 673.33 feet to a 5/8 inch iron rod with cap stamped "LJA SURVEY", found, for the southwest corner of said 0.2918 acre tract conveyed to Sonmar of Scottsdale L.L.C., Sonmar of Albuquerque L.L.C., same being the southeast corner of that certain called 0.2918 acre tract conveyed to Shea Homes Houston, L.L.C. by an instrument of record under Document Number 2020030094, B.C.O.P.R;

Thence, North 03° 05' 49" West, with the east line of said 0.2918 acre tract conveyed to Shea Homes Houston, L.L.C., same being the west line of said 0.2918 acre tract conveyed to Sonmar of Scottsdale L.L.C., Sonmar of Albuquerque, L.L.C., 443.26 feet to a 5/8 inch iron rod found for the common north corner of said 0.2918 acre tracts, same being the most northerly northwest corner of the herein described tract and lying in an easterly interior line of Reserve "C" of said Del Bello Lakes Section 5, said Reserve "C" conveyed to Brazoria County Municipal Utility District Number 43 by an instrument of record under Document Number 2022015173, B.C.O.P.R.;

Thence, North 86° 40' 18" East, with an easterly interior line of said Reserve "C", a portion of the south line of Reserve "B" of said Del Bello Lakes Section 5 conveyed to Brazoria County Municipal Utility District Number 43 by an instrument of record under Document Number 2023043951, B.C.O.P.R., same being the north lines of said 0.2918 acre tract conveyed to Sonmar of Scottsdale L.L.C., Sonmar of Albuquerque, L.L.C. and said 120.000 acre tract, at 29.27 feet pass the common north corner of said

0.2918 acre tract and said 120.000 acre tract, continuing with the north line of said 120.000 acre tract and the south line of said Reserve "B", in all a total distance of 751.39 feet to a 5/8 inch iron rod with cap stamped "LJA SURVEY", found, for the northeast corner of said 120.000 acre tract, same being the northwest corner of the aforementioned 23.595 acre tract;

Thence, North 86° 38' 04" East, continuing with the south line of said Reserve "B", the south line of Reserve “A” of Del Bello Lakes Section 4, subdivision of record under Document Number 2020036283, B.C.O.P.R., said Reserve “A” conveyed to Brazoria County Municipal Utility District Number 43 by an instrument of record under Document Number 2023043944, B.C.O.P.R. and the south line of Reserve “B” of Del Bello Lakes Section 3, A subdivision of record under Document Number 2020006365, B.C.O.P.R., same being the north line of said called 23.595 acre tract, and the herein described tract, 1,511.07 feet to a 5/8 inch iron rod with cap stamped “KALKOMEY”, found, for the northeast corner of said called 95.710 acre tract and the herein described tract, said point lying in the west right of way line of County Road 82, also known as Iowa Lane, called 60 feet wide;

Thence, South 02° 29' 45" East, with the west right of way line of said County Road 82, same being the east line of said called 95.710 acre tract, 2,595.70 feet to a 5/8 inch iron rod, found, for the southeast corner of said called 95.710 acre tract, and the herein described tract, said point lying in the north line of a 25 foot wide road right of way easement per plat of said Emigration Land Company Subdivision;

Thence, South 86° 49' 17" West, with the north line of said road right of way easement, same being a southeast interior line of the herein described tract and in part a southeast interior line of said called 23.595 acre tract, 1,512.55 feet to a point for corner;

Thence, South 02° 56' 05" East, with a southeast interior line of said called 23.595 acre tract and the herein described tract, same being the west lines of that certain called tract of land conveyed to Christy N. Ngo by an instrument of record under Document Number 2019034949, B.C.O.P.R., that certain called 10 acre tract conveyed to William C. Allen by an instrument of record under Document Number 2017061766, B.C.O.P.R. and that certain called 3.030 acre tract conveyed to Milestone South Six Development, LTD by an instrument of record under Document Number 2019026571, B.C.O.P.R., 1,549.24 feet to a 5/8 inch iron rod, found for the southwest corner of said called 3.030 acre tract, same being the southeast corner of said called 23.595 acre tract, said point lying on the north right of way line of State Highway 6, called 200 feet wide;

Thence, North 70° 28' 11" West, with the north right of way line of said State Highway 6, same being the south lines of said called 23.595 acre tract, the aforementioned 3.8029 acre tract, the aforementioned 120.000 acre tract, the aforementioned residue of a called 6.115 acre tract and the herein described tract, 2,147.18 feet to a point for corner for the southwest corner of said residue tract, same being the southeast corner of that certain called 1.166 acre tract conveyed to Global New Millenium Partners, LTD by an instrument of record under Document Number 2017054867, B.C.O.P.R.;

Thence, North 02° 37' 58" West, with the east line of said called 1.166 acre tract, same being the west line of said residue tract and a southwest interior line of the herein described tract, 206.42 feet to a point for corner for the north common corner of said called 1.166 acre tract and said residue tract, said point lying in the south line of the aforementioned 8.995 acre tract;

Thence, South 86° 42' 16" West, with the north line of said called 1.166 acre tract, same being the south line of said called 8.995 acre tract and a southwest interior line of the herein described tract, 416.54 feet to a point for corner for the northwest corner of said called 1.166 acre tract, same being the southwest corner of said called 8.995 acre tract;

Thence, North 03° 28' 32" West, with a west line of said called 8.995 acre tract, 384.02 feet to a point for corner;

Thence, South 86° 32' 02" West, with a northwesterly interior line of said called 8.995 acre tract, 226.68 feet to a point for corner said point lying in the east line of that certain called 1.580 acre tract conveyed to Charles Barclay Burrage, et al by an instrument of record under Document Number 2023004956, B.C.O.P.R.;

Thence, North 03° 22' 47" West, with the east line of said called 1.580 acre tract, same being the northwest line of said called 8.995 acre tract, 107.16 feet to a point for corner said point lying in the south line of a 50 foot road right of way easement per said plat of Emigration Land Company Subdivision;

Thence, North 86° 50' 19" East, with the south line of said roadway easement, same being the north line of said called 8.995 acre tract, 36.02 feet to a point for corner;

Thence, North 02° 56' 34" West, over and across said road right of way easement, with the west line of the aforementioned 120.000 acre tract, 486.40 feet to a 5/8 inch iron rod with cap stamped 'LJA SURVEY', found lying in the east right of way line of aforementioned State Highway 288;

Thence, North 29° 41' 19" East, with the east right of way line of said State Highway 288, same being the west line of said called 120.000 acre tract, 492.89 feet to a point for corner;

Thence, North 33° 09' 08" East, continuing with the east right of way line of said State Highway 288, same being the west line of said called 120.000 acre tract, 1,573.96 feet to the POINT OF BEGINNING and containing 260.60 acres (11,351,795 square feet) of land.

Part 2

BEGINNING at a 1/2-inch iron rod found on the east right-of-way line of County Road No. 82, Iowa Lane, 60.0 feet wide, and being the northwest corner of said 53.948 acre tract, same being the southwest corner of that certain called 1.367 acre tract conveyed to Joan Banneyer, by an instrument of record under Document Number 2005003981, B.C.O.R.;

Thence North 86° 38' 25" East, along the north line of said 53.948 acre tract and the south line of said 1.367 acre tract and the south line of Manvel Parkway (120 feet wide) as shown on Del Bello Boulevard and Manvel Parkway Street Dedication, a subdivision of record under Document Number 2019062193, and along the south line of the remainder of that certain called 56.104 acre tract conveyed to Shea Homes Houston, LLC by an instrument of record under Document Number 2018049942, B.C.O.R., 866.40 feet to the northwest corner of that certain called 7.57 acre tract conveyed to Gulf Coast Water Authority by an instrument of record under 2020044179, B.C.O.R.;

Thence South 03° 20' 50" East, departing the north line of said 53.948 acre tract and the south line of said 56.104 acre tract, and along the west line of said 7.57 acre tract, 2,598.60 feet to a point for corner on the south line of said 53.948 acre tract, said point being on the common line between the aforesaid Kate R. Ehrmann Survey, A-460 and the H.T.&B.R.R. Company Survey, Section 65, A-285;

Thence South 86° 50' 08" West, along the south line of said 53.948 acre tract and said common survey line, 910.84 feet to a 5/8-inch iron rod found for the southwest corner of said 53.948 acre tract and on the east right-of-way line of County Road No. 82, Iowa Lane;

Thence North 02° 29' 45" West, departing said common survey lines, and along the east right-of-way line of said County Road No. 82, Iowa Lane and with the west line of said 53.948 acre tract, 2,595.79 feet to the POINT OF BEGINNING and containing 52.98 acres (2,307,789 square feet) of land.

Part 3

"COMMENCING for reference at an old one (1) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision, same being on the west right-of-way line of County Road No. 82 (Iowa Lane), varying width, and the northeast corner of that certain tract called 9.51 acres conveyed to B.J. Reynolds, et al, Trustee, by an instrument of record in File No. 97-004363 of the B.C.P.R.;

Thence South 02° 37' 36" East, 489.15 feet with the east line of Lot No. 254, the west right-of-way line of said County Road No. 82 and the east line of said 9.51 acre tract to the POINT OF BEGINNING of the herein described tract, same being the southeast corner of said 9.51 acre tract, the southeast corner of said Lot No. 254, the northeast corner of the aforesaid 12.7523 acre tract and the northeast corner of Lot No. 229 of said subdivision;

Thence South 02° 37' 36" East, with the west right-of-way line of said County Road No. 82, with the east line of said Lot No. 229 and the east line of said 12.7523 acre tract, at 660.82 feet pass the southeast corner of said Lot No. 229, the southeast corner of said 12.7523 acre tract and the north line of the aforesaid 40.0 foot wide Platted Roadway (not open), at 700.83 feet pass the northeast corner of Lot No. 228 of said subdivision, the northeast corner of said 17.1449 acre tract and the south line of said 40.0 foot wide Platted Roadway (not open) and continue with said west right-of-way line, the east line of Lot No. 228 and Lot No. 203, with the east line of said 17.1449 acre tract and with the east line of the aforesaid 3.3719 acre tract in all a total of 1631.61 feet to a point for corner from which a TxDOT brass disk in concrete bears South 40° 25' 35" East, 1.22 feet;

Thence South 53° 19' 57" West, 30.42 feet departing said east and west lines to a point for corner on the northerly right-of-way line of State Highway No. 6, 200.0 feet wide;

Thence North 70° 28' 11" West, 1231.29 feet with said northerly right-of-way line to a point for corner on a west line of the aforesaid 17.1449 acre tract and on the east line of that certain tract called 3.030 acres conveyed to Todd Properties, Ltd., by an instrument of record in File No. 98-036507 of the B.C.P.R.;

Thence North 02° 46' 47" West, with the common line between said 17.1449 acre and 3.030 acre tracts, at 472.70 feet pass the common north corner of said 17.1449 acre and 3.030 acre tracts, same being on the south line of the aforesaid 40.0 foot wide Platted Roadway (not open), and continue in all a total of 492.70 feet to a point for corner on the centerline of said 40.0 foot wide Platted Roadway (not open);

Thence North 86° 50' 47" East, 329.67 feet with the centerline of said 40.0 foot wide Platted Roadway (not open) to a point for corner;

Thence North 03° 18' 49" West, departing said centerline, at 20.00 feet pass the common south corner of Lot No. 229 and Lot No. 230 of said subdivision, the southwest corner of the aforesaid 12.7523 acre tract, the southeast corner of that certain tract called 10.0 acres conveyed to Jayne Meadows Cotter Allen, Trustee, by an instrument of record in File No. 03-043040 of the B.C.P.R. and continue with the common line between Lot No. 229 and Lot No. 230 and with the common line between said 12.7523 acre and 10.0 acre tracts in all a total of 680.20 feet to a point for corner, the common north corner of Lot No. 229 and Lot No. 230, the common north corner of said 12.7523 acre and 10.0 acre tracts, the common south corner of Lot No. 253 and Lot No. 254, the common south corner of the aforesaid 9.51 acre tract and that certain tract called 7.41 acres conveyed to Fredrick Lee Huffman, et al, by an instrument of record in File No. 01-052769 of the B.C.P.R.

Thence North 86° 48' 20" East, with the common line between said Lot No. 229 and Lot No. 254 and with the common line between said 12.7523 acre and 9.51 acre tracts, at 605.67 feet pass the northwest corner of the aforesaid 1.000 acre tract, at 815.43 feet pass the northeast corner of said 1.000 acre tract and continue with the common line between said Lot No. 229 and Lot No. 254 and with the common line between said 12.7523 acre and 9.51 acre tracts in all a total of 845.43 feet to the POINT OF BEGINNING and containing 32.821 acres of land."

Part 4

"BEGINNING at the southeast corner of Lot 58 of said Emigration Land Company Subdivision, same being the southeast corner of aforementioned residue of a called 10.2 acre tract and the herein

described tract, from which a 5/8 inch iron rod, found for the southerly west corner of aforementioned 120.000 acre tract bears South 61° 06’ 30” East, 47.08 feet;

Thence, South 86° 49’ 17” West with the south line of said residue tract and the herein described tract, 240.35 feet to the southwest corner of the said residue tract and the herein described tract, said point lying in the east right of way line of State Highway 288, called 420 feet wide and recorded under Volume 1056, Page 748, B.C.D.R.;

Thence, North 29° 41’ 19” West, with the east right of way line of said State Highway 288, same being the west line of said residue tract and the herein described tract, 445.72 feet to the north corner of said residue tract and the herein described tract, said point lying in the east line of said Lot 58;

Thence, South 02° 56’ 34” East, with the east line of said Lot 58, the east line of said residue tract and the herein described tract, 374.38 feet to the POINT OF BEGINNING and containing 1.033 acres (44,990 square feet) of land.”

Part 5

“COMMENCING for reference at an old one (I) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision and on the west right-of-way line of County Road No. 82 (Iowa Lane), varying width;

Thence South 02° 37' 36" East, with said west right-of-way line and with the east line of said subdivision, at 1189.97 feet pass the south line of a 40.0 foot wide platted road (not open) and the northeast corner of Lot No. 228 of said subdivision, at 2509.88 feet pass the southeast corner of Lot No. 203 of said subdivision, the southeast corner of that certain tract called 6.327 acres conveyed to William G. Neumann, Jr., by an instrument of record in File No. 97- 014478 of the B.C.P.R. and on the north line of a 40.0 foot wide platted roadway (not open) and continue in all a total of 2549.88 feet to the POINT OF BEGINNING of the herein described tract, same being on the south line of said 40.0 foot wide platted roadway (not open), the northeast corner of Lot 202 of said subdivision, the northeast corner of the aforesaid 25.5279 acre tract and the northeast corner of the 30.244 acre tract;

Thence South 02° 37' 36" East, 962.69 feet continuing with said west right-of-way line, with the east line of said subdivision, with the east line of said Lot No. 202 and with the east of said 25.5279 acre tract, to a point for corner, the southeast corner of said Lot 202, the southeast corner of said 25.5279

acre tract and on the northerly right-of-way line of the Topeka & Santa Fe Railroad Company's 150.00 foot wide right-of-way line;

Thence North 70° 28' 24" West, departing said east and west lines, with the south line of said Lot No. 202 and Lot No. 201 of said subdivision, with the south line of said 25.5279 acre tract and with said northerly right-of-way line, at 2494.26 feet pass the west corner of said Lot No. 201, the west corner of said 25.5279 acre tract and on the south line of a 40.0 foot wide platted roadway (not open), at 2597.90 feet pass the north right-of-way line of said 40.0 foot wide platted road (not open), the westerly southeast corner of Lot No. 206 of said subdivision, a westerly southeast corner of the aforesaid 19.1938 acre tract and continue with said northerly right-of-way line and with a south line of said 19.1938 acre tract in all a total of 3029.05 feet to a point for corner, the southwest corner of Lot No. 206 and the southwest corner of said 19.1938 acre tract, same being the southeast corner of Lot No. 207 and that certain tract called "All of Lot No. 207, Lot No. 208 and Lot No. 225" conveyed to Fred McCutcheon by an instrument of record in File No. 99-030488 of the B.C.P.R.;

Thence North 03° 08' 59" West, 493.86 feet with the common line between said 19.1938 acre tract and said McCutcheon tract and with the common line between said Lot No. 206 and Lot No. 207 to a point for corner on the east line of said Lot No. 207, same being the northwest corner of said Lot No. 206, the northwest corner of said 30.244 acre tract and the southwest corner of said Lot No. 225;

Thence North 86° 46' 37" East, with the north line of said 30.244 acre tract, the south line of said McCutcheon tract, the south line of that certain tract called 3.696 acres conveyed to Douglas B. Wilson, Trustee, by an instrument of record in File No. 02-048631 of the B.C.P.R., with the common line between Lot No. 206 and Lot No. 225 and Lot No. 205 and Lot No. 226, at 1314.41 feet pass a found one (1) inch iron pipe and continue in all a total of 1317.67 feet to a point for corner, the northeast corner of said 30.244 acre tract and the common corner of Lot No. 204, Lot No. 205, Lot No. 226 and Lot No. 227 of said subdivision and on a west line of that certain tract called 5.021 acres conveyed to Grace United Methodist Church of Manvel and Iowa Colony, Texas by an instrument of record in File No. 2004-039311of the B.C.P.R.;

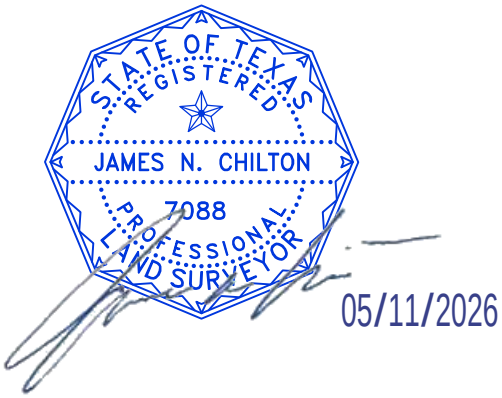
Thence South 03° 03' 09" East, with the east line of said 30.244 acre tract, with the west line of said 5.021 acre tract and with the common line between said Lot No. 205 and Lot No. 204, at 661.35 feet pass the common south corner of the aforesaid 19.1938 acre and 5.021 acre tracts and the common south corner of said Lot No. 205 and Lot No. 204 and continue in all a total of 701.35 feet to a point for

corner on the south line of the aforesaid 40.0 foot wide platted road (not open) and on the north line of said 30.244 acre tract;

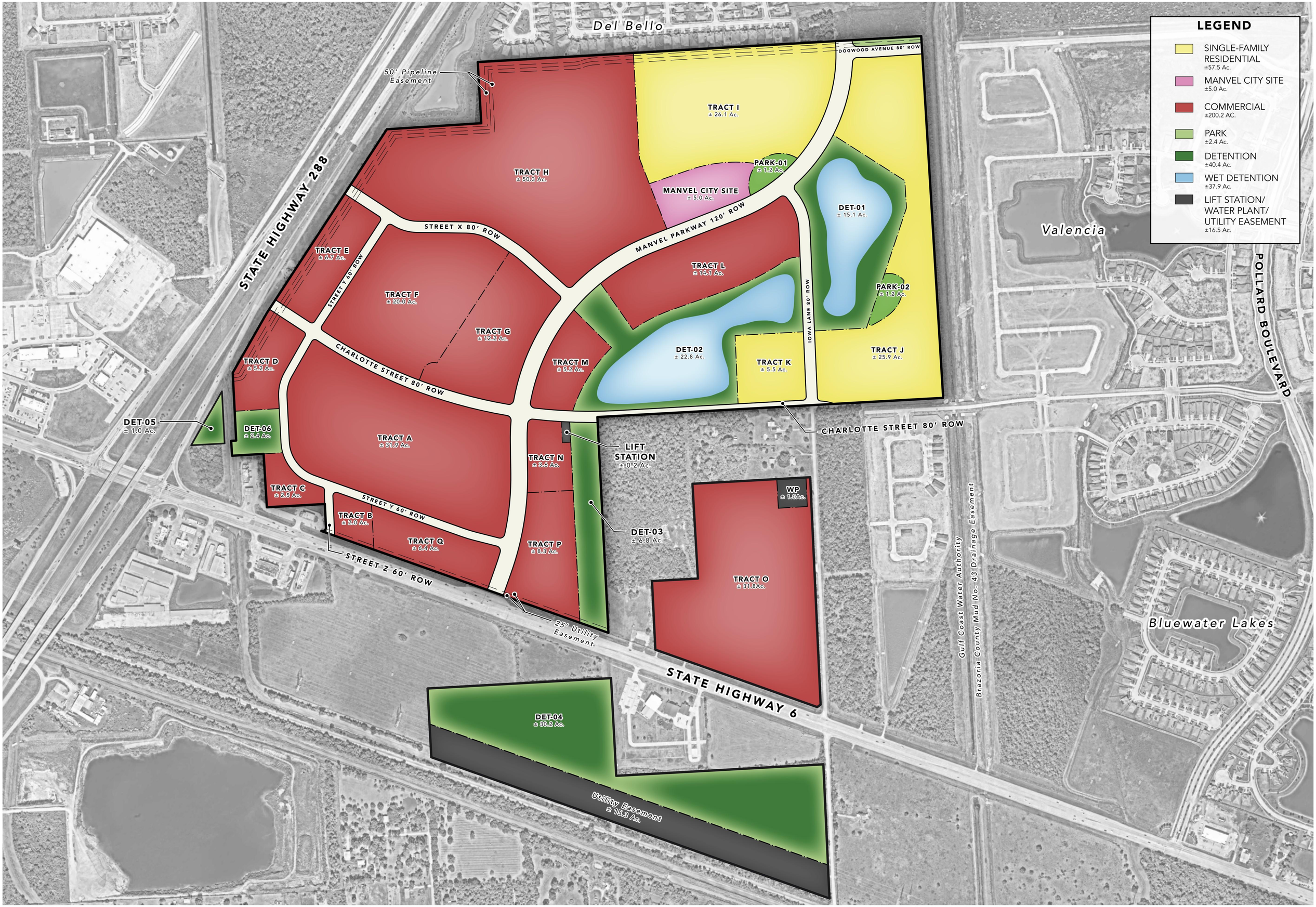
Thence North 86° 49' 27" East, 1487.21 feet with the south line of said 40.0 foot wide platted roadway (not open) and the north line of said 30.244 acre tract to the POINT OF BEGINNING and containing 45.548 acres of land."

Said Parts 1, 2, 3, 4, and 5 containing a total of 392.98 acres of land.

This document was prepared under 22 Texas Administrative Code § 138.95, does not reflect the results of an on the ground survey, and is not to be used to convey or establish interests in real property except those rights and interests implied or established by the creation or reconfiguration of the boundary of the political subdivision for which it was prepared.



LJA Surveying, Inc.



± 392.9 Ac. PRESIDIO - CONCEPTUAL LAND USE EXHIBIT

EXHIBIT E

LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

P:\01 Planning\1140-09004\02-City and Zoning\PUD Exhibits\1140-09004_Presidio Conceptual Land Use Plan_12.09.25.indd

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LEGEND

- PROPOSED LOCAL ROAD
- PROPOSED COLLECTOR ROAD
- EXISTING COLLECTOR ROAD
- PROPOSED MAJOR THOROUGHFARE
- EXISTING HIGHWAY

Del Bello

Valencia

Bluewater Lakes

STATE HIGHWAY 288

STATE HIGHWAY 6

POLLARD BOULEVARD

Gulf Coast Water Authority

Brazoria County Mud No. 43 Drainage Easement

50' Pipeline Easement

25' Utility Easement

DOGWOOD AVENUE 80' ROW

MANVEL PARKWAY 120' ROW

STREET X 80' ROW

STREET Y 60' ROW

CHARLOTTE STREET 80' ROW

IOWA LANE 80' ROW

STREET Z 60' ROW

TRACT A ± 31.9 Ac.

TRACT B ± 2.0 Ac.

TRACT C ± 2.5 Ac.

TRACT D ± 5.2 Ac.

TRACT E ± 6.7 Ac.

TRACT F ± 20.0 Ac.

TRACT G ± 12.2 Ac.

TRACT H ± 50.3 Ac.

TRACT I ± 26.1 Ac.

TRACT J ± 25.9 Ac.

TRACT K ± 5.5 Ac.

TRACT L ± 14.1 Ac.

TRACT M ± 5.2 Ac.

TRACT N ± 3.6 Ac.

TRACT O ± 31.8Ac.

TRACT P ± 8.3 Ac.

TRACT Q ± 6.4 Ac.

MANVEL CITY SITE ± 5.0 Ac.

PARK-01 ± 1.2 Ac.

PARK-02 ± 1.2 Ac.

DET-01 ± 15.1 Ac.

DET-02 ± 22.8 Ac.

DET-03 ± 6.8 Ac.

DET-04 ± 30.2 Ac.

DET-05 ± 1.0 Ac.

DET-06 ± 2.4 Ac.

LIFT STATION ± 0.2 Ac.

WP ± 1.0Ac.

Utility Easement ± 15.3 Ac.

± 392.9 Ac. PRESIDIO - CONCEPTUAL ROADWAY EXHIBIT

EXHIBIT F

0 100 200 400

LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

P:\01 Planning\1140-09004\02-City and Zoning\PUD Exhibits\1140-09004_Presidio PUD Exhibits_12.09.25.indd

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This exhibit is an illustrative representation for presentation purposes only and should not be used for computation or construction purposes. The information provided within should be considered a graphic representation to aid in visualization of the proposed development. Boundaries, dimensions, areas, locations of roadways, utilities, easements, road alignments, drainage, flood plains, environmental issues, and other information shown is approximate and should not be relied upon for any purpose. No warranties, express or implied, concerning the actual design, entering location, and character of the facilities shown on this exhibit are intended.



± 392.9 Ac. PRESIDIO - CONCEPTUAL AMENITIES AND OPEN SPACE EXHIBIT

EXHIBIT G

0 100 200 400

LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

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LEGEND

- PHASE 1
- PHASE 2

Del Bello

50' Pipeline Easement

DOGWOOD AVENUE 80' ROW

TRACT I
± 26.1 Ac.

TRACT H
± 50.3 Ac.

PARK-01
± 1.2 Ac.

MANVEL CITY SITE
± 5.0 Ac.

DET-01
± 15.1 Ac.

STATE HIGHWAY 288

STREET X 80' ROW

MANVEL PARKWAY 120' ROW

Valencia

POLLARD BOULEVARD

TRACT E
± 6.7 Ac.

STREET Y 60' ROW

TRACT F
± 20.0 Ac.

TRACT L
± 14.1 Ac.

PARK-02
± 1.2 Ac.

IOWA LANE 80' ROW

TRACT G
± 12.2 Ac.

CHARLOTTE STREET 80' ROW

TRACT M
± 5.2 Ac.

DET-02
± 22.8 Ac.

TRACT K
± 5.5 Ac.

TRACT J
± 25.9 Ac.

TRACT D
± 5.2 Ac.

DET-05
± 1.0 Ac.

DET-06
± 2.4 Ac.

TRACT A
± 31.9 Ac.

TRACT N
± 3.6 Ac.

LIFT STATION
± 0.2 Ac.

CHARLOTTE STREET 80' ROW

TRACT C
± 2.5 Ac.

STREET Y 60' ROW

TRACT B
± 2.0 Ac.

TRACT Q
± 6.4 Ac.

TRACT P
± 8.3 Ac.

DET-03
± 6.8 Ac.

WP
± 1.0Ac.

STREET Z 60' ROW

TRACT O
± 31.8Ac.

25' Utility Easement

Gulf Coast Water Authority

Brazoria County Mud No. 43 Drainage Easement

Bluewater Lakes

STATE HIGHWAY 6

DET-04
± 30.2 Ac.

Utility Easement
± 15.3 Ac.

± 392.9 Ac. PRESIDIO - PHASING EXHIBIT

EXHIBIT H

0 100 200 400

LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

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LEGEND

- RESIDENTIAL ENTRY SIGNAGE
- MULTI-TENENT HIGHWAY PYLON SIGN

*POSSIBLE SIGNAGE LOCATIONS. SUBJECT TO CHANGE

Del Bello

Valencia

Bluewater Lakes

STATE HIGHWAY 288

POLLARD BOULEVARD

DOGWOOD AVENUE 80' ROW

50' Pipeline Easement

TRACT I
± 26.1 Ac.

TRACT H
± 50.3 Ac.

PARK-01
± 1.2 Ac.

MANVEL CITY SITE
± 5.0 Ac.

DET-01
± 15.1 Ac.

MANVEL PARKWAY 120' ROW

STREET X 80' ROW

TRACT E
± 6.7 Ac.

STREET Y 60' ROW

TRACT L
± 14.1 Ac.

PARK-02
± 1.2 Ac.

TRACT F
± 20.0 Ac.

TRACT G
± 12.2 Ac.

IOWA LANE 80' ROW

TRACT D
± 5.2 Ac.

CHARLOTTE STREET 80' ROW

DET-02
± 22.8 Ac.

TRACT M
± 5.2 Ac.

TRACT K
± 5.5 Ac.

TRACT J
± 25.9 Ac.

DET-05
± 1.0 Ac.

DET-06
± 2.4 Ac.

TRACT A
± 31.9 Ac.

LIFT STATION
± 0.2 Ac.

TRACT N
± 3.6 Ac.

TRACT C
± 2.5 Ac.

STREET Y 60' ROW

TRACT B
± 2.0 Ac.

TRACT Q
± 6.4 Ac.

TRACT P
± 8.3 Ac.

DET-03
± 6.8 Ac.

WP
± 1.0Ac.

STREET Z 60' ROW

TRACT O
± 31.8Ac.

25' Utility Easement

STATE HIGHWAY 6

DET-04
± 30.2 Ac.

Utility Easement
± 15.3 Ac.

Gulf Coast Water Authority
Brazoria County Mud No. 43 Drainage Easement

± 392.9 Ac. PRESIDIO - CONCEPTUAL PROJECT SIGNAGE EXHIBIT

EXHIBIT I

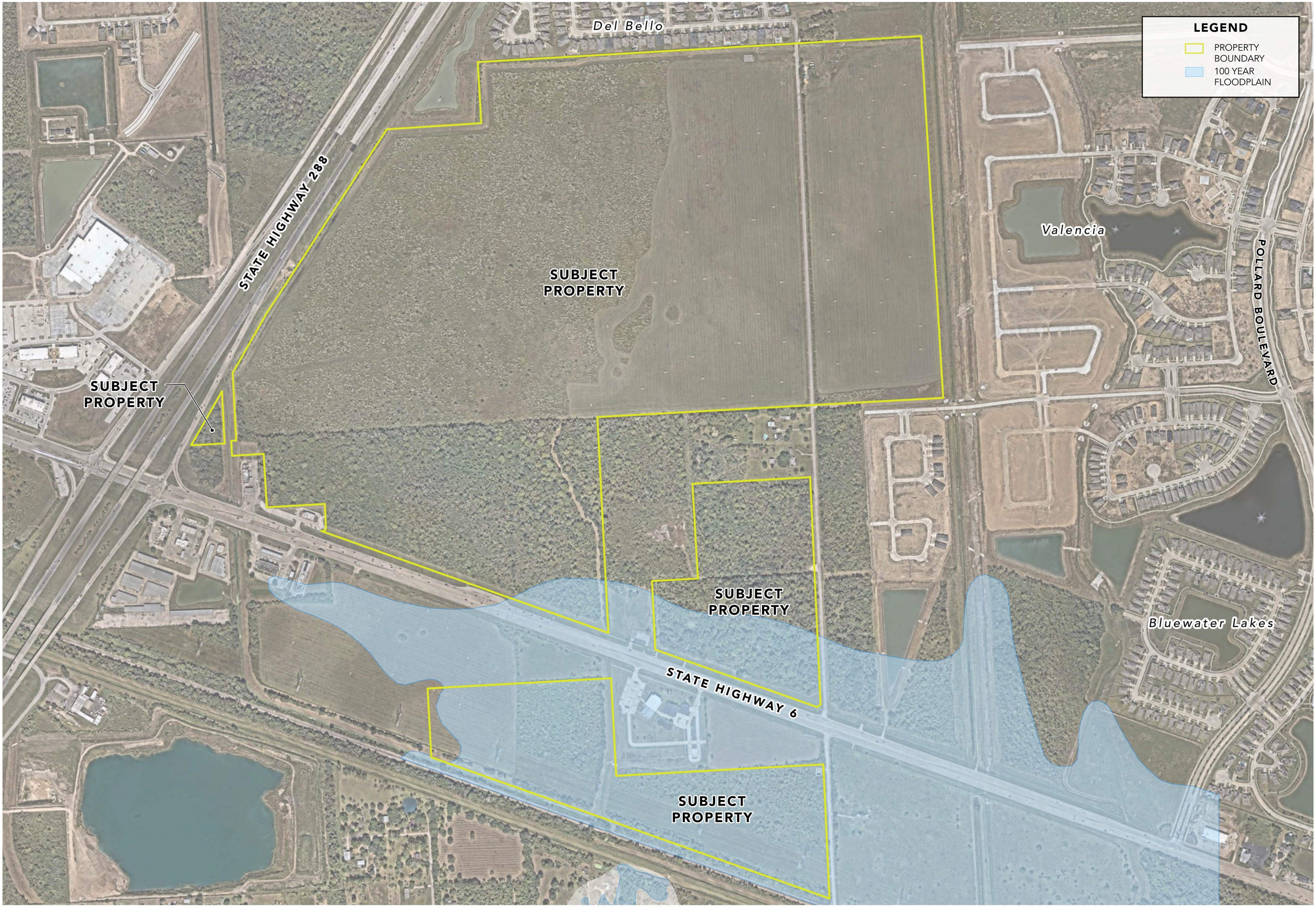
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LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

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± 392.9 Ac. PRESIDIO - 100 YEAR FLOODPLAIN EXHIBIT

EXHIBIT J

LOCATION: Manvel, Texas CLIENT: Diversified Real Estate Group DATE: May 13, 2026

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As requested, the following provides a high-level summary of the major differences between the previously approved O-PUD (2007) and the current Presidio PUD. The intent of the updated PUD is to maintain the original development vision while modernizing standards, improving flexibility, and aligning with current City regulations and market conditions.

Category	Previous O-PUD (2007)	Current PUD (2026)
Non-Residential Land Use	Included Pad, Office, and Hotel; Included Water Plan and Wastewater Treatment Plan; Included a Civic Center; Included Detention; included ROW	Includes traditional Commercial and Medical; Included Water Plan; included a Civic Center; Included Detention; Included ROW; NAICS tables included
Residential Land Use	Traditional Single Family with a minimum lot size of 60' and Urban Density Residential	Traditional Single Family ranging from 50' – 60' and removed Urban Density Residential
Parks & Open Space	6' trails along Manvel Parkway and Iowa Lane; No dedicated park space	A variety of trail sizes ranging from 6' to 12' along Manvel Parkway, Iowa Lane, Charlotte Street, and Street X; dedicated park space based on Manvel's current parks requirements
Signage Standards	Unified Signage program to be submitted separately and approved by City Council	Signage standards listed within the PUD
Landscaping & Buffering	No specific screening or buffering requirements	Clear landscaping, buffering, and screening requirements provided
SH6 Overlay District Compliance	Not addressed	Incorporates SH 6 Overlay requirements
Definitions	Limited or not included	Comprehensive definitions section added

Overall, the proposed Presidio PUD maintains the foundational vision of the original O-PUD while updating development standards to reflect current regulatory requirements, infrastructure planning, and market conditions.

Presidio PUD – Signage Ordinance Comparison

Sign Type / Requirement	Current City of Manvel Requirement	Proposed Presidio PUD Standard
Multi-Tenant Highway Pylon Signs	Not specifically addressed in current ordinance	SH 288: 50’ maximum height; SH 6: 40’ maximum height; 25’ maximum width
Multi-Tenant Highway Pylon Sign Quantity	Not specifically addressed in current ordinance	One sign permitted at each primary entrance along SH 288; up to three signs permitted along SH 6 frontage
Sign Setbacks Along SH 288 / SH 6	Standard ordinance setbacks apply	No setback required along SH 288 and SH 6 frontage
Off-Premise Signage	Prohibited	Permitted within Presidio for uses located in Tracts A, F, G, and H
Multi-Tenant Monument Sign Area	Maximum 50 square feet	Maximum 90 square feet (exclusive of development name)
Single-Tenant Monument Sign Area	Maximum 50 square feet	Maximum 50 square feet
Additional Single-Tenant Monument Signs	Standard ordinance quantity limitations apply	Commercial tracts with multi-tenant monument signs may also provide one single-tenant monument sign per tenant
Directional / Informational Signs	Directional or informational signs shall be no more than four feet in height with a maximum area per side of six square feet;	Up to six signs permitted; maximum 6’ in height and 18 SF per side
Wall Signs – Principal Entrance Elevation	Maximum 15% of business frontage or 200 SF	Maximum 15% of building elevation and 200 SF for buildings 30’ or less
Wall Signs – Public Street Frontage	Maximum 10% of business frontage or 150 SF	Buildings over 30’ may have wall signage up to 25% of building elevation and 400 SF
Wall Signs – Canopies	Maximum 10% per canopy side	Canopy signage permitted up to 50% of canopy face
Electronic Reader Boards / LED Screens	Subject to ordinance limitations	Prohibited along public ROW except at fuel stations; custom illumination standards added
Residential Entry Monumentation	Standard subdivision signage regulations apply	Custom primary, secondary, and village entry monument standards permitted

PRESIDIO PLANNED UNIT DEVELOPMENT DEVELOPMENT STANDARDS COMPARISON TABLE				
Subject	**City of Manvel Code of Ordinances Section**	**Code of Ordinances Regulation**	**Proposed**	**Variance**
Land Use Change	**N/A**	**N/A**	**Each land use category may be increased or decreased in acreage by up to ten (10) percent of the total gross acreage of that land use category.**	**No**
Zoning – Single Family Residential (SFR) District	**Sec. 77-28. - Single-family residential (SFR) district.**	**(b) Minimum lot size.** **(1) Minimum lot area is 6,300 square feet.** **(2) The minimum front lot width is 60 feet measured at the front setback line.** **(3) Minimum lot width for a cul-de-sac lot is 20 feet measured at the street edge and 60 feet measured at the setback line.** **(c) Setbacks, minimum.** **(1) Front yard: The minimum front yard setback shall be 25 feet.** **(2) Side yard: The minimum side yard setback shall be five feet.** **(3) Corner side yard: The minimum corner side yard setback shall be ten feet.** **(4) Rear yard: The minimum rear yard setback shall be 15 feet for the principal structure.** **(5) Accessory structure. The minimum side and rear yard setback shall**	**Lot Sizes and Standards:** **a. 50' lots:** **i. Minimum lot size area: 6,000 square feet** **ii. Minimum width – 50 feet (measured at the front yard setback)** **iii. Front yard setback – 20 feet minimum** **iv. Side yard setback – 5 feet minimum** **v. Corner side yard setback – 10 feet minimum** **vi. Garage Front yard setback – 25 feet minimum** **vii. Rear yard setback – 15 feet minimum** **viii. Building height – 40 feet maximum** **ix. Accessory building front setback – 20 feet minimum** **x. Accessory building corner setback – 10 feet minimum** **xi. Accessory building rear setback – equivalent to utility easement width or 5 feet (greater of the two)** **b. 60' lots:** **i. Minimum lot size area: 6,300 square feet** **ii. Minimum width – 60 feet (measured at the front building line)** **iii. Front yard setback – 20 feet minimum** **iv. Side yard setback – 5 feet minimum** **v. Corner side yard setback – 10 feet minimum** **vi. Garage Front yard setback – 25 feet minimum** **vii. Rear yard setback – 15 feet minimum** **viii. Building height – 40 feet maximum** **ix. Accessory building front setback – 20 feet minimum** **x. Accessory building corner setback – 10 feet minimum** **xi. Accessory building rear setback – equivalent to utility easement width or 5 feet (greater of the two)** **If the rear property line of a corner parcel abuts the side property line of a neighboring parcel, the street side setback of the corner parcel must be a minimum of 15 feet**	**Yes**

		be five feet and corner side setback shall be ten feet. Accessory structures shall not extend past the front line of the principal structure. (d) Parking. A minimum of one off-street parking space in an enclosed garage is required per dwelling unit. (e) Maximum building height. The maximum height of any building in the open-single-family residential district shall not exceed 40 feet measured from the finished grade to the highest point of the roof, not including ancillary structures such as chimneys. (f)Accessory dwelling unit (ADU). One accessory dwelling unit is allowed if all the requirements of section 77-37 are satisfied.		
Zoning – Light Commercial	Sec. 77-31. - Light-commercial (LC) district.	(b) *Minimum lot size.* (1) The minimum lot width is 60 feet measured at the setback line. (2) The minimum lot depth is 100 feet measured at the setback line. (c) Setbacks. (1) Minimum front yard setback is 25 feet.	a. Minimum lot width – 60 feet (measured at the front yard setback) b. Minimum lot depth – 100 feet c. Front yard setback – 10 feet minimum d. Rear yard setback – 10 feet minimum (Zero feet is adjacent to commercial/retail) e. Side yard setback – 10 feet minimum (Zero feet is adjacent to commercial/retail) f. Corner side yard setback – 10 feet minimum g. Building Height: i. Pad Site - No building may exceed thirty five feet in height. ii. Commercial Anchor Tenant- No building may exceed sixty feet in height	Yes

		(2) Minimum rear yard setback is ten feet. (3) Minimum side yard and corner side yard is five feet. (4) Accessory structure. A minimum side and rear yard setback of five feet and corner side setback of ten feet. Accessory structures shall not extend past the front line of the principal structure. (d) *Maximum building height.* The maximum height of any building in the light commercial district may not exceed 60 feet measured from the finished grade to the highest point of the roof, not including ancillary structures such as chimneys. (e) Open storage and display of new or used cars for sale shall only be permitted where in compliance with section 77-52.	

Permitted Land Uses	**Chapter 77-26 – Permitted Land Uses**	**See table in column adjacent**	
Signage	**Chapter 53 – Signs**	**See separate document for full details**	

Permitted		Permitted Status in Manvel Code under LC or SFR
NAICS Code	Classification	
	Single Family	P
311811	Retail Bakeries	P
4491	Furniture And Home Furnishing Stores	P
4492	Electronics And Appliance Stores	P
444	Building Material, Garden Equipment And Supplies Dealers	P
445	Food And Beverage Stores	P
4561	Health And Personal Care Stores	P
4571	1 Gasoline Station in association with a Grocer	S
458110	Clothing And Clothing Accessories Stores	P
459	Sporting Goods, Hobby, Book, And Music Stores	P
455	General Merchandise Stores	P
4599	Misc. Store Retailers	P
491110	Postal Service	P
52	Finance And Insurance	P
531	Real Estate	P
531120	Lessors Of Nonresidential Buildings (Except Mini Warehouses)	P
5322	Consumer Goods Rental	P
541	Professional, Scientific, And Technical Services	P
54121	Accounting, Tax Preparation, Bookkeeping And Payroll	P
54194	Veterinary Services	P
55	Management Of Companies And Enterprises	P
561	Administrative And Support Services	P
611710	Educational Support Services	P/S
624	Social Assistance	P
624410	Child Care Services	P
71	Arts, Entertainment, And Recreation	P
713940	Fitness And Recreational Sports Centers	P
722	Food Services	P
8112	Electronic And Precision Equipment Repair And Maintenance	P
811122	Automotive Glass Replacement Shop	P
812	Personal And Laundry Services	P
238	Specialty Trade Contractors	O
3231	Printing And Related Support	P
42	Wholesale	O
622110	Medical / Hospital Uses (Tract H Only)	S
445131	Convenience Retailers	S
811111	Automotive Repairs And Replacement Shops	S

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PRESIDIO
TRAFFIC IMPACT ANALYSIS

LJA Project No. 2013 - 2515

Bahareh Bakhtiari, PE, PTOE
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FRN-F-1386

March 2026

PRESIDIO
TRAFFIC IMPACT ANALYSIS



March 31, 2026

LJA Project No. 2013 - 2515

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March 2026

Executive Summary

This report presents the summary of findings for the Traffic Impact Analysis (TIA) prepared by LJA Engineering, Inc. (LJA) for the proposed Presidio development in Manvel, Texas. This development consists of a shopping center, multifamily housing, medical hospital, and single-family housing. The site for this development is located approximately 0.65 miles south of Del Bello Blvd and directly east of the intersection of SH 288 northbound entrance ramp and SH 6. The analyzed development is expected to be completed by 2030, therefore, the study horizon for this TIA is 2035. The objective of this study is to analyze the impacts of the traffic generated by the proposed development on the performance of the surrounding street network and to determine the required mitigation measures to address any resulting deficiencies.

Access to this development will be provided via two (2) proposed driveways along a new frontage road to be constructed parallel to the SH 288 northbound entrance ramp and three (3) along SH 6, the proposed Manvel Pkwy connection to SH 6, and existing Iowa Ln. Internal intersections within the development will also be analyzed in this study. An assumed speed of 45 mph was used along the proposed frontage road, based on conditions observed at the intersection of SH 288 frontage road and Broadway St located approximately five (5) miles north of the proposed development. This TIA also analyzes existing major intersections along SH 288, Del Bello Blvd and SH 6. In total, twenty (20) intersections were analyzed, existing and proposed.

Only the weekday AM and PM peak hour periods were analyzed in this TIA. The overall proposed development is expected to externally generate 52,027 daily vehicle trips with 2,274 vehicle trips during the AM peak hour period and 4,691 vehicle trips during the PM peak hour period.

An average annualized growth rate of five (5) percent was calculated by comparing the 2020 traffic volumes to the projected 2045 traffic volumes in the Houston-Galveston Area Council (H-GAC) Travel Demand Models. This growth rate was applied to the 2025 traffic volumes in order to determine the future traffic volumes without the proposed development generated traffic (Future No Build conditions). The No Build conditions will also include the background volume data from the Valencia Development and the City Center for Manvel project. The traffic that would be generated by this proposed development was then added to the No Build conditions to establish the future 2030 Build conditions.

Intersection Capacity Analyses were completed for major intersections within the study area. Mitigation measures for this TIA require that when the LOS without development is LOS A, B, C or D, the minimum acceptable projected LOS shall be LOS D, and when the LOS without development is LOS E or F, the minimum acceptable projected LOS shall be equal to the LOS without development.

Right and left turn lane analyses were completed along Del Bello Blvd, SH 6, and Manvel Pkwy at the proposed driveways, using the Texas Department of Transportation (TxDOT) Access Management Manual and National Cooperative Highway Research Program (NCHRP) 457 requirements for right and left turn deceleration lanes. Based on the analysis, various right and left turn lanes warrant along the driveways of SH 288 northbound frontage road, Del Bello Blvd, Manvel Pkwy, and SH 6.

A Traffic Signal Warrant Analysis (TSWA) was completed for the intersections of SH 6 at Iowa Lane and Manvel Pkwy at Charlotte St under Future Build conditions. Under Future Build conditions, the 8-hour and 4-hour warrant are met at all intersections. A TSWA was also completed for the intersections of Del Bello Blvd at Manvel Pkwy and SH 288 ramps at Rodeo Palms/Del Bello Blvd for the No Build conditions. Under No Build conditions the 8-hour and 4-hour warrant are met at all intersections.

Recommendations

The improvements that will be required to successfully accommodate the traffic that will be generated by the proposed **Presidio development** are listed below:

Please Be Advised: The City Center Development was included in this TIA as background traffic data at the city's request. Based on the analysis, three intersections are expected to operate at failing conditions under No-Build conditions due to background data. It is our understanding that, since the city requested this information to be included as background, the City Center Development is expected to occur prior to the proposed development. Since these issues are expected to occur before the Presidio development, the Presidio developer is not responsible for constructing these signals at these locations, however they are included in the analysis. Based on the traffic analysis these are the three intersections:

- SH 288 SB exit ramp and Rodeo Palms Pkwy
- SH 288 NB exit ramp and Del Bello Blvd
- Del Bello Blvd and Manvel Pkwy

Please Note: When the second lane of Manvel Pkwy is constructed by the Del Bello MUD, the left and right turn lanes need to be reanalyzed by the City Center Development as part of the City Center analysis at Del Bello Blvd and Manvel Pkwy.

The developer is responsible for the improvements shown below:

- **SH 6 and Pollard Blvd:**
  - Update signal timings (Done by TxDOT)
- **SH 6 and Iowa Ln:**

  The following three (3) mitigation measures for this intersection are required due to traffic generated by Tracts K and L, which create the need for a signal; these improvements should be implemented once Tracts K and L are fully constructed by the year 2030.

  - Construct a signal at this intersection.
  - Construct a southbound left turn lane along Iowa Ln that consists of 335' of storage length and a 100-foot taper.
  - Construct a westbound right turn lane along SH 6 that consists of 250' of storage length, 340' of deceleration length and a 100-foot taper.

  Freeway segments were evaluated using density parameters, and conditions are expected to remain acceptable. However, it is recommended that the posted speed limit along this section of SH 6 be reevaluated due to the addition of multiple new driveways, which increase turning movements and potential conflict points. To improve corridor safety, we recommend based on a review of similar density and corridor conditions within the vicinity of SH 6 and I-69/US 59, where the speed limit is reduced to 45 mph due to increased access points and higher potential for conflicts. Therefore, a lower speed limit would better reflect future conditions and help improve safety for all users.

- **SH 6 and Manvel Pkwy:**
    - Update signal modification due to the connection of Manvel Pkwy, e.g. new signal design, optimization of new signal turn types, addition of signal heads for the southbound approach, removal and reconstruction of the existing median and shoulder along the westbound approach.
    - Restripe the existing eastbound only U-turn lane to left turn lane.
    - Construct 2 dual southbound left turn lanes.
    - Construct a westbound right turn lane along SH 6 that consists of 430' of storage length, 340' of deceleration length and a 100-foot taper.

      Freeway segments were evaluated using density parameters, and conditions are expected to remain acceptable. However, it is recommended that the posted speed limit along this section of SH 6 be reevaluated due to the addition of multiple new driveways, which increase turning movements and potential conflict points. To improve corridor safety, we recommend based on a review of similar density and corridor conditions within the vicinity of SH 6 and I-69/US 59, where the speed limit is reduced to 45 mph due to increased access points and higher potential for conflicts. Therefore, a lower speed limit would better reflect future conditions and help improve safety for all users.

- **Manvel Pkwy and Driveway 1:**
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 110' of storage length (95th Queue), and a 100-foot taper.
    - Construct a southbound right turn lane along Manvel Pkwy that consists of 190' of storage length (95th Queue), and a 100-foot taper.
    - Construct an eastbound right turn lane along Driveway 1 that consists of 265' of storage length (95th Queue), and a 100-foot taper.

- **Manvel Pkwy and Charlotte St:**
    - Construct a signal at this intersection.
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a northbound right turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a southbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct an eastbound left turn lane along Charlotte Street that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a westbound left turn lane along Charlotte Street that consists of 100' of storage length (95th Queue), and a 100-foot taper.

- **Manvel Pkwy and Driveway 2:**
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue) and a 100-foot taper.
    - Construct an eastbound left turn lane along Driveway 2 that consists of 100' of storage length (95th Queue) and a 100-foot taper.

      Please Note: Driveway 2 will be a 3-lane roadway with one lane in each direction and a center two-way left turn lane (TWLTL).

- **Driveway 2 and Driveway 3:**
    - Construct an eastbound left turn lane along Driveway 2 that consists of 100' of storage length (95th Queue) and a 100-foot taper.
    - Construct a westbound left turn lane along Driveway 2 that consists of 100' of storage length (95th Queue) and a 100-foot taper.

      Please Note: Driveway 2 will be a 3-lane roadway with one lane in each direction and a center two-way left turn lane (TWLTL).

- **Driveways 1 & 3 and Charlotte St**
    - Construct a northbound left turn lane along Driveway 1 that consists of 100' of storage length (95th Queue) and a 100-foot taper.
    - Construct a southbound left turn lane along Driveway 3 that consists of 100' of storage length (95th Queue) and a 100-foot taper.

- **SH 288 NB Frontage Road and Charlotte St:**
    - Construct a northbound right turn lane along SH 288 northbound frontage road that consists of 120' storage length (95th Queue), 340' of deceleration length and a 100-foot taper.

- **SH 288 NB Frontage Road and Driveway 2:**
    - Construct a northbound right turn lane along SH 288 northbound frontage road that consists of 230' storage length (95th Queue), 340' of deceleration length and a 100-foot taper.

- **SH 288 NB Frontage Road and SH 6:**
    - Update signal timings (Done by TxDOT).

- **SH 288 SB Exit Ramp and SH 6:**
    - Update signal timings (Done by TxDOT).

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Introduction

This report presents the summary of findings for the Traffic Impact Analysis (TIA) prepared by LJA Engineering, Inc. (LJA) for the proposed Presidio development in Manvel, Texas. This development consists of a shopping center, multifamily housing, medical hospital, and single-family housing. The site for this development is located approximately 0.65 miles south of Del Bello Blvd and directly east of the intersection of SH 288 NB Entrance Ramp and SH 6. The analyzed development is expected to be completed by 2030. The objective of this study is to analyze the impacts of the traffic generated by the proposed development on the performance of the surrounding street network and to determine the required mitigation measures to address any resulting deficiencies. **Figure 1** shows the vicinity map and the existing street network within the study area. **Appendix A** provides a preliminary site plan of the proposed development.

Existing Area Conditions

The study area for this TIA includes the street network located within one mile from the proposed development's access points. Existing lane configurations are presented in **Figure 2.**

Table 1: Roadway Conditions

Street Name	Functional Class	Existing Roadway Cross Section	Posted Speed (MPH)
SH 6	Arterial	6-lane divided	60
Iowa Ln	Collector	2-lane undivided	30
Pollard Blvd	Collector	4-lane divided	30
Del Bello Blvd	Collector	4-lane divided	35
Rodeo Palms Pkwy	Collector	4-lane divided	35
SH 288	Arterial	4-lane divided	55

13-hour traffic volume data was collected on August 26, 2025. 13-hour volumes were used to determine the AM and PM peak periods of traffic. Pedestrian volumes were determined to be low and were not considered in this study. **Figure 3** shows the existing traffic volumes which were collected within the study area. Collected traffic volumes are presented in **Appendix B**.

Proposed Area Conditions

Access to this development will be provided via two proposed driveways along a new frontage road to be constructed parallel to the SH 288 northbound entrance ramp and three along SH 6, the proposed Manvel Pkwy connection to SH 6, and existing Iowa Ln. Internal intersections within the development will also be analyzed in this study. An assumed speed of 45 mph was used along the proposed frontage road, based on conditions observed at the intersection of SH 288 frontage road and Broadway St located approximately 5 miles north of the proposed development. This TIA also analyzes existing major intersections along SH 288, Del Bello Blvd and SH 6. In total, twenty (20) intersections were analyzed, existing and proposed.

Table 2: Intersection Distance			
Intersection	**Reference Point**	**Distance (ft)**	**Direction / Note**
Driveway 1	Build Exhibit (Bubble #4)	500 ft	North of SH 6 & Manvel Pkwy
Driveway 2	Build Exhibit (Bubble #5)	560 ft	North of Driveway 1
Driveway 3	Build Exhibit (Bubble #6)	700 ft	North of Charlotte St
Driveway 4	Build Exhibit (Bubble #9)	1250 ft	West of Driveway 2 and Manvel Pkwy
Driveway 5	Build Exhibit (Bubble #10)	1300 ft	West of the intersection of Charlotte St and Manvel Pkwy
Driveway 6	Build Exhibit (Bubble #11)	1820 ft	West of the intersection of Charlotte St and Manvel Pkwy
Driveway 7	Build Exhibit (Bubble #12)	1600 ft	West of the intersection of Driveway 2 and Manvel Pkwy
Driveway 8	Build Exhibit (Bubble #17)	1000 ft	West of Intersection of SH 6 and Manvel Pkwy
Driveway 9	Build Exhibit (Bubble #18)	1060 ft	West of Intersection of Driveway 1 and Manvel Pkwy
Driveway 10	Build Exhibit (Bubble #19)	1310 ft	East of SH 6 and Manvel Pkwy
Driveway 11	Build Exhibit (Bubble #20)	2050 ft	East of SH 6 and Manvel Pkwy

Within the area two (2) projects were considered for background traffic, the Valencia Development and the proposed City Center for Manvel project. The Valencia Development report created by LJA engineering is currently under construction and consists of residential development which will connect to Del Bello Blvd. Therefore, the trip generated volumes for the Valencia Development were included in the No Build and Build conditions. The proposed City Center for Manvel project report was created by Voigt Associates, however the site plan analyzed has changed. With the new site plan that was provided by the City of Manvel, an updated trip generation was established and distributed based on the same distribution on the report. The newly generated trips that were calculated were then used as background traffic volumes and included in the No Build and Build conditions. Furthermore, it is our understanding that, since the city requested this information to be included as background, the City Center Development is expected to occur prior to the proposed development. Since the City Center Development is expected to occur before the proposed Presidio development, the developer is not responsible for constructing these signals at the locations of SH 288 southbound exit ramp at Rodeo Palms Pkwy, SH 288 northbound exit ramp at Del Bello Blvd, and Del Bello Blvd at Manvel Pkwy. Additionally, the recommendations for each project were incorporated into this study for both the No Build and Build Conditions. The combined trips from the Valencia Development and City Center for Manvel project are shown in **Figure 4.**

VICINITY MAP
MANVEL, TEXAS

CROIX ROAD

PROJECT LOCATION

DEL BELLO BLVD

SH 288

SH 6

RODEO PALMS PKWY

STOP

DEL BELLO BLVD

MANVEL PKWY

DOGWOOD AVE

PROPOSED DEVELOPMENT

SH 288 NB

SH 6

CHARLOTTE STREET

SH 288 SB

SH 6

POLLARD BLVD

N

NOT TO SCALE

LEGEND

PROPOSED DEVELOPMENT

STOP CONTROLLED INTERSECTION

SIGNALIZED INTERSECTION

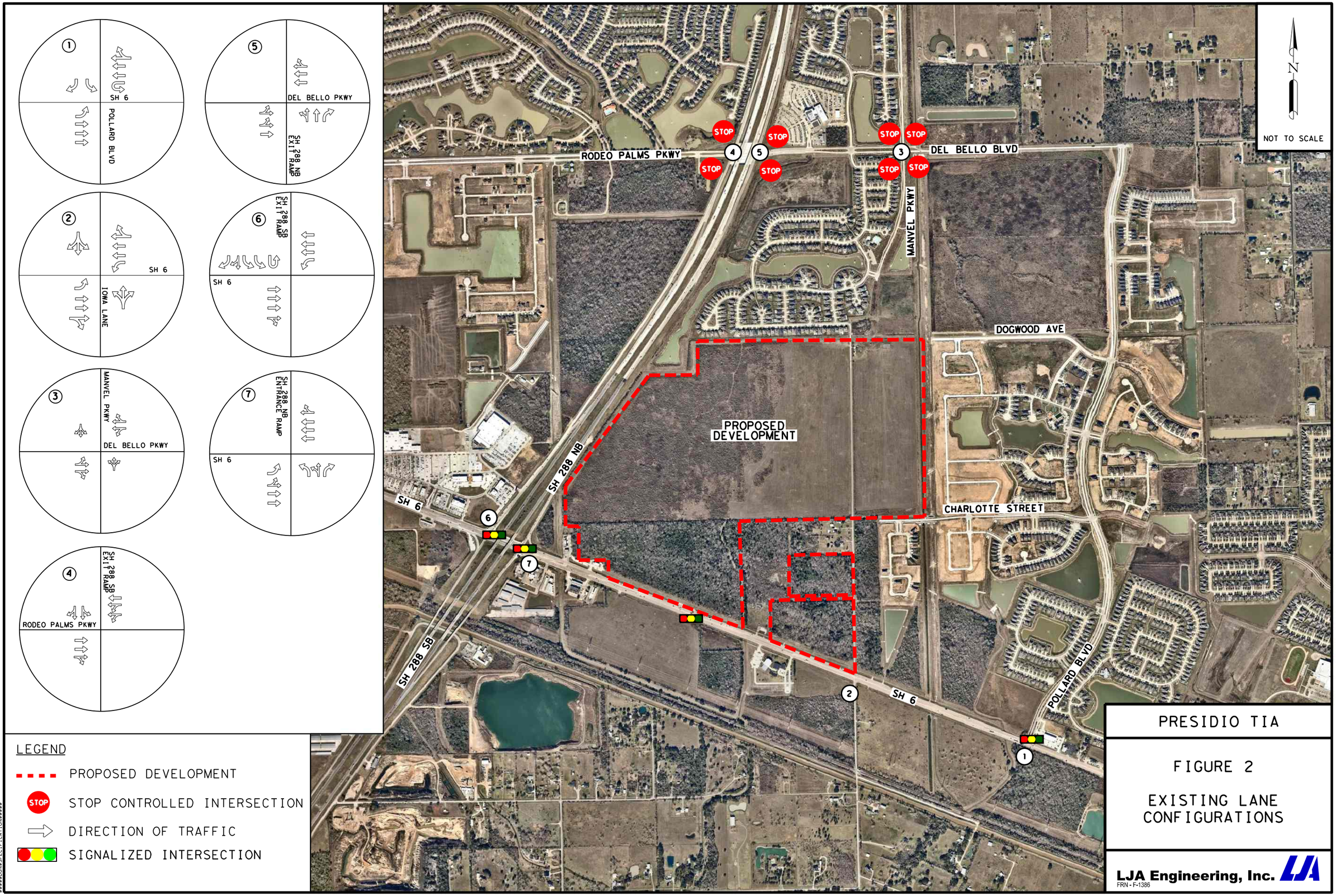
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PRESIDIO TIA

FIGURE 1

STUDY AREA CONDITIONS

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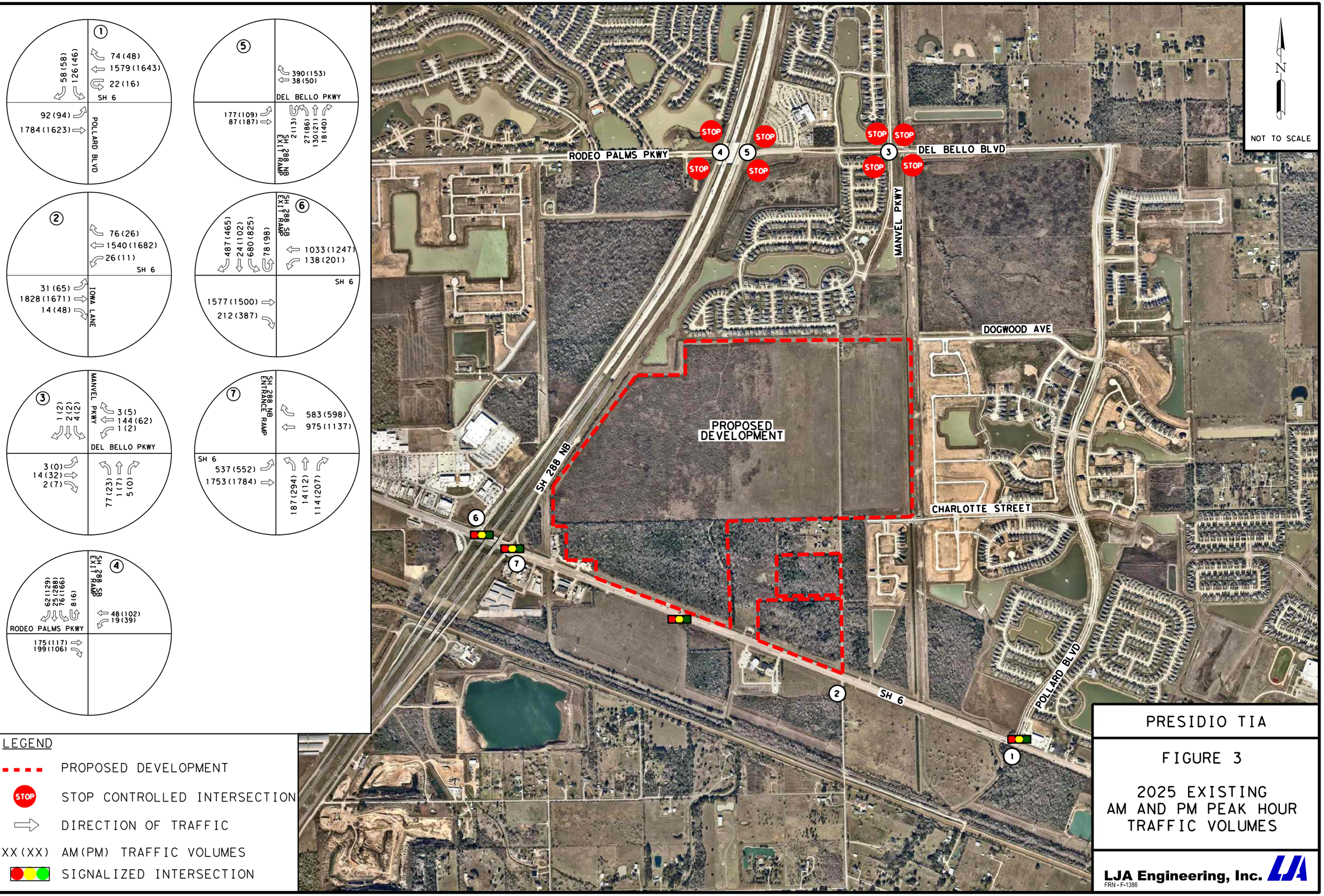
PRESIDIO TIA

FIGURE 2

EXISTING LANE CONFIGURATIONS

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$$$$$$SYSTIME$$$$$$ $DATE$
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LEGEND

- PROPOSED DEVELOPMENT
- STOP — STOP CONTROLLED INTERSECTION
- DIRECTION OF TRAFFIC
- XX (XX) — AM (PM) TRAFFIC VOLUMES
- SIGNALIZED INTERSECTION

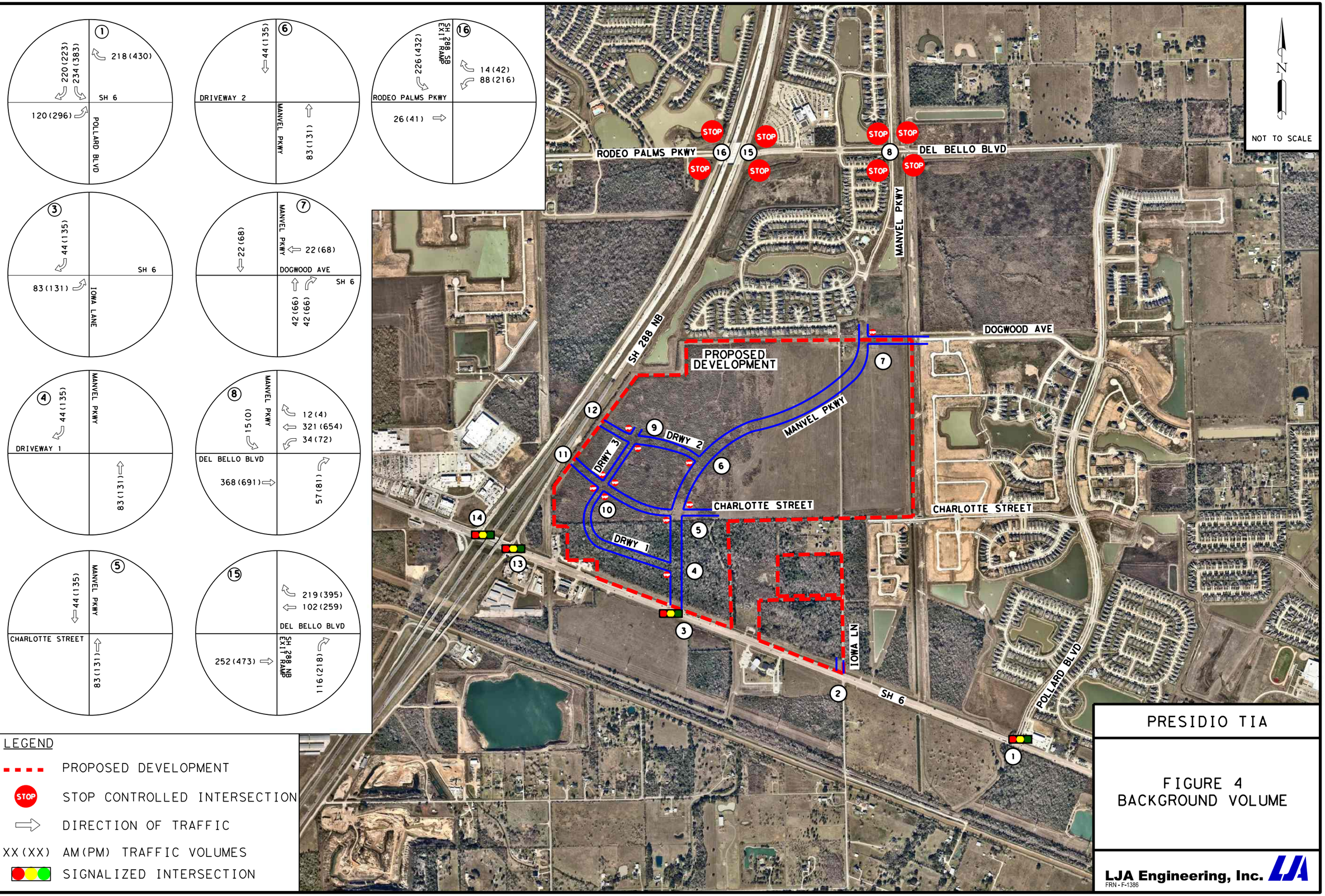
PRESIDIO TIA

FIGURE 3

2025 EXISTING
AM AND PM PEAK HOUR
TRAFFIC VOLUMES

LJA Engineering, Inc.
FRN - F-1386

$$$$$$SYSTIME$$$$$ $DATE$
$$$$$$DONOTSPECIFICATION$$$$$$



LEGEND

- PROPOSED DEVELOPMENT
- STOP CONTROLLED INTERSECTION
- DIRECTION OF TRAFFIC
- XX (XX) AM (PM) TRAFFIC VOLUMES
- SIGNALIZED INTERSECTION

PRESIDIO TIA

FIGURE 4
BACKGROUND VOLUME

LJA Engineering, Inc.
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$$$$$$SYSTIME$$$$$ $DATE$
$$$$$DON$SPECIFICATION$$$$$

Methodology

In order to evaluate the traffic impacts of the proposed development on the surrounding street network, future traffic conditions were analyzed without (No Build) and with (Build) the development's generated traffic. After the future Build conditions were analyzed, mitigation measures were established in order to address any resulting deficiencies in the performance of the surrounding street network. The AM and PM peak hours were analyzed at the proposed intersections for each of the Existing, No Build, Build and Mitigation conditions. A total of ten (10) conditions were analyzed for this study:

- 2025 Existing AM Conditions
- 2025 Existing PM Conditions
- 2030 No Build AM Conditions
- 2030 No Build PM Conditions
- 2030 Build AM Conditions
- 2030 Build PM Conditions
- 2030 Mitigation AM Conditions
- 2030 Mitigation PM Conditions
- 2030 Horizon AM Conditions
- 2030 Horizon PM Conditions

Trip Growth

An average annualized growth rate of five (5) percent was calculated from the Houston-Galveston Area Council (H-GAC) traffic projection modules. The growth rate was applied to the 2025 traffic volumes in order to determine the future traffic volumes without the proposed development generated traffic (2030 No Build conditions). Background traffic was then added to the 2030 No Build conditions. The traffic that would be generated by this proposed development was then added to the 2030 No Build conditions to establish the future 2030 Build conditions. **Figure 5** shows the future No Build traffic volumes for the year 2030.

Trip Generation

The amount of traffic a proposed development will generate depends on a number of factors including the nature, size, and location of the proposed development. The Trip Generation Manual, 12th Edition which is published by the Institute of Transportation Engineers (ITE) is a compilation of trip generation studies that have been performed at various sites throughout the United States. Standard engineering practice dictates the use of this manual to determine the amount of entering and exiting traffic a proposed development will generate during the peak hours of traffic by using rates or equations provided in the manual for various types of developments. **Table 3** shows the amount of traffic which will be generated by this proposed development. Trip generation calculations are presented in **Appendix C**.

Table 3: Vehicle Trips Generated by the Proposed Development

Land Use	ITE	Daily Trips (vpd)			AM Peak Trips (vph)			PM Peak Trips (vph)		
	Code	In	Out	Total	In	Out	Total	In	Out	Total
Shopping Center (>150K)	820	15939	15939	31878	478	293	771	1399	1457	2856
Multi-Family Housing (Low Rise)	220	1056	1055	2111	33	106	139	110	67	177
Hospital + Bed Tower	610	2942	2942	5885	295	140	434	161	312	473
Surgery	610	535	535	1070	54	25	79	29	57	86
HAL	630	3760	3760	7520	446	104	550	213	521	734
Single Family Detached Housing	210	1782	1781	3563	74	200	274	226	139	365
Total		**26,014**	**26,012**	**52,027**	**1,380**	**868**	**2,247**	**2,138**	**2,553**	**4,691**

The overall proposed development is expected to generate 52,027 daily vehicle trips with 2,247 vehicle trips during the AM peak hour period and 4,691 vehicle trips during the PM peak hour period.

Trip Distribution and Assignment

Peak hour trips generated by the proposed development were distributed to the entrances and exits of the surrounding roadway network based on the expected traffic patterns within the study area. Generated traffic volumes were assigned to the study street network according to the routes that provide the shortest travel distance to their corresponding origins/destinations. Trip distribution and assignment percentages are shown in **Figure 6**. Generated vehicle trips are presented in **Figure 7**. Generated vehicle trips were then added to the No-Build traffic to determine the Build traffic volumes. **Figure 8** shows the total traffic volumes which are projected within the study area following the completion of this development (Build conditions).

Internal Capture

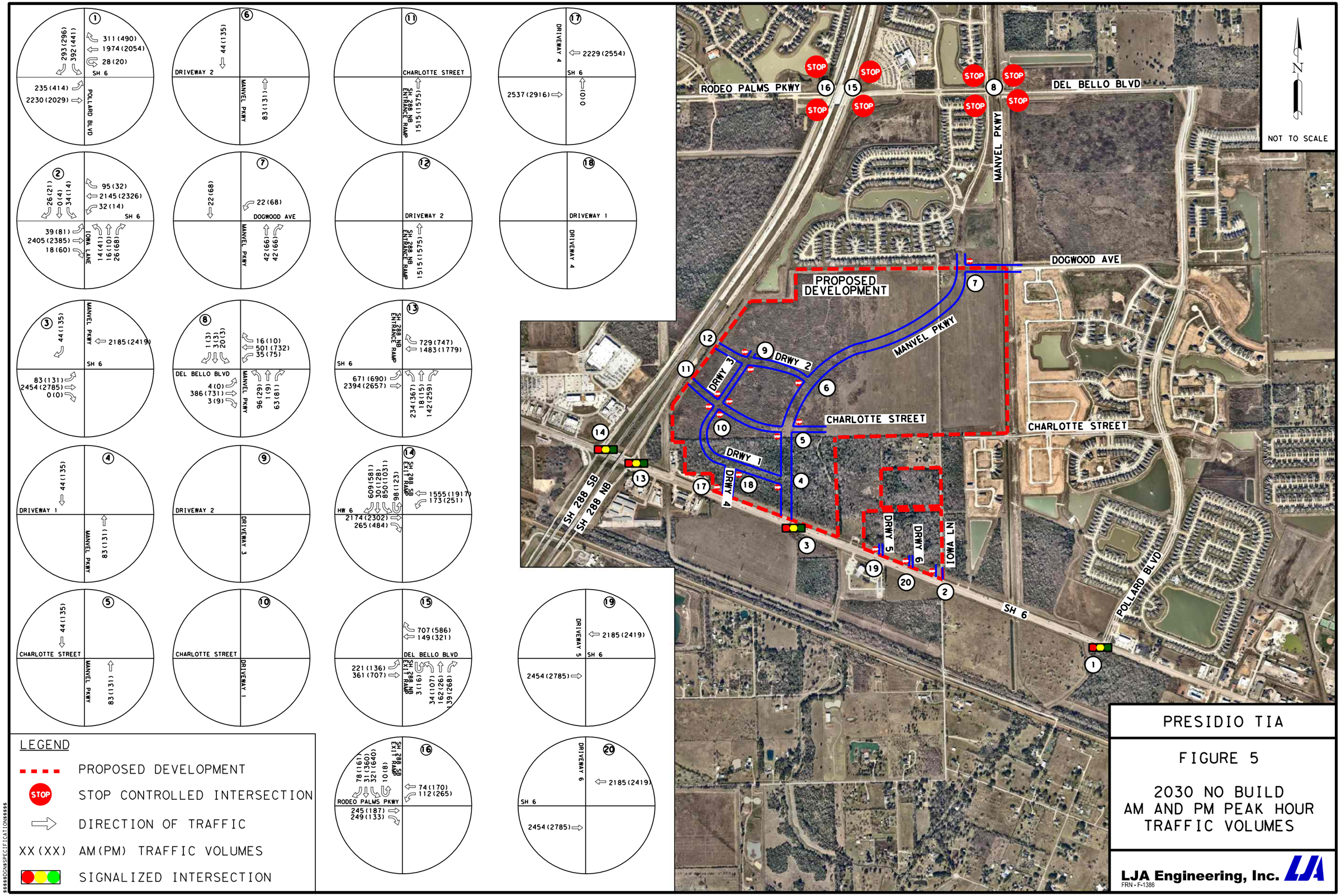
Internal Capture only applies to certain types of developments. These types of developments are presented in the Trip Generation Manual 12th Edition, which is published by the Institute of Transportation Engineers (ITE). Internal capture was not applied to the proposed development.

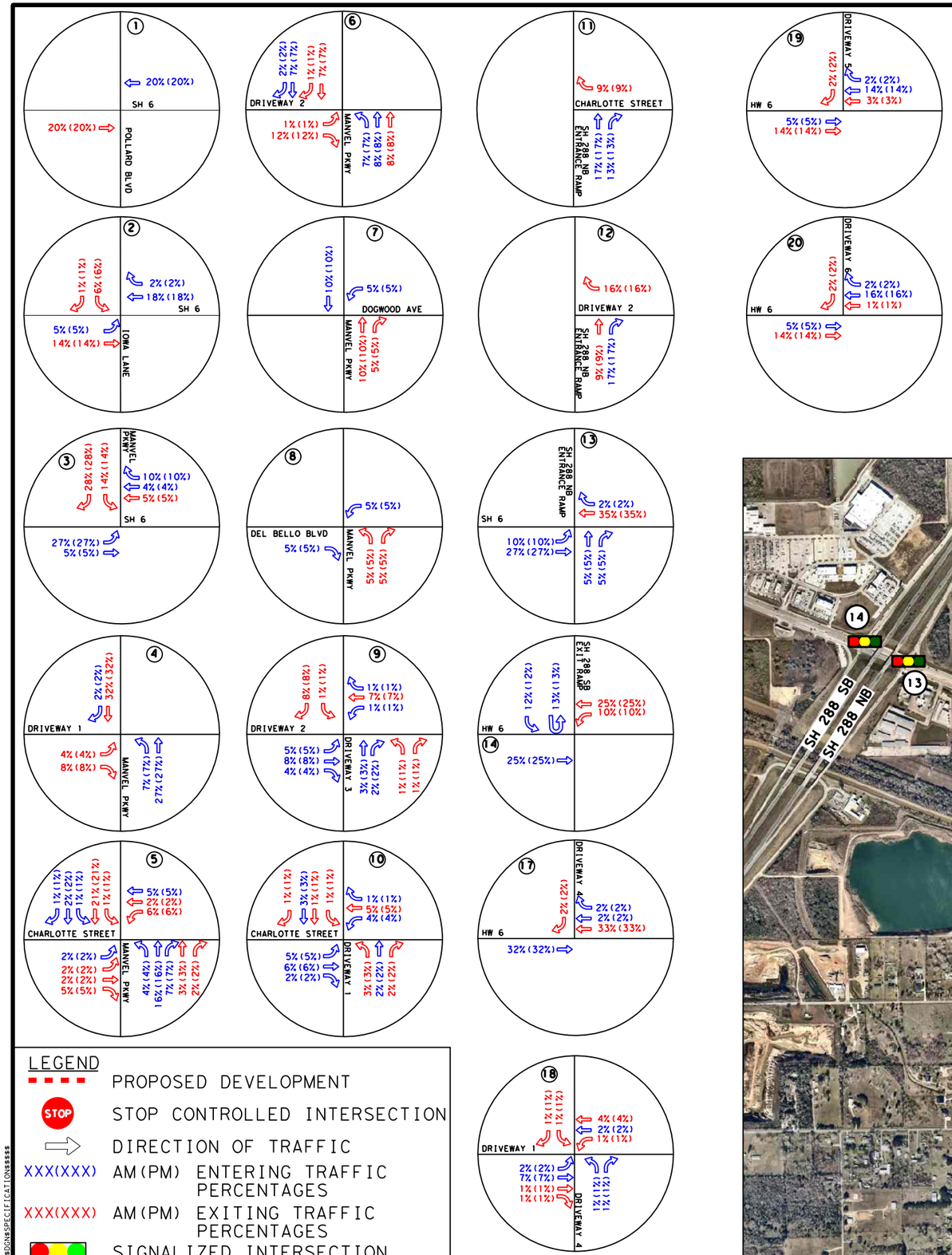
Pass-by Reduction

The total external trips of the generated traffic may be reduced by a Pass-by Reduction factor to account for the projected traffic that is already traveling along the roadways adjacent to the proposed development. Pass-by Reduction methodologies are established by the Institute of Transportation Engineers (ITE) and only apply to certain types of development. Pass-by reduction does not apply to this type of development and was not considered in this analysis.

Modal Split

This study assumed that all existing private vehicular trips would continue to be made as private vehicular trips. In order to be conservative in the determination of the development impacts on the adjacent street network, no credit was taken for mass transit and carpooling.


1
311 (490)
1974 (2054)
28 (20)
SH 6
293 (296)
392 (441)
235 (414)
2230 (2029)
POLLARD BLVD
2
95 (32)
2145 (2326)
32 (14)
SH 6
26 (21)
0 (4)
34 (14)
39 (81)
2405 (2385)
18 (60)
IOWA LANE
14 (41)
16 (10)
26 (68)
3
44 (135)
2185 (2419)
MANVEL PKWY
SH 6
83 (131)
2454 (2785)
0 (0)
4
44 (135)
DRIVEWAY 1
MANVEL PKWY
83 (131)
5
44 (135)
CHARLOTTE STREET
MANVEL PKWY
83 (131)
6
44 (135)
DRIVEWAY 2
MANVEL PKWY
83 (131)
7
22 (68)
DOGWOOD AVE
22 (68)
MANVEL PKWY
42 (66)
42 (66)
8
1 (3)
3 (3)
20 (13)
DEL BELLO BLVD
16 (10)
501 (732)
35 (75)
MANVEL PKWY
4 (0)
386 (731)
3 (9)
96 (29)
1 (9)
63 (81)
9
DRIVEWAY 2
DRIVEWAY 3
10
CHARLOTTE STREET
DRIVEWAY 1
11
CHARLOTTE STREET
SH 288 NB EXIT RAMP
1515 (1575)
12
DRIVEWAY 2
SH 288 NB ENTRANCE RAMP
1515 (1575)
13
SH 288 NB ENTRANCE RAMP
729 (747)
1483 (1779)
SH 6
671 (690)
2394 (2657)
234 (367)
18 (15)
142 (259)
14
SH 288 SB EXIT RAMP
1555 (1917)
173 (251)
609 (581)
351 (283)
850 (1031)
98 (123)
HW 6
2174 (2302)
265 (484)
15
707 (586)
149 (321)
DEL BELLO BLVD
SH 288 NB EXIT RAMP
221 (136)
361 (707)
3 (16)
34 (107)
162 (26)
139 (268)
16
SH 288 SB EXIT RAMP
78 (161)
31 (360)
321 (640)
10 (8)
74 (170)
112 (265)
RODEO PALMS PKWY
245 (187)
249 (133)
17
DRIVEWAY 4
2229 (2554)
SH 6
2537 (2916)
0 (0)
18
DRIVEWAY 1
DRIVEWAY 4
19
DRIVEWAY 5
2185 (2419)
SH 6
2454 (2785)
20
DRIVEWAY 6
2185 (2419)
SH 6
2454 (2785)
LEGEND
PROPOSED DEVELOPMENT
STOP CONTROLLED INTERSECTION
DIRECTION OF TRAFFIC
XX (XX) AM (PM) TRAFFIC VOLUMES
SIGNALIZED INTERSECTION
STOP
RODEO PALMS PKWY
DEL BELLO BLVD
MANVEL PKWY
DOGWOOD AVE
PROPOSED DEVELOPMENT
CHARLOTTE STREET
CHARLOTTE STREET
DRWY 1
DRWY 2
DRWY 3
DRWY 4
DRWY 5
DRWY 6
IOWA LN
SH 288 SB
SH 288 NB
SH 6
POLLARD BLVD
NOT TO SCALE
PRESIDIO TIA
FIGURE 5
2030 NO BUILD
AM AND PM PEAK HOUR
TRAFFIC VOLUMES
LJA Engineering, Inc.
FRN - F-1386
$$$$$$SYSTIME$$$$$$ $DATE$
$$$$$$DGNSPECIFICATION$$$$$$

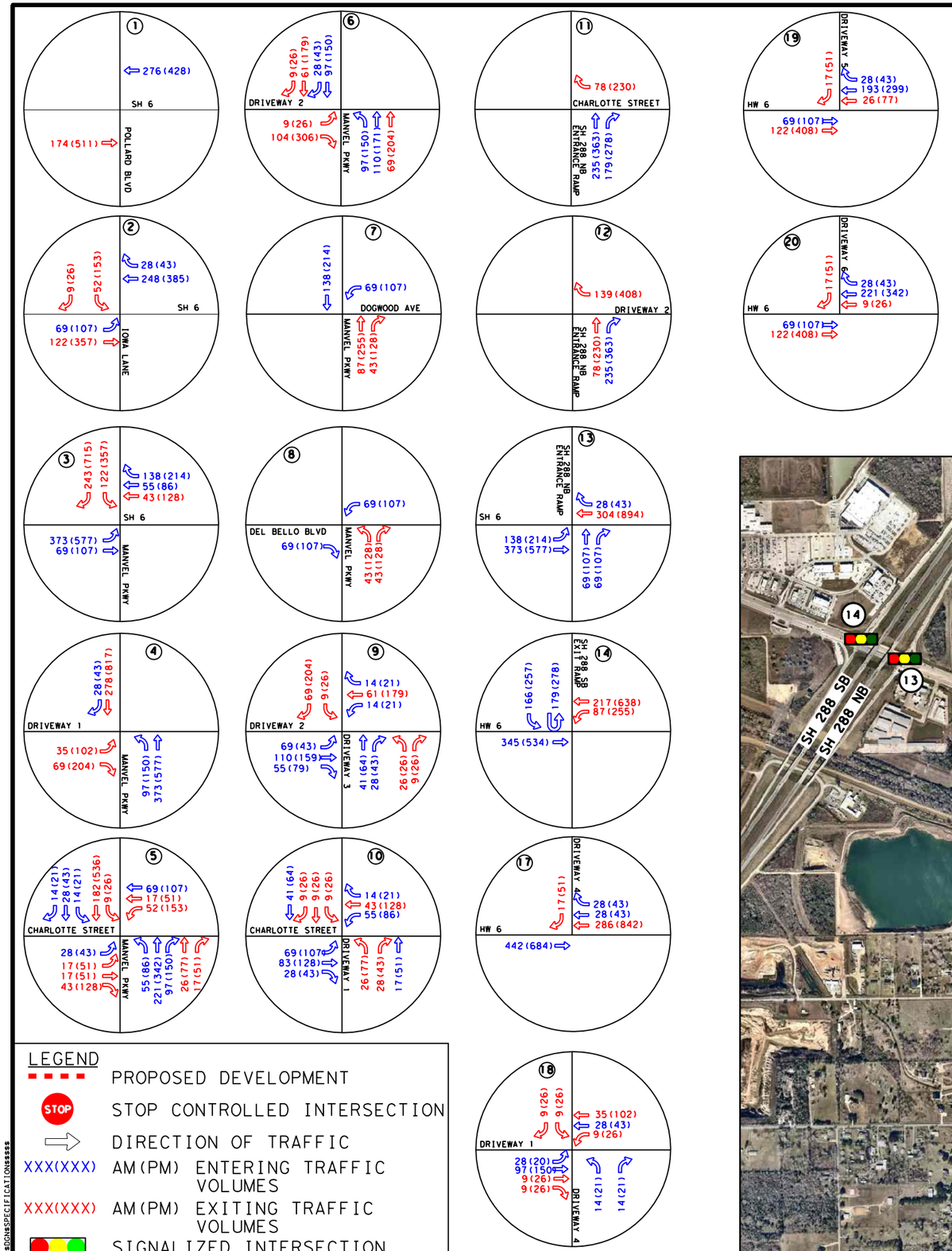


PRESIDIO TIA

FIGURE 6

2030 GENERATED AM AND PM TRAFFIC PERCENTAGES

LJA Engineering, Inc.
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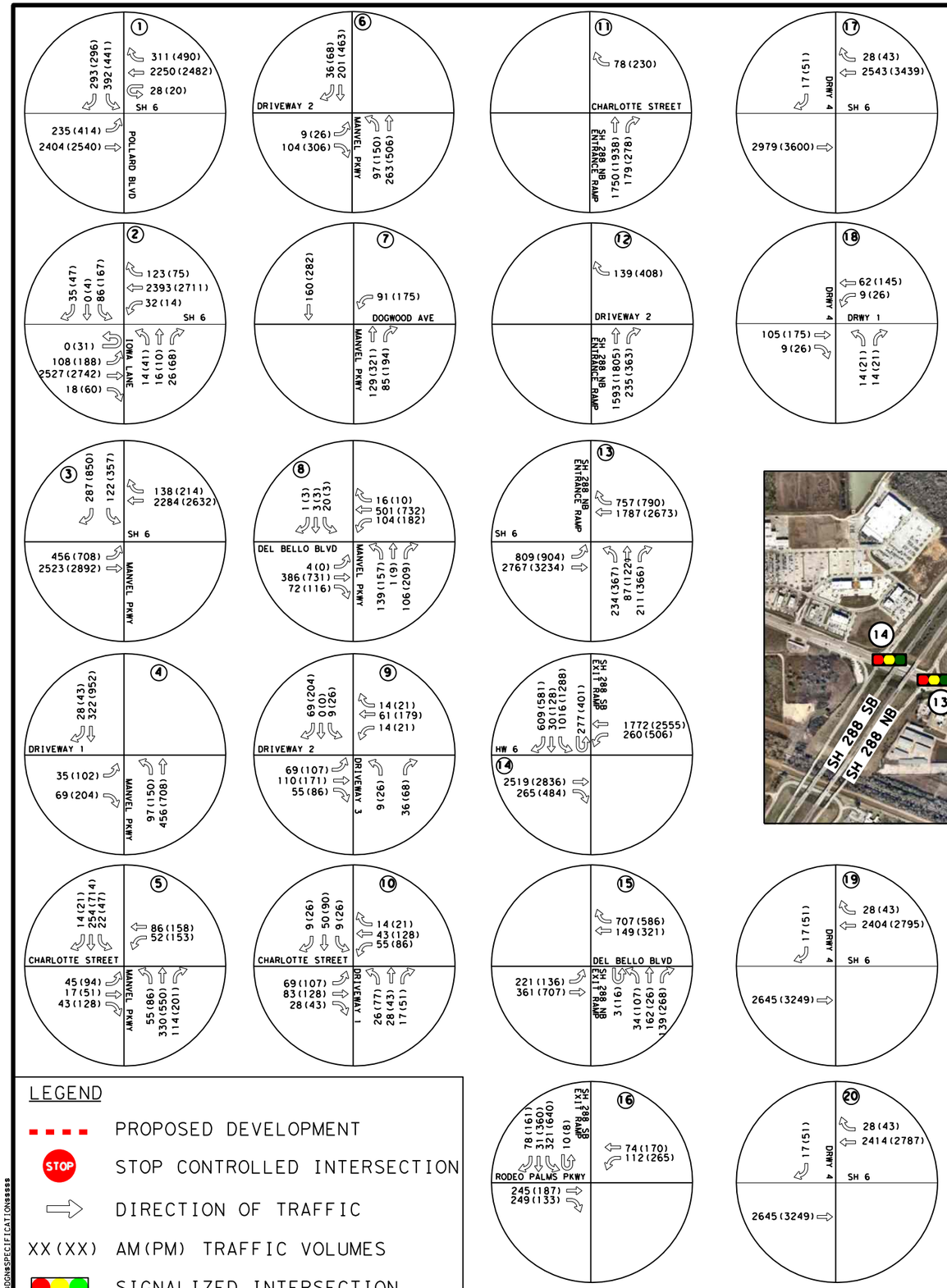
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PRESIDIO TIA

FIGURE 7

2030 GENERATED AM AND PM TRAFFIC VOLUMES

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$$$$$$SYSTIME$$$$$$ $$DATE$$
$$$$$$DGNSPECIFICATION$$$$$$

PRESIDIO TIA

FIGURE 8

2030 BUILD
AM AND PM
TRAFFIC VOLUMES

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Intersection Capacity Analysis

The Highway Capacity Manual, 7th Edition (HCM) provides procedures which are used to evaluate the operations of all types of transportation facilities, including both signalized and unsignalized intersections. For intersections that cannot be evaluated with HCM 7th edition methodologies, HCM 2000 was utilized. These procedures require the input of the intersection geometrics, operational characteristics, as well as the traffic volumes in order to determine the maximum capacity the intersection can handle and to calculate the amount of average delay a driver will experience as they travel through the intersection. Following these procedures, a Level of Service (LOS) is given to each of the controlled movements at an intersection which is based on the average amount of control delay drivers experience traveling through the intersection. Control delay is the delay experienced by drivers due to the presence of a traffic control device (e.g. a stop sign, a yield sign, or a traffic signal) and includes the time associated with drivers slowing down as they approach the intersection, the delay associated in traveling through the intersection in the desired direction, as well as the time it takes drivers to accelerate back to their desired speed. There are six Levels of Service which can be assigned to a controlled movement at an intersection (A through F). Generally, a LOS C or better is considered acceptable. LOS E represents a condition where the demand volume is approaching the maximum capacity for a particular movement or the intersection in general, and a LOS F represents a condition where the demand volume exceeds the capacity.

For signalized intersections and all-way stop controlled intersections, a LOS is calculated for each of the lane groups at the intersection and an overall LOS is also calculated by aggregating the delays at the intersection weighted by the traffic volumes. For one-way and two-way stop-controlled intersections, an overall LOS is not defined, and a LOS is only calculated for the movements which are controlled with a stop sign, a yield sign, or left turning traffic which must yield to the opposing conflicting traffic at the intersection. **Table 4** shows the criteria for each of the levels of service as listed in the HCM for both signalized and unsignalized intersections.

Table 4: Level of Service Criteria for Intersections and Intersection Lane Groups

Level of Service	Average Amount of Control Delay (sec/veh)	
	Unsignalized Intersections	Signalized Intersections
A	0 – 10	0 – 10
B	>10 – 15	>10 – 20
C	>15 – 25	>20 – 35
D	>25 – 35	>35 – 55
E	>35 – 50	>55 – 80
F	> 50	> 80

Synchro 12 software was utilized to complete the analysis. Signalized intersections use optimized signal timings values under the assumption that the intersection is already at its optimized capacity prior to the construction of the proposed development.

Capacity Analysis results are presented in the following sub-sections of the report. Complete Capacity Analyses output files are presented in **Appendix D.**

The intersection capacity analysis for the existing roadway network indicates that the Existing conditions generally operates at acceptable levels of service, with most intersections functioning efficiently except for SH 6 & Iowa Ln, which currently experience high delays and LOS F during the peak hour. Under the No-

Build condition (2030), the overall network is projected to operate at LOS F, primarily due to increased background traffic volumes associated with regional growth and no roadway improvements. Several intersections, particularly SH 6 & Iowa Ln, Pollard Blvd & SH 6, and SH 288 northbound frontage roads & SH 6 are expected to continue operating at failing levels of service, reflecting the growth in the area. Under the Build condition (2030), the analysis shows substantial increases in delay and worsening levels of service (LOS E/F) across multiple intersections along SH 6, SH 288 ramps, and the proposed driveways. However, with the implementation of mitigation measures, the overall intersections at the proposed driveways are expected to operate at acceptable levels of service. The only exceptions remain at SH 6 & Iowa Ln and SH 6 & Manvel Pkwy, which are projected to continue experiencing high delays and failing levels of service even after implementation of mitigation measures shown in **Table 5 and 6.**

After applying the 5-year horizon from the build/mitigation year, the analysis indicates that all proposed site driveways are expected to continue operating at acceptable levels of service. However, some intersections are projected to experience increased delay during the 5-year horizon period, including the intersections of SH 6 & Pollard Blvd, SH 6 & Iowa Lane, SH 6 & Manvel Pkwy, SH 288 northbound frontage road & SH 6, and SH 288 southbound exit ramp & SH 6. To maintain acceptable operations, updating signal timing may be required at these locations as traffic volumes increase over time.

Table 5 : Intersection Capacity Analysis Summary (AM)

Intersection	Northbound		Southbound		Eastbound		Westbound		Overall	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Existing Conditions (2025)										
Pollard Blvd & SH 6	-	-	17.2	B	18	B	20.7	C	19.5	B
SH 6 & Iowa Ln	>500	F	>500	F	0.5	A	0.7	A	-	-
SH 6 & Manvel Pkwy	0	A	0	A	0	A	0	A	0	A
Del Bello Blvd & Manvel Pkwy	8.1	A	7.5	A	7.7	A	8	A	8	A
SH 288 NB Entrance Ramp & SH 6	37.9	D	0	A	17.7	B	39.6	D	27.4	C
SH 288 SB Exit Ramp & SH 6	0	A	22.3	C	32	C	5	A	21.6	C
SH 288 NB Exit Ramp & Del Bello Blvd	9.6	A	-	-	9.8/	A	8.3	A	9	A
SH 288 SB Exit Ramp & Rodeo Palms Pkwy	-	-	9	A	7.2	A	7.9	A	7.8	A
No Build Year (2030)										
Pollard Blvd & SH 6	-	-	29.5	C	73.3	E	108.7	F	82.8	F
SH 6 & Iowa Ln	>500	F	>500	F	1.6	A	1.8	A	-	-
SH 6 & Manvel Pkwy	0	A	0	A	0.1	A	0.1	A	0.1	A
Del Bello Blvd & Manvel Pkwy	11.7	B	10.2	B	11.9	B	13.7	B	12.7	B
SH 288 NB Entrance Ramp & SH 6	38.4	D	0	A	21.1	C	182.4	F	85.3	F
SH 288 SB Exit Ramp & SH 6	0	A	25.1	C	116.6	F	4.8	A	58.3	E
SH 288 NB Exit Ramp & Del Bello Blvd	12.9	B	-	-	14.9	B	76.5	F	44.3	E
SH 288 SB Exit Ramp & Rodeo Palms Pkwy	-	-	21.5	C	10.6	B	11.1	B	14.9	B
Build Out Year (2030)										
Pollard Blvd & SH 6	-	-	29.5	C	97.5	F	171.8	F	122.2	F
SH 6 & Iowa Ln	>500	F	>500	F	30.1	D	2.2	A	-	-
SH 6 & Manvel Pkwy	0	A	28	C	40.2	D	192.8	F	102.9	F
Manvel Pkwy & Driveway 1	2	A	0	A	14.4	B	-	-	-	-
Charlotte St & Manvel Pkwy	1.1	A	0.8	A	23	C	36.8	E	-	-
Manvel Pkwy & Driveway 2	2.5	A	0	A	10.2	B	-	-	-	-
Manvel Pkwy & Dogwood Ave	0	A	0	A	-	-	11.1	B	-	-
Del Bello Blvd & Manvel Pkwy	13.3	B	11.8	B	14.8	B	19.6	C	16.7	C
Driveway 2 & Driveway 3	12	B	9.6	A	2.2	A	1.2	A	-	-
Driveway 1/Driveway 3 & Charlotte St	13.4	B	13.6	B	2.9	A	3.7	A	-	-
SH 288 NB Frontage Road & Charlotte St	0	A	-	-	-	-	30.5	D	-	-
SH 288 NB Frontage Road & Driveway 2	0	A	-	-	-	-	41.1	E	-	-
SH 288 NB Entrance Ramp & SH 6	40.7	D	0	A	72.5	E	275	F	147.4	F
SH 288 SB Exit Ramp & SH 6	0	A	29	C	190.5	F	22.7	C	96.5	F
SH 288 NB Exit Ramp & Del Bello Blvd	12.9	B	0	A	14.9	B	76.5	F	44.3	E
SH 288 SB Exit Ramp & Rodeo Palms Pkwy	-	-	21.5	C	10.6	B	11.1	B	14.9	B
SH 6 & Driveway 4	-	-	43.4	E	0	A	0	A	-	-
Driveway 1 & Driveway 4	9.4	A	-	-	0	A	0.9	A	-	-
SH 6 & Driveway 5	-	-	38.4	E	0	A	0	A	-	-
SH 6 & Driveway 6	-	-	38.8	E	0	A	0	A	-	-
Mitigation (2030)										
Pollard Blvd & SH 6	-	-	80.2	F	37.2	D	54.7	D	49.9	D
SH 6 & Iowa Ln	45.5	D	60.1	E	23.7	C	28	C	26.7	C
SH 6 & Manvel Pkwy	0	A	40.3	D	38.6	D	39.8	D	39.2	D
Manvel Pkwy & Driveway 1	1.5	A	0	A	12.9	B	-	-	-	-
Charlotte St & Manvel Pkwy	7.9	A	9.7	A	20	B	19.7	B	11.2	A
Manvel Pkwy & Driveway 2	2.2	A	0	A	10	A	-	-	-	-
Driveway 2 & Driveway 3	11.9	B	9.6	A	2.2	A	1.2	A	-	-
Driveway 1/Driveway 3 & Charlotte St	12.7	B	13.2	B	2.9	A	3.7	A	-	-
SH 288 NB Frontage Road & Charlotte St	0	A	-	-	-	-	25.4	D	-	-
SH 288 NB Frontage Road & Driveway 2	0	A	-	-	-	-	29.1	D	-	-
SH 288 NB Entrance Ramp & SH 6	100.4	F	0	A	41.8	D	178.3	F	98.7	F
SH 288 SB Exit Ramp & SH 6	0	A	63.2	E	103.7	F	8.6	A	63.5	E

Table 6 : Intersection Capacity Analysis Summary (PM)

Intersection	Northbound		Southbound		Eastbound		Westbound		Overall	
	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
Existing Conditions (2025)										
Pollard Blvd & SH 6	-	-	15.5	B	18.3	B	21.7	C	19.9	B
SH 6 & Iowa Ln	>500	F	>500	F	2.6	A	0.2	A	-	-
SH 6 & Manvel Pkwy	0	A	0	A	0	A	0	A	0	A
Del Bello Blvd & Manvel Pkwy	7.5	A	7.1	A	7.4	A	7.5	A	7.5	A
SH 288 NB Entrance Ramp & SH 6	40.5	D	0	A	18.7	B	50.4	D	33.1	C
SH 288 SB Exit Ramp & SH 6	0	A	30.6	C	32	C	4.5	A	23.2	C
SH 288 NB Exit Ramp & Del Bello Blvd	9.3	A	-	-	8.3	A	6.9	A	8.1	A
SH 288 SB Exit Ramp & Rodeo Palms Pkwy	-	-	14	B	8.9	A	9.5	A	12.1	B
No Build Year (2030)										
Pollard Blvd & SH 6	-	-	36.4	D	182.2	F	169.9	F	158	F
SH 6 & Iowa Ln	>500	F	>500	F	19.4	B	0.5	A	-	-
SH 6 & Manvel Pkwy	0	A	0	A	14.6	B	0.1	A	8	A
Del Bello Blvd & Manvel Pkwy	11.8	B	10.6	B	33.6	D	26.8	D	28.6	D
SH 288 NB Entrance Ramp & SH 6	45.7	D	0	A	50.6	D	246.7	F	126.2	F
SH 288 SB Exit Ramp & SH 6	0	A	52.3	D	170.9	F	5.7	A	86.6	F
SH 288 NB Exit Ramp & Del Bello Blvd	20	C	-	-	35.9	E	90.8	F	56.1	F
SH 288 SB Exit Ramp & Rodeo Palms Pkwy	0	A	303	F	13.9	B	17.2	C	189.8	F
Build Out Year (2030)										
Pollard Blvd & SH 6	-	-	36.4	D	207	F	271.9	F	217.3	F
SH 6 & Iowa Ln	>500	F	>500	F	191.8	F	0.8	A	-	-
SH 6 & Manvel Pkwy	0	A	180.2	F	115.7	F	300.3	F	194.5	F
Manvel Pkwy & Driveway 1	4.5	A	0	A	>500	F	-	-	-	-
Charlotte St & Manvel Pkwy	1.8	A	1.2	A	>500	F	>500	F	-	-
Manvel Pkwy & Driveway 2	3	A	0	A	22.8	C	-	-	-	-
Manvel Pkwy & Dogwood Ave	0	A	0	A	-	-	20	C	-	-
Del Bello Blvd & Manvel Pkwy	19.8	C	13	B	73.7	F	112.8	F	80.8	F
Driveway 2 & Driveway 3	21.4	C	14.3	B	2.3	A	0.8	A	-	-
Driveway 1/Driveway 3 & Charlotte St	43.9	E	27.8	D	3	A	2.9	A	-	-
SH 288 NB Frontage Road & Charlotte St	0	A	-	-	-	-	267.8	F	-	-
SH 288 NB Frontage Road & Driveway 2	0	A	-	-	-	-	>500	F	-	-
SH 288 NB Entrance Ramp & SH 6	72	E	0	A	208	F	495.7	F	312	F
SH 288 SB Exit Ramp & SH 6	0	A	119.3	F	282.9	F	76.3	E	168.4	F
SH 288 NB Exit Ramp & Del Bello Blvd	20	C	0	A	35.9	E	90.8	F	56.1	F
SH 288 SB Exit Ramp & Rodeo Palms Pkwy	-	-	303	F	13.9	B	17.2	C	189.8	F
SH 6 & Driveway 4	-	-	283.7	F	0	A	0	A	-	-
Driveway 1 & Driveway 4	10.7	B	-	-	0	A	1.2	A	-	-
SH 6 & Driveway 5	-	-	96.8	F	0	A	0	A	-	-
SH 6 & Driveway 6	-	-	95.6	F	0	A	0	A	-	-
Mitigation (2030)										
Pollard Blvd & SH 6	-	-	114.7	F	54.3	D	176	F	151.4	F
SH 6 & Iowa Ln	81.6	F	86.1	F	48.7	D	41.2	D	47.2	D
SH 6 & Manvel Pkwy	0	A	127.3	F	60.1	E	130.8	F	96.9	F
Manvel Pkwy & Driveway 1	2.2	A	0	A	207.3	F	-	-	-	-
Charlotte St & Manvel Pkwy	15.9	B	21.3	C	22.6	C	19.5	B	19.1	B
Manvel Pkwy & Driveway 2	2.1	A	0	A	15.9	C	-	-	-	-
Driveway 2 & Driveway 3	21	C	14.1	B	2.3	A	0.8	A	-	-
Driveway 1/Driveway 3 & Charlotte St	27.1	D	22.3	C	3	A	2.9	A	-	-
SH 288 NB Frontage Road & Charlotte St	0	A	-	-	-	-	143.6	F	-	-
SH 288 NB Frontage Road & Driveway 2	0	A	-	-	-	-	402.4	F	-	-
SH 288 NB Entrance Ramp & SH 6	191	F	0	A	152.6	F	318.9	F	224.6	F
SH 288 SB Exit Ramp & SH 6	0	A	115.6	F	270.8	F	62.2	E	157.6	F

Right and Left Turn Lane Analysis

Right and left turn lane analyses were completed along Del Bello Blvd, SH 6, and Manvel Pkwy at the proposed driveways, the Texas Department of Transportation (TxDOT) Access Management Manual and the National Cooperative highway Research Program (NCHRP) 457 requirements for right and left turn deceleration lanes. Based on the analyses, various right and left turn lanes warrant along the driveways of SH 288 northbound frontage road, Del Bello Blvd and Manvel Pkwy. **Appendix E** provides the criteria for a right turn lane. **Appendix F** provides the left turn criteria. The following lanes are recommended.

The improvements that will be required to successfully accommodate the traffic that will be generated by the proposed **Presidio development** are listed below:

- **SH 6 and Iowa Ln:**
    - Construct a signal at this intersection.
    - Construct a southbound left turn lane along Iowa lane that consists of 335' of storage length and a 100-foot taper.
    - Construct a westbound right turn lane along SH 6 that consists of 250' of storage length, 340' of deceleration length and a 100-foot taper.

- **SH 6 and Manvel Pkwy:**
    - Update signal modification due to the connection of Manvel Pkwy, e.g. a new signal design, optimization of new signal turn types, addition of signal heads for the southbound approach, removal and reconstruction of the existing median and shoulder along the westbound approach.
    - Restripe the existing eastbound only U-turn Lane to left turn lane.
    - Construct 2 dual southbound left turn lanes.
    - Construct a westbound right turn lane along SH 6 that consists of 430' of storage length, 340' of deceleration length and a 100-foot taper.

- **Manvel Pkwy and Driveway 1:**
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 110' of storage length (95th Queue), and a 100-foot taper.
    - Construct a southbound right turn lane along Manvel Pkwy that consists of 190' of storage length (95th Queue), and a 100-foot taper.
    - Construct an eastbound right turn lane along Driveway 1 that consists of 265' of storage length (95th Queue), and a 100-foot taper.

- **Manvel Pkwy and Charlotte St:**
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a northbound right turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a southbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper
    - Construct an eastbound left turn lane along Charlotte Street that consists of 100' of storage length (95th Queue), and a 100-foot taper
    - Construct a westbound left turn lane along Charlotte Street that consists of 100' of storage length (95th Queue), and a 100-foot taper

- **Manvel Pkwy and Driveway 2:**
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 100’ of storage length (95th Queue) and a 100-foot taper.
    - Construct an eastbound left turn lane along Driveway 2 that consists of 100’ of storage length (95th Queue) and a 100-foot taper.

- **Driveway 2 and Driveway 3:**
    - Construct an eastbound left turn lane along Driveway 2 that consists of 100’ of storage length (95th Queue) and a 100-foot taper.
    - Construct a westbound left turn lane along Driveway 2 that consists of 100’ of storage length (95th Queue) and a 100-foot taper.

- **Driveways 1 & 3 and Charlotte St**
    - Construct a northbound left turn lane along Driveway 1 that consists of 100’ of storage length (95th Queue) and a 100-foot taper.
    - Construct a southbound left turn lane along Driveway 3 that consists of 100’ of storage length (95th Queue) and a 100-foot taper.

- **SH 288 NB Frontage Road and Charlotte St:**
    - Construct a northbound right turn lane along SH 288 NB Frontage Road that consists of 120’ storage length (95th Queue), 340’ of deceleration length and a 100-foot taper.

- **SH 288 NB Frontage Road and Driveway 2:**
    - Construct a northbound right turn lane along SH 288 NB Frontage Road that consists of 230’ storage length (95th Queue), 340’ of deceleration length and a 100-foot taper.

Table 7: Calculated Storage lengths							
Intersesections	**95th QUE Storage (Feet)**	**Signalized Equation Storage [L = (V/N)(2)(S)]**	**Unsignalized Equation Storage [L = (V/30)(2)(S)]**	**Recommended Storage (Feet)**	**Deceleration Length (Feet)**	**Taper Length (Feet)**	**Total Length (Feet)**
SH 6 & Iowa Lane (WBR)	260	246'	-	**250**	**600/340**	**100**	**690**
SH 6 & Iowa Lane (SBL)	170	335'	-	**335**	**-**	**100**	**435**
SH 6 & Manvel Pkwy (WBR)	275	428'	-	**430**	**600/340**	**100**	**870**
Manvel Pkwy & Driveway 1 (NBL)	110	-	250'	**110**	**-**	**100**	**210**
Manvel Pkwy & Driveway 1 (SBR)	190	-	72'	**190**	**-**	**100**	**290**
Manvel Pkwy & Driveway 1 (EBR)	265	-	340'	**265**	**-**	**100**	**365**
Manvel Pkwy & Charlotte St (NBL)	65	172'	-	**100**	**-**	**100**	**200**
Manvel Pkwy & Charlotte St (NBR)	50	402'	-	**100**	**-**	**100**	**200**
Manvel Pkwy & Charlotte St (SBL)	36	94'	-	**100**	**-**	**100**	**200**
Manvel Pkwy & Charlotte St (WBL)	92	300'	-	**100**	**-**	**100**	**200**
Manvel Pkwy & Charlotte St (EBL)	82	188'	-	**100**	**-**	**100**	**200**
Driveway 2 & Manvel Pkwy (EBL)	86	-	510'	**100**	**-**	**100**	**200**
Driveway 2 & Manvel Pkwy (NBL)	57	-	250'	**100**	**-**	**100**	**200**
Driveway 3 & Driveway 2 (EBL)	25	-	166'	**100**	**-**	**100**	**200**
Driveway 3 & Driveway 2 (WBL)	100			**100**		**100**	**200**
Driveway 1/3 & Charlotte St (NBL)	25	-	166'	**100**	**-**	**100**	**200**
Driveway 1/3 & Charlotte St (SBL)	100			**100**		**100**	**200**
SH 288 NB (Frontage Rd) & Charlotte St (NBR)	120	-	463'	**120**	**340**	**100**	**560**
SH 288 NB (Frontage Rd) & Driveway 2 (NBR)	230	-	605'	**230**	**340**	**100**	**670**

Traffic Signal Warrant Analysis

A Traffic Signal Warrant Analysis (TSWA) was completed for the following intersections:

- SH 6 and Iowa Ln (Build)
- Manvel Pkwy and Charlotte St (Build)
- SH 288 Ramps and Rodeo Palms/Del Bello Blvd (No Build)
- Del Bello Blvd and Manvel Pkwy (No Build)

The procedures listed in the Texas Manual on Uniform Traffic Control Devices (TMUTCD) were used to determine the appropriateness of a traffic signal at this intersection. The manual lists nine traffic signal warrants, which should be evaluated at an intersection to determine if a traffic signal should be installed. The following is a list of these warrants:

- Eight Hour Vehicular Volume Warrant
- Four Hour Vehicular Volume Warrant
- Peak Hour Warrant
- Pedestrian Volume Warrant
- School Crossing Warrant
- Coordinated Signal System Warrant
- Crash Experience Warrant
- Roadway Network Warrant
- Intersection Near a Rail Crossing

Should one of these warrants be satisfied, the installation of a traffic signal should be considered. However, the satisfaction of one of these warrants should not by itself require the installation of the traffic signal; the final determination should be based upon sound engineering judgment. The warrants which are applicable to this intersection include the Eight Hour Vehicular Volume Warrant and the Four-Hour Vehicular Volume Warrant. Each of the traffic signal warrants which were evaluated is explained in further detail in the following sub-sections. Traffic Signal Warrant Analysis worksheets are provided in **Appendix E**.

Eight Hour Vehicular Volume Warrant

There are two separate conditions for the Eight Hour Vehicular Volume Warrant; Condition A is intended for application where a large volume of intersecting traffic is the principal reason to consider the installation of a traffic signal, while Condition B is intended for application where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street. For both of these warrants, the TMUTCD lists minimum threshold volumes for both the main street (sum of both approaches) and the higher volume minor street approach which must be met for a minimum of 8 hours of an average day in order for the warrant to be met.

Under the Build Conditions, the Eight Hour Vehicular Volume Warrant will be met at all intersections.

Four Hour Vehicular Volume Warrant

The Four-Hour Vehicular Volume warrant is intended to be applied where the volume of the intersecting traffic is the principal reason to consider installing a traffic control signal. In order for this warrant to be satisfied, the average traffic volumes at the intersection must fall above the threshold curves provided in the TMUTCD for a minimum of four hours of an average day. These curves are shown in the warrant analysis reports included in **Appendix E**.

Under the Build Conditions, the Four-Hour Vehicular Volume Warrant is met at all intersections

Peak Hour Warrant

The Peak Hour Signal Warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. The Peak Hour Signal Warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time. At this time no intersections meet the Peak Hour Warrant criteria.

Crash Experience

The Crash Experience Warrant is intended to be applied where the number of reported crashes is the principal reason to consider installing a traffic control signal. In order for this warrant to be satisfied, there must have been 5 or more reported crashes susceptible to correction by a traffic signal in the last 12 months. Crash data for the intersection has been collected and evaluated, however, a traffic signal is not warranted based on crash experience.

The intersections of SH 6 and Iowa Ln, Manvel Pkwy and Driveway 1, Manvel Pkwy and Charlotte St, and Charlotte St and Driveways 1 & 3 are recommended to be signalized based on the results of the four-hour and eight-hour traffic signal warrants analyses Adding traffic signals at these intersections will improve overall traffic operations, enhance safety, and provide better control for turning and through movements during busy hours.

Conclusion

This report presents the summary of findings for the Traffic Impact Analysis (TIA) prepared by LJA Engineering, Inc. (LJA) for the proposed Presidio development in Manvel, Texas. This development consists of a shopping center, multifamily housing, medical hospital, and single-family housing. The site for this development is located approximately 0.65 miles south of Del Bello Blvd and directly east of the intersection of SH 288 northbound entrance ramp and SH 6. The analyzed development is expected to be completed by 2030, therefore, the study horizon for this TIA is 2035. The objective of this study is to analyze the impacts of the traffic generated by the proposed development on the performance of the surrounding street network and to determine the required mitigation measures to address any resulting deficiencies.

Access to this development will be provided via two (2) proposed driveways along a new frontage road to be constructed parallel to the SH 288 northbound entrance ramp and three (3) along SH 6, the proposed Manvel Pkwy connection to SH 6, and existing Iowa Ln. Internal intersections within the development will also be analyzed in this study. An assumed speed of 45 mph was used along the proposed frontage road, based on conditions observed at the intersection of SH 288 frontage road and Broadway St located approximately five (5) miles north of the proposed development. This TIA also analyzes existing major intersections along SH 288, Del Bello Blvd and SH 6. In total, twenty (20) intersections were analyzed, existing and proposed.

Only the weekday AM and PM peak hour periods were analyzed in this TIA. The overall proposed development is expected to externally generate 52,027 daily vehicle trips with 2,274 vehicle trips during the AM peak hour period and 4,691 vehicle trips during the PM peak hour period.

An average annualized growth rate of five (5) percent was calculated by comparing the 2020 traffic volumes to the projected 2045 traffic volumes in the Houston-Galveston Area Council (H-GAC) Travel Demand Models. This growth rate was applied to the 2025 traffic volumes in order to determine the future traffic volumes without the proposed development generated traffic (Future No Build conditions). The No Build conditions will also include the background volume data from the Valencia Development and the City Center for Manvel project. The traffic that would be generated by this proposed development was then added to the No Build conditions to establish the future 2030 Build conditions.

Intersection Capacity Analyses were completed for major intersections within the study area. Mitigation measures for this TIA require that when the LOS without development is LOS A, B, C or D, the minimum acceptable projected LOS shall be LOS D, and when the LOS without development is LOS E or F, the minimum acceptable projected LOS shall be equal to the LOS without development.

Right and left turn lane analyses were completed along Del Bello Blvd, SH 6, and Manvel Pkwy at the proposed driveways, using the Texas Department of Transportation (TxDOT) Access Management Manual and National Cooperative Highway Research Program (NCHRP) 457 requirements for right and left turn deceleration lanes. Based on the analysis, various right and left turn lanes warrant along the driveways of SH 288 northbound frontage road, Del Bello Blvd, Manvel Pkwy, and SH 6.

A Traffic Signal Warrant Analysis (TSWA) was completed for the intersections of SH 6 at Iowa Lane and Manvel Pkwy at Charlotte St under Future Build conditions. Under Future Build conditions, the 8-hour and 4-hour warrant are met at all intersections. A TSWA was also completed for the intersections of Del Bello Blvd at Manvel Pkwy and SH 288 ramps at Rodeo Palms/Del Bello Blvd for the No Build conditions. Under No Build conditions the 8-hour and 4-hour warrant are met at all intersections.

Recommendations

The improvements that will be required to successfully accommodate the traffic that will be generated by the proposed **Presidio development** are listed below:

Please Be Advised: The City Center Development was included in this TIA as background traffic data at the city's request. Based on the analysis, three intersections are expected to operate at failing conditions under No-Build conditions due to background data. It is our understanding that, since the city requested this information to be included as background, the City Center Development is expected to occur prior to the proposed development. Since these issues are expected to occur before the Presidio development, the Presidio developer is not responsible for constructing these signals at these locations, however they are included in the analysis. Based on the traffic analysis these are the three intersections:

- SH 288 SB exit ramp and Rodeo Palms Pkwy
- SH 288 NB exit ramp and Del Bello Blvd
- Del Bello Blvd and Manvel Pkwy

Please Note: When the second lane of Manvel Pkwy is constructed by the Del Bello MUD, the left and right turn lanes need to be reanalyzed by the City Center Development as part of the City Center analysis at Del Bello Blvd and Manvel Pkwy.

The developer is responsible for the improvements shown below:

- **SH 6 and Pollard Blvd:**
  - Update signal timings (Done by TxDOT)
- **SH 6 and Iowa Ln:**

  The following three (3) mitigation measures for this intersection are required due to traffic generated by Tracts K and L, which create the need for a signal; these improvements should be implemented once Tracts K and L are fully constructed by the year 2030.

  - Construct a signal at this intersection.
  - Construct a southbound left turn lane along Iowa Ln that consists of 335' of storage length and a 100-foot taper.
  - Construct a westbound right turn lane along SH 6 that consists of 250' of storage length, 340' of deceleration length and a 100-foot taper.

  Freeway segments were evaluated using density parameters, and conditions are expected to remain acceptable. However, it is recommended that the posted speed limit along this section of SH 6 be reevaluated due to the addition of multiple new driveways, which increase turning movements and potential conflict points. To improve corridor safety, we recommend based on a review of similar density and corridor conditions within the vicinity of SH 6 and I-69/US 59, where the speed limit is reduced to 45 mph due to increased access points and higher potential for conflicts. Therefore, a lower speed limit would better reflect future conditions and help improve safety for all users.

- **SH 6 and Manvel Pkwy:**
    - Update signal modification due to the connection of Manvel Pkwy, e.g. new signal design, optimization of new signal turn types, addition of signal heads for the southbound approach, removal and reconstruction of the existing median and shoulder along the westbound approach.
    - Restripe the existing eastbound only U-turn lane to left turn lane.
    - Construct 2 dual southbound left turn lanes.
    - Construct a westbound right turn lane along SH 6 that consists of 430' of storage length, 340' of deceleration length and a 100-foot taper.

      Freeway segments were evaluated using density parameters, and conditions are expected to remain acceptable. However, it is recommended that the posted speed limit along this section of SH 6 be reevaluated due to the addition of multiple new driveways, which increase turning movements and potential conflict points. To improve corridor safety, we recommend based on a review of similar density and corridor conditions within the vicinity of SH 6 and I-69/US 59, where the speed limit is reduced to 45 mph due to increased access points and higher potential for conflicts. Therefore, a lower speed limit would better reflect future conditions and help improve safety for all users.

- **Manvel Pkwy and Driveway 1:**
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 110' of storage length (95th Queue), and a 100-foot taper.
    - Construct a southbound right turn lane along Manvel Pkwy that consists of 190' of storage length (95th Queue), and a 100-foot taper.
    - Construct an eastbound right turn lane along Driveway 1 that consists of 265' of storage length (95th Queue), and a 100-foot taper.

- **Manvel Pkwy and Charlotte St:**
    - Construct a signal at this intersection.
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a northbound right turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a southbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct an eastbound left turn lane along Charlotte Street that consists of 100' of storage length (95th Queue), and a 100-foot taper.
    - Construct a westbound left turn lane along Charlotte Street that consists of 100' of storage length (95th Queue), and a 100-foot taper.

- **Manvel Pkwy and Driveway 2:**
    - Construct a northbound left turn lane along Manvel Pkwy that consists of 100' of storage length (95th Queue) and a 100-foot taper.
    - Construct an eastbound left turn lane along Driveway 2 that consists of 100' of storage length (95th Queue) and a 100-foot taper.

      Please Note: Driveway 2 will be a 3-lane roadway with one lane in each direction and a center two-way left turn lane (TWLTL).

- **Driveway 2 and Driveway 3:**
    - Construct an eastbound left turn lane along Driveway 2 that consists of 100' of storage length (95th Queue) and a 100-foot taper.
    - Construct a westbound left turn lane along Driveway 2 that consists of 100' of storage length (95th Queue) and a 100-foot taper.

      Please Note: Driveway 2 will be a 3-lane roadway with one lane in each direction and a center two-way left turn lane (TWLTL).

- **Driveways 1 & 3 and Charlotte St**
    - Construct a northbound left turn lane along Driveway 1 that consists of 100' of storage length (95th Queue) and a 100-foot taper.
    - Construct a southbound left turn lane along Driveway 3 that consists of 100' of storage length (95th Queue) and a 100-foot taper.

- **SH 288 NB Frontage Road and Charlotte St:**
    - Construct a northbound right turn lane along SH 288 northbound frontage road that consists of 120' storage length (95th Queue), 340' of deceleration length and a 100-foot taper.

- **SH 288 NB Frontage Road and Driveway 2:**
    - Construct a northbound right turn lane along SH 288 northbound frontage road that consists of 230' storage length (95th Queue), 340' of deceleration length and a 100-foot taper.

- **SH 288 NB Frontage Road and SH 6:**
    - Update signal timings (Done by TxDOT).

- **SH 288 SB Exit Ramp and SH 6:**
    - Update signal timings (Done by TxDOT).

References

1. Highway Capacity Manual 7th Edition, Transportation Research Board, National Research Council, Washington D.C., 2018.
2. TxDOT Access Management Manual, Texas Department of Transportation, July 2011
3. Trip Generation Manual, 2025 12th Edition, Institute of Transportation Engineers
4. A Policy on Geometric Design of Highways and Streets, 7th Edition, 2018, American Association of State Highway and Transportation Officials.

Appendix A

Proposed Site Plan

LEGEND
- SINGLE-FAMILY DETACHED RESIDENTIAL
- URBAN DENSITY RESIDENTIAL
- DRAINAGE / DETENTION
- COMMERCIAL (PAD, OFFICE, HOTEL)
- LIFT FACILITIES

STATE HIGHWAY 288

STREET X 80'ROW

STREET Y 60'ROW

MANVEL PARKWAY 120'ROW

CHARLOTTE STREET 80'ROW

STREET Y 60' ROW

STATE HIGHWAY 6

IOWA LANE

Gulf Coast Water Authority Brazoria County Mud No. 43 Drainage Easement

Valencia

TRACT D ± 50 Ac.

TRACT E ± 30.9 Ac.

TRACT F ± 15.2 Ac.

TRACT G ± 9.1 Ac.

TRACT H ± 3.8 Ac.

TRACT I ± 14.7 Ac.

TRACT J ± 24.0 Ac.

TRACT K ± 12.8Ac.

TRACT L ± 19.1 Ac.

TRACT A1 ± 12.7 Ac.

TRACT A2 ± 10.0 Ac.

TRACT A3 ± 1.7 Ac.

TRACT A4 ± 5.8 Ac.

TRACT A5 ± 1.6 Ac.

TRACT B1 ± 10.5 Ac.

TRACT B2 ± 7.7 Ac.

TRACT B3 ± 1.8 Ac.

TRACT B4 ± 12.2 Ac.

TRACT C ± 5.8 Ac.

PAD A1 ± 1.2 Ac.

PAD A2 ± 1.3 Ac.

PAD A3 ± 1.2 Ac.

PAD A4 ± 1.5 Ac.

PAD A5 ± 1.5 Ac.

PAD B1 ± 1.5 Ac.

PAD B2 ± 1.8 Ac.

PAD B3 ± 2.3 Ac.

PAD B4 ± 1.9 Ac.

PAD B5 ± 1.8 Ac.

PAD B6 ± 0.8 Ac.

PAD C1 ± 1.9 Ac.

PAD C2 ± 1.6 Ac.

PAD C3 ± 1.6 Ac.

PAD C4 ± 1.6 Ac.

PAD C5 ± 2.1 Ac.

PAD D1 ± 8.3 Ac.

PAD D2 ± 3.7 Ac.

DETENTION ± 11.5 Ac.

DETENTION ± 17.4 Ac.

DETENTION ± 9.7 Ac.

DETENTION ± 1.0 Ac.

DETENTION ± 9.8 Ac.

DETENTION ± 29.5 Ac.

LIFT STATION ± 0.5 Ac.

± 394.2 Ac 35(6,',2 Ã 0$67(5 3/$1

PLANNED UNIT DEVELOPMENT

LOCATION: Manvel, Texas CLIENT ¸ 'LYHUVLIHG 5HDO (VWDWH;OU RXS DATE

S:\Planning\01 Planning\1140-09004\07-Exhibits\1140-09004_Presidio Master Plan_07.30.2025.pdf

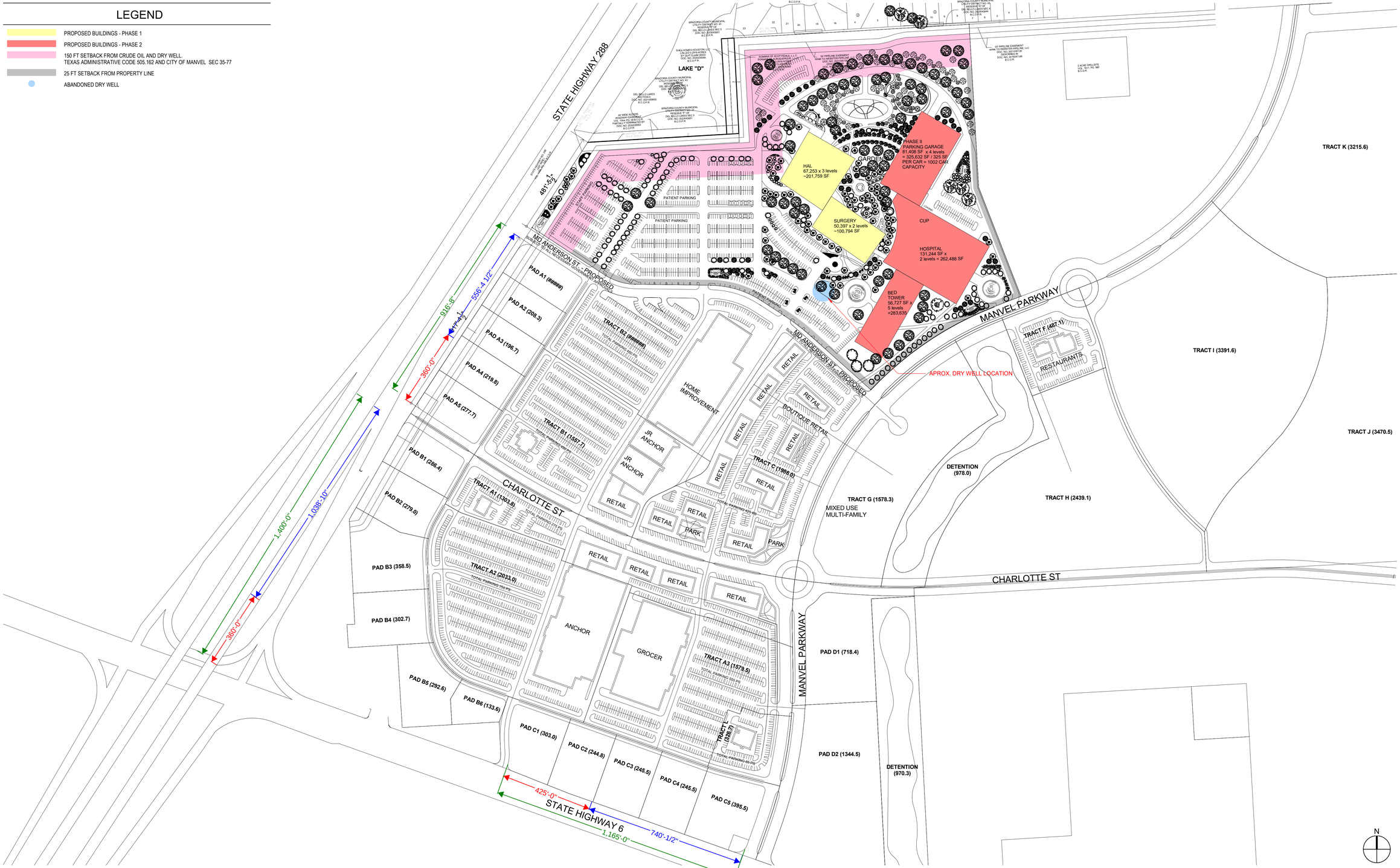
0 100 200 400

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LEGEND

- PROPOSED BUILDINGS - PHASE 1
- PROPOSED BUILDINGS - PHASE 2
- 150 FT SETBACK FROM CRUDE OIL AND DRY WELL. TEXAS ADMINISTRATIVE CODE 505.162 AND CITY OF MANVEL SEC 35-77
- 25 FT SETBACK FROM PROPERTY LINE
- ABANDONED DRY WELL



1 SITE PLAN - FINAL CONCEPT
1" = 200'-0"

MANVEL HAL SITE ANALYSIS

THESE DOCUMENTS ARE INTENDED FOR INTERIM REVIEW ONLY AND NOT FOR PERMIT OR CONSTRUCTION PURPOSES.

THE UNIVERSITY OF TEXAS
MD Anderson Cancer Center
Making Cancer History®

SITE PLAN - FINAL CONCEPT

SCALE: As indicated
SHEET ISSUE DATE: 2025 12 17
PROJECT NUMBER: 25-0054-00

JOHNSTON
2603 Augusta Drive, Suite 1600
Houston, TX 77057
713.244.8300
www.johnstonllc.com

Appendix B

Traffic Counts

National Data & Surveying Services

Intersection Turning Movement Count

Location: Manvel Pkwy & Del Bello Blvd
City: Manvel
Control: 4-Way Stop

Project ID: 25-450176-001
Date: 8/26/2025

Data - Totals

NS/EW Streets:	Manvel Pkwy				Manvel Pkwy				Del Bello Blvd				Del Bello Blvd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	6	0	1	0	0	1	1	0	0	0	0	0	0	21	0	0	30
6:15 AM	5	2	1	0	1	0	1	0	0	1	0	0	1	16	0	0	28
6:30 AM	14	2	1	0	1	0	0	0	0	1	0	0	0	19	1	0	39
6:45 AM	17	1	2	0	0	0	0	0	1	1	1	0	0	40	2	0	65
7:00 AM	15	0	2	0	0	1	0	0	0	5	1	0	1	34	0	0	59
7:15 AM	20	0	1	0	1	0	0	0	0	4	0	0	0	39	0	0	65
7:30 AM	25	0	0	0	3	1	1	0	2	4	0	0	0	31	1	0	68
7:45 AM	18	1	1	0	1	0	0	0	2	2	0	1	0	27	1	0	54
8:00 AM	6	2	0	0	1	0	1	0	1	2	0	0	0	25	2	0	40
8:15 AM	8	0	1	0	0	0	1	0	0	3	0	0	0	18	3	0	34
8:30 AM	5	1	0	0	1	0	0	0	0	4	1	1	0	18	2	0	33
8:45 AM	4	0	0	0	2	0	0	0	1	0	2	0	0	7	1	0	17
9:00 AM	4	2	0	0	2	2	1	0	0	3	1	0	0	8	1	0	24
9:15 AM	4	0	0	0	1	0	0	0	0	2	1	0	1	15	0	0	24
9:30 AM	2	1	0	0	0	0	0	0	0	5	0	0	0	6	0	0	14
9:45 AM	7	2	0	1	2	1	0	0	0	2	2	0	0	11	0	0	28
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	160	14	10	1	16	6	6	0	7	39	9	2	3	335	14	0	622
APPROACH %'s :	86.49%	7.57%	5.41%	0.54%	57.14%	21.43%	21.43%	0.00%	12.28%	68.42%	15.79%	3.51%	0.85%	95.17%	3.98%	0.00%	
PEAK HR :	06:45 AM - 07:45 AM																TOTAL
PEAK HR VOL :	77	1	5	0	4	2	1	0	3	14	2	0	1	144	3	0	257
PEAK HR FACTOR :	0.770	0.250	0.625	0.000	0.333	0.500	0.250	0.000	0.375	0.700	0.500	0.000	0.250	0.900	0.375	0.000	0.945
	0.830				0.350				0.792				0.881				

NOON	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
10:00 AM	3	1	0	0	0	1	1	0	0	3	5	0	0	15	0	0	29
10:15 AM	5	1	0	0	0	0	0	0	1	3	2	1	0	8	1	0	22
10:30 AM	3	0	0	0	1	0	0	0	1	1	2	1	1	11	0	0	21
10:45 AM	5	0	0	0	2	0	2	0	0	3	1	0	0	11	1	0	25
11:00 AM	3	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	9
11:15 AM	4	1	0	0	0	0	1	0	1	3	2	0	0	11	3	0	26
11:30 AM	4	0	0	0	0	0	2	0	0	3	2	2	1	13	0	0	27
11:45 AM	1	0	0	0	0	0	0	0	1	5	3	1	0	12	1	0	24
12:00 PM	4	1	1	0	1	0	1	0	0	3	2	0	1	9	1	0	24
12:15 PM	3	1	0	0	2	0	1	0	0	3	4	0	0	3	2	0	19
12:30 PM	2	0	1	0	0	0	0	0	0	4	4	1	0	5	0	0	17
12:45 PM	1	1	0	0	1	3	0	0	0	1	3	1	0	11	0	0	22
1:00 PM	5	0	0	0	0	1	1	0	1	5	3	2	0	5	0	0	23
1:15 PM	3	0	0	0	0	1	3	0	0	2	2	0	0	4	1	0	16
1:30 PM	5	1	1	0	0	0	0	0	1	0	2	1	1	7	0	0	19
1:45 PM	2	0	1	0	1	0	0	0	0	3	2	1	0	10	0	0	20
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	53	7	4	0	8	6	12	0	6	46	39	11	4	137	10	0	343
APPROACH %'s :	82.81%	10.94%	6.25%	0.00%	30.77%	23.08%	46.15%	0.00%	5.88%	45.10%	38.24%	10.78%	2.65%	90.73%	6.62%	0.00%	
PEAK HR :	11:15 AM - 12:15 PM																TOTAL
PEAK HR VOL :	13	2	1	0	1	0	4	0	2	14	9	3	2	45	5	0	101
PEAK HR FACTOR :	0.813	0.500	0.250	0.000	0.250	0.000	0.500	0.000	0.500	0.700	0.750	0.375	0.500	0.865	0.417	0.000	0.935
	0.667				0.625				0.700				0.929				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
2:00 PM	3	1	1	0	0	0	0	0	0	5	1	0	0	9	3	0	23
2:15 PM	5	0	0	0	0	1	1	0	0	6	1	0	0	6	0	0	20
2:30 PM	4	1	0	0	0	0	1	0	0	4	3	1	0	11	0	0	25
2:45 PM	2	0	1	0	1	1	0	0	1	3	3	0	2	8	1	0	23
3:00 PM	8	3	0	0	1	1	1	0	0	10	2	3	0	12	0	0	41
3:15 PM	4	0	0	0	2	0	0	0	0	4	1	0	0	13	1	1	26
3:30 PM	2	2	0	0	1	0	0	0	0	4	7	0	1	14	4	0	35
3:45 PM	5	2	0	0	0	2	0	0	0	6	5	0	0	18	0	0	38
4:00 PM	1	0	0	0	1	0	0	0	1	2	3	0	0	14	2	0	24
4:15 PM	5	0	0	0	1	1	1	0	0	6	1	3	0	13	1	1	33
4:30 PM	4	5	1	0	0	1	0	0	0	1	1	0	0	10	1	0	24
4:45 PM	3	1	1	0	0	0	0	0	0	2	1	2	0	17	0	0	27
5:00 PM	7	1	0	0	1	1	0	0	2	7	3	3	1	12	3	0	41
5:15 PM	4	0	0	0	0	2	0	0	0	5	1	0	0	19	2	0	33
5:30 PM	6	2	0	0	1	0	0	0	0	8	0	0	1	14	0	0	32
5:45 PM	6	5	0	0	0	0	0	0	0	5	3	0	1	11	2	0	33
6:00 PM	7	0	0	0	1	0	2	0	0	14	3	0	0	18	1	0	46
6:15 PM	3	2	0	0	0	1	0	0	0	7	4	0	1	13	0	0	31
6:30 PM	2	0	0	0	0	0	0	0	0	2	8	0	0	11	0	0	23
6:45 PM	2	0	1	0	1	1	2	0	1	4	2	0	2	13	1	0	30
7:00 PM	3	1	0	0	1	0	2	0	0	7	2	1	0	6	0	0	23
7:15 PM	2	0	0	0	1	0	1	0	0	3	8	0	2	15	2	0	34
7:30 PM	1	0	1	0	0	0	0	0	0	2	2	0	0	12	0	0	18
7:45 PM	0	2	0	0	0	0	0	0	0	4	1	0	0	2	0	0	9
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	89	28	6	0	13	12	11	0	5	121	66	13	11	291	24	2	692
APPROACH %'s :	72.36%	22.76%	4.88%	0.00%	36.11%	33.33%	30.56%	0.00%	2.44%	59.02%	32.20%	6.34%	3.35%	88.72%	7.32%	0.61%	
PEAK HR :	05:15 PM - 06:15 PM																TOTAL
PEAK HR VOL :	23	7	0	0	2	2	2	0	0	32	7	0	2	62	5	0	144
PEAK HR FACTOR :	0.821	0.350	0.000	0.000	0.500	0.250	0.250	0.000	0.000	0.571	0.583	0.000	0.500	0.816	0.625	0.000	0.783
	0.682				0.500				0.574				0.821				

Prepared by National Data & Surveying Services

Manvel Pkwy & Del Bello Blvd

Peak Hour Turning Movement Count

ID: 25-450176-001
City: Manvel

Day: Tuesday
Date: 8/26/2025

PEAK HOURS

AM	06:45 AM - 07:45 AM
NOON	11:15 AM - 12:15 PM
PM	05:15 PM - 06:15 PM

COUNT PERIODS

AM	6:00 AM - 10:00 AM
NOON	10:00 AM - 02:00 PM
PM	2:00 PM - 08:00 PM

Manvel Pkwy

SOUTHBOUND

AM	1	2	4	0	7	AM
NOON	4	0	1	0	9	NOON
PM	2	2	2	0	12	PM

Del Bello Blvd

EASTBOUND

AM	NOON	PM		
222	65	87	⇦	
0	3	0	↶	0
3	2	0	↱	0
14	14	32	→	1
2	9	7	↴	0
AM	NOON	PM		

CONTROL

4-Way Stop

TEV	257 AM	101 NOON	144 PM
PHF	0.94	0.94	0.78

WESTBOUND

PM	NOON	AM		
5	5	3	↶	0
62	45	144	←	1
2	2	1	↰	0
0	0	0	↲	0
34	16	23	⇨	
PM	NOON	AM		

Del Bello Blvd

NORTHBOUND

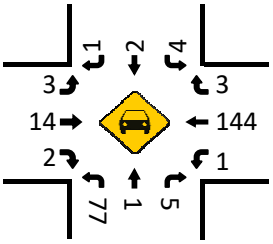
PM	11	0	23	7	0	PM
NOON	11	0	13	2	1	NOON
AM	5	0	77	1	5	AM

Manvel Pkwy

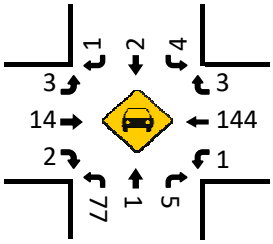
0 1 0 0 (SB turning movements)

0 0 1 0 (NB turning movements)

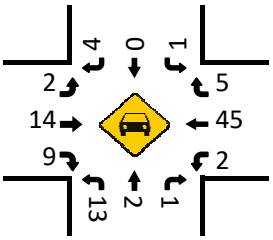
Totals (AM)



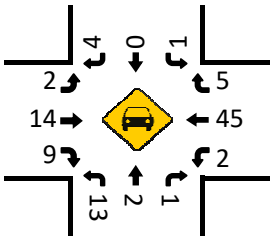
Totals (AM)



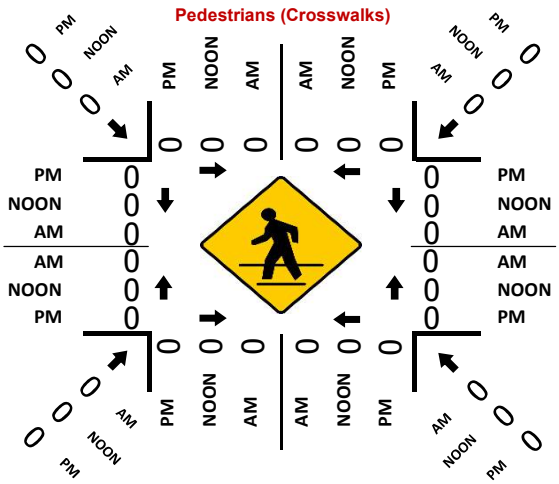
Totals (NOON)



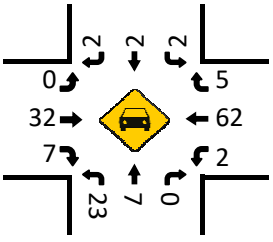
Totals (NOON)



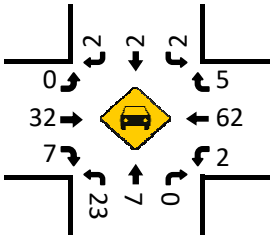
Pedestrians (Crosswalks)



Totals (PM)



Totals (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Pollard Blvd & SR 6/Morris Ave
City: Manvel
Control: Signalized

Project ID: 25-450183-005
Date: 8/28/2025

Data - Totals

NS/EW Streets:	Pollard Blvd				Pollard Blvd				SR 6/Morris Ave				SR 6/Morris Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	1	0	1	0	1	3	0	0	0	3	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:30 AM	0	0	0	0	10	0	18	0	9	339	0	0	0	320	8	2	706
6:45 AM	0	0	0	0	22	0	10	0	17	501	0	1	0	415	7	8	981
7:00 AM	0	0	0	0	34	0	18	0	26	524	0	1	0	424	18	6	1051
7:15 AM	0	0	0	0	27	0	16	0	26	362	0	2	0	454	28	4	919
7:30 AM	0	0	0	0	43	0	14	0	19	397	0	0	0	286	21	4	784
7:45 AM	0	0	0	0	25	0	14	0	18	411	0	0	0	357	14	7	846
8:00 AM	0	0	0	0	21	0	10	0	26	326	0	0	0	308	18	2	711
8:15 AM	0	0	0	0	18	0	15	0	17	342	0	0	0	356	13	6	767
8:30 AM	0	0	0	0	14	0	11	0	24	302	0	1	0	325	11	7	695
8:45 AM	0	0	0	0	8	0	15	0	15	242	0	1	0	291	9	1	582
9:00 AM	0	0	0	0	9	0	17	0	14	260	0	1	0	274	13	1	589
9:15 AM	0	0	0	0	10	0	16	0	11	215	0	1	0	242	8	2	505
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	241	0	174	0	222	4221	0	8	0	4052	168	50	9136
APPROACH %'s :					58.07%	0.00%	41.93%	0.00%	4.99%	94.83%	0.00%	0.18%	0.00%	94.89%	3.93%	1.17%	
PEAK HR :	06:45 AM - 07:45 AM																TOTAL
PEAK HR VOL :	0	0	0	0	126	0	58	0	88	1784	0	4	0	1579	74	22	3735
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.733	0.000	0.806	0.000	0.846	0.851	0.000	0.500	0.000	0.869	0.661	0.688	0.888
					0.807				0.851				0.862				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	1	0	1	0	1	3	0	0	0	3	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	11	0	16	0	23	391	0	0	0	397	10	4	852
4:15 PM	0	0	0	0	20	0	15	0	24	358	0	6	0	464	8	4	899
4:30 PM	0	0	0	0	9	0	9	1	23	404	0	1	0	422	16	3	888
4:45 PM	0	0	0	0	7	0	21	0	17	435	0	1	0	365	14	4	864
5:00 PM	0	0	0	0	10	0	13	0	22	426	0	0	0	392	10	5	878
5:15 PM	0	0	0	0	13	0	8	0	25	441	0	2	0	372	17	3	881
5:30 PM	0	0	0	0	11	0	8	0	29	395	0	1	0	369	17	3	833
5:45 PM	0	0	0	0	11	0	12	0	30	357	0	0	0	388	5	5	808
6:00 PM	0	0	0	0	20	0	9	0	27	378	0	0	0	342	13	3	792
6:15 PM	0	0	0	0	11	0	7	0	23	384	0	1	0	394	17	8	845
6:30 PM	0	0	0	0	11	0	12	0	27	331	0	0	0	358	9	3	751
6:45 PM	0	0	0	0	10	0	19	0	22	271	0	1	0	314	2	3	642
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	144	0	149	1	292	4571	0	13	0	4577	138	48	9933
APPROACH %'s :					48.98%	0.00%	50.68%	0.34%	5.99%	93.74%	0.00%	0.27%	0.00%	96.09%	2.90%	1.01%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	0	0	0	0	46	0	58	1	86	1623	0	8	0	1643	48	16	3529
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.575	0.000	0.690	0.250	0.896	0.933	0.000	0.333	0.000	0.885	0.750	0.800	0.981
					0.750				0.948				0.897				

Prepared by National Data & Surveying Services

Pollard Blvd & SR 6/Morris Ave

Peak Hour Turning Movement Count

ID: 25-450183-005
City: Manvel

Day: Thursday
Date: 8/28/2025

PEAK HOURS	COUNT PERIODS
06:45 AM - 07:45 AM	6:30 AM - 09:30 AM
NONE	NONE
04:15 PM - 05:15 PM	4:00 PM - 07:00 PM

SOUTHBOUND (Pollard Blvd)

AM	58	0	126	0	162	AM
NOON	0	0	0	0	0	NOON
PM	58	0	46	1	135	PM

EASTBOUND (SR 6/Morris Ave)

AM	NOON	PM	
1641	0	1709	
4	0	8	0
88	0	86	1
1784	0	1623	3
0	0	0	0
AM	NOON	PM	

WESTBOUND (SR 6/Morris Ave)

PM	NOON	AM	
48	0	74	0
1643	0	1579	3
0	0	0	0
16	0	22	0
1685	0	1932	
PM	NOON	AM	

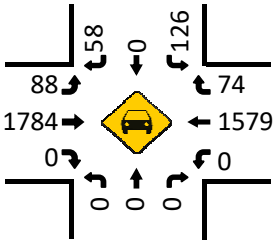
NORTHBOUND (Pollard Blvd)

PM	0	0	0	0	0	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

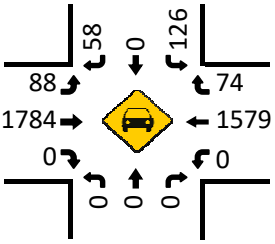
CONTROL			
Signalized			
TEV	3735 AM	0 NOON	3529 PM
PHF	0.89		0.98

Turning movements at the intersection: 1 0 1 0 | 0 0 0 0

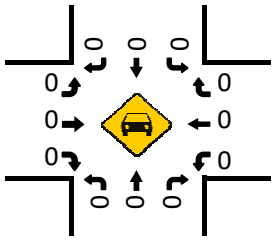
Totals (AM)



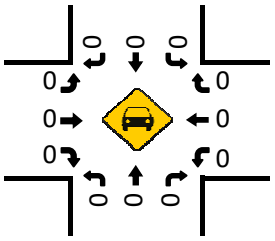
Totals (AM)



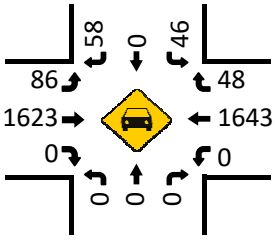
Totals (NOON)



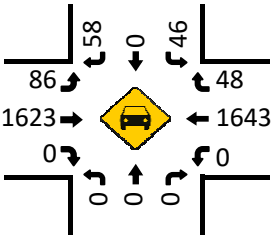
Totals (NOON)



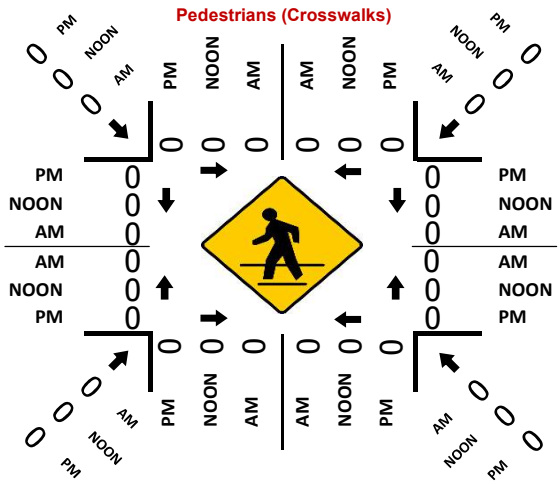
Totals (PM)



Totals (PM)



Pedestrians (Crosswalks)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Iowa Ln & Alvin Sugarland Rd/SR 6/Morris Ave
City: Manvel
Control: 2-Way Stop(NB/SB)

Project ID: 25-450183-004
Date: 8/28/2025

Data - Totals

NS/EW Streets:	Iowa Ln				Iowa Ln				Alvin Sugarland Rd/SR 6/Morris Ave				Alvin Sugarland Rd/SR 6/Morris Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	3	0	0	1	3	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:30 AM	2	1	5	0	1	0	5	0	8	349	2	6	6	340	9	0	734
6:45 AM	3	3	4	0	5	0	5	0	7	515	2	8	6	392	6	0	956
7:00 AM	3	3	5	0	7	0	4	0	3	530	3	0	4	438	22	1	1023
7:15 AM	2	4	5	0	6	0	5	0	10	383	5	0	8	418	19	0	865
7:30 AM	3	3	7	0	9	0	7	0	2	400	4	1	6	292	29	1	764
7:45 AM	3	1	10	0	4	1	4	0	7	414	5	0	5	320	20	0	794
8:00 AM	4	0	7	0	1	1	5	0	8	340	4	0	8	330	7	1	716
8:15 AM	3	1	4	0	3	0	5	0	2	354	3	0	9	343	5	0	732
8:30 AM	2	2	4	0	3	0	7	0	4	331	3	1	6	334	9	0	706
8:45 AM	1	0	1	0	2	0	3	0	6	253	4	3	4	294	6	0	577
9:00 AM	0	0	7	0	3	0	6	0	6	260	4	31	2	274	3	0	596
9:15 AM	2	0	4	0	1	0	2	0	4	224	1	35	4	260	2	0	539
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	28	18	63	0	45	2	58	0	67	4353	40	85	68	4035	137	3	9002
APPROACH %'s :	25.69%	16.51%	57.80%	0.00%	42.86%	1.90%	55.24%	0.00%	1.47%	95.78%	0.88%	1.87%	1.60%	95.10%	3.23%	0.07%	
PEAK HR :	06:45 AM - 07:45 AM																TOTAL
PEAK HR VOL :	11	13	21	0	27	0	21	0	22	1828	14	9	24	1540	76	2	3608
PEAK HR FACTOR :	0.917	0.813	0.750	0.000	0.750	0.000	0.750	0.000	0.550	0.862	0.700	0.281	0.750	0.879	0.655	0.500	0.882
	0.865				0.750				0.874				0.883				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	3	0	0	1	3	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	9	1	19	0	2	0	6	0	11	391	8	0	7	416	5	2	877
4:15 PM	23	2	18	0	3	1	4	0	10	381	15	19	2	466	7	1	952
4:30 PM	9	3	14	0	4	0	5	0	10	404	12	2	2	441	5	0	911
4:45 PM	1	2	10	0	3	1	3	0	18	444	8	3	2	382	9	0	886
5:00 PM	0	1	12	0	1	1	5	0	27	442	13	1	4	393	5	0	905
5:15 PM	1	1	14	0	7	0	11	0	24	443	12	0	4	385	7	0	909
5:30 PM	2	1	14	0	2	0	9	0	15	399	5	1	5	353	18	0	824
5:45 PM	2	1	3	0	1	0	7	0	16	391	5	0	8	379	10	0	823
6:00 PM	1	1	3	0	2	0	6	0	22	397	9	0	3	338	6	0	788
6:15 PM	2	0	8	0	5	1	10	0	22	392	13	0	2	387	6	1	849
6:30 PM	0	1	2	0	1	0	5	0	7	350	6	0	9	347	3	1	732
6:45 PM	0	0	2	0	2	0	7	0	9	293	8	0	6	317	4	1	649
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	50	14	119	0	33	4	78	0	191	4727	114	26	54	4604	85	6	10105
APPROACH %'s :	27.32%	7.65%	65.03%	0.00%	28.70%	3.48%	67.83%	0.00%	3.78%	93.46%	2.25%	0.51%	1.14%	96.95%	1.79%	0.13%	
PEAK HR :	04:15 PM - 05:15 PM																TOTAL
PEAK HR VOL :	33	8	54	0	11	3	17	0	65	1671	48	25	10	1682	26	1	3654
PEAK HR FACTOR :	0.359	0.667	0.750	0.000	0.688	0.750	0.850	0.000	0.602	0.941	0.800	0.329	0.625	0.902	0.722	0.250	0.960
	0.552				0.861				0.936				0.903				

Prepared by National Data & Surveying Services

Iowa Ln & Alvin Sugarland Rd/SR 6/Morris Ave

Peak Hour Turning Movement Count

ID: 25-450183-004
City: Manvel

Day: Thursday
Date: 8/28/2025

PEAK HOURS	COUNT PERIODS
06:45 AM - 07:45 AM	6:30 AM - 09:30 AM
NONE	NONE
04:15 PM - 05:15 PM	4:00 PM - 07:00 PM

SOUTHBOUND (Iowa Ln)

AM	21	0	27	0	111	AM
NOON	0	0	0	0	0	NOON
PM	17	3	11	0	99	PM

EASTBOUND (Alvin Sugarland Rd/SR 6/Morris Ave)

AM	NOON	PM	
1581	0	1757	
9	0	25	0
22	0	65	1
1828	0	1671	3
14	0	48	0

WESTBOUND (Alvin Sugarland Rd/SR 6/Morris Ave)

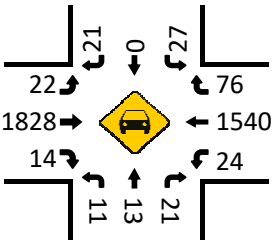
	PM	NOON	AM
0	26	0	76
3	1682	0	1540
1	10	0	24
0	1	0	2
	1737	0	1878

NORTHBOUND (Iowa Ln)

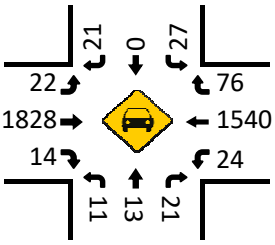
PM	61	0	33	8	54	PM
NOON	0	0	0	0	0	NOON
AM	38	0	11	13	21	AM

CONTROL			
2-Way Stop(NB/SB)			
TEV	3608 AM	0 NOON	3654 PM
PHF	0.88		0.96

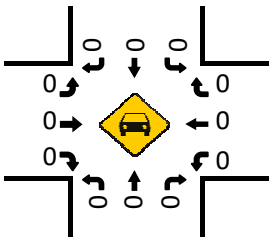
Totals (AM)



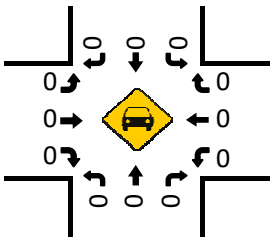
Totals (AM)



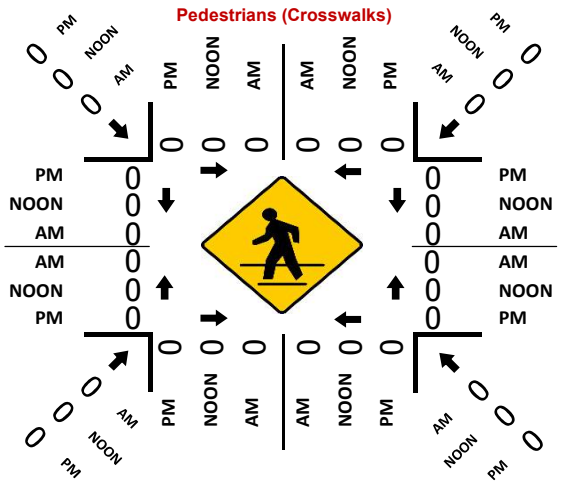
Totals (NOON)



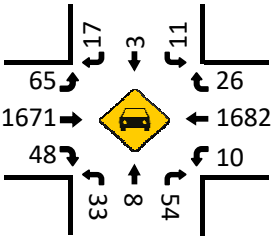
Totals (NOON)



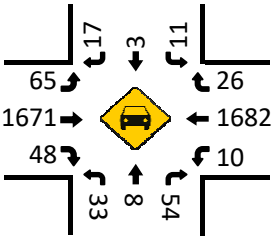
Pedestrians (Crosswalks)



Totals (PM)



Totals (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: SH 288 SB Ramps & Alvin Sugarland Rd/SR 6
City: Manvel
Control: Signalized

Project ID: 25-450183-001
Date: 8/28/2025

Data - Totals

NS/EW Streets:	SH 288 SB Ramps				SH 288 SB Ramps				Alvin Sugarland Rd/SR 6				Alvin Sugarland Rd/SR 6				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	2	0.5	1.5	1	0	4	1	0	1	3	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:30 AM	0	0	0	0	159	4	130	11	0	320	49	0	40	197	0	0	910
6:45 AM	0	0	0	0	184	8	133	15	0	429	44	0	36	274	0	0	1123
7:00 AM	0	0	0	0	191	5	108	11	0	437	53	0	32	229	0	0	1066
7:15 AM	0	0	0	0	146	3	129	30	0	329	48	0	36	305	0	0	1026
7:30 AM	0	0	0	0	159	8	117	22	0	382	67	0	33	225	0	1	1014
7:45 AM	0	0	0	0	153	7	125	18	0	309	37	0	32	259	0	0	940
8:00 AM	0	0	0	0	163	11	109	16	0	318	47	0	35	200	0	0	899
8:15 AM	0	0	0	0	153	4	93	27	0	280	58	0	27	234	0	0	876
8:30 AM	0	0	0	0	158	12	87	48	0	289	44	0	22	209	0	0	869
8:45 AM	0	0	0	0	133	9	99	31	0	308	47	0	28	195	0	0	850
9:00 AM	0	0	0	0	131	4	92	34	0	246	41	0	37	164	0	1	750
9:15 AM	0	0	0	0	99	6	80	28	0	238	42	0	20	186	0	0	699
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	1829	81	1302	291	0	3885	577	0	378	2677	0	2	11022
APPROACH %'s :					52.21%	2.31%	37.17%	8.31%	0.00%	87.07%	12.93%	0.00%	12.37%	87.57%	0.00%	0.07%	
PEAK HR :	06:45 AM - 07:45 AM																TOTAL
PEAK HR VOL :	0	0	0	0	680	24	487	78	0	1577	212	0	137	1033	0	1	4229
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.890	0.750	0.915	0.650	0.000	0.902	0.791	0.000	0.951	0.847	0.000	0.250	0.941
						0.933				0.913				0.859			

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	2	0.5	1.5	1	0	4	1	0	1	3	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	194	19	121	28	0	346	68	0	43	220	0	0	1039
4:15 PM	0	0	0	0	185	27	104	23	0	381	78	0	42	281	0	0	1121
4:30 PM	0	0	0	0	210	34	115	26	0	377	84	1	43	293	0	0	1183
4:45 PM	0	0	0	0	214	19	121	22	0	366	111	0	58	332	0	0	1243
5:00 PM	0	0	0	0	194	27	108	26	0	382	104	0	48	327	0	1	1217
5:15 PM	0	0	0	0	207	22	121	24	0	374	88	0	51	295	0	0	1182
5:30 PM	0	0	0	0	204	29	109	21	0	305	94	0	50	303	0	0	1115
5:45 PM	0	0	0	0	176	17	114	25	0	319	76	0	34	305	0	1	1067
6:00 PM	0	0	0	0	194	24	115	26	0	296	90	1	44	312	0	0	1102
6:15 PM	0	0	0	0	193	24	131	33	0	285	81	0	33	328	0	0	1108
6:30 PM	0	0	0	0	195	20	146	37	0	249	69	0	34	244	0	0	994
6:45 PM	0	0	0	0	150	23	150	25	0	280	73	0	34	223	0	0	958
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	2316	285	1455	316	0	3960	1016	2	514	3463	0	2	13329
APPROACH %'s :					52.97%	6.52%	33.28%	7.23%	0.00%	79.55%	20.41%	0.04%	12.92%	87.03%	0.00%	0.05%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	0	0	0	0	825	102	465	98	0	1499	387	1	200	1247	0	1	4825
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.964	0.750	0.961	0.942	0.000	0.981	0.872	0.250	0.862	0.939	0.000	0.250	0.970
						0.968				0.971				0.928			

Prepared by National Data & Surveying Services

SH 288 SB Ramps & Alvin Sugarland Rd/SR 6

Peak Hour Turning Movement Count

ID: 25-450183-001
City: Manvel

Day: Thursday
Date: 8/28/2025

PEAK HOURS

AM: 06:45 AM - 07:45 AM
NOON: NONE
PM: 04:30 PM - 05:30 PM

COUNT PERIODS

AM: 6:30 AM - 09:30 AM
NOON: NONE
PM: 4:00 PM - 07:00 PM

SOUTHBOUND — SH 288 SB Ramps

AM	487	24	680	78	78	AM
NOON	0	0	0	0	0	NOON
PM	465	102	825	98	98	PM

1.5 | 0.5 | 2 | 0

EASTBOUND — Alvin Sugarland Rd/SR 6

AM	NOON	PM	
1520	0	1713	
0	0	1	0
0	0	0	0
1577	0	1499	4
212	0	387	1

WESTBOUND — Alvin Sugarland Rd/SR 6

PM	NOON	AM	
0	0	0	0
1247	0	1033	3
200	0	137	1
1	0	1	0
2325	0	2258	

CONTROL

Signalized

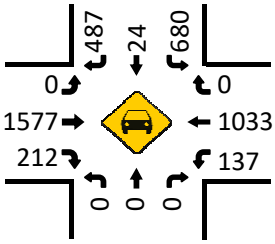
TEV	4229 AM	0 NOON	4825 PM
PHF	0.94		0.97

0 | 0 | 0 | 0

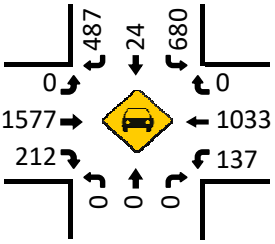
NORTHBOUND — SH 288 SB Ramps

PM	689	0	0	0	0	PM
NOON	0	0	0	0	0	NOON
AM	373	0	0	0	0	AM

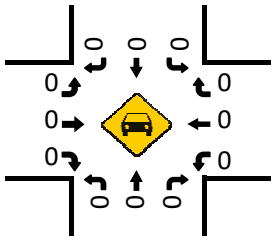
Totals (AM)



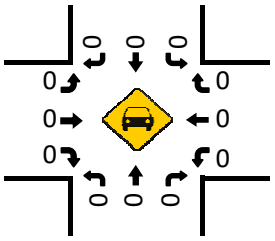
Totals (AM)



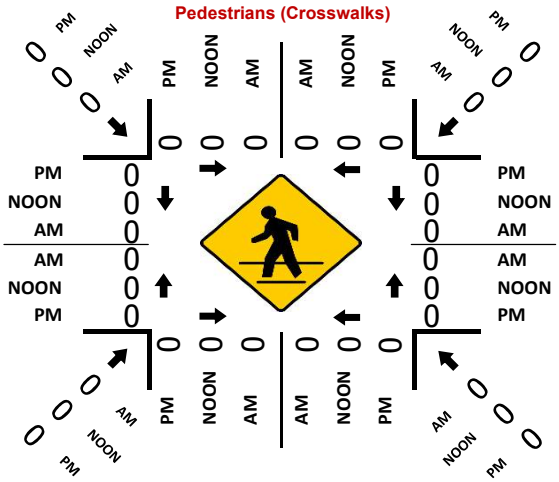
Totals (NOON)



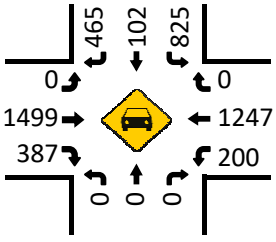
Totals (NOON)



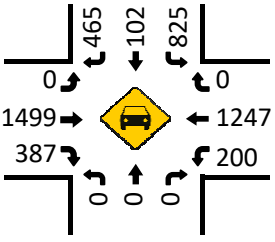
Pedestrians (Crosswalks)



Totals (PM)



Totals (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: SH 288 NB Ramps & Alvin Sugarland Rd/SR 6/Morris Ave
City: Manvel
Control: Signalized

Project ID: 25-450183-002
Date: 8/28/2025

Data - Totals

NS/EW Streets:	SH 288 NB Ramps				SH 288 NB Ramps				Alvin Sugarland Rd/SR 6/Morris Ave				Alvin Sugarland Rd/SR 6/Morris Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1.5	0.5	1	0	0	0	0	0	1.5	2.5	0	0	0	3.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:30 AM	63	1	25	0	0	0	0	0	126	364	0	0	0	171	168	0	918
6:45 AM	46	3	22	0	0	0	0	0	127	486	0	5	0	260	179	0	1128
7:00 AM	39	6	28	0	0	0	0	0	120	518	0	1	0	222	171	0	1105
7:15 AM	50	1	32	0	0	0	0	0	138	344	0	0	0	290	123	0	978
7:30 AM	52	4	32	0	0	0	0	0	145	405	0	1	0	203	110	0	952
7:45 AM	68	4	55	0	0	0	0	0	121	346	0	1	0	221	152	0	968
8:00 AM	60	1	30	0	0	0	0	0	130	353	0	0	0	175	161	0	910
8:15 AM	70	0	39	0	0	0	0	0	106	326	0	0	0	196	167	0	904
8:30 AM	57	2	43	0	0	0	0	0	130	318	0	0	0	179	166	0	895
8:45 AM	60	0	33	0	0	0	0	0	147	294	0	0	0	168	152	0	854
9:00 AM	62	0	27	0	0	0	0	0	121	260	0	0	0	142	174	0	786
9:15 AM	54	2	27	0	0	0	0	0	129	205	0	0	0	152	169	0	738
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	681	24	393	0	0	0	0	0	1540	4219	0	8	0	2379	1892	0	11136
APPROACH %'s :	62.02%	2.19%	35.79%	0.00%					26.70%	73.16%	0.00%	0.14%	0.00%	55.70%	44.30%	0.00%	
PEAK HR :	06:45 AM - 07:45 AM																TOTAL
PEAK HR VOL :	187	14	114	0	0	0	0	0	530	1753	0	7	0	975	583	0	4163
PEAK HR FACTOR :	0.899	0.583	0.891	0.000	0.000	0.000	0.000	0.000	0.914	0.846	0.000	0.350	0.000	0.841	0.814	0.000	0.923
	0.895								0.896				0.887				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1.5	0.5	1	0	0	0	0	0	1.5	2.5	0	0	0	3.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	24	0	17	0	0	0	0	0	146	422	0	0	0	233	191	0	1033
4:15 PM	39	1	25	0	0	0	0	0	175	377	0	0	0	279	212	0	1108
4:30 PM	55	0	42	0	0	0	0	0	169	429	0	0	0	284	191	0	1170
4:45 PM	75	4	62	0	0	0	0	0	117	435	0	3	0	313	119	0	1128
5:00 PM	76	3	52	0	0	0	0	0	141	466	0	2	0	294	143	0	1177
5:15 PM	88	5	51	0	0	0	0	0	117	454	0	3	0	246	145	0	1109
5:30 PM	81	4	63	0	0	0	0	0	106	412	0	2	0	261	136	0	1065
5:45 PM	70	16	38	0	0	0	0	0	115	372	0	1	0	263	125	0	1000
6:00 PM	96	3	44	0	0	0	0	0	104	398	0	5	0	257	128	0	1035
6:15 PM	73	3	38	0	0	0	0	0	110	383	0	0	0	297	130	0	1034
6:30 PM	53	1	32	0	0	0	0	0	99	347	0	1	0	220	160	0	913
6:45 PM	49	1	19	0	0	0	0	0	134	301	0	0	0	210	136	0	850
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	779	41	483	0	0	0	0	0	1533	4796	0	17	0	3157	1816	0	12622
APPROACH %'s :	59.79%	3.15%	37.07%	0.00%					24.16%	75.58%	0.00%	0.27%	0.00%	63.48%	36.52%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																TOTAL
PEAK HR VOL :	294	12	207	0	0	0	0	0	544	1784	0	8	0	1137	598	0	4584
PEAK HR FACTOR :	0.835	0.600	0.835	0.000	0.000	0.000	0.000	0.000	0.805	0.957	0.000	0.667	0.000	0.908	0.783	0.000	0.974
	0.891								0.959				0.913				

Prepared by National Data & Surveying Services

SH 288 NB Ramps & Alvin Sugarland Rd/SR 6/Morris Ave

Peak Hour Turning Movement Count

ID: 25-450183-002
City: Manvel

Day: Thursday
Date: 8/28/2025

PEAK HOURS	COUNT PERIODS
06:45 AM - 07:45 AM	6:30 AM - 09:30 AM
NONE	NONE
04:30 PM - 05:30 PM	4:00 PM - 07:00 PM

CONTROL: Signalized

	AM	NOON	PM
TEV	4163	0	4584
PHF	0.92		0.97

SOUTHBOUND — SH 288 NB Ramps

AM	0	0	0	0	1127	AM
NOON	0	0	0	0	0	NOON
PM	0	0	0	0	1154	PM

EASTBOUND — Alvin Sugarland Rd/SR 6/Morris Ave

AM	NOON	PM	
1169	0	1439	
7	0	8	0
530	0	544	1.5
1753	0	1784	2.5
0	0	0	0

WESTBOUND — Alvin Sugarland Rd/SR 6/Morris Ave

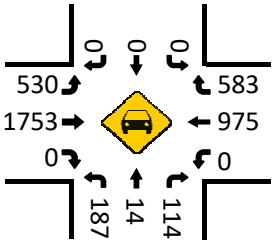
	PM	NOON	AM
0.5	598	0	583
3.5	1137	0	975
0	0	0	0
0	0	0	0
	1991	0	1867

NORTHBOUND — SH 288 NB Ramps

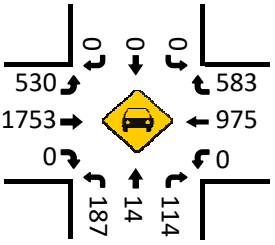
PM	0	0	294	12	207	PM
NOON	0	0	0	0	0	NOON
AM	0	0	187	14	114	AM

0 0 0 0 — 0 1.5 0.5 1

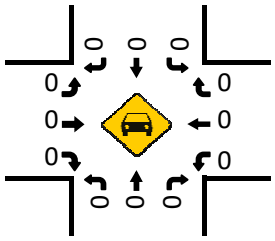
Totals (AM)



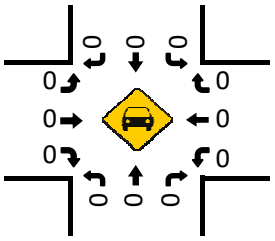
Totals (AM)



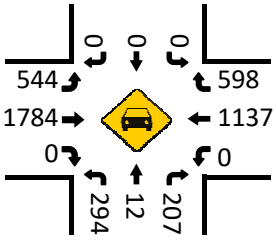
Totals (NOON)



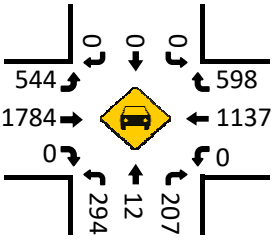
Totals (NOON)



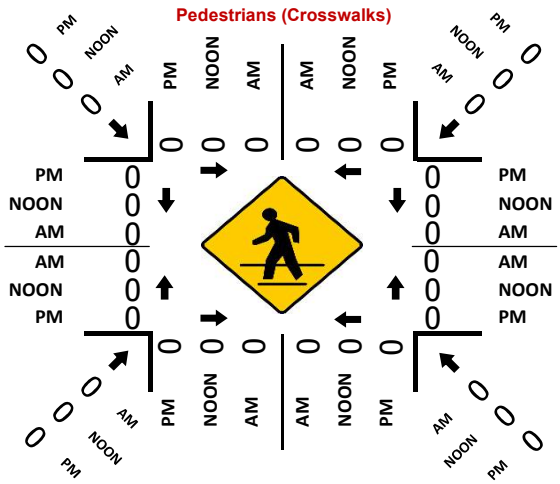
Totals (PM)



Totals (PM)



Pedestrians (Crosswalks)



National Data & Surveying Services Intersection Turning Movement Count

Location: SR 288 NB & Rodeo Palms Pkwy/Del Bello Blvd
City: Manvel
Control: 3-Way Stop(NB/EB/WB)

Project ID: 26-450043-002
Date: 2/24/2026

Data - Total

NS/EW Streets:	SR 288 NB				SR 288 NB				Rodeo Palms Pkwy/Del Bello Blvd				Rodeo Palms Pkwy/Del Bello Blvd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1.5	1	0	0	0	0	0	1	2	0	0	0	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	4	2	3	0	0	0	0	0	41	5	0	0	0	2	52	0	109
6:15 AM	3	7	1	0	0	0	0	0	28	3	0	0	0	1	53	0	96
6:30 AM	8	26	3	0	0	0	0	0	50	19	0	0	0	4	72	0	182
6:45 AM	5	27	7	0	0	0	0	0	40	18	0	0	0	8	84	1	190
7:00 AM	7	20	6	2	0	0	0	0	39	25	0	0	0	9	91	0	199
7:15 AM	11	37	4	0	0	0	0	0	37	23	0	0	0	15	114	0	241
7:30 AM	4	46	1	0	0	0	0	0	61	21	0	0	0	5	101	0	239
7:45 AM	2	26	4	0	0	0	0	0	33	25	0	0	0	4	80	0	174
8:00 AM	12	4	8	0	0	0	0	0	39	33	0	0	0	9	53	0	158
8:15 AM	8	2	8	0	0	0	0	0	30	33	0	0	0	7	57	0	145
8:30 AM	9	3	7	2	0	0	0	0	34	37	0	0	0	8	47	0	147
8:45 AM	9	3	10	1	0	0	0	0	34	25	0	0	0	5	45	0	132
9:00 AM	10	0	8	1	0	0	0	0	28	22	0	0	0	5	30	0	104
9:15 AM	11	0	6	0	0	0	0	0	21	28	0	0	0	4	24	0	94
9:30 AM	9	1	10	0	0	0	0	0	23	23	0	0	0	7	29	0	102
9:45 AM	12	1	11	1	0	0	0	0	27	25	0	0	0	7	32	0	116
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	124	205	97	7	0	0	0	0	565	365	0	0	0	100	964	1	2428
APPROACH %'s :	28.64%	47.34%	22.40%	1.62%					60.75%	39.25%	0.00%	0.00%	0.00%	9.39%	90.52%	0.09%	
PEAK HR :	06:45 AM - 07:45 AM																TOTAL
PEAK HR VOL :	27	130	18	2	0	0	0	0	177	87	0	0	0	37	390	1	869
PEAK HR FACTOR :	0.614	0.707	0.643	0.250	0.000	0.000	0.000	0.000	0.725	0.870	0.000	0.000	0.000	0.617	0.855	0.250	0.901
	0.851								0.805				0.829				

NOON	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1.5	1	0	0	0	0	0	1	2	0	0	0	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
10:00 AM	10	2	7	3	0	0	0	0	18	17	0	0	0	5	24	0	86
10:15 AM	8	2	7	1	0	0	0	0	23	37	0	0	0	5	18	1	102
10:30 AM	9	0	13	0	0	0	0	0	21	26	0	0	0	8	40	0	117
10:45 AM	9	2	6	0	0	0	0	0	16	28	0	0	0	14	30	0	105
11:00 AM	9	3	8	4	0	0	0	0	26	20	0	0	0	5	24	0	99
11:15 AM	15	3	5	1	0	0	0	0	20	16	0	0	0	7	25	0	92
11:30 AM	8	3	7	4	0	0	0	0	21	24	0	0	0	11	22	0	100
11:45 AM	12	1	10	0	0	0	0	0	13	26	0	0	0	5	25	0	92
12:00 PM	13	1	7	1	0	0	0	0	19	30	0	0	0	12	35	0	118
12:15 PM	13	2	5	3	0	0	0	0	31	30	0	0	0	10	28	0	122
12:30 PM	8	3	12	2	0	0	0	0	20	24	0	0	0	13	34	0	116
12:45 PM	9	1	10	4	0	0	0	0	14	20	0	0	0	2	33	0	93
1:00 PM	19	2	11	1	0	0	0	0	13	35	0	0	0	9	40	0	130
1:15 PM	15	0	10	2	0	0	0	0	12	28	0	0	0	15	24	0	106
1:30 PM	11	2	11	4	0	0	0	0	21	29	0	0	0	8	35	0	121
1:45 PM	9	3	10	5	0	0	0	0	21	15	0	0	0	8	23	0	94
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	177	30	139	35	0	0	0	0	309	405	0	0	0	137	460	1	1693
APPROACH %'s :	46.46%	7.87%	36.48%	9.19%					43.28%	56.72%	0.00%	0.00%	0.00%	22.91%	76.92%	0.17%	
PEAK HR :	12:15 PM - 01:15 PM																TOTAL
PEAK HR VOL :	49	8	38	10	0	0	0	0	78	109	0	0	0	34	135	0	461
PEAK HR FACTOR :	0.645	0.667	0.792	0.625	0.000	0.000	0.000	0.000	0.629	0.779	0.000	0.000	0.000	0.654	0.844	0.000	0.887
	0.795								0.766				0.862				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1.5	1	0	0	0	0	0	1	2	0	0	0	1.5	0.5	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
2:00 PM	22	2	13	2	0	0	0	0	23	28	0	0	0	9	35	0	134
2:15 PM	13	2	15	2	0	0	0	0	31	29	0	0	0	9	20	0	121
2:30 PM	11	2	8	1	0	0	0	0	19	34	0	0	0	11	26	0	112
2:45 PM	20	3	8	4	0	0	0	0	31	30	0	0	0	6	34	0	136
3:00 PM	38	1	11	3	0	0	0	0	15	26	0	0	0	17	25	0	136
3:15 PM	22	1	6	2	0	0	0	0	15	39	0	0	0	6	45	0	136
3:30 PM	20	3	9	1	0	0	0	0	18	36	0	0	0	7	27	0	121
3:45 PM	26	2	12	3	0	0	0	0	20	39	0	0	0	12	32	0	146
4:00 PM	24	4	11	5	0	0	0	0	30	50	0	0	0	17	38	1	180
4:15 PM	7	10	6	2	0	0	0	0	27	53	0	0	0	11	43	0	159
4:30 PM	28	3	13	3	0	0	0	0	24	40	0	0	0	16	36	0	163
4:45 PM	27	4	10	3	0	0	0	0	28	44	0	0	0	6	35	0	157
5:00 PM	20	2	5	4	0	0	0	0	19	45	0	0	0	9	33	0	137
5:15 PM	20	3	10	2	0	0	0	0	22	48	0	0	0	11	41	0	157
5:30 PM	18	0	6	2	0	0	0	0	22	34	0	0	0	9	31	0	122
5:45 PM	17	3	6	1	0	0	0	0	20	64	0	0	0	8	47	0	166
6:00 PM	19	0	2	2	0	0	0	0	16	44	0	0	0	15	48	0	146
6:15 PM	21	4	17	1	0	0	0	0	26	43	0	0	0	12	43	0	167
6:30 PM	12	2	7	2	0	0	0	0	17	43	0	0	0	8	38	0	129
6:45 PM	13	0	8	0	0	0	0	0	21	35	0	0	0	9	34	0	120
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	398	51	183	45	0	0	0	0	444	804	0	0	0	208	711	1	2845
APPROACH %'s :	58.79%	7.53%	27.03%	6.65%					35.58%	64.42%	0.00%	0.00%	0.00%	22.61%	77.28%	0.11%	
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	86	21	40	13	0	0	0	0	109	187	0	0	0	50	152	1	659
PEAK HR FACTOR :	0.768	0.525	0.769	0.650	0.000	0.000	0.000	0.000	0.908	0.882	0.000	0.000	0.000	0.735	0.884	0.250	0.915
	0.851								0.925				0.906				

Prepared by National Data & Surveying Services

SR 288 NB & Rodeo Palms Pkwy/Del Bello Blvd

Peak Hour Turning Movement Count

ID: 26-450043-002
City: Manvel

Day: Tuesday
Date: 2/24/2026

PEAK HOURS

AM	06:45 AM - 07:45 AM
NOON	12:15 PM - 01:15 PM
PM	04:00 PM - 05:00 PM

COUNT PERIODS

AM	6:00 AM - 10:00 AM
NOON	10:00 AM - 02:00 PM
PM	2:00 PM - 07:00 PM

CONTROL

3-Way Stop(NB/EB/WB)

	AM	NOON	PM
TEV	869	461	659
PHF	0.90	0.89	0.92

SR 288 NB — SOUTHBOUND

	Left	Thru	Thru	Right		
AM	0	0	0	0	697	AM
NOON	0	0	0	0	221	NOON
PM	0	0	0	0	282	PM

EASTBOUND — Rodeo Palms Pkwy/Del Bello Blvd

AM	NOON	PM		
64	83	136	⇦	
0	0	0	↩	0
177	78	109	↱	1
87	109	187	→	2
0	0	0	↳	0
AM	NOON	PM		

WESTBOUND — Rodeo Palms Pkwy/Del Bello Blvd

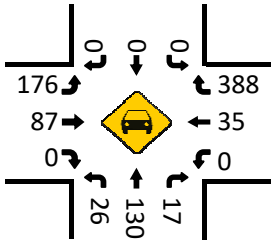
PM	NOON	AM		
152	135	390	↰	0.5
50	34	37	←	1.5
0	0	0	↩	0
1	0	1	↩	0
228	147	106	⇨	
PM	NOON	AM		

SR 288 NB — NORTHBOUND

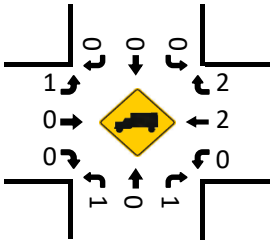
	Left	Thru	Thru	Right		
PM	13	13	86	21	40	PM
NOON	10	10	49	8	38	NOON
AM	2	2	27	130	18	AM

0 0 1.5 1

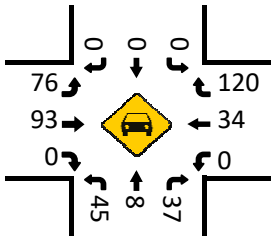
Cars (AM)



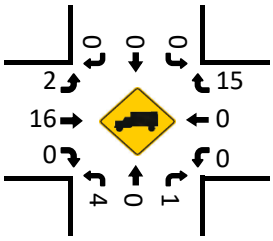
Total Trucks (AM)



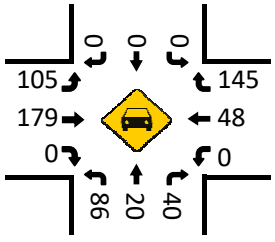
Cars (NOON)



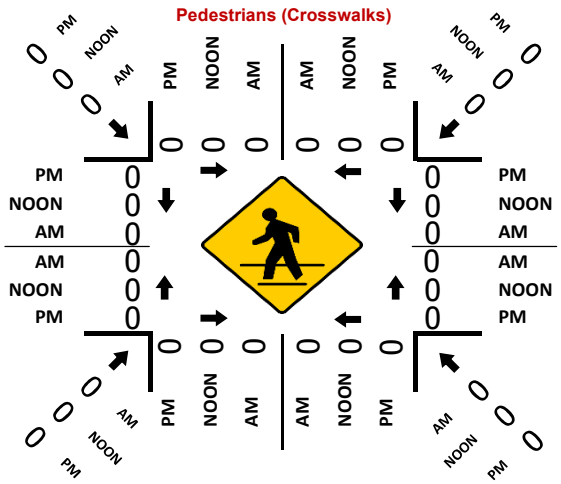
Total Trucks (NOON)



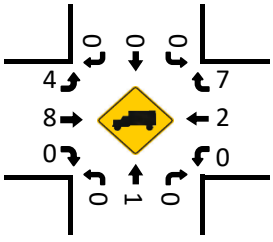
Cars (PM)



Pedestrians (Crosswalks)



Total Trucks (PM)



National Data & Surveying Services Intersection Turning Movement Count

Location: SR 288 SB & Rodeo Palms Pkwy/Del Bello Blvd
City: Manvel
Control: 3-Way Stop(SB/EB/WB)

Project ID: 26-450043-001
Date: 2/24/2026

Data - Total

NS/EW Streets:	SR 288 SB				SR 288 SB				Rodeo Palms Pkwy/Del Bello Blvd				Rodeo Palms Pkwy/Del Bello Blvd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	2	0	0	0	3	0	0	1	2	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	0	0	0	0	5	1	3	0	0	41	17	0	2	4	0	0	73
6:15 AM	0	0	0	0	3	3	10	0	0	28	23	0	1	3	0	0	71
6:30 AM	0	0	0	0	19	3	16	2	0	50	34	0	3	9	0	0	136
6:45 AM	0	0	0	0	15	10	18	1	0	43	72	0	5	8	0	0	172
7:00 AM	0	0	0	0	21	4	14	3	0	43	59	0	3	13	0	0	160
7:15 AM	0	0	0	0	21	8	14	2	0	39	34	0	8	18	0	0	144
7:30 AM	0	0	0	0	21	5	14	1	0	61	19	1	3	6	0	0	131
7:45 AM	0	0	0	0	22	2	12	1	0	36	20	0	1	5	0	0	99
8:00 AM	0	0	0	0	28	6	16	1	0	44	17	0	4	17	0	0	133
8:15 AM	0	0	0	0	30	2	16	1	0	33	26	0	3	12	0	0	123
8:30 AM	0	0	0	0	32	6	22	2	0	39	23	0	4	13	0	0	141
8:45 AM	0	0	0	0	23	1	19	2	0	36	28	0	4	10	0	0	123
9:00 AM	0	0	0	0	20	2	12	1	0	30	14	0	5	10	0	0	94
9:15 AM	0	0	0	0	28	5	15	0	0	21	12	0	4	11	0	0	96
9:30 AM	0	0	0	0	23	3	17	1	0	23	17	0	5	11	0	0	100
9:45 AM	0	0	0	0	23	2	19	0	0	29	10	0	6	13	0	0	102
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	334	63	237	18	0	596	425	1	61	163	0	0	1898
APPROACH %'s :					51.23%	9.66%	36.35%	2.76%	0.00%	58.32%	41.59%	0.10%	27.23%	72.77%	0.00%	0.00%	
PEAK HR :	06:30 AM - 07:30 AM																TOTAL
PEAK HR VOL :	0	0	0	0	76	25	62	8	0	175	199	0	19	48	0	0	612
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.905	0.625	0.861	0.667	0.000	0.875	0.691	0.000	0.594	0.667	0.000	0.000	0.890
					0.950				0.813				0.644				

NOON	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	2	0	0	0	3	0	0	1	2	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
10:00 AM	0	0	0	0	16	3	10	4	0	19	11	0	2	13	0	0	78
10:15 AM	0	0	0	0	35	2	9	1	0	25	20	0	4	9	0	0	105
10:30 AM	0	0	0	0	24	2	15	3	0	23	18	0	7	10	0	0	102
10:45 AM	0	0	0	0	25	5	16	3	0	19	12	0	13	10	0	0	103
11:00 AM	0	0	0	0	16	4	17	1	0	30	11	0	4	10	0	0	93
11:15 AM	0	0	0	0	16	3	16	0	0	20	13	1	6	16	0	0	91
11:30 AM	0	0	0	0	24	2	16	0	0	21	13	0	11	8	0	0	95
11:45 AM	0	0	0	0	25	6	17	1	0	14	17	0	5	12	0	0	97
12:00 PM	0	0	0	0	28	3	19	2	0	21	15	1	11	14	0	0	114
12:15 PM	0	0	0	0	28	9	20	0	0	33	14	0	8	15	0	0	127
12:30 PM	0	0	0	0	22	5	15	0	0	22	21	0	9	12	0	0	106
12:45 PM	0	0	0	0	20	4	21	2	0	14	10	0	2	9	0	0	82
1:00 PM	0	0	0	0	32	6	16	3	0	16	16	0	8	20	0	0	117
1:15 PM	0	0	0	0	25	2	17	1	0	15	12	0	14	16	0	0	102
1:30 PM	0	0	0	0	26	6	19	0	0	24	23	0	8	11	0	0	117
1:45 PM	0	0	0	0	15	2	14	1	0	21	16	0	6	11	0	0	86
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	377	64	257	22	0	337	242	2	118	196	0	0	1615
APPROACH %'s :					52.36%	8.89%	35.69%	3.06%	0.00%	58.00%	41.65%	0.34%	37.58%	62.42%	0.00%	0.00%	
PEAK HR :	11:45 AM - 12:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	103	23	71	3	0	90	67	1	33	53	0	0	444
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.920	0.639	0.888	0.375	0.000	0.682	0.798	0.250	0.750	0.883	0.000	0.000	0.874
					0.877				0.840				0.860				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	2	0	0	0	3	0	0	1	2	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
2:00 PM	0	0	0	0	25	5	16	1	0	26	11	1	7	24	0	0	116
2:15 PM	0	0	0	0	26	4	13	6	0	34	18	0	8	14	0	0	123
2:30 PM	0	0	0	0	32	6	15	2	0	21	17	0	8	14	0	0	115
2:45 PM	0	0	0	0	30	4	22	3	0	31	18	0	5	21	0	0	134
3:00 PM	0	0	0	0	25	12	23	6	0	16	19	0	11	44	0	0	156
3:15 PM	0	0	0	0	36	10	33	7	0	18	13	0	3	25	0	0	145
3:30 PM	0	0	0	0	32	26	29	5	0	22	20	0	5	22	0	0	161
3:45 PM	0	0	0	0	37	75	36	3	0	22	22	0	6	32	0	0	233
4:00 PM	0	0	0	0	45	68	31	0	0	35	28	0	13	28	0	0	248
4:15 PM	0	0	0	0	46	81	35	2	0	34	33	0	10	8	0	0	249
4:30 PM	0	0	0	0	38	64	27	1	0	26	23	0	10	34	0	0	223
4:45 PM	0	0	0	0	43	38	26	1	0	29	20	0	6	27	0	0	190
5:00 PM	0	0	0	0	44	77	36	3	0	20	17	0	7	22	0	0	226
5:15 PM	0	0	0	0	44	29	34	3	0	26	23	0	9	22	0	0	190
5:30 PM	0	0	0	0	33	46	31	3	0	23	18	0	3	24	0	0	181
5:45 PM	0	0	0	0	61	36	35	5	0	23	23	0	6	19	0	0	208
6:00 PM	0	0	0	0	38	23	32	1	0	22	23	0	12	22	0	0	173
6:15 PM	0	0	0	0	39	52	38	3	0	30	26	0	10	23	0	0	221
6:30 PM	0	0	0	0	40	27	37	0	0	20	25	0	8	12	0	0	169
6:45 PM	0	0	0	0	28	17	28	2	0	28	15	0	7	15	0	0	140
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	742	700	577	57	0	506	412	1	154	452	0	0	3601
APPROACH %'s :					35.74%	33.72%	27.79%	2.75%	0.00%	55.06%	44.83%	0.11%	25.41%	74.59%	0.00%	0.00%	
PEAK HR :	03:45 PM - 04:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	166	288	129	6	0	117	106	0	39	102	0	0	953
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.902	0.889	0.896	0.500	0.000	0.836	0.803	0.000	0.750	0.750	0.000	0.000	0.957
					0.898				0.832				0.801				

Prepared by National Data & Surveying Services

SR 288 SB & Rodeo Palms Pkwy/Del Bello Blvd

Peak Hour Turning Movement Count

ID: 26-450043-001
City: Manvel

Day: Tuesday
Date: 2/24/2026

PEAK HOURS	COUNT PERIODS
06:30 AM - 07:30 AM	6:00 AM - 10:00 AM
11:45 AM - 12:45 PM	10:00 AM - 02:00 PM
03:45 PM - 04:45 PM	2:00 PM - 07:00 PM

SOUTHBOUND (SR 288 SB)

AM	62	25	76	8	8	AM
NOON	71	23	103	3	3	NOON
PM	129	288	166	6	6	PM
	0	2	0	0		

EASTBOUND (Rodeo Palms Pkwy/Del Bello Blvd)

AM	NOON	PM	
110	125	231	
0	1	0	0
0	0	0	0
175	90	117	3
199	67	106	0
AM	NOON	PM	

WESTBOUND (Rodeo Palms Pkwy/Del Bello Blvd)

PM	NOON	AM	
0	0	0	0
102	53	48	2
39	33	19	1
0	0	0	0
283	193	251	
PM	NOON	AM	

CONTROL

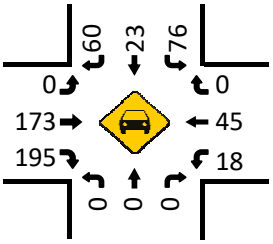
3-Way Stop(SB/EB/WB)

	AM	NOON	PM
TEV	612	444	953
PHF	0.89	0.87	0.96

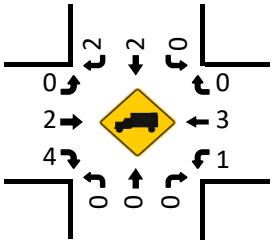
NORTHBOUND (SR 288 SB)

PM	433	0	0	0	0	PM
NOON	123	0	0	0	0	NOON
AM	243	0	0	0	0	AM
		0	0	0	0	

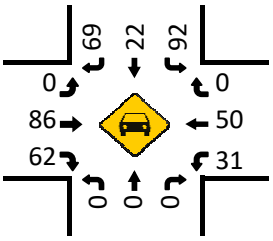
Cars (AM)



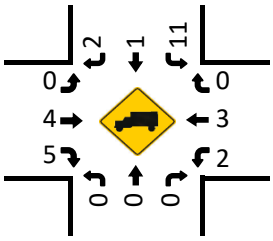
Total Trucks (AM)



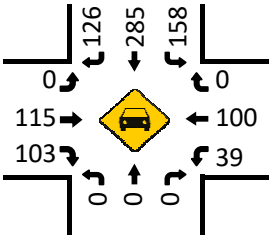
Cars (NOON)



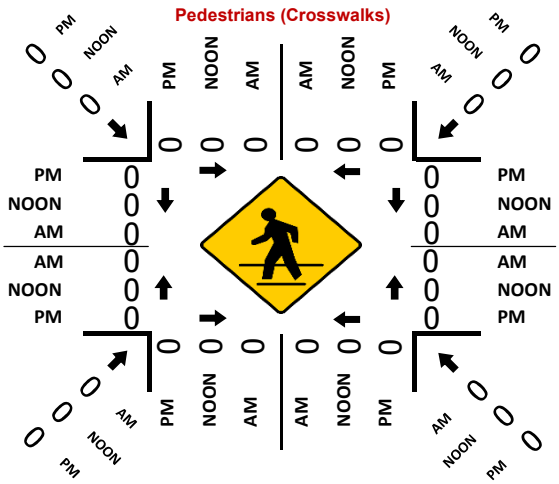
Total Trucks (NOON)



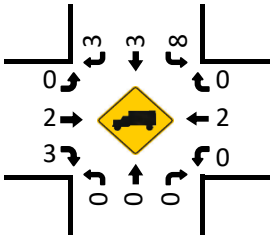
Cars (PM)



Pedestrians (Crosswalks)



Total Trucks (PM)



Appendix C

Trip Generation

Trip Generation

Project:	Presidio
Job Number:	2013-2515
Phase	Ultimate
Land Use:	Shopping Center (>150K)
ITE Code:	820
Independent Variable:	1000 Sq.Ft
Variable Value:	876

Acres	%	Sq Ft	1000 Fq Ft
134	0.15	875556	875.56

Daily Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		36.39			
Linear Equation:	T=		(X) +		
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	31,878		
	In	50%	15,939	15,939	
	Out	50%	15,939	15,939	

AM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		0.88			
Linear Equation:	T=		(X) +		
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	771		
	In	62%	478	478	
	Out	38%	293	293	

PM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		3.26			
Linear Equation:	T=		(X) +		
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	2,856		
	In	49%	1,399	1,399	
	Out	51%	1,457	1,456	

Trip Generation

Project:	Presidio
Job Number:	2013-2515
Phase	Ultimate
Land Use:	Multi Family Housing (Low Rise)
ITE Code:	220
Independent Variable:	Dwelling Units
Variable Value:	340

Daily Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		6.21			
Linear Equation:	T=	5.63	(X) +	120.45	
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	**2,111**		
	In	50%	**1,056**	**1,056**	
	Out	50%	**1,055**	**1,056**	

AM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		0.41			
Linear Equation:	T=	0.35	(X) +	12.93	
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	**139**		
	In	24%	**33**		
	Out	76%	**106**		

PM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		0.52			
Linear Equation:	T=	0.48	(X) +	7.35	
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	**177**		
	In	62%	**110**		
	Out	38%	**67**		

Trip Generation

Project:	Presidio
Job Number:	2013-2515
Phase	Ultimate
Land Use:	Hospital + Bed Tower
ITE Code:	610
Independent Variable:	1000 Sq.Ft
Variable Value:	550

USE	Acres	%	Sq Ft	1000 Fq Ft
Hospital	-	-	262488	262.488
Bed Tower	-	-	283635	283.635
Total	-	-	546123	546.12

Daily Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		10.7			
Linear Equation:	T=	4.6	(X) +	120.45	
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	5,885		
	In	50%	2,943	2,943	
	Out	50%	2,942	2,943	

AM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		0.79			
Linear Equation:	T=	0.56	(X) +	12.93	
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	435		
	In	68%	295	295	
	Out	32%	140	139	

PM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		0.86			
Linear Equation:	T=		(X) +	7.35	
Exponential Equation:	Ln (T)=	0.58	Ln(X) +		
		%	Volume		
	Total Traffic	100%	473		
	In	34%	161	161	
	Out	66%	312	312	

Trip Generation

Project:	Presidio
Job Number:	2013-2515
Phase	Ultimate
Land Use:	Surgery
ITE Code:	610
Independent Variable:	1000 Sq.Ft
Variable Value:	100

USE	Acres	%	Sq Ft	1000 Fq Ft
Sugery	-	-	100794	100.794
Total	-	-	100794	100.79

Daily Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		10.7			
Linear Equation:	T=	4.6	(X) +	120.45	
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	1,070		
	In	50%	535	535	
	Out	50%	535	535	

AM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		0.79			
Linear Equation:	T=	0.56	(X) +	12.93	
Exponential Equation:	Ln (T)=		Ln(X) +		
		%	Volume		
	Total Traffic	100%	79		
	In	68%	54	54	
	Out	32%	25	25	

PM Peak Traffic

Type of Equation: 1 (1 Rate, 2 Linear, 3 Exponential)

Average Rate:		0.86			
Linear Equation:	T=		(X) +	7.35	
Exponential Equation:	Ln (T)=	0.58	Ln(X) +		
		%	Volume		
	Total Traffic	100%	86		
	In	34%	29	29	
	Out	66%	57	57	

Trip Generation

Project:	Presidio
Job Number:	2013-2515
Phase	Ultimate
Land Use:	HAL
ITE Code:	630
Independent Variable:	1000 Sq.Ft
Variable Value:	200

USE	Acres	%	Sq Ft	1000 Fq Ft
Hospital				
Bed Tower				
Sugery				
HAL	-	-	201759	201.759
Total	-	-	201759	201.76

Daily Traffic

Type of Equation: 1

Average Rate:		37.6			1 Rate
Linear Equation:	T=	35.86	(X) +	34.88	2 Linear
Exponential Equation:	Ln (T)=		Ln(X) +		3 Exponential
		%	Volume		
	Total Traffic	100%	7,520		
	In	50%	3,760	3,760	
	Out	50%	3,760	3,760	

AM Peak Traffic

Type of Equation: 1

Average Rate:		2.75			1 Rate
Linear Equation:	T=	2.19	(X) +	8.68	2 Linear
Exponential Equation:	Ln (T)=		Ln(X) +		3 Exponential
		%	Volume		
	Total Traffic	100%	550		
	In	81%	446	446	
	Out	19%	104	105	

PM Peak Traffic

Type of Equation: 1

Average Rate:		3.67			1 Rate
Linear Equation:	T=	3.53	(X) +	2.9	2 Linear
Exponential Equation:	Ln (T)=		Ln(X) +		3 Exponential
		%	Volume		
	Total Traffic	100%	734		
	In	29%	213	213	
	Out	71%	521	521	

Trip Generation

Project:	Presidio
Job Number:	2013-2515
Phase	Ultimate
Land Use:	Single Family Detached Housing
ITE Code:	210
Independent Variable:	Dwelling Units
Variable Value:	392

Daily Traffic

Type of Equation: 1

Average Rate:		9.09			1 Rate
Linear Equation:	T=		(X) +	229.68	2 Linear
Exponential Equation:	Ln (T)=		Ln(X) +		3 Exponential
		%	Volume		
	Total Traffic	100%	3,563		
	In	50%	1,782	1,782	
	Out	50%	1,781	1,782	

AM Peak Traffic

Type of Equation: 1

Average Rate:		0.7			1 Rate
Linear Equation:	T=		(X) +		2 Linear
Exponential Equation:	Ln (T)=		Ln(X) +		3 Exponential
		%	Volume		
	Total Traffic	100%	274		
	In	27%	74	74	
	Out	73%	200	200	

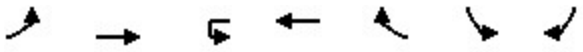
PM Peak Traffic

Type of Equation: 1

Average Rate:		0.93			1 Rate
Linear Equation:	T=		(X) +		2 Linear
Exponential Equation:	Ln (T)=		Ln(X) +		3 Exponential
		%	Volume		
	Total Traffic	100%	365		
	In	62%	226	226	
	Out	38%	139	139	

Appendix D

Intersection Capacity Analysis Reports



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	92	1784	22	1579	74	126	58
Future Volume (vph)	92	1784	22	1579	74	126	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91		1.00	1.00
Frt	1.00	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	1770	5051		1770	1583
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1770	5085	1770	5051		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	1939	24	1716	80	137	63
RTOR Reduction (vph)	0	0	0	8	0	0	45
Lane Group Flow (vph)	100	1939	24	1788	0	137	18
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	7	4	3	8		6	
Permitted Phases							6
Actuated Green, G (s)	4.1	29.1	1.0	26.0		18.1	18.1
Effective Green, g (s)	4.1	29.1	1.0	26.0		18.1	18.1
Actuated g/C Ratio	0.07	0.47	0.02	0.42		0.29	0.29
Clearance Time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	117	2398	28	2128		519	464
v/s Ratio Prot	c0.06	c0.38	0.01	0.35		c0.08	
v/s Ratio Perm							0.01
v/c Ratio	0.85	0.81	0.86	0.84		0.26	0.04
Uniform Delay, d1	28.5	13.9	30.3	16.0		16.7	15.6
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	41.9	2.1	108.8	3.2		1.2	0.2
Delay (s)	70.4	16.0	139.1	19.2		17.9	15.7
Level of Service	E	B	F	B		B	B
Approach Delay (s/veh)		18.7		20.7		17.2	
Approach LOS		B		C		B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	65.4

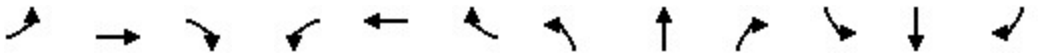
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	1828	14	26	1540	76	11	13	21	27	0	21
Future Vol, veh/h	31	1828	14	26	1540	76	11	13	21	27	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	540	-	-	710	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	1987	15	28	1674	83	12	14	23	29	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1757	0	0	2002	0	0	2788	3875	1001	2641	3841	878
Stage 1	-	-	-	-	-	-	2062	2062	-	1772	1772	-
Stage 2	-	-	-	-	-	-	726	1813	-	869	2070	-
Critical Hdwy	5.34	-	-	5.34	-	-	6.44	6.54	7.14	6.44	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	7.34	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.74	5.54	-	6.74	5.54	-
Follow-up Hdwy	3.12	-	-	3.12	-	-	3.82	4.02	3.92	3.82	4.02	3.92
Pot Cap-1 Maneuver	166	-	-	125	-	-	20	~ 3	207	~ 25	4	250
Stage 1	-	-	-	-	-	-	35	96	-	56	135	-
Stage 2	-	-	-	-	-	-	347	128	-	283	95	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	166	-	-	125	-	-	~ 11	~ 2	207	~ 14	2	250
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 11	~ 2	-	~ 14	2	-
Stage 1	-	-	-	-	-	-	28	76	-	44	104	-
Stage 2	-	-	-	-	-	-	244	99	-	164	76	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.53	0.67	$ 4216.6	$ 919.45
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	6	166	-	-	125	-	-	23
HCM Lane V/C Ratio	7.835	0.203	-	-	0.227	-	-	2.236
HCM Control Delay (s/veh)	$ 4216.6	32.1	-	-	42.1	-	-	$ 919.5
HCM Lane LOS	F	D	-	-	E	-	-	F
HCM 95th %tile Q(veh)	7.7	0.7	-	-	0.8	-	-	6.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1867	0	0	1572	0	0	0	0	0	0	0
Future Volume (vph)	0	1867	0	0	1572	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5							
Lane Util. Factor		0.91			0.91							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		5085			5085							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		5085			5085							
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2029	0	0	1709	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	2029	0	0	1709	0	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA							
Protected Phases		4			8							
Permitted Phases	4			8								
Actuated Green, G (s)		90.0			90.0							
Effective Green, g (s)		90.0			90.0							
Actuated g/C Ratio		1.00			1.00							
Clearance Time (s)		4.5			4.5							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		5085			5085							
v/s Ratio Prot		c0.40			0.34							
v/s Ratio Perm												
v/c Ratio		0.40			0.34							
Uniform Delay, d1		0.0			0.0							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.0			0.0							
Delay (s)		0.0			0.0							
Level of Service		A			A							
Approach Delay (s/veh)		0.0			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	0.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	4.5
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

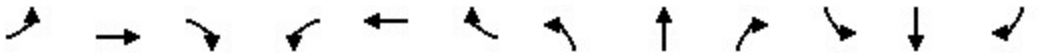
c Critical Lane Group

Intersection	
Intersection Delay, s/veh	8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	14	2	1	144	3	77	1	5	4	2	1
Future Vol, veh/h	3	14	2	1	144	3	77	1	5	4	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	15	2	1	157	3	84	1	5	4	2	1
Number of Lanes	0	2	0	0	2	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay, s/veh	7.7	8	8.1	7.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	93%	30%	0%	1%	0%	57%
Vol Thru, %	1%	70%	78%	99%	96%	29%
Vol Right, %	6%	0%	22%	0%	4%	14%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	83	10	9	73	75	7
LT Vol	77	3	0	1	0	4
Through Vol	1	7	7	72	72	2
RT Vol	5	0	2	0	3	1
Lane Flow Rate	90	11	10	79	82	8
Geometry Grp	2	5	5	5	5	2
Degree of Util (X)	0.113	0.015	0.013	0.104	0.106	0.01
Departure Headway (Hd)	4.522	5.054	4.747	4.725	4.69	4.496
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	798	711	757	751	757	800
Service Time	2.523	2.763	2.456	2.502	2.467	2.499
HCM Lane V/C Ratio	0.113	0.015	0.013	0.105	0.108	0.01
HCM Control Delay, s/veh	8.1	7.8	7.5	8.1	8	7.5
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.4	0	0	0.3	0.4	0

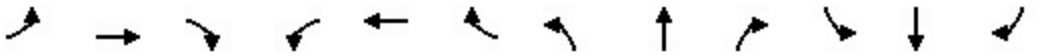


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	537	1753	0	0	975	583	187	14	114	0	0	0
Future Volume (vph)	537	1753	0	0	975	583	187	14	114	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.94		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.96	1.00			
Satd. Flow (prot)	1522	4799			6048		1681	1697	1583			
Flt Permitted	0.95	0.86			1.00		0.95	0.96	1.00			
Satd. Flow (perm)	1522	4120			6048		1681	1697	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	584	1905	0	0	1060	634	203	15	124	0	0	0
RTOR Reduction (vph)	0	0	0	0	119	0	0	0	64	0	0	0
Lane Group Flow (vph)	526	1963	0	0	1575	0	110	108	60	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	39.4	65.1			25.7		11.4	11.4	11.4			
Effective Green, g (s)	39.4	65.1			25.7		11.4	11.4	11.4			
Actuated g/C Ratio	0.44	0.72			0.29		0.13	0.13	0.13			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	666	3277			1727		212	214	200			
v/s Ratio Prot	c0.35	0.26			c0.26		c0.07	0.06				
v/s Ratio Perm		0.17							0.04			
v/c Ratio	0.79	0.60			1.09dr		0.52	0.50	0.30			
Uniform Delay, d1	21.7	6.1			31.1		36.7	36.7	35.7			
Progression Factor	1.12	2.41			1.00		1.00	1.00	1.00			
Incremental Delay, d2	3.9	0.2			8.5		2.1	1.9	0.9			
Delay (s)	28.2	14.8			39.6		38.9	38.5	36.5			
Level of Service	C	B			D		D	D	D			
Approach Delay (s/veh)		17.7			39.6			37.9			0.0	
Approach LOS		B			D			D			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1577	212	138	1033	0	0	0	0	680	24	487
Future Volume (vph)	0	1577	212	138	1033	0	0	0	0	680	24	487
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.98		1.00	1.00					1.00	0.86	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6294		1770	5085					3433	1529	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6294		1770	5085					3433	1529	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1714	230	150	1123	0	0	0	0	739	26	529
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	40	80
Lane Group Flow (vph)	0	1917	0	150	1123	0	0	0	0	739	240	195
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		31.7		11.3	47.5					33.5	33.5	33.5
Effective Green, g (s)		31.7		11.3	47.5					33.5	33.5	33.5
Actuated g/C Ratio		0.35		0.13	0.53					0.37	0.37	0.37
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2216		222	2683					1277	569	559
v/s Ratio Prot		c0.30		c0.08	0.22					c0.22	0.16	
v/s Ratio Perm												0.13
v/c Ratio		0.86		0.68	0.42					0.58	0.42	0.35
Uniform Delay, d1		27.2		37.6	12.9					22.6	21.0	20.4
Progression Factor		1.00		0.50	0.19					1.00	1.00	1.00
Incremental Delay, d2		4.8		4.4	0.1					0.6	0.5	0.4
Delay (s)		32.0		23.1	2.5					23.2	21.5	20.8
Level of Service		C		C	A					C	C	C
Approach Delay (s/veh)		32.0			5.0			0.0			22.3	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	177	87	0	0	38	390	27	130	18	0	0	0
Future Vol, veh/h	177	87	0	0	38	390	27	130	18	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	192	95	0	0	41	424	29	141	20	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	9.8	8.3	9.6
HCM LOS	A	A	A

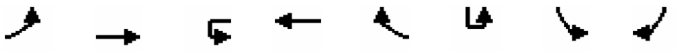
Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	38%	0%	0%	100%	75%	0%	0%	0%	0%
Vol Thru, %	62%	100%	0%	0%	25%	100%	100%	100%	2%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	98%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	70	87	18	89	118	58	15	15	398
LT Vol	27	0	0	89	89	0	0	0	0
Through Vol	43	87	0	0	29	58	15	15	8
RT Vol	0	0	18	0	0	0	0	0	390
Lane Flow Rate	76	94	20	96	128	63	17	17	432
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.131	0.156	0.029	0.169	0.22	0.071	0.026	0.026	0.398
Departure Headway (Hd)	6.162	5.97	5.271	6.322	6.198	4.073	5.75	5.75	3.314
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	584	603	682	569	581	882	619	619	1072
Service Time	3.874	3.682	2.983	4.036	3.911	1.787	3.516	3.516	1.08
HCM Lane V/C Ratio	0.13	0.156	0.029	0.169	0.22	0.071	0.027	0.027	0.403
HCM Control Delay, s/veh	9.8	9.8	8.1	10.3	10.7	7.1	8.7	8.7	8.3
HCM Lane LOS	A	A	A	B	B	A	A	A	A
HCM 95th-tile Q	0.4	0.5	0.1	0.6	0.8	0.2	0.1	0.1	1.9

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	175	199	19	48	0	0	0	0	76	25	62
Future Vol, veh/h	0	175	199	19	48	0	0	0	0	76	25	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	190	216	21	52	0	0	0	0	83	27	67
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	7.2	7.9	9
HCM LOS	A	A	A

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	11%	0%	86%	0%
Vol Thru, %	100%	100%	15%	0%	89%	100%	14%	17%
Vol Right, %	0%	0%	85%	0%	0%	0%	0%	83%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	70	70	234	17	18	32	89	75
LT Vol	0	0	0	17	2	0	76	0
Through Vol	70	70	35	0	16	32	13	13
RT Vol	0	0	199	0	0	0	0	62
Lane Flow Rate	76	76	254	19	19	35	96	81
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.11	0.11	0.204	0.032	0.031	0.038	0.156	0.109
Departure Headway (Hd)	5.226	5.226	2.882	6.15	5.7	3.9	5.854	4.846
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	688	688	1246	581	627	913	610	735
Service Time	2.944	2.944	0.6	3.896	3.446	1.645	3.613	2.605
HCM Lane V/C Ratio	0.11	0.11	0.204	0.033	0.03	0.038	0.157	0.11
HCM Control Delay, s/veh	8.6	8.6	6.3	9.1	8.6	6.8	9.7	8.2
HCM Lane LOS	A	A	A	A	A	A	A	A
HCM 95th-tile Q	0.4	0.4	0.8	0.1	0.1	0.1	0.5	0.4



Movement	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	94	1623	16	1643	48	1	46	58
Future Volume (vph)	94	1623	16	1643	48	1	46	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91			1.00	1.00
Frt	1.00	1.00	1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1770	5064			1770	1583
Flt Permitted	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)	1770	5085	1770	5064			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	102	1764	17	1786	52	1	50	63
RTOR Reduction (vph)	0	0	0	5	0	0	0	44
Lane Group Flow (vph)	102	1764	17	1833	0	0	51	19
Turn Type	Prot	NA	Prot	NA		Perm	Prot	Perm
Protected Phases	7	4	3	8			6	
Permitted Phases						6		6
Actuated Green, G (s)	4.1	28.5	1.0	25.4			18.7	18.7
Effective Green, g (s)	4.1	28.5	1.0	25.4			18.7	18.7
Actuated g/C Ratio	0.07	0.46	0.02	0.41			0.30	0.30
Clearance Time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	117	2348	28	2084			536	479
v/s Ratio Prot	c0.06	c0.35	0.01	c0.36				
v/s Ratio Perm							0.03	0.01
v/c Ratio	0.87	0.75	0.61	0.88			0.10	0.04
Uniform Delay, d1	28.5	13.7	30.2	16.7			15.4	15.2
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	46.1	1.4	32.0	4.6			0.4	0.2
Delay (s)	74.6	15.1	62.1	21.4			15.8	15.3
Level of Service	E	B	E	C			B	B
Approach Delay (s/veh)		18.3		21.7			15.5	
Approach LOS		B		C			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	182.2

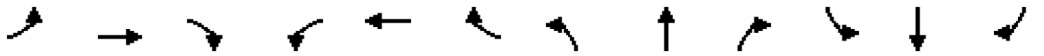
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	25	65	1671	48	11	1682	26	33	8	54	11	3	17
Future Vol, veh/h	25	65	1671	48	11	1682	26	33	8	54	11	3	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	540	-	-	710	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	71	1816	52	12	1828	28	36	9	59	12	3	18

Major/Minor	Major1				Major2			Minor1			Minor2		
Conflicting Flow All	1355	1857	0	0	1868	0	0	2795	3918	934	2793	3930	928
Stage 1	-	-	-	-	-	-	-	2038	2038	-	1866	1866	-
Stage 2	-	-	-	-	-	-	-	757	1880	-	927	2064	-
Critical Hdwy	5.64	5.34	-	-	5.34	-	-	6.44	6.54	7.14	6.44	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	7.34	5.54	-	7.34	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.74	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.32	3.12	-	-	3.12	-	-	3.82	4.02	3.92	3.82	4.02	3.92
Pot Cap-1 Maneuver	278	148	-	-	146	-	-	~ 20	~ 3	229	20	~ 3	232
Stage 1	-	-	-	-	-	-	-	36	99	-	48	121	-
Stage 2	-	-	-	-	-	-	-	332	119	-	261	96	-
Platoon blocked, %			-	-		-	-						
Mov Cap-1 Maneuver	167	167	-	-	146	-	-	~ 7	~ 1	229	~ 6	~ 1	232
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 7	~ 1	-	~ 6	~ 1	-
Stage 1	-	-	-	-	-	-	-	~ 15	41	-	44	111	-
Stage 2	-	-	-	-	-	-	-	272	109	-	64	40	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.63	0.2	$ 6043.92	$ 2793.39
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	8	167	-	-	146	-	-	7
HCM Lane V/C Ratio	12.483	0.584	-	-	0.082	-	-	4.9
HCM Control Delay (s/veh)	$ 6043.9	52.9	-	-	31.9	-	-	$ 2793.4
HCM Lane LOS	F	F	-	-	D	-	-	F
HCM 95th %tile Q(veh)	14.5	3.1	-	-	0.3	-	-	5.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1991	0	0	1757	0	0	0	0	0	0	0
Future Volume (vph)	0	1991	0	0	1757	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5							
Lane Util. Factor		0.91			0.91							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		5085			5085							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		5085			5085							
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2164	0	0	1910	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	2164	0	0	1910	0	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA							
Protected Phases		4			8							
Permitted Phases	4			8								
Actuated Green, G (s)		90.0			90.0							
Effective Green, g (s)		90.0			90.0							
Actuated g/C Ratio		1.00			1.00							
Clearance Time (s)		4.5			4.5							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		5085			5085							
v/s Ratio Prot		c0.43			0.38							
v/s Ratio Perm												
v/c Ratio		0.43			0.38							
Uniform Delay, d1		0.0			0.0							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.0			0.0							
Delay (s)		0.0			0.0							
Level of Service		A			A							
Approach Delay (s/veh)		0.0			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	0.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	4.5
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

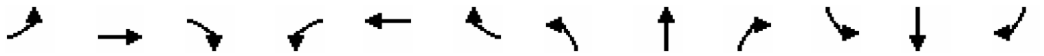
c Critical Lane Group

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	32	7	2	62	5	23	7	0	2	2	2
Future Vol, veh/h	0	32	7	2	62	5	23	7	0	2	2	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	35	8	2	67	5	25	8	0	2	2	2
Number of Lanes	0	2	0	0	2	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay, s/veh	7.4	7.5	7.5	7.1
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	77%	0%	0%	6%	0%	33%
Vol Thru, %	23%	100%	60%	94%	86%	33%
Vol Right, %	0%	0%	40%	0%	14%	33%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	30	21	18	33	36	6
LT Vol	23	0	0	2	0	2
Through Vol	7	21	11	31	31	2
RT Vol	0	0	7	0	5	2
Lane Flow Rate	33	23	19	36	39	7
Geometry Grp	2	5	5	5	5	2
Degree of Util (X)	0.039	0.03	0.023	0.046	0.049	0.007
Departure Headway (Hd)	4.289	4.641	4.363	4.655	4.527	4.022
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	825	770	818	769	790	876
Service Time	2.368	2.379	2.102	2.385	2.258	2.11
HCM Lane V/C Ratio	0.04	0.03	0.023	0.047	0.049	0.008
HCM Control Delay, s/veh	7.5	7.5	7.2	7.6	7.5	7.1
HCM Lane LOS	A	A	A	A	A	A
HCM 95th-tile Q	0.1	0.1	0.1	0.1	0.2	0

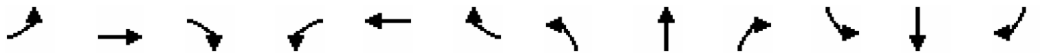


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	552	1784	0	0	1137	598	294	12	207	0	0	0
Future Volume (vph)	552	1784	0	0	1137	598	294	12	207	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.95		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.96	1.00			
Satd. Flow (prot)	1522	4799			6077		1681	1692	1583			
Flt Permitted	0.95	0.81			1.00		0.95	0.96	1.00			
Satd. Flow (perm)	1522	3887			6077		1681	1692	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	600	1939	0	0	1236	650	320	13	225	0	0	0
RTOR Reduction (vph)	0	0	0	0	105	0	0	0	61	0	0	0
Lane Group Flow (vph)	540	1999	0	0	1781	0	166	167	164	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	35.6	62.2			26.6		14.3	14.3	14.3			
Effective Green, g (s)	35.6	62.2			26.6		14.3	14.3	14.3			
Actuated g/C Ratio	0.40	0.69			0.30		0.16	0.16	0.16			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	602	3047			1796		267	268	251			
v/s Ratio Prot	c0.35	0.26			c0.29		0.10	0.10				
v/s Ratio Perm		0.19							c0.10			
v/c Ratio	0.90	0.66			1.12dr		0.62	0.62	0.65			
Uniform Delay, d1	25.5	7.9			31.6		35.3	35.3	35.5			
Progression Factor	1.16	1.67			1.00		1.00	1.00	1.00			
Incremental Delay, d2	8.7	0.3			18.8		4.4	4.5	5.9			
Delay (s)	38.4	13.4			50.4		39.8	39.8	41.5			
Level of Service	D	B			D		D	D	D			
Approach Delay (s/veh)		18.7			50.4			40.5			0.0	
Approach LOS		B			D			D			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1500	387	201	1247	0	0	0	0	825	102	465
Future Volume (vph)	0	1500	387	201	1247	0	0	0	0	825	102	465
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.97		1.00	1.00					1.00	0.90	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6211		1770	5085					3433	1597	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6211		1770	5085					3433	1597	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1630	421	218	1355	0	0	0	0	897	111	505
RTOR Reduction (vph)	0	51	0	0	0	0	0	0	0	0	33	87
Lane Group Flow (vph)	0	2000	0	218	1355	0	0	0	0	897	285	211
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		32.9		15.1	52.5					28.5	28.5	28.5
Effective Green, g (s)		32.9		15.1	52.5					28.5	28.5	28.5
Actuated g/C Ratio		0.37		0.17	0.58					0.32	0.32	0.32
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2270		296	2966					1087	505	476
v/s Ratio Prot		c0.32		c0.12	0.27					c0.26	0.18	
v/s Ratio Perm												0.14
v/c Ratio		0.88		0.74	0.46					0.83	0.56	0.44
Uniform Delay, d1		26.7		35.6	10.7					28.4	25.6	24.4
Progression Factor		1.00		0.50	0.16					1.00	1.00	1.00
Incremental Delay, d2		5.3		4.3	0.1					5.2	1.5	0.7
Delay (s)		32.0		22.1	1.7					33.7	27.0	25.1
Level of Service		C		C	A					C	C	C
Approach Delay (s/veh)		32.0			4.5			0.0			30.6	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	109	187	0	0	50	153	86	21	40	0	0	0
Future Vol, veh/h	109	187	0	0	50	153	86	21	40	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	118	203	0	0	54	166	93	23	43	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	8.3	6.9	9.3
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	92%	0%	0%	100%	17%	0%	0%	0%	0%
Vol Thru, %	8%	100%	0%	0%	83%	100%	100%	100%	6%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	94%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	93	14	40	96	75	125	20	20	163
LT Vol	86	0	0	96	13	0	0	0	0
Through Vol	7	14	0	0	62	125	20	20	10
RT Vol	0	0	40	0	0	0	0	0	153
Lane Flow Rate	101	15	43	104	82	136	22	22	177
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.168	0.023	0.058	0.169	0.123	0.135	0.034	0.034	0.158
Departure Headway (Hd)	5.988	5.527	4.829	5.834	5.419	3.591	5.607	5.607	3.204
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	596	645	737	614	660	992	638	638	1113
Service Time	3.747	3.286	2.588	3.58	3.165	1.336	3.345	3.345	0.941
HCM Lane V/C Ratio	0.169	0.023	0.058	0.169	0.124	0.137	0.034	0.034	0.159
HCM Control Delay, s/veh	10	8.4	7.9	9.8	8.9	6.9	8.5	8.5	6.5
HCM Lane LOS	A	A	A	A	A	A	A	A	A
HCM 95th-tile Q	0.6	0.1	0.2	0.6	0.4	0.5	0.1	0.1	0.6

Intersection	
Intersection Delay, s/veh	12.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	117	106	39	102	0	0	0	0	166	288	129
Future Vol, veh/h	0	117	106	39	102	0	0	0	0	166	288	129
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	127	115	42	111	0	0	0	0	180	313	140
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	8.9	9.5	14
HCM LOS	A	A	B

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	10%	0%	54%	0%
Vol Thru, %	100%	100%	18%	0%	90%	100%	46%	53%
Vol Right, %	0%	0%	82%	0%	0%	0%	0%	47%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	47	47	129	35	38	68	310	273
LT Vol	0	0	0	35	4	0	166	0
Through Vol	47	47	23	0	34	68	144	144
RT Vol	0	0	106	0	0	0	0	129
Lane Flow Rate	51	51	141	38	41	74	337	297
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.095	0.095	0.17	0.078	0.079	0.104	0.552	0.437
Departure Headway (Hd)	6.698	6.698	4.342	7.345	6.886	5.061	5.897	5.3
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	535	535	823	488	520	706	613	680
Service Time	4.442	4.442	2.085	5.091	4.633	2.807	3.623	3.026
HCM Lane V/C Ratio	0.095	0.095	0.171	0.078	0.079	0.105	0.55	0.437
HCM Control Delay, s/veh	10.1	10.1	8	10.7	10.2	8.4	15.7	12.1
HCM Lane LOS	B	B	A	B	B	A	C	B
HCM 95th-tile Q	0.3	0.3	0.6	0.3	0.3	0.3	3.4	2.2



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	235	2230	28	1974	311	392	293
Future Volume (vph)	235	2230	28	1974	311	392	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91		1.00	1.00
Frt	1.00	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	1770	4982		1770	1583
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1770	5085	1770	4982		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	255	2424	30	2146	338	426	318
RTOR Reduction (vph)	0	0	0	34	0	0	138
Lane Group Flow (vph)	255	2424	30	2450	0	426	180
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	7	4	3	8		6	
Permitted Phases							6
Actuated Green, G (s)	5.3	29.2	2.0	25.9		18.0	18.0
Effective Green, g (s)	5.3	29.2	2.0	25.9		18.0	18.0
Actuated g/C Ratio	0.08	0.47	0.03	0.41		0.29	0.29
Clearance Time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	149	2368	56	2057		508	454
v/s Ratio Prot	c0.14	c0.48	0.02	c0.49		c0.24	
v/s Ratio Perm							0.11
v/c Ratio	1.71	1.02	0.54	1.19		0.84	0.40
Uniform Delay, d1	28.7	16.8	29.9	18.4		21.0	18.0
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	346.9	24.8	9.5	91.1		15.2	2.6
Delay (s)	375.6	41.5	39.4	109.5		36.2	20.5
Level of Service	F	D	D	F		D	C
Approach Delay (s/veh)		73.3		108.7		29.5	
Approach LOS		E		F		C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	82.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	2016.1

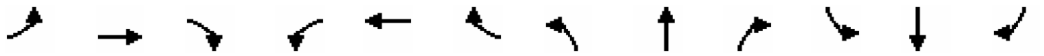
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	39	2405	18	32	2145	95	14	16	26	34	0	26
Future Vol, veh/h	39	2405	18	32	2145	95	14	16	26	34	0	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	540	-	-	710	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	42	2614	20	35	2332	103	15	17	28	37	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2435	0	0	2634	0	0	3711	5213	1317	3592	5171	1217
Stage 1	-	-	-	-	-	-	2709	2709	-	2453	2453	-
Stage 2	-	-	-	-	-	-	1002	2504	-	1139	2718	-
Critical Hdwy	5.34	-	-	5.34	-	-	6.44	6.54	7.14	6.44	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	7.34	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.74	5.54	-	6.74	5.54	-
Follow-up Hdwy	3.12	-	-	3.12	-	-	3.82	4.02	3.92	3.82	4.02	3.92
Pot Cap-1 Maneuver	75	-	-	59	-	-	~ 5	~ 0	127	~ 6	0	148
Stage 1	-	-	-	-	-	-	~ 11	44	-	~ 18	60	-
Stage 2	-	-	-	-	-	-	234	57	-	192	44	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	75	-	-	59	-	-	~ 1	~ 0	127	~ 1	0	148
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 1	~ 0	-	~ 1	0	-
Stage 1	-	-	-	-	-	-	~ 5	19	-	~ 7	25	-
Stage 2	-	-	-	-	-	-	78	23	-	~ 6	19	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	1.63	1.84	$ 148066.97	$ 24636.13
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	75	-	-	59	-	-	1
HCM Lane V/C Ratio	264.15	0.566	-	-	0.59	-	-	45.124
HCM Control Delay (s/veh)	$ 148067	103.1	-	-	131	-	-	$ 24636.1
HCM Lane LOS	F	F	-	-	F	-	-	F
HCM 95th %tile Q(veh)	9.9	2.4	-	-	2.4	-	-	10.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	2454	0	0	2185	0	0	0	0	0	0	0
Future Volume (vph)	83	2454	0	0	2185	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5							
Lane Util. Factor	1.00	0.91			0.91							
Frt	1.00	1.00			1.00							
Flt Protected	0.95	1.00			1.00							
Satd. Flow (prot)	1770	5085			5085							
Flt Permitted	0.06	1.00			1.00							
Satd. Flow (perm)	117	5085			5085							
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	2667	0	0	2375	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	90	2667	0	0	2375	0	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA							
Protected Phases		4			8							
Permitted Phases	4			8								
Actuated Green, G (s)	90.0	90.0			90.0							
Effective Green, g (s)	90.0	90.0			90.0							
Actuated g/C Ratio	1.00	1.00			1.00							
Clearance Time (s)	4.5	4.5			4.5							
Vehicle Extension (s)	3.0	3.0			3.0							
Lane Grp Cap (vph)	117	5085			5085							
v/s Ratio Prot		0.52			0.47							
v/s Ratio Perm	c0.77											
v/c Ratio	0.77	0.52			0.47							
Uniform Delay, d1	0.0	0.0			0.0							
Progression Factor	1.00	1.00			1.00							
Incremental Delay, d2	2.8	0.0			0.1							
Delay (s)	2.8	0.0			0.1							
Level of Service	A	A			A							
Approach Delay (s/veh)		0.1			0.1			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	0.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	4.5
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

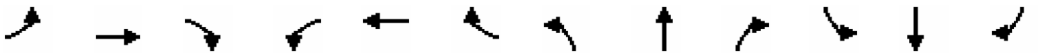
c Critical Lane Group

Intersection	
Intersection Delay, s/veh	12.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	386	3	35	501	16	96	1	63	20	3	1
Future Vol, veh/h	4	386	3	35	501	16	96	1	63	20	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	420	3	38	545	17	104	1	68	22	3	1
Number of Lanes	0	2	0	0	2	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay, s/veh	11.9	13.7	11.7	10.2
HCM LOS	B	B	B	B

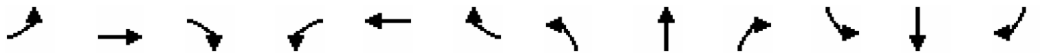
Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	60%	2%	0%	12%	0%	83%
Vol Thru, %	1%	98%	98%	88%	94%	13%
Vol Right, %	39%	0%	2%	0%	6%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	160	197	196	286	267	24
LT Vol	96	4	0	35	0	20
Through Vol	1	193	193	251	251	3
RT Vol	63	0	3	0	16	1
Lane Flow Rate	174	214	213	310	290	26
Geometry Grp	2	5	5	5	5	2
Degree of Util (X)	0.295	0.354	0.351	0.5	0.458	0.049
Departure Headway (Hd)	6.112	5.952	5.931	5.801	5.696	6.81
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	588	604	607	621	631	525
Service Time	4.151	3.689	3.668	3.534	3.429	4.867
HCM Lane V/C Ratio	0.296	0.354	0.351	0.499	0.46	0.05
HCM Control Delay, s/veh	11.7	11.9	11.9	14.2	13.2	10.2
HCM Lane LOS	B	B	B	B	B	B
HCM 95th-tile Q	1.2	1.6	1.6	2.8	2.4	0.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	671	2394	0	0	1483	729	234	18	142	0	0	0
Future Volume (vph)	671	2394	0	0	1483	729	234	18	142	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.95		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.96	1.00			
Satd. Flow (prot)	1522	4799			6091		1681	1697	1583			
Flt Permitted	0.95	0.76			1.00		0.95	0.96	1.00			
Satd. Flow (perm)	1522	3658			6091		1681	1697	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	729	2602	0	0	1612	792	254	20	154	0	0	0
RTOR Reduction (vph)	0	0	0	0	99	0	0	0	63	0	0	0
Lane Group Flow (vph)	656	2675	0	0	2305	0	137	137	91	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	38.1	63.8			25.7		12.7	12.7	12.7			
Effective Green, g (s)	38.1	63.8			25.7		12.7	12.7	12.7			
Actuated g/C Ratio	0.42	0.71			0.29		0.14	0.14	0.14			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	644	3076			1739		237	239	223			
v/s Ratio Prot	c0.43	0.37			c0.38		c0.08	0.08				
v/s Ratio Perm		0.25							0.06			
v/c Ratio	1.02	0.87			1.42dr		0.58	0.57	0.41			
Uniform Delay, d1	26.0	9.9			32.2		36.1	36.1	35.2			
Progression Factor	1.12	1.51			1.00		1.00	1.00	1.00			
Incremental Delay, d2	15.7	0.3			150.3		3.4	3.3	1.2			
Delay (s)	44.9	15.3			182.4		39.5	39.4	36.5			
Level of Service	D	B			F		D	D	D			
Approach Delay (s/veh)		21.1			182.4			38.4			0.0	
Approach LOS		C			F			D			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	85.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2174	265	173	1555	0	0	0	0	850	30	609
Future Volume (vph)	0	2174	265	173	1555	0	0	0	0	850	30	609
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.98		1.00	1.00					1.00	0.86	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6303		1770	5085					3433	1529	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6303		1770	5085					3433	1529	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2363	288	188	1690	0	0	0	0	924	33	662
RTOR Reduction (vph)	0	24	0	0	0	0	0	0	0	0	9	80
Lane Group Flow (vph)	0	2627	0	188	1690	0	0	0	0	924	342	264
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		31.7		11.3	47.5					33.5	33.5	33.5
Effective Green, g (s)		31.7		11.3	47.5					33.5	33.5	33.5
Actuated g/C Ratio		0.35		0.13	0.53					0.37	0.37	0.37
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2220		222	2683					1277	569	559
v/s Ratio Prot		c0.42		c0.11	0.33					c0.27	0.22	
v/s Ratio Perm												0.18
v/c Ratio		1.18		0.85	0.63					0.72	0.60	0.47
Uniform Delay, d1		29.2		38.5	15.0					24.3	22.9	21.5
Progression Factor		1.00		0.49	0.19					1.00	1.00	1.00
Incremental Delay, d2		87.4		2.9	0.0					2.1	1.8	0.6
Delay (s)		116.6		21.9	2.9					26.3	24.6	22.2
Level of Service		F		C	A					C	C	C
Approach Delay (s/veh)		116.6			4.8			0.0			25.1	
Approach LOS		F			A			A			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	58.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	44.3
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	221	361	0	0	149	707	34	162	139	0	0	0
Future Vol, veh/h	221	361	0	0	149	707	34	162	139	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	240	392	0	0	162	768	37	176	151	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	14.9	76.5	12.9
HCM LOS	B	F	B

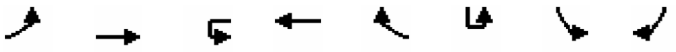
Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	39%	0%	0%	100%	22%	0%	0%	0%	0%
Vol Thru, %	61%	100%	0%	0%	78%	100%	100%	100%	4%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	96%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	88	108	139	188	153	241	60	60	737
LT Vol	34	0	0	188	33	0	0	0	0
Through Vol	54	108	0	0	120	241	60	60	30
RT Vol	0	0	139	0	0	0	0	0	707
Lane Flow Rate	96	117	151	204	167	262	65	65	801
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.206	0.247	0.289	0.451	0.351	0.416	0.134	0.134	1.107
Departure Headway (Hd)	8.019	7.823	7.112	8.264	7.864	5.983	7.426	7.426	4.978
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	451	463	509	439	460	607	486	486	737
Service Time	5.719	5.523	4.812	5.964	5.564	3.683	5.126	5.126	2.678
HCM Lane V/C Ratio	0.213	0.253	0.297	0.465	0.363	0.432	0.134	0.134	1.087
HCM Control Delay, s/veh	12.8	13.1	12.7	17.6	14.8	12.9	11.3	11.3	87.1
HCM Lane LOS	B	B	B	C	B	B	B	B	F
HCM 95th-tile Q	0.8	1	1.2	2.3	1.6	2	0.5	0.5	22.8

Intersection	
Intersection Delay, s/veh	14.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	245	249	112	74	0	0	0	0	321	31	78
Future Vol, veh/h	0	245	249	112	74	0	0	0	0	321	31	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	266	271	122	80	0	0	0	0	349	34	85
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	10.6	11.1	21.5
HCM LOS	B	B	C

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	68%	0%	95%	0%
Vol Thru, %	100%	100%	16%	0%	32%	100%	5%	17%
Vol Right, %	0%	0%	84%	0%	0%	0%	0%	83%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	98	298	60	76	49	337	94
LT Vol	0	0	0	60	51	0	321	0
Through Vol	98	98	49	0	25	49	16	16
RT Vol	0	0	249	0	0	0	0	78
Lane Flow Rate	107	107	324	66	83	54	366	102
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.201	0.201	0.397	0.142	0.175	0.082	0.705	0.166
Departure Headway (Hd)	6.779	6.779	4.409	7.787	7.62	5.495	6.943	5.884
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	526	526	807	458	468	645	519	607
Service Time	4.562	4.562	2.19	5.585	5.418	3.29	4.704	3.645
HCM Lane V/C Ratio	0.203	0.203	0.401	0.144	0.177	0.084	0.705	0.168
HCM Control Delay, s/veh	11.3	11.3	10.1	11.9	12	8.8	24.7	9.8
HCM Lane LOS	B	B	B	B	B	A	C	A
HCM 95th-tile Q	0.7	0.7	1.9	0.5	0.6	0.3	5.5	0.6



Movement	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	414	2029	20	2054	490	1	441	296
Future Volume (vph)	414	2029	20	2054	490	1	441	296
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91			1.00	1.00
Frt	1.00	1.00	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1770	4938			1770	1583
Flt Permitted	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)	1770	5085	1770	4938			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	2205	22	2233	533	1	479	322
RTOR Reduction (vph)	0	0	0	63	0	0	0	140
Lane Group Flow (vph)	450	2205	22	2703	0	0	480	182
Turn Type	Prot	NA	Prot	NA		Perm	Prot	Perm
Protected Phases	7	4	3	8			6	
Permitted Phases						6		6
Actuated Green, G (s)	5.3	30.5	1.0	26.2			18.6	18.6
Effective Green, g (s)	5.3	30.5	1.0	26.2			18.6	18.6
Actuated g/C Ratio	0.08	0.48	0.02	0.41			0.29	0.29
Clearance Time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	147	2438	27	2034			517	462
v/s Ratio Prot	c0.25	c0.43	0.01	c0.55				
v/s Ratio Perm							0.27	0.11
v/c Ratio	3.06	0.90	0.81	1.33			0.93	0.39
Uniform Delay, d1	29.2	15.2	31.2	18.7			21.9	18.0
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	945.4	5.2	95.3	151.5			25.3	2.5
Delay (s)	974.5	20.4	126.5	170.2			47.2	20.5
Level of Service	F	C	F	F			D	C
Approach Delay (s/veh)		182.2		169.9			36.4	
Approach LOS		F		F			D	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	158.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	109.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	332.6

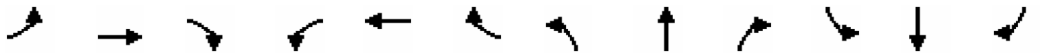
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	31	81	2385	60	14	2326	32	41	10	68	14	4	21
Future Vol, veh/h	31	81	2385	60	14	2326	32	41	10	68	14	4	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	540	-	-	710	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	88	2592	65	15	2528	35	45	11	74	15	4	23

Major/Minor	Major1				Major2			Minor1			Minor2		
Conflicting Flow All	1871	2563	0	0	2658	0	0	3912	5462	1329	3862	5477	1282
Stage 1	-	-	-	-	-	-	-	2868	2868	-	2576	2576	-
Stage 2	-	-	-	-	-	-	-	1044	2593	-	1286	2901	-
Critical Hdwy	5.64	5.34	-	-	5.34	-	-	6.44	6.54	7.14	6.44	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	7.34	5.54	-	7.34	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.74	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.32	3.12	-	-	3.12	-	-	3.82	4.02	3.92	3.82	4.02	3.92
Pot Cap-1 Maneuver	142	~ 64	-	-	57	-	-	~ 4	~ 0	125	~ 4	~ 0	134
Stage 1	-	-	-	-	-	-	-	~ 9	36	-	~ 14	52	-
Stage 2	-	-	-	-	-	-	-	221	51	-	156	35	-
Platoon blocked, %			-	-		-	-						
Mov Cap-1 Maneuver	73	~ 73	-	-	57	-	-	~ 2	0	125	~ 1	0	134
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 2	0	-	~ 1	0	-
Stage 1	-	-	-	-	-	-	-	~ 9	0	-	~ 11	38	-
Stage 2	-	-	-	-	-	-	-	119	37	-	63	0	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	19.42	0.53	$ 10996.3	$ 8525.54
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	6	~ 73	-	-	57	-	-	3
HCM Lane V/C Ratio	22.647	1.657	-	-	0.266	-	-	14.66
HCM Control Delay (s/veh)	$ 10996.3	$ 443.3	-	-	89.2	-	-	$ 8525.5
HCM Lane LOS	F	F	-	-	F	-	-	F
HCM 95th %tile Q(veh)	18.1	10.4	-	-	0.9	-	-	7.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	2785	0	0	2419	0	0	0	0	0	0	0
Future Volume (vph)	131	2785	0	0	2419	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5							
Lane Util. Factor	1.00	0.91			0.91							
Frt	1.00	1.00			1.00							
Flt Protected	0.95	1.00			1.00							
Satd. Flow (prot)	1770	5085			5085							
Flt Permitted	0.05	1.00			1.00							
Satd. Flow (perm)	88	5085			5085							
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	142	3027	0	0	2629	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	142	3027	0	0	2629	0	0	0	0	0	0	0
Turn Type	Perm	NA		Perm	NA							
Protected Phases		4			8							
Permitted Phases	4			8								
Actuated Green, G (s)	90.0	90.0			90.0							
Effective Green, g (s)	90.0	90.0			90.0							
Actuated g/C Ratio	1.00	1.00			1.00							
Clearance Time (s)	4.5	4.5			4.5							
Vehicle Extension (s)	3.0	3.0			3.0							
Lane Grp Cap (vph)	88	5085			5085							
v/s Ratio Prot		0.60			0.52							
v/s Ratio Perm	c1.61											
v/c Ratio	1.61	0.60			0.52							
Uniform Delay, d1	45.0	0.0			0.0							
Progression Factor	1.00	1.00			1.00							
Incremental Delay, d2	280.9	0.0			0.1							
Delay (s)	325.9	0.0			0.1							
Level of Service	F	A			A							
Approach Delay (s/veh)		14.6			0.1			0.0			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	1.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	4.5
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

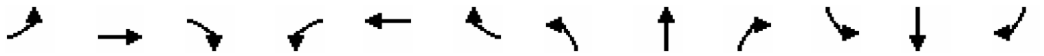
c Critical Lane Group

Intersection	
Intersection Delay, s/veh	28.6
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	731	9	75	732	10	29	9	81	3	3	3
Future Vol, veh/h	0	731	9	75	732	10	29	9	81	3	3	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	795	10	82	796	11	32	10	88	3	3	3
Number of Lanes	0	2	0	0	2	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay, s/veh	33.6	26.8	11.8	10.6
HCM LOS	D	D	B	B

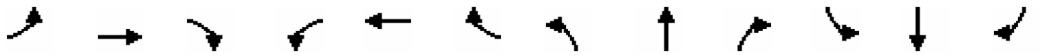
Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	24%	0%	0%	17%	0%	33%
Vol Thru, %	8%	100%	96%	83%	97%	33%
Vol Right, %	68%	0%	4%	0%	3%	33%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	119	487	253	441	376	9
LT Vol	29	0	0	75	0	3
Through Vol	9	487	244	366	366	3
RT Vol	81	0	9	0	10	3
Lane Flow Rate	129	530	275	479	409	10
Geometry Grp	2	5	5	5	5	2
Degree of Util (X)	0.239	0.912	0.471	0.822	0.689	0.02
Departure Headway (Hd)	6.651	6.201	6.176	6.17	6.065	7.421
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	539	583	582	585	593	481
Service Time	4.694	3.96	3.935	3.924	3.819	5.486
HCM Lane V/C Ratio	0.239	0.909	0.473	0.819	0.69	0.021
HCM Control Delay, s/veh	11.8	43.6	14.4	31.4	21.3	10.6
HCM Lane LOS	B	E	B	D	C	B
HCM 95th-tile Q	0.9	11.2	2.5	8.4	5.4	0.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	690	2657	0	0	1779	747	367	15	259	0	0	0
Future Volume (vph)	690	2657	0	0	1779	747	367	15	259	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.96		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.96	1.00			
Satd. Flow (prot)	1522	4800			6124		1681	1692	1583			
Flt Permitted	0.95	0.74			1.00		0.95	0.96	1.00			
Satd. Flow (perm)	1522	3560			6124		1681	1692	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	750	2888	0	0	1934	812	399	16	282	0	0	0
RTOR Reduction (vph)	0	0	0	0	84	0	0	0	60	0	0	0
Lane Group Flow (vph)	675	2963	0	0	2662	0	207	208	222	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	34.1	60.7			26.6		15.8	15.8	15.8			
Effective Green, g (s)	34.1	60.7			26.6		15.8	15.8	15.8			
Actuated g/C Ratio	0.38	0.67			0.30		0.18	0.18	0.18			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	576	2870			1809		295	297	277			
v/s Ratio Prot	c0.44	0.39			c0.43		0.12	0.12				
v/s Ratio Perm		0.31							c0.14			
v/c Ratio	1.17	1.03			1.47		0.70	0.70	0.80			
Uniform Delay, d1	28.0	14.6			31.7		34.9	34.9	35.6			
Progression Factor	1.22	1.37			1.00		1.00	1.00	1.00			
Incremental Delay, d2	79.2	16.2			214.9		7.3	7.3	15.2			
Delay (s)	113.2	36.3			246.7		42.2	42.1	50.8			
Level of Service	F	D			F		D	D	D			
Approach Delay (s/veh)		50.6			246.7			45.7			0.0	
Approach LOS		D			F			D			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	126.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2302	484	251	1917	0	0	0	0	1031	128	581
Future Volume (vph)	0	2302	484	251	1917	0	0	0	0	1031	128	581
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.97		1.00	1.00					1.00	0.90	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6241		1770	5085					3433	1597	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6241		1770	5085					3433	1597	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2502	526	273	2084	0	0	0	0	1121	139	632
RTOR Reduction (vph)	0	42	0	0	0	0	0	0	0	0	5	87
Lane Group Flow (vph)	0	2986	0	273	2084	0	0	0	0	1121	393	286
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		32.9		15.1	52.5					28.5	28.5	28.5
Effective Green, g (s)		32.9		15.1	52.5					28.5	28.5	28.5
Actuated g/C Ratio		0.37		0.17	0.58					0.32	0.32	0.32
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2281		296	2966					1087	505	476
v/s Ratio Prot		c0.48		c0.15	0.41					c0.33	0.25	
v/s Ratio Perm												0.19
v/c Ratio		1.31		0.92	0.70					1.03	0.78	0.60
Uniform Delay, d1		28.6		36.9	13.2					30.8	27.9	26.0
Progression Factor		1.00		0.53	0.24					1.00	1.00	1.00
Incremental Delay, d2		142.4		5.0	0.1					35.6	7.4	2.1
Delay (s)		170.9		24.4	3.3					66.4	35.3	28.1
Level of Service		F		C	A					E	D	C
Approach Delay (s/veh)		170.9			5.7			0.0			52.3	
Approach LOS		F			A			A			D	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	86.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	56.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	136	707	0	0	321	586	107	26	268	0	0	0
Future Vol, veh/h	136	707	0	0	321	586	107	26	268	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	148	768	0	0	349	637	116	28	291	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	55.9	90.8	20
HCM LOS	E	F	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	93%	0%	0%	100%	5%	0%	0%	0%	0%
Vol Thru, %	7%	100%	0%	0%	95%	100%	100%	100%	10%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	90%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	116	17	268	122	249	471	128	128	650
LT Vol	107	0	0	122	14	0	0	0	0
Through Vol	9	17	0	0	235	471	128	128	64
RT Vol	0	0	268	0	0	0	0	0	586
Lane Flow Rate	126	19	291	133	271	512	140	140	707
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.306	0.043	0.616	0.321	0.618	0.919	0.328	0.328	1.184
Departure Headway (Hd)	9.049	8.576	7.861	9.063	8.578	6.768	8.454	8.454	6.029
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	400	420	463	399	423	538	426	426	601
Service Time	6.749	6.276	5.561	6.763	6.278	4.468	6.205	6.205	3.779
HCM Lane V/C Ratio	0.315	0.045	0.629	0.333	0.641	0.952	0.329	0.329	1.176
HCM Control Delay, s/veh	15.7	11.7	22.4	16	24.2	47.2	15.3	15.3	120.6
HCM Lane LOS	C	B	C	C	C	E	C	C	F
HCM 95th-tile Q	1.3	0.1	4.1	1.4	4	11.1	1.4	1.4	24.4

Intersection	
Intersection Delay, s/veh	189.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	187	133	265	170	0	0	0	0	640	360	161
Future Vol, veh/h	0	187	133	265	170	0	0	0	0	640	360	161
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	203	145	288	185	0	0	0	0	696	391	175
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	13.9	17.2	303
HCM LOS	B	C	F

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	68%	0%	78%	0%
Vol Thru, %	100%	100%	22%	0%	32%	100%	22%	53%
Vol Right, %	0%	0%	78%	0%	0%	0%	0%	47%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	75	75	170	143	179	113	820	341
LT Vol	0	0	0	143	122	0	640	0
Through Vol	75	75	37	0	57	113	180	180
RT Vol	0	0	133	0	0	0	0	161
Lane Flow Rate	81	81	185	156	194	123	891	371
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.189	0.189	0.314	0.366	0.448	0.214	1.873	0.705
Departure Headway (Hd)	9.692	9.692	7.302	9.742	9.577	7.411	7.566	6.843
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	372	372	496	372	378	488	481	526
Service Time	7.392	7.392	5.002	7.442	7.277	5.111	5.324	4.601
HCM Lane V/C Ratio	0.218	0.218	0.373	0.419	0.513	0.252	1.852	0.705
HCM Control Delay, s/veh	14.6	14.6	13.3	18	19.8	12.1	418.9	24.4
HCM Lane LOS	B	B	B	C	C	B	F	C
HCM 95th-tile Q	0.7	0.7	1.3	1.6	2.2	0.8	57.3	5.6



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	235	2404	28	2250	311	392	293
Future Volume (vph)	235	2404	28	2250	311	392	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91		1.00	1.00
Frt	1.00	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	1770	4993		1770	1583
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1770	5085	1770	4993		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	255	2613	30	2446	338	426	318
RTOR Reduction (vph)	0	0	0	28	0	0	138
Lane Group Flow (vph)	255	2613	30	2756	0	426	180
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	7	4	3	8		6	
Permitted Phases							6
Actuated Green, G (s)	5.3	29.2	2.0	25.9		18.0	18.0
Effective Green, g (s)	5.3	29.2	2.0	25.9		18.0	18.0
Actuated g/C Ratio	0.08	0.47	0.03	0.41		0.29	0.29
Clearance Time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	149	2368	56	2062		508	454
v/s Ratio Prot	c0.14	c0.51	0.02	c0.55		c0.24	
v/s Ratio Perm							0.11
v/c Ratio	1.71	1.10	0.54	1.34		0.84	0.40
Uniform Delay, d1	28.7	16.8	29.9	18.4		21.0	18.0
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	346.9	53.6	9.5	154.8		15.2	2.6
Delay (s)	375.6	70.4	39.4	173.2		36.2	20.5
Level of Service	F	E	D	F		D	C
Approach Delay (s/veh)		97.5		171.8		29.5	
Approach LOS		F		F		C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	122.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	1860.6

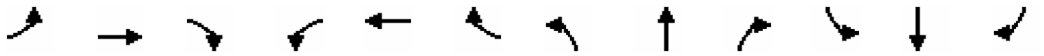
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	108	2527	18	32	2393	123	14	16	26	86	0	35
Future Vol, veh/h	108	2527	18	32	2393	123	14	16	26	86	0	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	540	-	-	710	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	117	2747	20	35	2601	134	15	17	28	93	0	38

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2735	0	0	2766	0	0	4101	5796	1383	4080	5739	1367
Stage 1	-	-	-	-	-	-	2991	2991	-	2738	2738	-
Stage 2	-	-	-	-	-	-	1110	2804	-	1342	3001	-
Critical Hdwy	5.34	-	-	5.34	-	-	6.44	6.54	7.14	6.44	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	7.34	5.54	-	7.34	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.74	5.54	-	6.74	5.54	-
Follow-up Hdwy	3.12	-	-	3.12	-	-	3.82	4.02	3.92	3.82	4.02	3.92
Pot Cap-1 Maneuver	~ 52	-	-	50	-	-	~ 3	~ 0	114	~ 3	0	117
Stage 1	-	-	-	-	-	-	~ 7	31	-	~ 11	43	-
Stage 2	-	-	-	-	-	-	201	39	-	143	31	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	~ 52	-	-	50	-	-	~ 1	0	114	~ 1	0	117
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 1	0	-	~ 1	0	-
Stage 1	-	-	-	-	-	-	~ 7	0	-	~ 3	13	-
Stage 2	-	-	-	-	-	-	42	~ 12	-	108	0	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	30.14	2.16	$ 21066.23	$ 72240.88
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	2	~ 52	-	-	50	-	-	1
HCM Lane V/C Ratio	38.194	2.248	-	-	0.692	-	-	144.385
HCM Control Delay (s/veh)	$ 21066.2	$ 740.4	-	-	172	-	-	$ 72240.9
HCM Lane LOS	F	F	-	-	F	-	-	F
HCM 95th %tile Q(veh)	9.8	11.9	-	-	2.8	-	-	18.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	456	2523	0	0	2284	138	0	0	0	122	0	287
Future Volume (vph)	456	2523	0	0	2284	138	0	0	0	122	0	287
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5						4.5	
Lane Util. Factor	1.00	0.91			0.91						0.95	
Frt	1.00	1.00			0.99						0.89	
Flt Protected	0.95	1.00			1.00						0.99	
Satd. Flow (prot)	1770	5085			5042						3120	
Flt Permitted	0.95	1.00			1.00						0.99	
Satd. Flow (perm)	1770	5085			5042						3120	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	496	2742	0	0	2483	150	0	0	0	133	0	312
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	0	0	234	0
Lane Group Flow (vph)	496	2742	0	0	2626	0	0	0	0	0	211	0
Turn Type	Prot	NA		Perm	NA					Perm	NA	
Protected Phases	7	4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)	19.5	58.5			34.5						22.5	
Effective Green, g (s)	19.5	58.5			34.5						22.5	
Actuated g/C Ratio	0.22	0.65			0.38						0.25	
Clearance Time (s)	4.5	4.5			4.5						4.5	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	383	3305			1932						780	
v/s Ratio Prot	c0.28	0.54			c0.52							
v/s Ratio Perm											0.07	
v/c Ratio	1.30	0.83			1.36						0.27	
Uniform Delay, d1	35.3	12.0			27.8						27.1	
Progression Factor	1.00	1.00			1.00						1.00	
Incremental Delay, d2	150.9	1.8			165.0						0.9	
Delay (s)	186.2	13.8			192.8						28.0	
Level of Service	F	B			F						C	
Approach Delay (s/veh)		40.2			192.8			0.0			28.0	
Approach LOS		D			F			A			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	102.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	69	97	456	322	28
Future Vol, veh/h	35	69	97	456	322	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	75	105	496	350	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	824	190	380	0	-	0
Stage 1	365	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	311	819	1175	-	-	-
Stage 1	673	-	-	-	-	-
Stage 2	603	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	279	819	1175	-	-	-
Mov Cap-2 Maneuver	279	-	-	-	-	-
Stage 1	603	-	-	-	-	-
Stage 2	603	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	14.39	1.97	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	631	-	496	-	-
HCM Lane V/C Ratio	0.09	-	0.228	-	-
HCM Control Delay (s/veh)	8.4	0.6	14.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	-	-

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	45	17	43	52	86	0	55	330	114	22	254	14
Future Vol, veh/h	45	17	43	52	86	0	55	330	114	22	254	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	18	47	57	93	0	60	359	124	24	276	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	677	934	146	735	879	241	291	0	0	483	0	0
Stage 1	332	332	-	540	540	-	-	-	-	-	-	-
Stage 2	346	602	-	195	339	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	339	264	875	307	285	760	1267	-	-	1076	-	-
Stage 1	656	643	-	493	519	-	-	-	-	-	-	-
Stage 2	643	487	-	788	638	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	207	244	875	249	262	760	1267	-	-	1076	-	-
Mov Cap-2 Maneuver	207	244	-	249	262	-	-	-	-	-	-	-
Stage 1	640	628	-	466	491	-	-	-	-	-	-	-
Stage 2	492	460	-	707	623	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	23.04	36.82	1.1	0.79
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	292	-	-	312	257	254	-	-
HCM Lane V/C Ratio	0.047	-	-	0.366	0.583	0.022	-	-
HCM Control Delay (s/veh)	8	0.3	-	23	36.8	8.4	0.2	-
HCM Lane LOS	A	A	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.6	3.4	0.1	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	104	97	263	201	36
Future Vol, veh/h	9	104	97	263	201	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	113	105	286	218	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	129	258	0	-	0
Stage 1	238	-	-	-	-	-
Stage 2	354	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	438	897	1304	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	399	897	1304	-	-	-
Mov Cap-2 Maneuver	399	-	-	-	-	-
Stage 1	711	-	-	-	-	-
Stage 2	681	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	10.19	2.45	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	970	-	816	-	-
HCM Lane V/C Ratio	0.081	-	0.151	-	-
HCM Control Delay (s/veh)	8	0.4	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.5	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	91	0	129	85	0	160
Future Vol, veh/h	91	0	129	85	0	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	99	0	140	92	0	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	273	116	0	0	233	0
Stage 1	186	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	693	914	-	-	1332	-
Stage 1	827	-	-	-	-	-
Stage 2	926	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	693	914	-	-	1332	-
Mov Cap-2 Maneuver	693	-	-	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	926	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	11.05	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	693	1332	-
HCM Lane V/C Ratio	-	-	0.143	-	-
HCM Control Delay (s/veh)	-	-	11.1	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	386	72	104	501	16	139	1	106	20	3	1
Future Vol, veh/h	4	386	72	104	501	16	139	1	106	20	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	420	78	113	545	17	151	1	115	22	3	1
Number of Lanes	0	2	0	0	2	0	0	2	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay, s/veh	14.8	19.6	13.3	11.8
HCM LOS	B	C	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	2%	0%	29%	0%	83%
Vol Thru, %	0%	0%	98%	73%	71%	94%	13%
Vol Right, %	0%	100%	0%	27%	0%	6%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	107	197	265	355	267	24
LT Vol	139	0	4	0	104	0	20
Through Vol	1	1	193	193	251	251	3
RT Vol	0	106	0	72	0	16	1
Lane Flow Rate	152	116	214	288	385	290	26
Geometry Grp	5	5	5	5	5	5	4b
Degree of Util (X)	0.334	0.216	0.392	0.51	0.694	0.506	0.06
Departure Headway (Hd)	7.931	6.71	6.584	6.38	6.483	6.291	8.308
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	452	531	544	562	555	571	434
Service Time	5.713	4.491	4.363	4.159	4.256	4.064	6.308
HCM Lane V/C Ratio	0.336	0.218	0.393	0.512	0.694	0.508	0.06
HCM Control Delay, s/veh	14.7	11.4	13.6	15.7	22.8	15.4	11.8
HCM Lane LOS	B	B	B	C	C	C	B
HCM 95th-tile Q	1.4	0.8	1.9	2.9	5.4	2.8	0.2

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	69	110	55	14	61	14	9	41	36	9	0	69
Future Vol, veh/h	69	110	55	14	61	14	9	41	36	9	0	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	120	60	15	66	15	10	45	39	10	0	75

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	82	0	0	179	0	0	396	411	149	396	434	74
Stage 1	-	-	-	-	-	-	299	299	-	104	104	-
Stage 2	-	-	-	-	-	-	97	112	-	292	329	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1516	-	-	1396	-	-	564	530	897	564	515	988
Stage 1	-	-	-	-	-	-	709	666	-	901	809	-
Stage 2	-	-	-	-	-	-	910	803	-	716	646	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1516	-	-	1396	-	-	486	495	897	461	481	988
Mov Cap-2 Maneuver	-	-	-	-	-	-	486	495	-	461	481	-
Stage 1	-	-	-	-	-	-	670	629	-	891	800	-
Stage 2	-	-	-	-	-	-	831	794	-	601	610	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.21	1.2	11.99	9.57
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	608	498	-	-	273	-	-	873
HCM Lane V/C Ratio	0.154	0.049	-	-	0.011	-	-	0.097
HCM Control Delay (s/veh)	12	7.5	0	-	7.6	0	-	9.6
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.5	0.2	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	69	83	28	55	43	14	26	28	17	9	50	9
Future Vol, veh/h	69	83	28	55	43	14	26	28	17	9	50	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	90	30	60	47	15	28	30	18	10	54	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	62	0	0	121	0	0	449	437	105	429	445	54
Stage 1	-	-	-	-	-	-	255	255	-	174	174	-
Stage 2	-	-	-	-	-	-	193	182	-	255	271	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1541	-	-	1467	-	-	520	513	949	536	508	1013
Stage 1	-	-	-	-	-	-	749	696	-	828	755	-
Stage 2	-	-	-	-	-	-	808	749	-	749	685	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1541	-	-	1467	-	-	417	466	949	449	461	1013
Mov Cap-2 Maneuver	-	-	-	-	-	-	417	466	-	449	461	-
Stage 1	-	-	-	-	-	-	710	660	-	793	723	-
Stage 2	-	-	-	-	-	-	709	718	-	664	650	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.86	3.71	13.4	13.55
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	506	657	-	-	843	-	-	495
HCM Lane V/C Ratio	0.153	0.049	-	-	0.041	-	-	0.149
HCM Control Delay (s/veh)	13.4	7.5	0	-	7.6	0	-	13.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0.2	-	-	0.1	-	-	0.5

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	78	1750	179	0	0
Future Vol, veh/h	0	78	1750	179	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	85	1902	195	0	0

Major/Minor	Minor1	Major1		
Conflicting Flow All	-	1048	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	224	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	224	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s/v	30.5	1
HCM LOS	D	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	224
HCM Lane V/C Ratio	-	-	0.378
HCM Control Delay (s/veh)	-	-	30.5
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	1.7

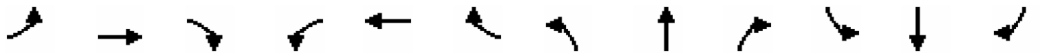
Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	139	1593	235	0	0
Future Vol, veh/h	0	139	1593	235	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	151	1732	255	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	993	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	244	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	244	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s/v	41.1	0
HCM LOS	E	

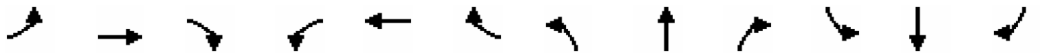
Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	244
HCM Lane V/C Ratio	-	-	0.619
HCM Control Delay (s/veh)	-	-	41.1
HCM Lane LOS	-	-	E
HCM 95th %tile Q(veh)	-	-	3.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	809	2767	0	0	1787	757	234	87	211	0	0	0
Future Volume (vph)	809	2767	0	0	1787	757	234	87	211	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.96		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00			
Satd. Flow (prot)	1522	4799			6122		1681	1730	1583			
Flt Permitted	0.95	0.72			1.00		0.95	0.98	1.00			
Satd. Flow (perm)	1522	3453			6122		1681	1730	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	879	3008	0	0	1942	823	254	95	229	0	0	0
RTOR Reduction (vph)	0	0	0	0	85	0	0	0	61	0	0	0
Lane Group Flow (vph)	791	3096	0	0	2680	0	173	176	168	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	36.3	62.0			25.7		14.5	14.5	14.5			
Effective Green, g (s)	36.3	62.0			25.7		14.5	14.5	14.5			
Actuated g/C Ratio	0.40	0.69			0.29		0.16	0.16	0.16			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	613	2921			1748		270	278	255			
v/s Ratio Prot	c0.52	0.43			c0.44		0.10	0.10				
v/s Ratio Perm		0.30							c0.11			
v/c Ratio	1.29	1.06			1.53		0.64	0.63	0.66			
Uniform Delay, d1	26.9	14.0			32.2		35.3	35.3	35.4			
Progression Factor	1.24	1.49			1.00		1.00	1.00	1.00			
Incremental Delay, d2	131.8	27.9			242.9		5.1	4.7	6.0			
Delay (s)	165.2	48.8			275.0		40.4	39.9	41.4			
Level of Service	F	D			F		D	D	D			
Approach Delay (s/veh)		72.5			275.0			40.7			0.0	
Approach LOS		E			F			D			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	147.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2519	265	260	1772	0	0	0	0	1016	30	609
Future Volume (vph)	0	2519	265	260	1772	0	0	0	0	1016	30	609
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.99		1.00	1.00					1.00	0.86	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6316		1770	5085					3433	1529	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6316		1770	5085					3433	1529	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2738	288	283	1926	0	0	0	0	1104	33	662
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	4	80
Lane Group Flow (vph)	0	3007	0	283	1926	0	0	0	0	1104	347	264
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		31.7		11.3	47.5					33.5	33.5	33.5
Effective Green, g (s)		31.7		11.3	47.5					33.5	33.5	33.5
Actuated g/C Ratio		0.35		0.13	0.53					0.37	0.37	0.37
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2224		222	2683					1277	569	559
v/s Ratio Prot		c0.48		c0.16	0.38					c0.32	0.23	
v/s Ratio Perm												0.18
v/c Ratio		1.35		1.27	0.72					0.86	0.61	0.47
Uniform Delay, d1		29.2		39.4	16.2					26.1	22.9	21.5
Progression Factor		1.00		0.51	0.27					1.00	1.00	1.00
Incremental Delay, d2		161.4		126.9	0.1					6.3	1.9	0.6
Delay (s)		190.5		146.8	4.4					32.5	24.8	22.2
Level of Service		F		F	A					C	C	C
Approach Delay (s/veh)		190.5			22.7			0.0			29.0	
Approach LOS		F			C			A			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	96.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	44.3
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	221	361	0	0	149	707	34	162	139	0	0	0
Future Vol, veh/h	221	361	0	0	149	707	34	162	139	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	240	392	0	0	162	768	37	176	151	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	14.9	76.5	12.9
HCM LOS	B	F	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	39%	0%	0%	100%	22%	0%	0%	0%	0%
Vol Thru, %	61%	100%	0%	0%	78%	100%	100%	100%	4%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	96%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	88	108	139	188	153	241	60	60	737
LT Vol	34	0	0	188	33	0	0	0	0
Through Vol	54	108	0	0	120	241	60	60	30
RT Vol	0	0	139	0	0	0	0	0	707
Lane Flow Rate	96	117	151	204	167	262	65	65	801
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.206	0.247	0.289	0.451	0.351	0.416	0.134	0.134	1.107
Departure Headway (Hd)	8.019	7.823	7.112	8.264	7.864	5.983	7.426	7.426	4.978
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	451	463	509	439	460	607	486	486	737
Service Time	5.719	5.523	4.812	5.964	5.564	3.683	5.126	5.126	2.678
HCM Lane V/C Ratio	0.213	0.253	0.297	0.465	0.363	0.432	0.134	0.134	1.087
HCM Control Delay, s/veh	12.8	13.1	12.7	17.6	14.8	12.9	11.3	11.3	87.1
HCM Lane LOS	B	B	B	C	B	B	B	B	F
HCM 95th-tile Q	0.8	1	1.2	2.3	1.6	2	0.5	0.5	22.8

Intersection	
Intersection Delay, s/veh	14.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	245	249	112	74	0	0	0	0	321	31	78
Future Vol, veh/h	0	245	249	112	74	0	0	0	0	321	31	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	266	271	122	80	0	0	0	0	349	34	85
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	10.6	11.1	21.5
HCM LOS	B	B	C

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	68%	0%	95%	0%
Vol Thru, %	100%	100%	16%	0%	32%	100%	5%	17%
Vol Right, %	0%	0%	84%	0%	0%	0%	0%	83%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	98	298	60	76	49	337	94
LT Vol	0	0	0	60	51	0	321	0
Through Vol	98	98	49	0	25	49	16	16
RT Vol	0	0	249	0	0	0	0	78
Lane Flow Rate	107	107	324	66	83	54	366	102
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.201	0.201	0.397	0.142	0.175	0.082	0.705	0.166
Departure Headway (Hd)	6.779	6.779	4.409	7.787	7.62	5.495	6.943	5.884
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	526	526	807	458	468	645	519	607
Service Time	4.562	4.562	2.19	5.585	5.418	3.29	4.704	3.645
HCM Lane V/C Ratio	0.203	0.203	0.401	0.144	0.177	0.084	0.705	0.168
HCM Control Delay, s/veh	11.3	11.3	10.1	11.9	12	8.8	24.7	9.8
HCM Lane LOS	B	B	B	B	B	A	C	A
HCM 95th-tile Q	0.7	0.7	1.9	0.5	0.6	0.3	5.5	0.6

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2979	2543	28	0	17
Future Vol, veh/h	0	2979	2543	28	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3238	2764	30	0	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1397
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	112
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	112
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	43.44
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	112
HCM Lane V/C Ratio	-	-	-	0.165
HCM Control Delay (s/veh)	-	-	-	43.4
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.6

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	105	9	9	62	14	14
Future Vol, veh/h	105	9	9	62	14	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	10	10	67	15	15

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	124	0	206	119
Stage 1	-	-	-	-	119	-
Stage 2	-	-	-	-	87	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1463	-	782	933
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	936	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1463	-	777	933
Mov Cap-2 Maneuver	-	-	-	-	777	-
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	930	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.95	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	848	-	-	228	-
HCM Lane V/C Ratio	0.036	-	-	0.007	-
HCM Control Delay (s/veh)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2645	2404	28	0	17
Future Vol, veh/h	0	2645	2404	28	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2875	2613	30	0	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1322
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	126
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	126
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	38.44
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	126
HCM Lane V/C Ratio	-	-	-	0.147
HCM Control Delay (s/veh)	-	-	-	38.4
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.5

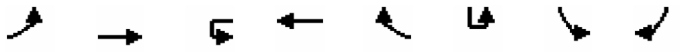
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2645	2414	28	0	17
Future Vol, veh/h	0	2645	2414	28	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2875	2624	30	0	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1327
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	125
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	125
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	38.77
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	125
HCM Lane V/C Ratio	-	-	-	0.148
HCM Control Delay (s/veh)	-	-	-	38.8
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.5



Movement	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	414	2540	20	2482	490	1	441	296
Future Volume (vph)	414	2540	20	2482	490	1	441	296
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91			1.00	1.00
Frt	1.00	1.00	1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1770	4959			1770	1583
Flt Permitted	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)	1770	5085	1770	4959			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	2761	22	2698	533	1	479	322
RTOR Reduction (vph)	0	0	0	46	0	0	0	140
Lane Group Flow (vph)	450	2761	22	3185	0	0	480	182
Turn Type	Prot	NA	Prot	NA		Perm	Prot	Perm
Protected Phases	7	4	3	8			6	
Permitted Phases						6		6
Actuated Green, G (s)	5.3	30.5	1.0	26.2			18.6	18.6
Effective Green, g (s)	5.3	30.5	1.0	26.2			18.6	18.6
Actuated g/C Ratio	0.08	0.48	0.02	0.41			0.29	0.29
Clearance Time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	147	2438	27	2042			517	462
v/s Ratio Prot	c0.25	c0.54	0.01	c0.64				
v/s Ratio Perm							0.27	0.11
v/c Ratio	3.06	1.13	0.81	1.56			0.93	0.39
Uniform Delay, d1	29.2	16.5	31.2	18.7			21.9	18.0
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	945.4	65.4	95.3	254.2			25.3	2.5
Delay (s)	974.5	81.9	126.5	272.9			47.2	20.5
Level of Service	F	F	F	F			D	C
Approach Delay (s/veh)		207.0		271.9			36.4	
Approach LOS		F		F			D	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	217.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	117.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	28059.9

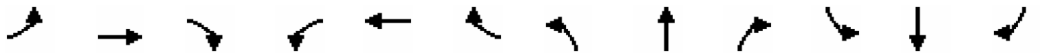
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	31	188	2742	60	14	2711	75	41	10	68	167	4	47
Future Vol, veh/h	31	188	2742	60	14	2711	75	41	10	68	167	4	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	540	-	-	710	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	204	2980	65	15	2947	82	45	11	74	182	4	51

Major/Minor	Major1				Major2			Minor1			Minor2		
Conflicting Flow All	2211	3028	0	0	3046	0	0	4700	6548	1523	4692	6540	1514
Stage 1	-	-	-	-	-	-	-	3489	3489	-	3018	3018	-
Stage 2	-	-	-	-	-	-	-	1211	3059	-	1674	3522	-
Critical Hdwy	5.64	5.34	-	-	5.34	-	-	6.44	6.54	7.14	6.44	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	7.34	5.54	-	7.34	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.74	5.54	-	6.74	5.54	-
Follow-up Hdwy	2.32	3.12	-	-	3.12	-	-	3.82	4.02	3.92	3.82	4.02	3.92
Pot Cap-1 Maneuver	91	~ 37	-	-	36	-	-	~ 1	~ 0	92	~ 1	~ 0	93
Stage 1	-	-	-	-	-	-	-	~ 3	17	-	~ 7	30	-
Stage 2	-	-	-	-	-	-	-	173	29	-	~ 88	16	-
Platoon blocked, %			-	-		-	-						
Mov Cap-1 Maneuver	37	~ 37	-	-	36	-	-	~ 0	0	92	~ 0	0	93
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 0	0	-	~ 0	0	-
Stage 1	-	-	-	-	-	-	-	~ 3	0	-	~ 4	17	-
Stage 2	-	-	-	-	-	-	-	~ 34	16	-	~ 17	0	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	991.78	0.83	$ 89684.45	$ 741003.12
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1	~ 37	-	-	36	-	-	-
HCM Lane V/C Ratio	178.736	6.408	-	-	0.425	-	1	544.963
HCM Control Delay (s/veh)	$ 89684.4	$ 2645.5	-	-	165.9	-	$ 7	41003.1
HCM Lane LOS	F	F	-	-	F	-	-	F
HCM 95th %tile Q(veh)	18.7	28.3	-	-	1.4	-	-	32.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	708	2892	0	0	2632	214	0	0	0	357	0	850
Future Volume (vph)	708	2892	0	0	2632	214	0	0	0	357	0	850
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5						4.5	
Lane Util. Factor	1.00	0.91			0.91						0.95	
Frt	1.00	1.00			0.99						0.89	
Flt Protected	0.95	1.00			1.00						0.99	
Satd. Flow (prot)	1770	5085			5028						3119	
Flt Permitted	0.95	1.00			1.00						0.99	
Satd. Flow (perm)	1770	5085			5028						3119	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	770	3143	0	0	2861	233	0	0	0	388	0	924
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	296	0
Lane Group Flow (vph)	770	3143	0	0	3084	0	0	0	0	0	1017	0
Turn Type	Prot	NA		Perm	NA					Perm	NA	
Protected Phases	7	4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)	19.5	58.5			34.5						22.5	
Effective Green, g (s)	19.5	58.5			34.5						22.5	
Actuated g/C Ratio	0.22	0.65			0.38						0.25	
Clearance Time (s)	4.5	4.5			4.5						4.5	
Vehicle Extension (s)	3.0	3.0			3.0						3.0	
Lane Grp Cap (vph)	383	3305			1927						779	
v/s Ratio Prot	c0.44	0.62			c0.61							
v/s Ratio Perm											0.33	
v/c Ratio	2.01	0.95			1.60						1.32dr	
Uniform Delay, d1	35.3	14.4			27.8						33.8	
Progression Factor	1.00	1.00			1.00						1.00	
Incremental Delay, d2	463.9	7.3			272.5						146.5	
Delay (s)	499.1	21.7			300.3						180.2	
Level of Service	F	C			F						F	
Approach Delay (s/veh)		115.7			300.3			0.0			180.2	
Approach LOS		F			F			A			F	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	194.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	144.0%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Intersection	
Int Delay, s/veh	118.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	102	204	150	708	952	43
Future Vol, veh/h	102	204	150	708	952	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	111	222	163	770	1035	47

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1769	541	1082	0	-	0
Stage 1	1058	-	-	-	-	-
Stage 2	711	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 75	486	641	-	-	-
Stage 1	295	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 50	486	641	-	-	-
Mov Cap-2 Maneuver	~ 50	-	-	-	-	-
Stage 1	199	-	-	-	-	-
Stage 2	448	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	$821.57	4.54	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	504	-	125	-	-
HCM Lane V/C Ratio	0.255	-	2.654	-	-
HCM Control Delay (s/veh)	12.5	2.8	$ 821.6	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	1	-	30.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	418.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	94	51	128	153	158	0	86	550	201	47	714	21
Future Vol, veh/h	94	51	128	153	158	0	86	550	201	47	714	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	102	55	139	166	172	0	93	598	218	51	776	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1461	1893	399	1412	1795	408	799	0	0	816	0	0
Stage 1	890	890	-	894	894	-	-	-	-	-	-	-
Stage 2	572	1003	-	518	901	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	~ 90	69	600	~ 98	~ 80	592	819	-	-	807	-	-
Stage 1	304	359	-	302	358	-	-	-	-	-	-	-
Stage 2	473	318	-	509	355	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 70	~ 54	600	~ 59	~ 62	592	819	-	-	807	-	-
Mov Cap-2 Maneuver	~ 70	~ 54	-	~ 59	~ 62	-	-	-	-	-	-	-
Stage 1	279	330	-	257	304	-	-	-	-	-	-	-
Stage 2	175	270	-	299	326	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/veh	$ 857.44	$ 2201.76	1.77	1.23
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	269	-	-	109	60	208	-	-
HCM Lane V/C Ratio	0.114	-	-	2.712	5.593	0.063	-	-
HCM Control Delay (s/veh)	10	1.1	-	$ 857.4	$ 2201.8	9.8	0.7	-
HCM Lane LOS	A	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.4	-	-	27.5	38	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	306	150	506	463	68
Future Vol, veh/h	26	306	150	506	463	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	333	163	550	503	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1141	289	577	0	-	0
Stage 1	540	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	194	708	992	-	-	-
Stage 1	548	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	156	708	992	-	-	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	442	-	-	-	-	-
Stage 2	510	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	22.75	3.01	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	823	-	555	-	-
HCM Lane V/C Ratio	0.164	-	0.65	-	-
HCM Control Delay (s/veh)	9.3	1.1	22.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.6	-	4.7	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	175	0	321	194	0	282
Future Vol, veh/h	175	0	321	194	0	282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	0	349	211	0	307

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	608	280	0	0	560	0
Stage 1	454	-	-	-	-	-
Stage 2	153	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	428	717	-	-	1007	-
Stage 1	606	-	-	-	-	-
Stage 2	859	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	428	717	-	-	1007	-
Mov Cap-2 Maneuver	428	-	-	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	859	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	19.99	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	428	1007	-
HCM Lane V/C Ratio	-	-	0.445	-	-
HCM Control Delay (s/veh)	-	-	20	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.2	0	-

Intersection	
Intersection Delay, s/veh	80.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	731	116	182	732	10	157	9	209	3	3	3
Future Vol, veh/h	0	731	116	182	732	10	157	9	209	3	3	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	795	126	198	796	11	171	10	227	3	3	3
Number of Lanes	0	2	0	0	2	0	0	2	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay, s/veh	73.7	112.8	19.8	13
HCM LOS	F	F	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	97%	0%	0%	0%	33%	0%	33%
Vol Thru, %	3%	2%	100%	68%	67%	97%	33%
Vol Right, %	0%	98%	0%	32%	0%	3%	33%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	162	214	487	360	548	376	9
LT Vol	157	0	0	0	182	0	3
Through Vol	5	5	487	244	366	366	3
RT Vol	0	209	0	116	0	10	3
Lane Flow Rate	176	232	530	391	596	409	10
Geometry Grp	5	5	5	5	5	5	4b
Degree of Util (X)	0.443	0.51	1.11	0.794	1.27	0.851	0.025
Departure Headway (Hd)	9.69	8.48	7.924	7.692	7.941	7.751	9.738
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	374	427	461	473	465	470	370
Service Time	7.39	6.18	5.624	5.392	5.641	5.451	7.738
HCM Lane V/C Ratio	0.471	0.543	1.15	0.827	1.282	0.87	0.027
HCM Control Delay, s/veh	19.9	19.7	103	34	162.1	40.9	13
HCM Lane LOS	C	C	F	D	F	E	B
HCM 95th-tile Q	2.2	2.8	17.2	7.2	24.2	8.6	0.1

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	107	171	86	21	179	21	26	64	68	26	0	204
Future Vol, veh/h	107	171	86	21	179	21	26	64	68	26	0	204
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	116	186	93	23	195	23	28	70	74	28	0	222

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	217	0	0	279	0	0	705	728	233	705	764	206
Stage 1	-	-	-	-	-	-	465	465	-	252	252	-
Stage 2	-	-	-	-	-	-	240	263	-	453	512	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1352	-	-	1283	-	-	351	350	807	351	334	835
Stage 1	-	-	-	-	-	-	577	563	-	753	699	-
Stage 2	-	-	-	-	-	-	763	691	-	586	536	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1352	-	-	1283	-	-	226	308	807	223	293	835
Mov Cap-2 Maneuver	-	-	-	-	-	-	226	308	-	223	293	-
Stage 1	-	-	-	-	-	-	518	505	-	737	685	-
Stage 2	-	-	-	-	-	-	549	677	-	412	481	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.33	0.75	21.44	14.25
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	388	496	-	-	168	-	-	637
HCM Lane V/C Ratio	0.443	0.086	-	-	0.018	-	-	0.392
HCM Control Delay (s/veh)	21.4	7.9	0	-	7.9	0	-	14.3
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.2	0.3	-	-	0.1	-	-	1.9

Intersection	
Int Delay, s/veh	15.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	107	128	43	86	128	21	77	43	51	26	90	26
Future Vol, veh/h	107	128	43	86	128	21	77	43	51	26	90	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	116	139	47	93	139	23	84	47	55	28	98	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	162	0	0	186	0	0	770	744	163	733	756	151
Stage 1	-	-	-	-	-	-	395	395	-	338	338	-
Stage 2	-	-	-	-	-	-	375	349	-	395	418	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1417	-	-	1389	-	-	318	343	882	336	337	896
Stage 1	-	-	-	-	-	-	630	605	-	677	641	-
Stage 2	-	-	-	-	-	-	646	634	-	630	590	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1417	-	-	1389	-	-	179	288	882	228	284	896
Mov Cap-2 Maneuver	-	-	-	-	-	-	179	288	-	228	284	-
Stage 1	-	-	-	-	-	-	572	549	-	627	593	-
Stage 2	-	-	-	-	-	-	484	587	-	491	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.99	2.85	43.88	27.82
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	269	660	-	-	641	-	-	308
HCM Lane V/C Ratio	0.692	0.082	-	-	0.067	-	-	0.5
HCM Control Delay (s/veh)	43.9	7.8	0	-	7.8	0	-	27.8
HCM Lane LOS	E	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	4.7	0.3	-	-	0.2	-	-	2.6

Intersection	
Int Delay, s/veh	25.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	230	1938	278	0	0
Future Vol, veh/h	0	230	1938	278	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	250	2107	302	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	1204	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	~ 176	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	~ 176	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s/veh	267.84	0
HCM LOS	F	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	176
HCM Lane V/C Ratio	-	-	1.419
HCM Control Delay (s/veh)	-	-	267.8
HCM Lane LOS	-	-	F
HCM 95th %tile Q(veh)	-	-	15.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	110

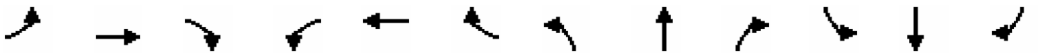
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	408	1805	363	0	0
Future Vol, veh/h	0	408	1805	363	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	443	1962	395	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	1178	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	~ 183	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	~ 183	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, $/s	$694.41	0
HCM LOS	F	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	183
HCM Lane V/C Ratio	-	-	2.418
HCM Control Delay (s/veh)	-	-	$ 694.4
HCM Lane LOS	-	-	F
HCM 95th %tile Q(veh)	-	-	37

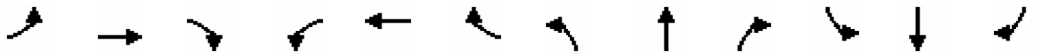
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	904	3234	0	0	2673	790	367	122	366	0	0	0
Future Volume (vph)	904	3234	0	0	2673	790	367	122	366	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.97		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00			
Satd. Flow (prot)	1522	4799			6188		1681	1726	1583			
Flt Permitted	0.95	0.69			1.00		0.95	0.98	1.00			
Satd. Flow (perm)	1522	3303			6188		1681	1726	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	983	3515	0	0	2905	859	399	133	398	0	0	0
RTOR Reduction (vph)	0	0	0	0	59	0	0	0	58	0	0	0
Lane Group Flow (vph)	885	3613	0	0	3705	0	263	269	340	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	31.9	58.5			26.6		18.0	18.0	18.0			
Effective Green, g (s)	31.9	58.5			26.6		18.0	18.0	18.0			
Actuated g/C Ratio	0.35	0.65			0.30		0.20	0.20	0.20			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	539	2677			1828		336	345	316			
v/s Ratio Prot	c0.58	0.48			c0.60		0.16	0.16				
v/s Ratio Perm		0.40							c0.21			
v/c Ratio	1.64	1.35			2.03		0.78	0.78	1.07			
Uniform Delay, d1	29.1	15.7			31.7		34.1	34.1	36.0			
Progression Factor	1.23	1.38			1.00		1.00	1.00	1.00			
Incremental Delay, d2	289.6	157.6			464.0		11.3	10.6	71.9			
Delay (s)	325.3	179.2			495.7		45.4	44.8	107.9			
Level of Service	F	F			F		D	D	F			
Approach Delay (s/veh)		208.0			495.7			72.0			0.0	
Approach LOS		F			F			E			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	312.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	125.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2836	484	506	2555	0	0	0	0	1288	128	581
Future Volume (vph)	0	2836	484	506	2555	0	0	0	0	1288	128	581
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.98		1.00	1.00					1.00	0.90	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6268		1770	5085					3433	1597	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6268		1770	5085					3433	1597	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3083	526	550	2777	0	0	0	0	1400	139	632
RTOR Reduction (vph)	0	34	0	0	0	0	0	0	0	0	1	87
Lane Group Flow (vph)	0	3575	0	550	2777	0	0	0	0	1400	397	286
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		32.9		15.1	52.5					28.5	28.5	28.5
Effective Green, g (s)		32.9		15.1	52.5					28.5	28.5	28.5
Actuated g/C Ratio		0.37		0.17	0.58					0.32	0.32	0.32
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2291		296	2966					1087	505	476
v/s Ratio Prot		c0.57		c0.31	0.55					c0.41	0.25	
v/s Ratio Perm												0.19
v/c Ratio		1.56		1.86	0.94					1.29	0.79	0.60
Uniform Delay, d1		28.6		37.4	17.2					30.8	28.0	26.0
Progression Factor		1.00		0.64	0.54					1.00	1.00	1.00
Incremental Delay, d2		254.3		387.3	0.7					136.6	7.9	2.1
Delay (s)		282.9		411.2	10.0					167.4	35.9	28.1
Level of Service		F		F	B					F	D	C
Approach Delay (s/veh)		282.9			76.3			0.0			119.3	
Approach LOS		F			E			A			F	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	168.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	125.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	56.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	136	707	0	0	321	586	107	26	268	0	0	0
Future Vol, veh/h	136	707	0	0	321	586	107	26	268	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	148	768	0	0	349	637	116	28	291	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	55.9	90.8	20
HCM LOS	E	F	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	93%	0%	0%	100%	5%	0%	0%	0%	0%
Vol Thru, %	7%	100%	0%	0%	95%	100%	100%	100%	10%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	90%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	116	17	268	122	249	471	128	128	650
LT Vol	107	0	0	122	14	0	0	0	0
Through Vol	9	17	0	0	235	471	128	128	64
RT Vol	0	0	268	0	0	0	0	0	586
Lane Flow Rate	126	19	291	133	271	512	140	140	707
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.306	0.043	0.616	0.321	0.618	0.919	0.328	0.328	1.184
Departure Headway (Hd)	9.049	8.576	7.861	9.063	8.578	6.768	8.454	8.454	6.029
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	400	420	463	399	423	538	426	426	601
Service Time	6.749	6.276	5.561	6.763	6.278	4.468	6.205	6.205	3.779
HCM Lane V/C Ratio	0.315	0.045	0.629	0.333	0.641	0.952	0.329	0.329	1.176
HCM Control Delay, s/veh	15.7	11.7	22.4	16	24.2	47.2	15.3	15.3	120.6
HCM Lane LOS	C	B	C	C	C	E	C	C	F
HCM 95th-tile Q	1.3	0.1	4.1	1.4	4	11.1	1.4	1.4	24.4

Intersection	
Intersection Delay, s/veh	189.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	187	133	265	170	0	0	0	0	640	360	161
Future Vol, veh/h	0	187	133	265	170	0	0	0	0	640	360	161
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	203	145	288	185	0	0	0	0	696	391	175
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	13.9	17.2	303
HCM LOS	B	C	F

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	68%	0%	78%	0%
Vol Thru, %	100%	100%	22%	0%	32%	100%	22%	53%
Vol Right, %	0%	0%	78%	0%	0%	0%	0%	47%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	75	75	170	143	179	113	820	341
LT Vol	0	0	0	143	122	0	640	0
Through Vol	75	75	37	0	57	113	180	180
RT Vol	0	0	133	0	0	0	0	161
Lane Flow Rate	81	81	185	156	194	123	891	371
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.189	0.189	0.314	0.366	0.448	0.214	1.873	0.705
Departure Headway (Hd)	9.692	9.692	7.302	9.742	9.577	7.411	7.566	6.843
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	372	372	496	372	378	488	481	526
Service Time	7.392	7.392	5.002	7.442	7.277	5.111	5.324	4.601
HCM Lane V/C Ratio	0.218	0.218	0.373	0.419	0.513	0.252	1.852	0.705
HCM Control Delay, s/veh	14.6	14.6	13.3	18	19.8	12.1	418.9	24.4
HCM Lane LOS	B	B	B	C	C	B	F	C
HCM 95th-tile Q	0.7	0.7	1.3	1.6	2.2	0.8	57.3	5.6

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3600	3439	43	0	51
Future Vol, veh/h	0	3600	3439	43	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3913	3738	47	0	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1892
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	~ 51
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	~ 51
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	283.69
HCM LOS			F

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	51
HCM Lane V/C Ratio	-	-	-	1.09
HCM Control Delay (s/veh)	-	-	-	283.7
HCM Lane LOS	-	-	-	F
HCM 95th %tile Q(veh)	-	-	-	4.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	175	26	26	145	21	21
Future Vol, veh/h	175	26	26	145	21	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	28	28	158	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	218	0	418	204
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	214	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1351	-	591	836
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	822	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1351	-	578	836
Mov Cap-2 Maneuver	-	-	-	-	578	-
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.17	10.65
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	683	-	-	274	-
HCM Lane V/C Ratio	0.067	-	-	0.021	-
HCM Control Delay (s/veh)	10.6	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3249	2795	43	0	51
Future Vol, veh/h	0	3249	2795	43	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3532	3038	47	0	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1542
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	89
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	89
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	96.79
HCM LOS			F

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	89
HCM Lane V/C Ratio	-	-	-	0.623
HCM Control Delay (s/veh)	-	-	-	96.8
HCM Lane LOS	-	-	-	F
HCM 95th %tile Q(veh)	-	-	-	2.9

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3249	2787	43	0	51
Future Vol, veh/h	0	3249	2787	43	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3532	3029	47	0	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1538
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	90
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	90
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	95.59
HCM LOS			F

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	90
HCM Lane V/C Ratio	-	-	-	0.619
HCM Control Delay (s/veh)	-	-	-	95.6
HCM Lane LOS	-	-	-	F
HCM 95th %tile Q(veh)	-	-	-	2.9



Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	235	2404	28	2250	311	392	293
Future Volume (vph)	235	2404	28	2250	311	392	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91		1.00	1.00
Frt	1.00	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	1770	4993		1770	1583
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1770	5085	1770	4993		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	255	2613	30	2446	338	426	318
RTOR Reduction (vph)	0	0	0	12	0	0	123
Lane Group Flow (vph)	255	2613	30	2772	0	426	195
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	7	4	3	8		6	
Permitted Phases							6
Actuated Green, G (s)	18.5	96.2	5.6	83.3		36.5	36.5
Effective Green, g (s)	18.5	96.2	5.6	83.3		36.5	36.5
Actuated g/C Ratio	0.12	0.63	0.04	0.55		0.24	0.24
Clearance Time (s)	4.5	4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	215	3222	65	2739		425	380
v/s Ratio Prot	c0.14	0.51	0.02	c0.56		c0.24	
v/s Ratio Perm							0.12
v/c Ratio	1.19	0.81	0.46	1.01		1.00	0.51
Uniform Delay, d1	66.7	20.9	71.6	34.3		57.7	49.9
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	120.7	1.6	5.1	20.2		44.2	1.2
Delay (s)	187.4	22.6	76.7	54.5		101.9	51.1
Level of Service	F	C	E	D		F	D
Approach Delay (s/veh)		37.2		54.7		80.2	
Approach LOS		D		D		F	

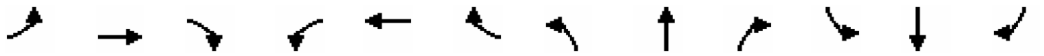
Intersection Summary			
HCM 2000 Control Delay (s/veh)	49.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	151.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	2527	18	32	2393	123	14	16	26	86	0	35
Future Volume (vph)	108	2527	18	32	2393	123	14	16	26	86	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00		1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85		0.94		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	1.00	
Satd. Flow (prot)	1770	5080		1770	5085	1583		1724		1770	1583	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.93		0.95	1.00	
Satd. Flow (perm)	1770	5080		1770	5085	1583		1622		1770	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	2747	20	35	2601	134	15	17	28	93	0	38
RTOR Reduction (vph)	0	0	0	0	0	59	0	24	0	0	29	0
Lane Group Flow (vph)	117	2767	0	35	2601	75	0	36	0	93	9	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	9.6	71.6		2.9	64.9	64.9		14.6		8.4	27.5	
Effective Green, g (s)	9.6	71.6		2.9	64.9	64.9		14.6		8.4	27.5	
Actuated g/C Ratio	0.08	0.62		0.03	0.56	0.56		0.13		0.07	0.24	
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)	147	3149		44	2857	889		205		128	376	
v/s Ratio Prot	c0.07	c0.54		0.02	0.51					c0.05	0.01	
v/s Ratio Perm						0.05		c0.02				
v/c Ratio	0.80	0.88		0.80	0.91	0.08		0.18		0.73	0.02	
Uniform Delay, d1	52.0	18.3		56.0	22.7	11.6		45.1		52.4	33.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	25.0	3.1		62.9	4.9	0.0		0.4		18.5	0.0	
Delay (s)	77.0	21.4		118.9	27.6	11.7		45.5		70.9	33.7	
Level of Service	E	C		F	C	B		D		E	C	
Approach Delay (s/veh)		23.7			28.0			45.5			60.1	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	115.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	456	2523	0	0	2284	138	0	0	0	122	0	287
Future Volume (vph)	456	2523	0	0	2284	138	0	0	0	122	0	287
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5				4.5		4.5
Lane Util. Factor	1.00	0.91			0.91	1.00				0.97		1.00
Frt	1.00	1.00			1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1770	5085			5085	1583				3433		1583
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1770	5085			5085	1583				3433		1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	496	2742	0	0	2483	150	0	0	0	133	0	312
RTOR Reduction (vph)	0	0	0	0	0	72	0	0	0	0	0	7
Lane Group Flow (vph)	496	2742	0	0	2483	78	0	0	0	133	0	305
Turn Type	Prot	NA		Perm	NA	Perm				Prot		pm+ov
Protected Phases	7	4			8					1		7
Permitted Phases				8		8						6
Actuated Green, G (s)	33.0	115.5			78.0	78.0				25.5		58.5
Effective Green, g (s)	33.0	115.5			78.0	78.0				25.5		58.5
Actuated g/C Ratio	0.22	0.77			0.52	0.52				0.17		0.39
Clearance Time (s)	4.5	4.5			4.5	4.5				4.5		4.5
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0		3.0
Lane Grp Cap (vph)	389	3915			2644	823				583		664
v/s Ratio Prot	c0.28	0.54			c0.49					0.04		c0.10
v/s Ratio Perm						0.05						0.09
v/c Ratio	1.28	0.70			0.94	0.09				0.23		0.46
Uniform Delay, d1	58.5	8.6			33.8	18.2				53.8		34.0
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	142.4	0.6			7.4	0.1				0.2		0.5
Delay (s)	200.9	9.2			41.1	18.2				54.0		34.5
Level of Service	F	A			D	B				D		C
Approach Delay (s/veh)		38.6			39.8			0.0			40.3	
Approach LOS		D			D			A			D	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	39.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

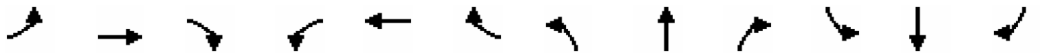
Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	69	97	456	322	28
Future Vol, veh/h	35	69	97	456	322	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	265	110	-	-	190
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	75	105	496	350	30

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	809	175	380	0	-	0
Stage 1	350	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	318	838	1175	-	-	-
Stage 1	684	-	-	-	-	-
Stage 2	603	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	290	838	1175	-	-	-
Mov Cap-2 Maneuver	290	-	-	-	-	-
Stage 1	623	-	-	-	-	-
Stage 2	603	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	12.94	1.47	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1175	-	290	838	-	-
HCM Lane V/C Ratio	0.09	-	0.131	0.09	-	-
HCM Control Delay (s/veh)	8.4	-	19.3	9.7	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.4	0.3	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	17	43	52	86	0	55	330	114	22	254	14
Future Volume (vph)	45	17	43	52	86	0	55	330	114	22	254	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.89		1.00	1.00		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1661		1770	1863		1770	3539	1583	1770	3512	
Flt Permitted	0.85	1.00		0.69	1.00		0.51	1.00	1.00	0.54	1.00	
Satd. Flow (perm)	1585	1661		1285	1863		942	3539	1583	1001	3512	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	18	47	57	93	0	60	359	124	24	276	15
RTOR Reduction (vph)	0	42	0	0	0	0	0	0	68	0	3	0
Lane Group Flow (vph)	49	23	0	57	93	0	60	359	56	24	288	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	6.9	4.7		9.1	5.8		25.5	22.0	22.0	20.3	19.4	
Effective Green, g (s)	6.9	4.7		9.1	5.8		25.5	22.0	22.0	20.3	19.4	
Actuated g/C Ratio	0.14	0.10		0.19	0.12		0.52	0.45	0.45	0.42	0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	231	159		271	220		550	1592	712	429	1393	
v/s Ratio Prot	0.01	0.01		c0.01	c0.05		c0.01	c0.10		0.00	0.08	
v/s Ratio Perm	0.02			0.02			0.05		0.04	0.02		
v/c Ratio	0.21	0.14		0.21	0.42		0.11	0.23	0.08	0.06	0.21	
Uniform Delay, d1	18.6	20.3		16.7	20.0		5.9	8.2	7.7	8.5	9.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.4		0.4	1.3		0.1	0.1	0.0	0.1	0.1	
Delay (s)	19.0	20.7		17.1	21.3		6.0	8.3	7.7	8.5	9.8	
Level of Service	B	C		B	C		A	A	A	A	A	
Approach Delay (s/veh)		20.0			19.7			7.9			9.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	104	97	263	201	36
Future Vol, veh/h	9	104	97	263	201	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	113	105	286	218	39

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	129	258	0	-	0
Stage 1	238	-	-	-	-	-
Stage 2	354	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	438	897	1304	-	-	-
Stage 1	779	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	402	897	1304	-	-	-
Mov Cap-2 Maneuver	402	-	-	-	-	-
Stage 1	716	-	-	-	-	-
Stage 2	681	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	9.96	2.16	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1304	-	402	897	-	-
HCM Lane V/C Ratio	0.081	-	0.024	0.126	-	-
HCM Control Delay (s/veh)	8	-	14.2	9.6	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.1	0.4	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	91	0	129	85	0	160
Future Vol, veh/h	91	0	129	85	0	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	99	0	140	92	0	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	273	116	0	0	233	0
Stage 1	186	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	693	914	-	-	1332	-
Stage 1	827	-	-	-	-	-
Stage 2	926	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	693	914	-	-	1332	-
Mov Cap-2 Maneuver	693	-	-	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	926	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	11.05	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	693	1332	-
HCM Lane V/C Ratio	-	-	0.143	-	-
HCM Control Delay (s/veh)	-	-	11.1	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	386	72	104	501	16	139	1	106	20	3	1
Future Vol, veh/h	4	386	72	104	501	16	139	1	106	20	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	420	78	113	545	17	151	1	115	22	3	1
Number of Lanes	0	2	0	0	2	0	0	2	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay, s/veh	14.8	19.6	13.3	11.8
HCM LOS	B	C	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	2%	0%	29%	0%	83%
Vol Thru, %	0%	0%	98%	73%	71%	94%	13%
Vol Right, %	0%	100%	0%	27%	0%	6%	4%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	107	197	265	355	267	24
LT Vol	139	0	4	0	104	0	20
Through Vol	1	1	193	193	251	251	3
RT Vol	0	106	0	72	0	16	1
Lane Flow Rate	152	116	214	288	385	290	26
Geometry Grp	5	5	5	5	5	5	4b
Degree of Util (X)	0.334	0.216	0.392	0.51	0.694	0.506	0.06
Departure Headway (Hd)	7.931	6.71	6.584	6.38	6.483	6.291	8.308
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	452	531	544	562	555	571	434
Service Time	5.713	4.491	4.363	4.159	4.256	4.064	6.308
HCM Lane V/C Ratio	0.336	0.218	0.393	0.512	0.694	0.508	0.06
HCM Control Delay, s/veh	14.7	11.4	13.6	15.7	22.8	15.4	11.8
HCM Lane LOS	B	B	B	C	C	C	B
HCM 95th-tile Q	1.4	0.8	1.9	2.9	5.4	2.8	0.2

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	110	55	14	61	14	9	41	36	9	0	69
Future Vol, veh/h	69	110	55	14	61	14	9	41	36	9	0	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	120	60	15	66	15	10	45	39	10	0	75

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	82	0	0	179	0	0	396	411	149	396	434	74
Stage 1	-	-	-	-	-	-	299	299	-	104	104	-
Stage 2	-	-	-	-	-	-	97	112	-	292	329	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1516	-	-	1396	-	-	564	530	897	564	515	988
Stage 1	-	-	-	-	-	-	709	666	-	901	809	-
Stage 2	-	-	-	-	-	-	910	803	-	716	646	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1516	-	-	1396	-	-	490	499	897	464	484	988
Mov Cap-2 Maneuver	-	-	-	-	-	-	490	499	-	464	484	-
Stage 1	-	-	-	-	-	-	674	633	-	892	800	-
Stage 2	-	-	-	-	-	-	832	794	-	605	614	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.21	1.2	11.95	9.56
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	611	1516	-	-	1396	-	-	874
HCM Lane V/C Ratio	0.153	0.049	-	-	0.011	-	-	0.097
HCM Control Delay (s/veh)	12	7.5	-	-	7.6	-	-	9.6
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.5	0.2	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	69	83	28	55	43	14	26	28	17	9	50	9
Future Vol, veh/h	69	83	28	55	43	14	26	28	17	9	50	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	90	30	60	47	15	28	30	18	10	54	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	62	0	0	121	0	0	449	437	105	429	445	54
Stage 1	-	-	-	-	-	-	255	255	-	174	174	-
Stage 2	-	-	-	-	-	-	193	182	-	255	271	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1541	-	-	1467	-	-	520	513	949	536	508	1013
Stage 1	-	-	-	-	-	-	749	696	-	828	755	-
Stage 2	-	-	-	-	-	-	808	749	-	749	685	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1541	-	-	1467	-	-	417	466	949	449	461	1013
Mov Cap-2 Maneuver	-	-	-	-	-	-	417	466	-	449	461	-
Stage 1	-	-	-	-	-	-	710	660	-	793	723	-
Stage 2	-	-	-	-	-	-	709	718	-	664	650	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.86	3.71	12.71	13.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	417	577	657	-	-	843	-	-	449	503
HCM Lane V/C Ratio	0.068	0.085	0.049	-	-	0.041	-	-	0.022	0.128
HCM Control Delay (s/veh)	14.3	11.8	7.5	0	-	7.6	0	-	13.2	13.2
HCM Lane LOS	B	B	A	A	-	A	A	-	B	B
HCM 95th %tile Q(veh)	0.2	0.3	0.2	-	-	0.1	-	-	0.1	0.4

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	78	1750	179	0	0
Future Vol, veh/h	0	78	1750	179	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	460	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	85	1902	195	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	951	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	260	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	260	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s/v	25.37	0
HCM LOS	D	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	260
HCM Lane V/C Ratio	-	-	0.326
HCM Control Delay (s/veh)	-	-	25.4
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	1.4

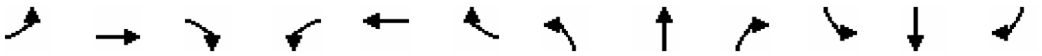
Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	139	1593	235	0	0
Future Vol, veh/h	0	139	1593	235	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	570	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	151	1732	255	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	866	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	297	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	297	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s/v	29.09	0
HCM LOS	D	

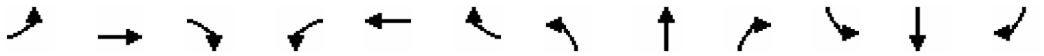
Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	297
HCM Lane V/C Ratio	-	-	0.509
HCM Control Delay (s/veh)	-	-	29.1
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	2.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	809	2767	0	0	1787	757	234	87	211	0	0	0
Future Volume (vph)	809	2767	0	0	1787	757	234	87	211	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.96		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00			
Satd. Flow (prot)	1522	4799			6122		1681	1730	1583			
Flt Permitted	0.95	0.66			1.00		0.95	0.98	1.00			
Satd. Flow (perm)	1522	3168			6122		1681	1730	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	879	3008	0	0	1942	823	254	95	229	0	0	0
RTOR Reduction (vph)	0	0	0	0	51	0	0	0	67	0	0	0
Lane Group Flow (vph)	791	3096	0	0	2714	0	173	176	162	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	67.1	119.1			52.0		17.4	17.4	17.4			
Effective Green, g (s)	67.1	119.1			52.0		17.4	17.4	17.4			
Actuated g/C Ratio	0.45	0.79			0.35		0.12	0.12	0.12			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	680	3244			2122		194	200	183			
v/s Ratio Prot	c0.52	0.43			c0.44		c0.10	0.10				
v/s Ratio Perm		0.33							0.10			
v/c Ratio	1.16	0.95			1.35dr		0.89	0.88	0.88			
Uniform Delay, d1	41.4	13.1			49.0		65.4	65.3	65.3			
Progression Factor	1.27	1.44			1.00		1.00	1.00	1.00			
Incremental Delay, d2	75.1	0.9			129.3		36.2	33.1	35.9			
Delay (s)	127.6	19.8			178.3		101.5	98.3	101.2			
Level of Service	F	B			F		F	F	F			
Approach Delay (s/veh)		41.8			178.3			100.4			0.0	
Approach LOS		D			F			F			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	98.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2519	265	260	1772	0	0	0	0	1016	30	609
Future Volume (vph)	0	2519	265	260	1772	0	0	0	0	1016	30	609
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.99		1.00	1.00					1.00	0.86	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6316		1770	5085					3433	1529	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6316		1770	5085					3433	1529	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2738	288	283	1926	0	0	0	0	1104	33	662
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	0	10	74
Lane Group Flow (vph)	0	3015	0	283	1926	0	0	0	0	1104	341	270
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		63.8		23.9	92.2					48.8	48.8	48.8
Effective Green, g (s)		63.8		23.9	92.2					48.8	48.8	48.8
Actuated g/C Ratio		0.43		0.16	0.61					0.33	0.33	0.33
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2686		282	3125					1116	497	489
v/s Ratio Prot		c0.48		c0.16	0.38					c0.32	0.22	
v/s Ratio Perm												0.18
v/c Ratio		1.12		1.00	0.62					0.99	0.69	0.55
Uniform Delay, d1		43.1		63.1	17.9					50.3	43.9	41.6
Progression Factor		1.00		0.70	0.04					1.00	1.00	1.00
Incremental Delay, d2		60.6		16.9	0.0					24.1	3.9	1.4
Delay (s)		103.7		61.1	0.8					74.4	47.9	43.0
Level of Service		F		E	A					E	D	D
Approach Delay (s/veh)		103.7			8.6			0.0			63.2	
Approach LOS		F			A			A			E	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	63.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	44.3
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	221	361	0	0	149	707	34	162	139	0	0	0
Future Vol, veh/h	221	361	0	0	149	707	34	162	139	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	240	392	0	0	162	768	37	176	151	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	14.9	76.5	12.9
HCM LOS	B	F	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	39%	0%	0%	100%	22%	0%	0%	0%	0%
Vol Thru, %	61%	100%	0%	0%	78%	100%	100%	100%	4%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	96%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	88	108	139	188	153	241	60	60	737
LT Vol	34	0	0	188	33	0	0	0	0
Through Vol	54	108	0	0	120	241	60	60	30
RT Vol	0	0	139	0	0	0	0	0	707
Lane Flow Rate	96	117	151	204	167	262	65	65	801
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.206	0.247	0.289	0.451	0.351	0.416	0.134	0.134	1.107
Departure Headway (Hd)	8.019	7.823	7.112	8.264	7.864	5.983	7.426	7.426	4.978
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	451	463	509	439	460	607	486	486	737
Service Time	5.719	5.523	4.812	5.964	5.564	3.683	5.126	5.126	2.678
HCM Lane V/C Ratio	0.213	0.253	0.297	0.465	0.363	0.432	0.134	0.134	1.087
HCM Control Delay, s/veh	12.8	13.1	12.7	17.6	14.8	12.9	11.3	11.3	87.1
HCM Lane LOS	B	B	B	C	B	B	B	B	F
HCM 95th-tile Q	0.8	1	1.2	2.3	1.6	2	0.5	0.5	22.8

Intersection	
Intersection Delay, s/veh	14.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	245	249	112	74	0	0	0	0	321	31	78
Future Vol, veh/h	0	245	249	112	74	0	0	0	0	321	31	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	266	271	122	80	0	0	0	0	349	34	85
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	10.6	11.1	21.5
HCM LOS	B	B	C

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	68%	0%	95%	0%
Vol Thru, %	100%	100%	16%	0%	32%	100%	5%	17%
Vol Right, %	0%	0%	84%	0%	0%	0%	0%	83%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	98	298	60	76	49	337	94
LT Vol	0	0	0	60	51	0	321	0
Through Vol	98	98	49	0	25	49	16	16
RT Vol	0	0	249	0	0	0	0	78
Lane Flow Rate	107	107	324	66	83	54	366	102
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.201	0.201	0.397	0.142	0.175	0.082	0.705	0.166
Departure Headway (Hd)	6.779	6.779	4.409	7.787	7.62	5.495	6.943	5.884
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	526	526	807	458	468	645	519	607
Service Time	4.562	4.562	2.19	5.585	5.418	3.29	4.704	3.645
HCM Lane V/C Ratio	0.203	0.203	0.401	0.144	0.177	0.084	0.705	0.168
HCM Control Delay, s/veh	11.3	11.3	10.1	11.9	12	8.8	24.7	9.8
HCM Lane LOS	B	B	B	B	B	A	C	A
HCM 95th-tile Q	0.7	0.7	1.9	0.5	0.6	0.3	5.5	0.6

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2979	2543	28	0	17
Future Vol, veh/h	0	2979	2543	28	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3238	2764	30	0	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1397
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	112
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	112
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	43.44
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	112
HCM Lane V/C Ratio	-	-	-	0.165
HCM Control Delay (s/veh)	-	-	-	43.4
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.6

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	105	9	9	62	14	14
Future Vol, veh/h	105	9	9	62	14	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	10	10	67	15	15

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	124	0	206	119
Stage 1	-	-	-	-	119	-
Stage 2	-	-	-	-	87	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1463	-	782	933
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	936	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1463	-	777	933
Mov Cap-2 Maneuver	-	-	-	-	777	-
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	930	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.95	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	848	-	-	228	-
HCM Lane V/C Ratio	0.036	-	-	0.007	-
HCM Control Delay (s/veh)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2645	2404	28	0	17
Future Vol, veh/h	0	2645	2404	28	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2875	2613	30	0	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1322
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	126
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	126
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	38.44
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	126
HCM Lane V/C Ratio	-	-	-	0.147
HCM Control Delay (s/veh)	-	-	-	38.4
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.5

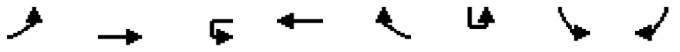
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2645	2414	28	0	17
Future Vol, veh/h	0	2645	2414	28	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	2875	2624	30	0	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1327
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	125
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	125
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	38.77
HCM LOS			E

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	125
HCM Lane V/C Ratio	-	-	-	0.148
HCM Control Delay (s/veh)	-	-	-	38.8
HCM Lane LOS	-	-	-	E
HCM 95th %tile Q(veh)	-	-	-	0.5



Movement	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Lane Configurations								
Traffic Volume (vph)	414	2540	20	2482	490	1	441	296
Future Volume (vph)	414	2540	20	2482	490	1	441	296
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	0.91			1.00	1.00
Frt	1.00	1.00	1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	5085	1770	4959			1770	1583
Flt Permitted	0.95	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)	1770	5085	1770	4959			1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	2761	22	2698	533	1	479	322
RTOR Reduction (vph)	0	0	0	21	0	0	0	190
Lane Group Flow (vph)	450	2761	22	3210	0	0	480	132
Turn Type	Prot	NA	Prot	NA		Perm	Prot	Perm
Protected Phases	7	4	3	8			6	
Permitted Phases						6		6
Actuated Green, G (s)	25.5	92.8	3.0	70.3			32.5	32.5
Effective Green, g (s)	25.5	92.8	3.0	70.3			32.5	32.5
Actuated g/C Ratio	0.18	0.65	0.02	0.50			0.23	0.23
Clearance Time (s)	4.5	4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	318	3327	37	2458			405	362
v/s Ratio Prot	c0.25	0.54	0.01	c0.65				
v/s Ratio Perm							0.27	0.08
v/c Ratio	1.42	0.83	0.59	1.31			1.19	0.36
Uniform Delay, d1	58.2	18.5	68.8	35.8			54.7	46.0
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	204.4	1.8	23.1	140.8			105.7	0.6
Delay (s)	262.6	20.4	91.9	176.5			160.4	46.6
Level of Service	F	C	F	F			F	D
Approach Delay (s/veh)		54.3		176.0			114.7	
Approach LOS		D		F			F	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	115.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	141.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	117.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

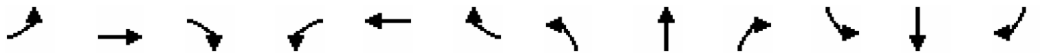
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	31	188	2742	60	14	2711	75	41	10	68	167	4
Future Volume (vph)	31	188	2742	60	14	2711	75	41	10	68	167	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5
Lane Util. Factor		1.00	0.91		1.00	0.91	1.00		1.00		1.00	1.00
Frt		1.00	1.00		1.00	1.00	0.85		0.92		1.00	0.86
Flt Protected		0.95	1.00		0.95	1.00	1.00		0.98		0.95	1.00
Satd. Flow (prot)		1770	5069		1770	5085	1583		1690		1770	1604
Flt Permitted		0.95	1.00		0.95	1.00	1.00		0.86		0.95	1.00
Satd. Flow (perm)		1770	5069		1770	5085	1583		1484		1770	1604
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	204	2980	65	15	2947	82	45	11	74	182	4
RTOR Reduction (vph)	0	0	2	0	0	0	34	0	42	0	0	40
Lane Group Flow (vph)	0	238	3043	0	15	2947	48	0	88	0	182	15
Turn Type	Prot	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA
Protected Phases	7	7	4		3	8		5	2		1	6
Permitted Phases							8					
Actuated Green, G (s)		10.5	78.8		2.9	71.2	71.2		9.5		13.5	27.5
Effective Green, g (s)		10.5	78.8		2.9	71.2	71.2		9.5		13.5	27.5
Actuated g/C Ratio		0.09	0.64		0.02	0.58	0.58		0.08		0.11	0.22
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)		151	3255		41	2950	918		114		194	359
v/s Ratio Prot		c0.13	0.60		0.01	c0.58					c0.10	0.01
v/s Ratio Perm							0.03		c0.06			
v/c Ratio		1.58	0.93		0.37	1.00	0.05		0.77		0.94	0.04
Uniform Delay, d1		56.1	19.7		59.0	25.7	11.1		55.5		54.2	37.3
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2		288.6	5.9		5.5	16.2	0.0		26.1		46.7	0.0
Delay (s)		344.7	25.5		64.5	41.9	11.2		81.6		100.9	37.3
Level of Service		F	C		E	D	B		F		F	D
Approach Delay (s/veh)			48.7			41.2			81.6			86.1
Approach LOS			D			D			F			F

Intersection Summary			
HCM 2000 Control Delay (s/veh)	47.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	122.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	SBR
Lane Configurations	
Traffic Volume (vph)	47
Future Volume (vph)	47
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	51
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s/veh)	
Approach LOS	
Intersection Summary	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	708	2892	0	0	2632	214	0	0	0	357	0	850
Future Volume (vph)	708	2892	0	0	2632	214	0	0	0	357	0	850
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5				4.5		4.5
Lane Util. Factor	1.00	0.91			0.91	1.00				0.97		1.00
Frt	1.00	1.00			1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1770	5085			5085	1583				3433		1583
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1770	5085			5085	1583				3433		1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	770	3143	0	0	2861	233	0	0	0	388	0	924
RTOR Reduction (vph)	0	0	0	0	0	125	0	0	0	0	0	6
Lane Group Flow (vph)	770	3143	0	0	2861	108	0	0	0	388	0	918
Turn Type	Prot	NA		Perm	NA	Perm				Prot		pm+ov
Protected Phases	7	4			8					1		7
Permitted Phases				8		8						6
Actuated Green, G (s)	43.5	115.6			67.6	67.6				21.2		64.7
Effective Green, g (s)	43.5	115.6			67.6	67.6				21.2		64.7
Actuated g/C Ratio	0.30	0.79			0.46	0.46				0.15		0.44
Clearance Time (s)	4.5	4.5			4.5	4.5				4.5		4.5
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0		3.0
Lane Grp Cap (vph)	528	4031			2357	733				499		751
v/s Ratio Prot	c0.44	0.62			c0.56					0.11		c0.36
v/s Ratio Perm						0.07						0.22
v/c Ratio	1.46	0.78			1.21	0.15				0.78		1.22
Uniform Delay, d1	51.2	8.2			39.1	22.5				60.0		40.6
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	216.6	1.0			100.4	0.1				7.5		111.8
Delay (s)	267.7	9.2			139.5	22.6				67.5		152.3
Level of Service	F	A			F	C				E		F
Approach Delay (s/veh)		60.1			130.7			0.0			127.3	
Approach LOS		E			F			A			F	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	96.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	145.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	111.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	30.3

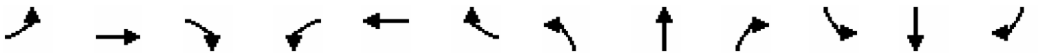
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	102	204	150	708	952	43
Future Vol, veh/h	102	204	150	708	952	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	265	110	-	-	190
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	111	222	163	770	1035	47

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1746	517	1082	0	-	0
Stage 1	1035	-	-	-	-	-
Stage 2	711	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 77	503	641	-	-	-
Stage 1	303	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 58	503	641	-	-	-
Mov Cap-2 Maneuver	~ 58	-	-	-	-	-
Stage 1	226	-	-	-	-	-
Stage 2	448	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/veh	$ 207.34	2.19	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	641	-	58	503	-	-
HCM Lane V/C Ratio	0.255	-	1.923	0.441	-	-
HCM Control Delay (s/veh)	12.5	-	$ 586.7	17.7	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	1	-	10.6	2.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	51	128	153	158	0	86	550	201	47	714	21
Future Volume (vph)	94	51	128	153	158	0	86	550	201	47	714	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	0.89		1.00	1.00		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1663		1770	1863		1770	3539	1583	1770	3524	
Flt Permitted	0.65	1.00		0.41	1.00		0.18	1.00	1.00	0.38	1.00	
Satd. Flow (perm)	1208	1663		764	1863		333	3539	1583	714	3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	102	55	139	166	172	0	93	598	218	51	776	23
RTOR Reduction (vph)	0	115	0	0	0	0	0	0	122	0	2	0
Lane Group Flow (vph)	102	79	0	166	172	0	93	598	96	51	797	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	18.1	11.5		24.1	14.5		29.8	23.8	23.8	25.0	21.4	
Effective Green, g (s)	18.1	11.5		24.1	14.5		29.8	23.8	23.8	25.0	21.4	
Actuated g/C Ratio	0.27	0.17		0.36	0.22		0.45	0.36	0.36	0.38	0.32	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	384	287		422	406		278	1266	566	325	1134	
v/s Ratio Prot	0.03	0.05		c0.06	c0.09		c0.03	0.17		0.01	c0.23	
v/s Ratio Perm	0.05			0.09			0.12		0.06	0.05		
v/c Ratio	0.27	0.28		0.39	0.42		0.33	0.47	0.17	0.16	0.70	
Uniform Delay, d1	18.7	23.9		15.1	22.4		11.9	16.5	14.6	13.4	19.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.5		0.6	0.7		0.7	0.3	0.1	0.2	2.0	
Delay (s)	19.1	24.4		15.8	23.1		12.6	16.8	14.7	13.6	21.8	
Level of Service	B	C		B	C		B	B	B	B	C	
Approach Delay (s/veh)		22.6			19.5			15.9			21.3	
Approach LOS		C			B			B			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	306	150	506	463	68
Future Vol, veh/h	26	306	150	506	463	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	333	163	550	503	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1141	289	577	0	-	0
Stage 1	540	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	194	708	992	-	-	-
Stage 1	548	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	162	708	992	-	-	-
Mov Cap-2 Maneuver	162	-	-	-	-	-
Stage 1	458	-	-	-	-	-
Stage 2	510	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.86	2.14	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	992	-	162	708	-	-
HCM Lane V/C Ratio	0.164	-	0.174	0.47	-	-
HCM Control Delay (s/veh)	9.3	-	31.8	14.5	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.6	-	0.6	2.5	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	175	0	321	194	0	282
Future Vol, veh/h	175	0	321	194	0	282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	0	349	211	0	307

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	608	280	0	0	560	0
Stage 1	454	-	-	-	-	-
Stage 2	153	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	428	717	-	-	1007	-
Stage 1	606	-	-	-	-	-
Stage 2	859	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	428	717	-	-	1007	-
Mov Cap-2 Maneuver	428	-	-	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	859	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	19.99	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	428	1007	-
HCM Lane V/C Ratio	-	-	0.445	-	-
HCM Control Delay (s/veh)	-	-	20	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.2	0	-

Intersection	
Intersection Delay, s/veh	80.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	731	116	182	732	10	157	9	209	3	3	3
Future Vol, veh/h	0	731	116	182	732	10	157	9	209	3	3	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	795	126	198	796	11	171	10	227	3	3	3
Number of Lanes	0	2	0	0	2	0	0	2	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay, s/veh	73.7	112.8	19.8	13
HCM LOS	F	F	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	97%	0%	0%	0%	33%	0%	33%
Vol Thru, %	3%	2%	100%	68%	67%	97%	33%
Vol Right, %	0%	98%	0%	32%	0%	3%	33%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	162	214	487	360	548	376	9
LT Vol	157	0	0	0	182	0	3
Through Vol	5	5	487	244	366	366	3
RT Vol	0	209	0	116	0	10	3
Lane Flow Rate	176	232	530	391	596	409	10
Geometry Grp	5	5	5	5	5	5	4b
Degree of Util (X)	0.443	0.51	1.11	0.794	1.27	0.851	0.025
Departure Headway (Hd)	9.69	8.48	7.924	7.692	7.941	7.751	9.738
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	374	427	461	473	465	470	370
Service Time	7.39	6.18	5.624	5.392	5.641	5.451	7.738
HCM Lane V/C Ratio	0.471	0.543	1.15	0.827	1.282	0.87	0.027
HCM Control Delay, s/veh	19.9	19.7	103	34	162.1	40.9	13
HCM Lane LOS	C	C	F	D	F	E	B
HCM 95th-tile Q	2.2	2.8	17.2	7.2	24.2	8.6	0.1

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	107	171	86	21	179	21	26	64	68	26	0	204
Future Vol, veh/h	107	171	86	21	179	21	26	64	68	26	0	204
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	116	186	93	23	195	23	28	70	74	28	0	222

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	217	0	0	279	0	0	705	728	233	705	764	206
Stage 1	-	-	-	-	-	-	465	465	-	252	252	-
Stage 2	-	-	-	-	-	-	240	263	-	453	512	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1352	-	-	1283	-	-	351	350	807	351	334	835
Stage 1	-	-	-	-	-	-	577	563	-	753	699	-
Stage 2	-	-	-	-	-	-	763	691	-	586	536	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1352	-	-	1283	-	-	231	314	807	228	300	835
Mov Cap-2 Maneuver	-	-	-	-	-	-	231	314	-	228	300	-
Stage 1	-	-	-	-	-	-	528	514	-	739	686	-
Stage 2	-	-	-	-	-	-	550	678	-	421	490	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.33	0.75	20.97	14.14
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	395	1352	-	-	1283	-	-	642
HCM Lane V/C Ratio	0.435	0.086	-	-	0.018	-	-	0.39
HCM Control Delay (s/veh)	21	7.9	-	-	7.9	-	-	14.1
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	2.1	0.3	-	-	0.1	-	-	1.8

Intersection	
Int Delay, s/veh	11.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	107	128	43	86	128	21	77	43	51	26	90	26
Future Vol, veh/h	107	128	43	86	128	21	77	43	51	26	90	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	116	139	47	93	139	23	84	47	55	28	98	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	162	0	0	186	0	0	770	744	163	733	756	151
Stage 1	-	-	-	-	-	-	395	395	-	338	338	-
Stage 2	-	-	-	-	-	-	375	349	-	395	418	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1417	-	-	1389	-	-	318	343	882	336	337	896
Stage 1	-	-	-	-	-	-	630	605	-	677	641	-
Stage 2	-	-	-	-	-	-	646	634	-	630	590	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1417	-	-	1389	-	-	179	288	882	228	284	896
Mov Cap-2 Maneuver	-	-	-	-	-	-	179	288	-	228	284	-
Stage 1	-	-	-	-	-	-	572	549	-	627	593	-
Stage 2	-	-	-	-	-	-	484	587	-	491	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	2.99	2.85	27.09	22.27
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	179	454	660	-	-	641	-	-	228	335
HCM Lane V/C Ratio	0.467	0.225	0.082	-	-	0.067	-	-	0.124	0.377
HCM Control Delay (s/veh)	41.6	15.2	7.8	0	-	7.8	0	-	23	22.1
HCM Lane LOS	E	C	A	A	-	A	A	-	C	C
HCM 95th %tile Q(veh)	2.2	0.9	0.3	-	-	0.2	-	-	0.4	1.7

Intersection	
Int Delay, s/veh	13.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	230	1938	278	0	0
Future Vol, veh/h	0	230	1938	278	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	460	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	250	2107	302	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	1053	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	~ 223	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	~ 223	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s/v	143.61	0
HCM LOS	F	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	223
HCM Lane V/C Ratio	-	-	1.124
HCM Control Delay (s/veh)	-	-	143.6
HCM Lane LOS	-	-	F
HCM 95th %tile Q(veh)	-	-	11.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	63.7

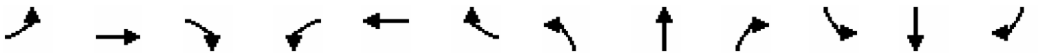
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	408	1805	363	0	0
Future Vol, veh/h	0	408	1805	363	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	570	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	443	1962	395	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	981	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.94	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.32	-	-
Pot Cap-1 Maneuver	0	~ 249	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	~ 249	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, $/#	$ 402.39	0
HCM LOS	F	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	249
HCM Lane V/C Ratio	-	-	1.783
HCM Control Delay (s/veh)	-	-	$ 402.4
HCM Lane LOS	-	-	F
HCM 95th %tile Q(veh)	-	-	29.9

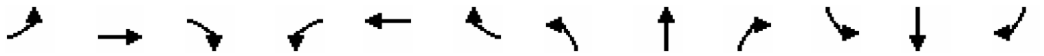
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	904	3234	0	0	2673	790	367	122	366	0	0	0
Future Volume (vph)	904	3234	0	0	2673	790	367	122	366	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5	4.5			
Lane Util. Factor	0.86	0.86			0.86		0.95	0.95	1.00			
Frt	1.00	1.00			0.97		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00			
Satd. Flow (prot)	1522	4799			6188		1681	1726	1583			
Flt Permitted	0.95	0.64			1.00		0.95	0.98	1.00			
Satd. Flow (perm)	1522	3076			6188		1681	1726	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	983	3515	0	0	2905	859	399	133	398	0	0	0
RTOR Reduction (vph)	0	0	0	0	36	0	0	0	65	0	0	0
Lane Group Flow (vph)	885	3613	0	0	3728	0	263	269	333	0	0	0
Turn Type	Prot	NA			NA		Split	NA	Perm			
Protected Phases	5	6 5			6		8	8				
Permitted Phases									8			
Actuated Green, G (s)	57.5	114.0			56.5		22.5	22.5	22.5			
Effective Green, g (s)	57.5	114.0			56.5		22.5	22.5	22.5			
Actuated g/C Ratio	0.38	0.76			0.38		0.15	0.15	0.15			
Clearance Time (s)	4.5				4.5		4.5	4.5	4.5			
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	583	2998			2330		252	258	237			
v/s Ratio Prot	c0.58	0.46			c0.60		0.16	0.16				
v/s Ratio Perm		0.45							c0.21			
v/c Ratio	1.52	1.21			1.60		1.04	1.04	1.41			
Uniform Delay, d1	46.3	18.0			46.8		63.8	63.8	63.8			
Progression Factor	1.26	1.43			1.00		1.00	1.00	1.00			
Incremental Delay, d2	233.9	92.6			272.1		68.6	67.6	206.3			
Delay (s)	292.2	118.4			318.9		132.3	131.4	270.1			
Level of Service	F	F			F		F	F	F			
Approach Delay (s/veh)		152.6			318.9			191.0			0.0	
Approach LOS		F			F			F			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	224.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	125.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2836	484	506	2555	0	0	0	0	1288	128	581
Future Volume (vph)	0	2836	484	506	2555	0	0	0	0	1288	128	581
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5	4.5					4.5	4.5	4.5
Lane Util. Factor		0.86		1.00	0.91					0.97	0.95	0.95
Frt		0.98		1.00	1.00					1.00	0.90	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		6268		1770	5085					3433	1597	1504
Flt Permitted		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (perm)		6268		1770	5085					3433	1597	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	3083	526	550	2777	0	0	0	0	1400	139	632
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	1	50
Lane Group Flow (vph)	0	3589	0	550	2777	0	0	0	0	1400	397	323
Turn Type		NA		Prot	NA					Split	NA	Perm
Protected Phases		2		1	2 1					4	4	
Permitted Phases												4
Actuated Green, G (s)		57.5		28.5	90.5					50.5	50.5	50.5
Effective Green, g (s)		57.5		28.5	90.5					50.5	50.5	50.5
Actuated g/C Ratio		0.38		0.19	0.60					0.34	0.34	0.34
Clearance Time (s)		4.5		4.5						4.5	4.5	4.5
Vehicle Extension (s)		3.0		3.0						3.0	3.0	3.0
Lane Grp Cap (vph)		2402		336	3067					1155	537	506
v/s Ratio Prot		c0.57		c0.31	c0.55					c0.41	0.25	
v/s Ratio Perm												0.21
v/c Ratio		1.49		1.64	0.91					1.21	0.74	0.64
Uniform Delay, d1		46.3		60.8	26.0					49.8	43.9	42.0
Progression Factor		1.00		0.57	0.40					1.00	1.00	1.00
Incremental Delay, d2		224.6		287.8	0.4					103.7	5.3	2.6
Delay (s)		270.8		322.3	10.7					153.4	49.2	44.7
Level of Service		F		F	B					F	D	D
Approach Delay (s/veh)		270.8			62.2			0.0			115.6	
Approach LOS		F			E			A			F	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	157.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	125.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	56.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	136	707	0	0	321	586	107	26	268	0	0	0
Future Vol, veh/h	136	707	0	0	321	586	107	26	268	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	148	768	0	0	349	637	116	28	291	0	0	0
Number of Lanes	1	2	0	0	3	0	0	2	1	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	3	3
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	3	0	3
HCM Control Delay, s/veh	55.9	90.8	20
HCM LOS	E	F	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3
Vol Left, %	93%	0%	0%	100%	5%	0%	0%	0%	0%
Vol Thru, %	7%	100%	0%	0%	95%	100%	100%	100%	10%
Vol Right, %	0%	0%	100%	0%	0%	0%	0%	0%	90%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	116	17	268	122	249	471	128	128	650
LT Vol	107	0	0	122	14	0	0	0	0
Through Vol	9	17	0	0	235	471	128	128	64
RT Vol	0	0	268	0	0	0	0	0	586
Lane Flow Rate	126	19	291	133	271	512	140	140	707
Geometry Grp	5	5	5	6	6	6	6	6	6
Degree of Util (X)	0.306	0.043	0.616	0.321	0.618	0.919	0.328	0.328	1.184
Departure Headway (Hd)	9.049	8.576	7.861	9.063	8.578	6.768	8.454	8.454	6.029
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	400	420	463	399	423	538	426	426	601
Service Time	6.749	6.276	5.561	6.763	6.278	4.468	6.205	6.205	3.779
HCM Lane V/C Ratio	0.315	0.045	0.629	0.333	0.641	0.952	0.329	0.329	1.176
HCM Control Delay, s/veh	15.7	11.7	22.4	16	24.2	47.2	15.3	15.3	120.6
HCM Lane LOS	C	B	C	C	C	E	C	C	F
HCM 95th-tile Q	1.3	0.1	4.1	1.4	4	11.1	1.4	1.4	24.4

Intersection	
Intersection Delay, s/veh	89.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	187	133	265	170	0	0	0	0	640	360	161
Future Vol, veh/h	0	187	133	265	170	0	0	0	0	640	360	161
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	203	145	288	185	0	0	0	0	696	391	175
Number of Lanes	0	3	0	1	2	0	0	0	0	0	2	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	3	3	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	3
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	3
HCM Control Delay, s/veh	13.9	17.2	303
HCM LOS	B	C	F

Lane	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	68%	0%	78%	0%
Vol Thru, %	100%	100%	22%	0%	32%	100%	22%	53%
Vol Right, %	0%	0%	78%	0%	0%	0%	0%	47%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	75	75	170	143	179	113	820	341
LT Vol	0	0	0	143	122	0	640	0
Through Vol	75	75	37	0	57	113	180	180
RT Vol	0	0	133	0	0	0	0	161
Lane Flow Rate	81	81	185	156	194	123	891	371
Geometry Grp	6	6	6	6	6	6	6	6
Degree of Util (X)	0.189	0.189	0.314	0.366	0.448	0.214	1.873	0.705
Departure Headway (Hd)	9.692	9.692	7.302	9.742	9.577	7.411	7.566	6.843
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	372	372	496	372	378	488	481	526
Service Time	7.392	7.392	5.002	7.442	7.277	5.111	5.324	4.601
HCM Lane V/C Ratio	0.218	0.218	0.373	0.419	0.513	0.252	1.852	0.705
HCM Control Delay, s/veh	14.6	14.6	13.3	18	19.8	12.1	418.9	24.4
HCM Lane LOS	B	B	B	C	C	B	F	C
HCM 95th-tile Q	0.7	0.7	1.3	1.6	2.2	0.8	57.3	5.6

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3600	3439	43	0	51
Future Vol, veh/h	0	3600	3439	43	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3913	3738	47	0	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1892
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	~ 51
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	~ 51
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	283.69
HCM LOS			F

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	51
HCM Lane V/C Ratio	-	-	-	1.09
HCM Control Delay (s/veh)	-	-	-	283.7
HCM Lane LOS	-	-	-	F
HCM 95th %tile Q(veh)	-	-	-	4.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	175	26	26	145	21	21
Future Vol, veh/h	175	26	26	145	21	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	28	28	158	23	23

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	218	0	418	204
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	214	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1351	-	591	836
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	822	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1351	-	578	836
Mov Cap-2 Maneuver	-	-	-	-	578	-
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.17	10.65
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	683	-	-	274	-
HCM Lane V/C Ratio	0.067	-	-	0.021	-
HCM Control Delay (s/veh)	10.6	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3249	2795	43	0	51
Future Vol, veh/h	0	3249	2795	43	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3532	3038	47	0	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1542
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	89
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	89
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	96.79
HCM LOS			F

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	89
HCM Lane V/C Ratio	-	-	-	0.623
HCM Control Delay (s/veh)	-	-	-	96.8
HCM Lane LOS	-	-	-	F
HCM 95th %tile Q(veh)	-	-	-	2.9

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3249	2787	43	0	51
Future Vol, veh/h	0	3249	2787	43	0	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3532	3029	47	0	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	1538
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	-	0	90
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	90
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	95.59
HCM LOS			F

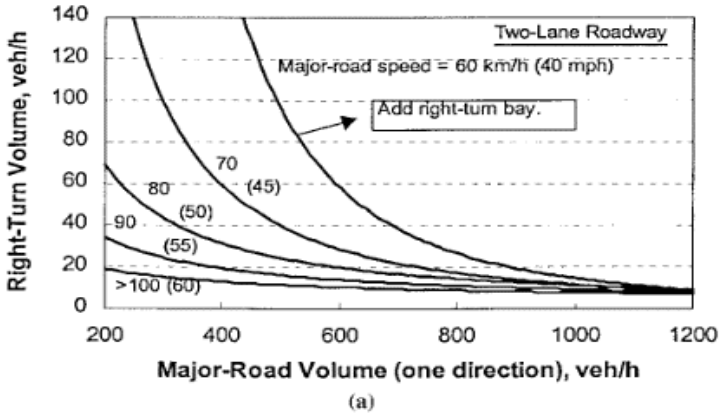
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	90
HCM Lane V/C Ratio	-	-	-	0.619
HCM Control Delay (s/veh)	-	-	-	95.6
HCM Lane LOS	-	-	-	F
HCM 95th %tile Q(veh)	-	-	-	2.9

Appendix E

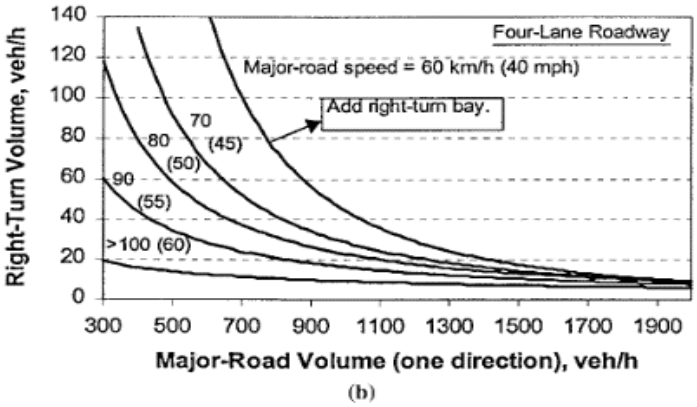
Right Turn Criteria

NCHRP 457 RT Turn Warrant Analysis					
Intersection	Year 2030				
	Advancing Volume	Opposing Volume	Right Turn Volume	AM	PM
Manvel Pkwy & Charlotte Street (NB & SB)	499(837)	290(782)	114(201)	**Yes**	**Yes**
Manvel Pkwy & Dogwood Ave (NB&SB)	214(515)	160(282)	85(194)	**No**	**No**
Driveway 2 & Driveway 3 (EB&WB)	234(364)	89(221)	55(86)	**No**	**No**
Driveway 1 & Charlotte Street (EB &WB)	180(278)	112(235)	28(43)	**No**	**No**
Driveway 1 & Charlotte Street (NB &SB)	71(171)	68(142)	17(51)	**No**	**No**
Manvel Pkwy & Charlotte Street (EB & WB)	105(273)	138(311)	43(128)	**No**	**No**
Manvel Pkwy & Driveway 1 (EB)	104(306)	0(0)	69(204)	**No**	**Yes**
Manvel Pkwy & Driveway 2 (EB)	113(332)	0(0)	104(306)	**No**	**Yes**
Manvel Pkwy & Driveway 1 (NB & SB)	350(995)	553(858)	28(43)	**No**	**Yes**
Manvel Pkwy & Charlotte Street (NB & SB)	290(782)	499(837)	14(21)	**No**	**No**
Manvel Pkwy & Driveway 2 (NB & SB)	237(531)	360(656)	36(68)	**No**	**No**
Driveway 2 & Driveway 3 (EB&WB)	89(221)	234(364)	14(21)	**No**	**No**
Driveway 1 & Charlotte Street (EB &WB)	112(235)	180(278)	14(21)	**No**	**No**
Driveway 1 & Charlotte Street (NB &SB)	68(142)	71(171)	9(26)	**No**	**No**

LEGEND:
AM Volume (PM Volume)



(a)



(b)

TxDOT Right Turn Warrant Analysis				
Intersection	Year 2030			
	Right Turn Volume	Threshold	AM	PM
SH 288 NB Frontage Road & Charlotte Street (NB)	179(278)	60	**Yes**	**Yes**
SH 288 NB Frontage Road & Driveway 2 (NB)	235(363)	60	**Yes**	**Yes**
SH 6 & Iowa Lane (EB&WB)	123(75)	50	**Yes**	**Yes**
SH 6 & Manvel Pkwy (EB&WB)	138(214)	50	**Yes**	**Yes**
SH 6 & Iowa Lane (NB&SB)	35(47)	60	**No**	**No**
SH 6 & Driveway 4 (EB&WB)	28(43)	50	**No**	**No**
SH 6 & Driveway 5 (EB&WB)	28(43)	50	No	No
SH 6 & Driveway 6 (EB&WB)	28(43)	50	No	No

LEGEND:
AM Volume (PM Volume)

Table 2-3: Auxiliary Lane Thresholds

Median Type	Left Turn to or from Property		Right Turn to or from Property (5)	
	Acceleration	Deceleration	Acceleration	Deceleration
Non-Traversable (Raised Median)	(2)	All	Right turn egress > 200 vph (4)	◆ > 45 mph where right turn volume is > 50 vph (3) ◆ ≤ 45 where right turn volume is > 60 vph (3)
Traversable (Undivided Road)	(2)	(1)	Same as above	Same as Above

(1) Refer to Table 3-11, TxDOT *Roadway Design Manual*, for alternative left-turn-bay operational considerations.

(2) A left-turn acceleration lane may be required if it would provide a benefit to the safety and operation of the roadway. A left-turn acceleration lane would interfere with the left-turn ingress movements to any other access connection.

(3) Additional right-turn considerations:

- Conditions for providing an exclusive right-turn lane when the right-turn traffic volume projections are less than indicated in Table 2-3:
  - High crash experience
  - Heavier than normal peak flow movements on the main roadway
  - Large volume of truck traffic
  - Highways where sight distance is limited
- Conditions for NOT requiring a right-turn lane where right-turn volumes are more than indicated in Table 2-3:
  - Dense or built-out corridor where space is limited
  - Where queues of stopped vehicles would block the access to the right turn lane
  - Where sufficient length of property width is not available for the appropriate design

(4) The acceleration lane should not interfere with any downstream access connection.

- The distance from the end of the acceleration lane taper to the next unsignalized downstream access connection should be equal to or greater than the distances found in Table 2-2.
- Additionally, if the next access connection is signalized, the distance from the end of the acceleration lane taper to the back of the 90th percentile queue should be greater than or equal to the distances found Table 2-2.

(5) Continuous right-turn lanes can provide mobility benefits both for through movements and for the turning vehicles.[a] Access connections within a continuous right turn lane should meet the spacing requirements found in Table 2-2. However, when combined with crossing left in movements, a continuous right-turn lane can introduce additional operational conflicts.

Appendix F

Left Turn Criteria

NCHRP 457 Left Turn Warrant Analysis					
Intersection	Year 2025				
	Advancing Volume	Opposing Volume	Left Turn Volume	AM	PM
Manvel Pkwy & Driveway 1 (NB & SB)	553(858)	350(995)	97(150)	Yes	Yes
Manvel Pkwy & Charlotte Street (NB & SB)	499(837)	290(782)	55(86)	Yes	Yes
Manvel Pkwy & Driveway 2 (NB & SB)	360(656)	237(531)	97(150)	No	Yes
Driveway 2 & Driveway 3 (EB&WB)	234(364)	89(221)	69(107)	No	Yes
Driveway 1 & Charlotte Street (EB &WB)	180(278)	112(235)	69(107)	No	No
Driveway 1 & Charlotte Street (NB &SB)	71(171)	68(142)	26(77)	No	No
Manvel Pkwy & Charlotte Street (EB & WB)	105(273)	138(311)	45(94)	No	Yes
Manvel Pkwy & Driveway 1 (EB)	104(306)	0(0)	35(102)	No	No
Manvel Pkwy & Driveway 2 (EB)	113(332)	0(0)	9(26)	No	No
Manvel Pkwy & Charlotte Street (NB & SB)	290(782)	499(837)	22(47)	No	Yes
Driveway 2 & Driveway 3 (EB&WB)	89(221)	234(364)	14(21)	No	No
Driveway 1 & Charlotte Street (EB &WB)	112(235)	180(278)	55(86)	No	No
Driveway 1 & Charlotte Street (NB &SB)	68(142)	71(171)	9(26)	No	No
Manvel Pkwy & Charlotte Street (EB & WB)	138(311)	105(273)	52(153)	No	Yes

LEGEND:
AM Volume (PM Volume)

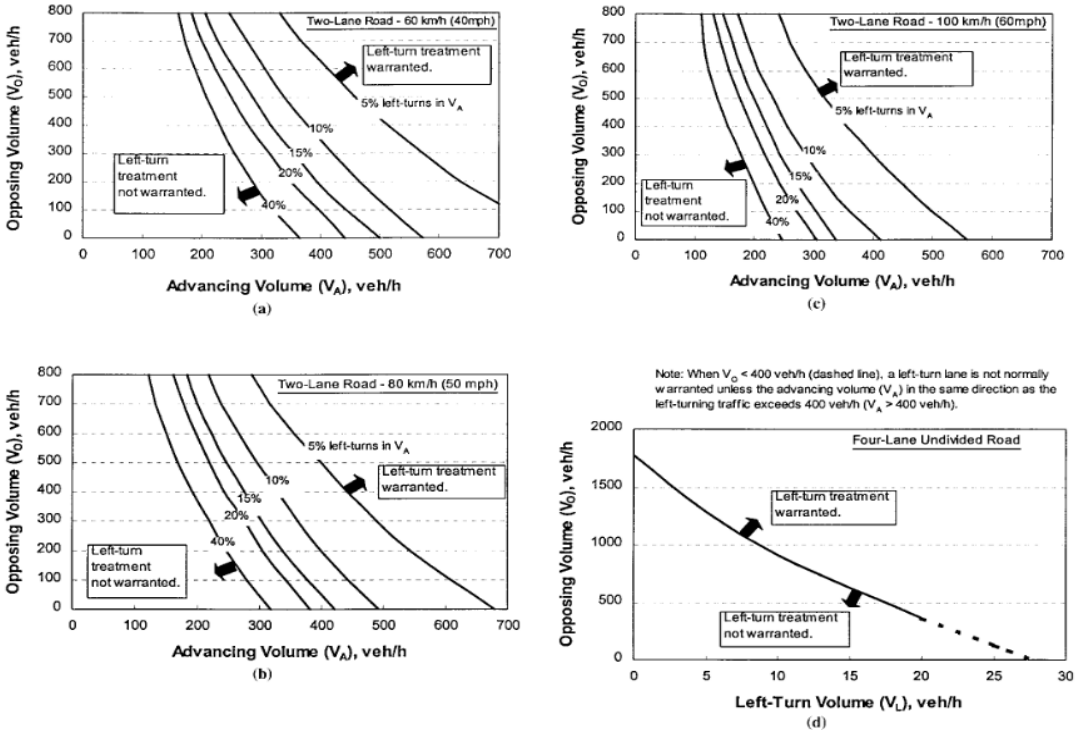


Figure 2-5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

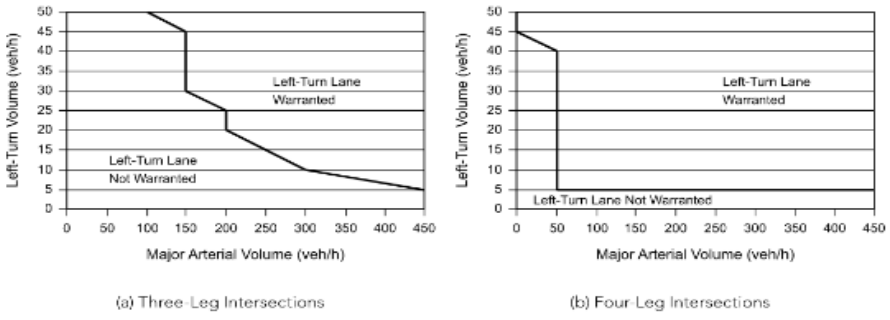
TxDOT Left Turn Warrant Analysis						
Intersection	Year 2030					
	Advancing Volume	Opposing Volume	Major Road Peak Hour Volume	Left Turn Volume	AM	PM
SH 6 & Iowa Lane (EB&WB)	2653(3021)	2548(2800)	867	108(188)	Yes	Yes
SH 6 & Manvel Pkwy (EB&WB)	2979(3600)	2422(2846)	900	456(708)	Yes	Yes
SH 6 & Iowa Lane (NB&SB)	121(218)	56(119)	44	86(167)	Yes	Yes

LEGEND:
AM Volume (PM Volume)

Table 4-17: Guide for Left-Turn Lane Warrants for Urban and Suburban Arterials

Source: AASHTO A Policy on Geometric Design of Highways and Streets

Left-Turn Lane Peak-Hour Volume (veh/hr)	Three-Leg Intersection, Major Urban and Suburban Arterial Volume (veh/hr/ln) That Warrants a Left-Turn Lane	Four-Leg Intersection, Major Urban and Suburban Arterial Volume (veh/hr/ln) That Warrants a Left-Turn Lane
5	450	50
10	300	50
15	250	50
20	200	50
25	200	50
30	150	50
35	150	50
40	150	50
45	150	< 50
50 or More	100	< 50
Notes:		
1. These guidelines apply where the major road is uncontrolled, and the minor-road approaches are stop- or yield-controlled. Both the left-turn peak-hour volume and the major-road volume warrants should be met as shown in Figure 4-11.		



(a) Three-Leg Intersections (b) Four-Leg Intersections

Figure 4-11: Suggested Left-Turn Warrants Based on Results from Benefit-Cost Evaluations for Intersections on Urban and Suburban Arterials

Source: AASHTO A Policy on Geometric Design of Highways and Streets

Appendix G

Traffic Signal Warrant Analysis

Traffic Survey - Count Analysis
2011 TMUTCD Warrants

Form TFF-TSCA
(8/18)
Page of

County: *Brazoria* District: *Houston*

City: *Manvel* Population: Survey Date:

	Route #	Name	Control	Section	85% Speed
Major		*SH 6*			*60*
Minor		*Iowa Lane*			*30*

Eight Highest Hours: Include the same 8 hours for the Major and Minor St. volumes.

Time Ends	Major St. - Both App.		Minor St. - Hi. Vol. App.	
	Veh. Total	Ped. Total	Veh. Total	Ped. Total
5:00 PM	*4,354*	*N/A*	*139*	*N/A*
6:00 PM	*4,206*	*N/A*	*65*	*N/A*
8:00 AM	*4,188*	*N/A*	*61*	*N/A*
7:00 PM	*3,699*	*N/A*	*25*	*N/A*
9:00 AM	*3,340*	*N/A*	*36*	*N/A*
7:00 AM	*2,070*	*N/A*	*23*	*N/A*
10:00 AM	*1,388*	*N/A*	*16*	*N/A*
11:00 AM	*1,385*	*N/A*	*15*	*N/A*

Comments:
2030 No Build Conditions

Warrant 1. Eight Hour Vehicular Volume

◯ Yes ◉ No Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition A. ***- or -*** Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition B. ***- or -*** Meets 80%[b] of Conditions A and B. ***- or -*** Meets 56%[d] of Conditions A and B (and major-street speed exceeds 40 mph and population less than 10,000).

◯ Yes ◉ No

◯ Yes ◉ No

◯ Yes ◉ No

Condition A - Minimum Vehicle Volume

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*231%*	100%[a]	80%[b]	70%[c]	56%[d]	*10%*
1	1	500	400	350	280		150	120	105	84	
2 or more	1	600	480	420	336	*1,385*	150	120	105	84	*15*
2 or more	2 or more	600	480	420	336		200	160	140	112	
1	2 or more	500	400	350	280		200	160	140	112	

Condition B - Interruption of Continuous Traffic

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*254%*	100%[a]	80%[b]	70%[c]	56%[d]	*20%*
1	1	750	600	525	420		75	60	53	42	
2 or more	1	900	720	630	504	*1,385*	75	60	53	42	*15*
2 or more	2 or more	900	720	630	504		100	80	70	56	
1	2 or more	750	600	525	420		100	80	70	56	

[a] Basic minimum hourly volume.
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.
[c] May be used when the major-street speed exceeds 40 mph or in a community with a population less than 10,000.
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when major street exceeds 40 mph or in an isolated community with a population of less than 10,000.

Contact/Help

Warrant 2. Four Hour Volumes

◉ Yes ○ No	Meets each of 4 Highest Hours (Warrant 2 - see Figure 1 and Figure 2).

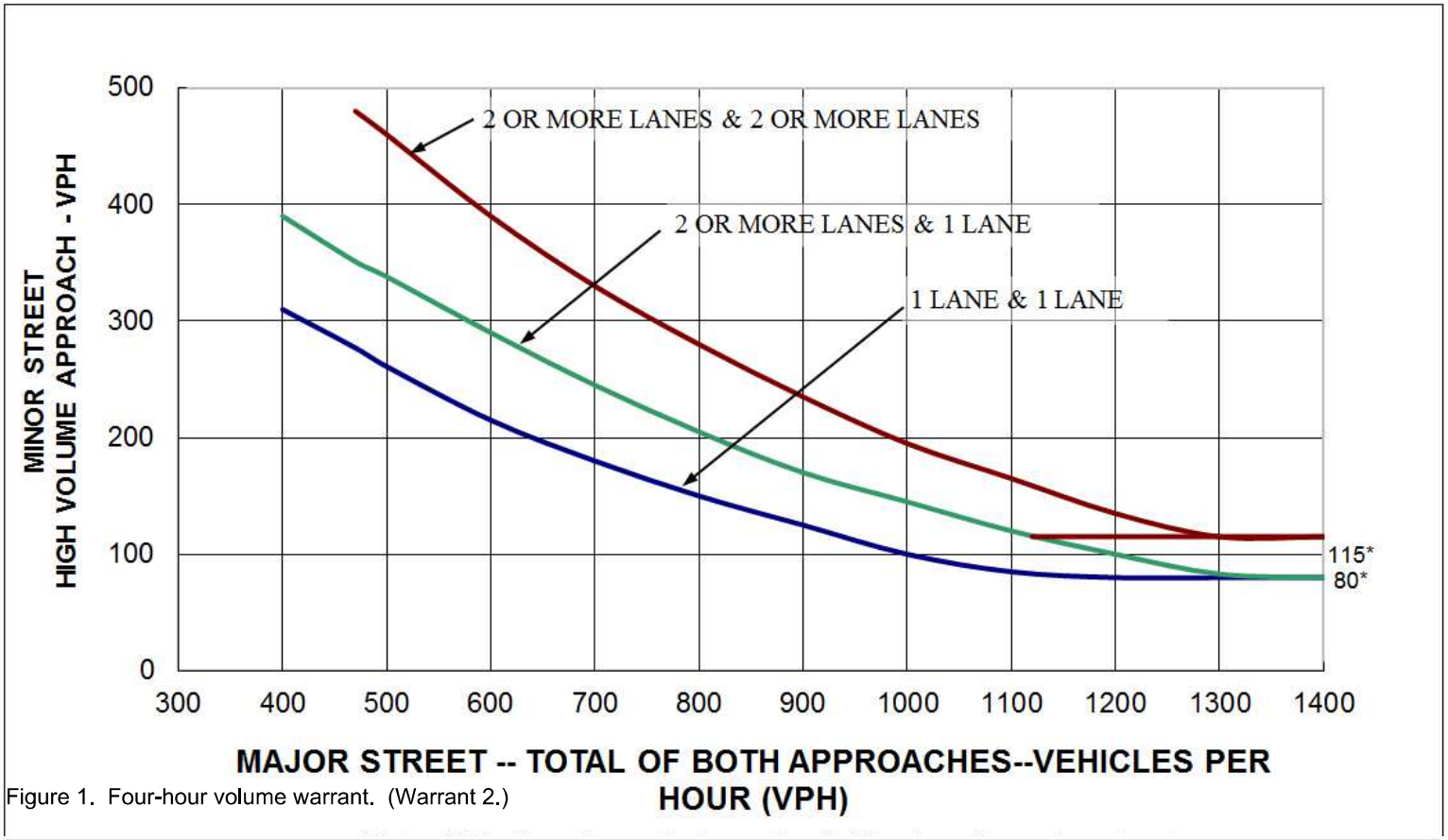


Figure 1. Four-hour volume warrant. (Warrant 2.)

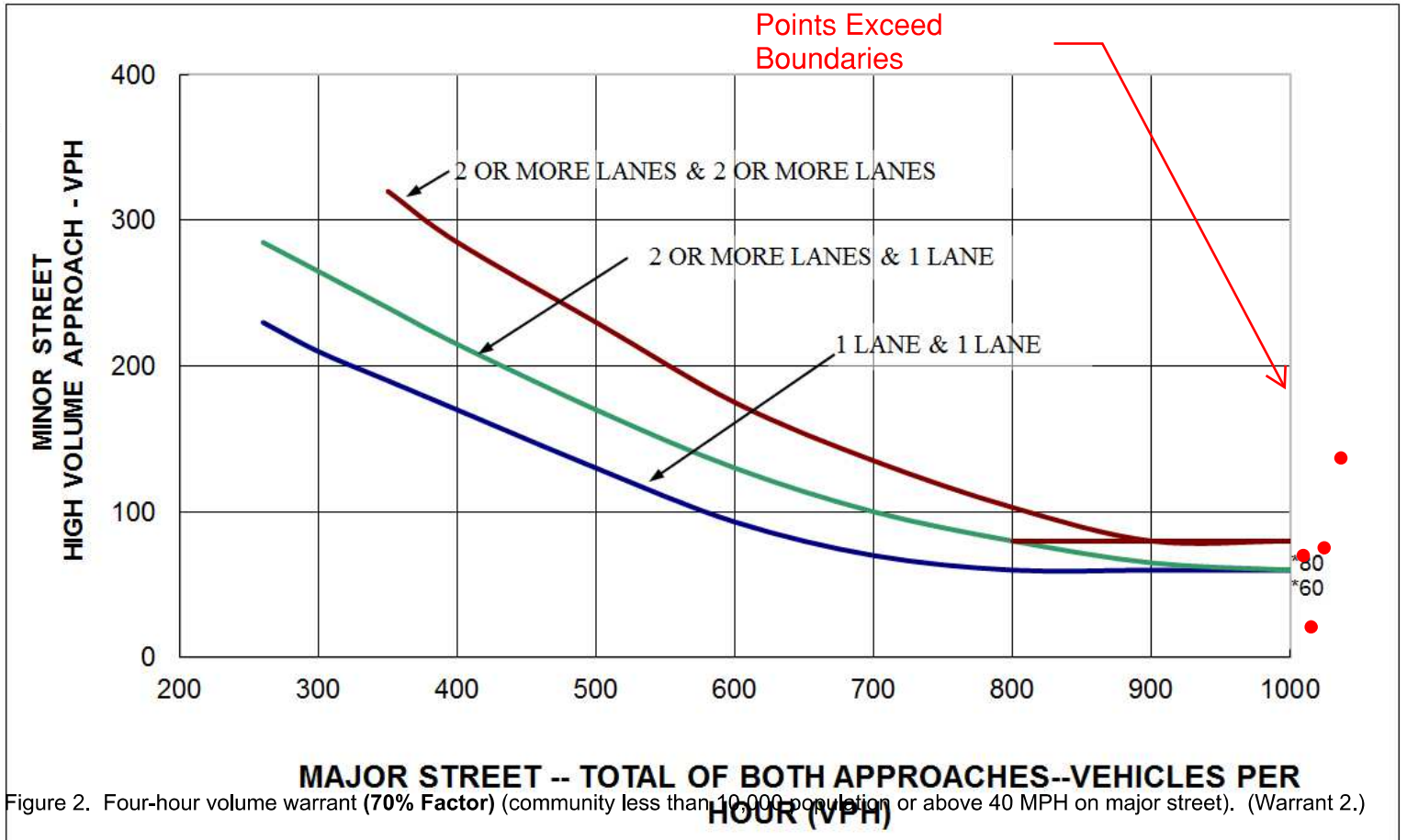


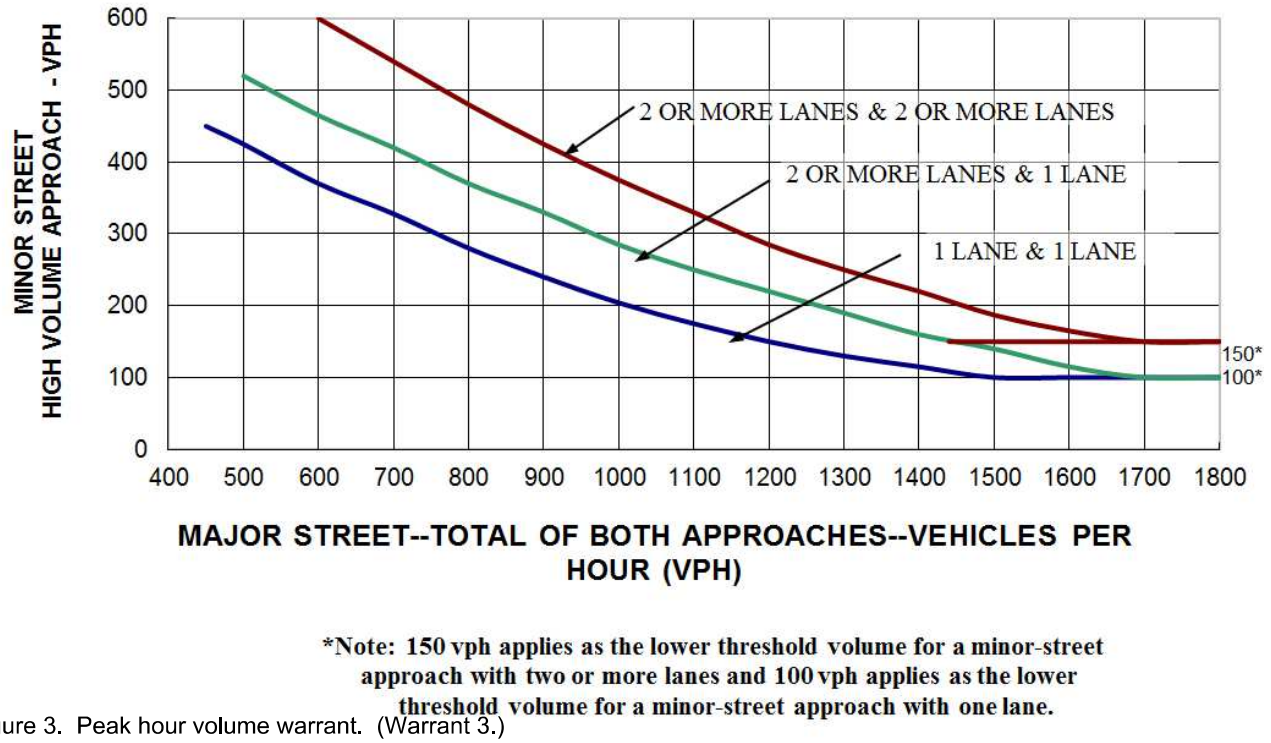
Figure 2. Four-hour volume warrant **(70% Factor)** (community less than 10,000 population or above 40 MPH on major street). (Warrant 2.)

***Note: 80 vph applies as the lower threshold volume for a minor-street**

Warrant 3. Peak Hour

○ Yes ◉ No Are all of the following conditions true for the same 1 hour (any four consecutive 15 minute periods)?
1. The total stopped time delay experienced by the traffic on one minor street approach (one direction only) controlled by a stop sign equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach, *and*
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, *and*
3. The total entering volume serviced during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four (or more) approaches. **- *or* -** Meets one High Hour (Warrant 3 - see Figure 3 and Figure 4).

○ Yes ◉ No



***Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.**

Figure 3. Peak hour volume warrant. (Warrant 3.)

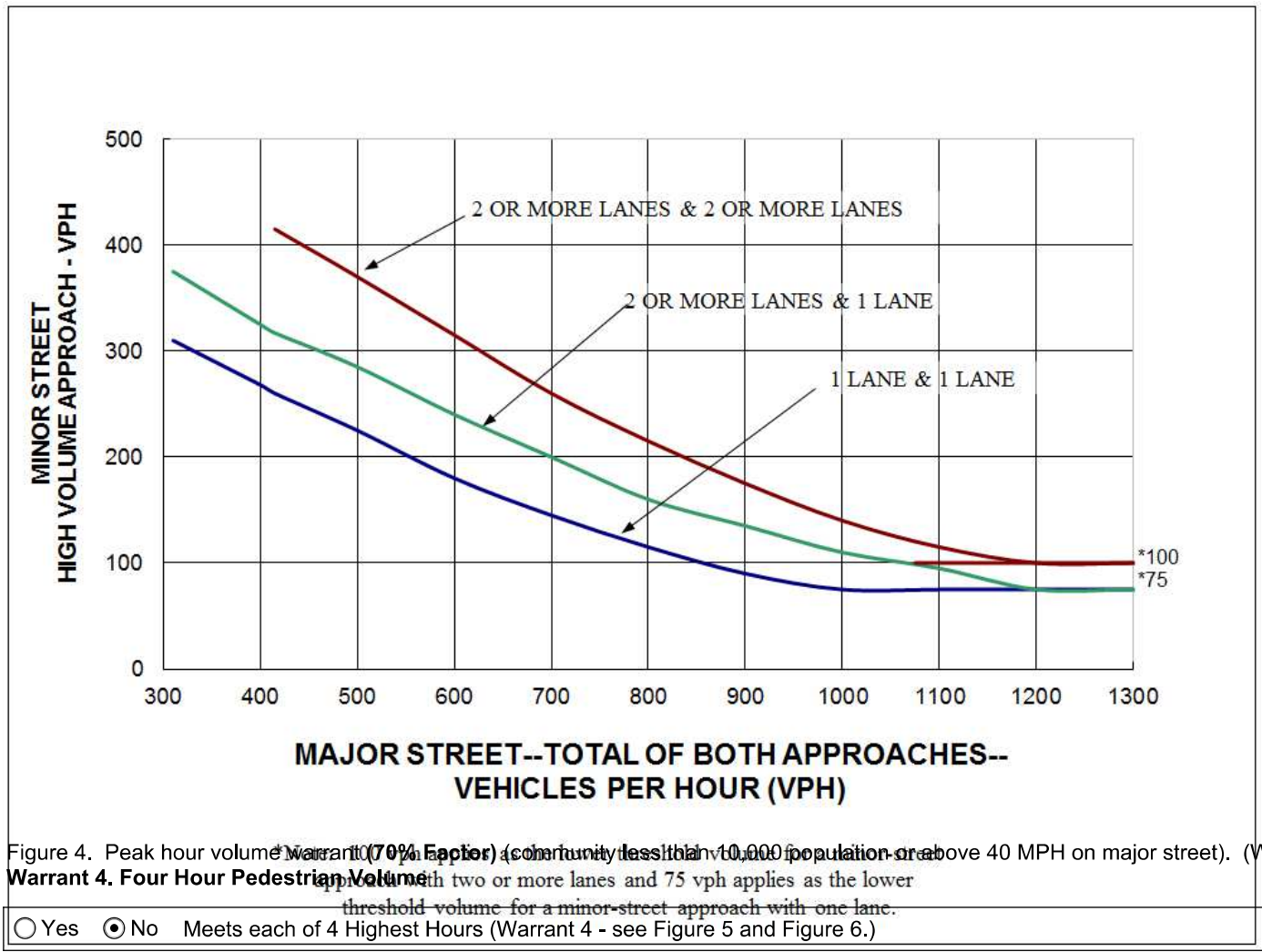
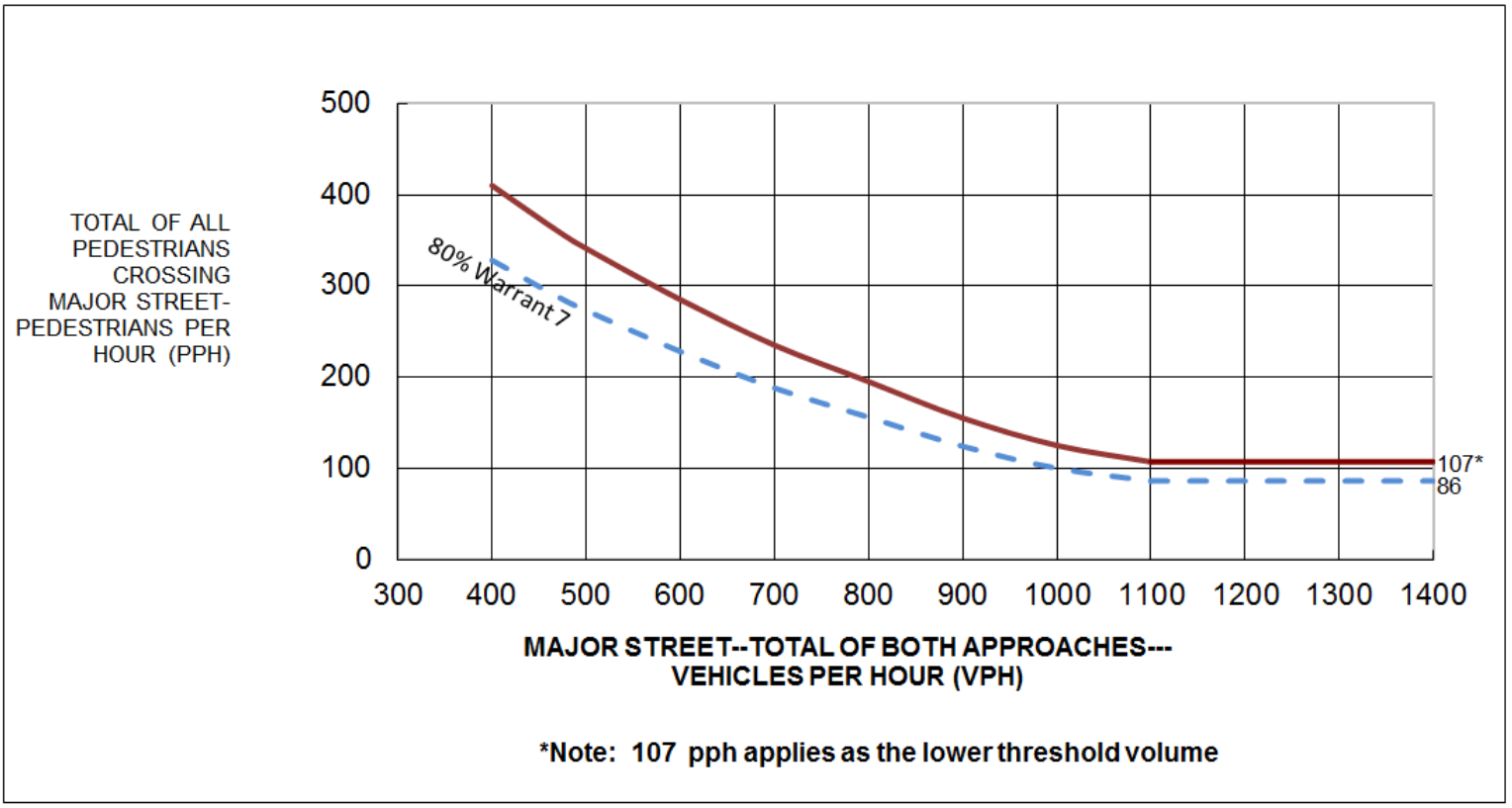


Figure 4. Peak hour volume warrant (**70% Factor**) (community less than 10,000 population or above 40 MPH on major street). (Warrant 3.)

Warrant 4. Four Hour Pedestrian Volume

◯ Yes ◉ No Meets each of 4 Highest Hours (Warrant 4 - see Figure 5 and Figure 6.)



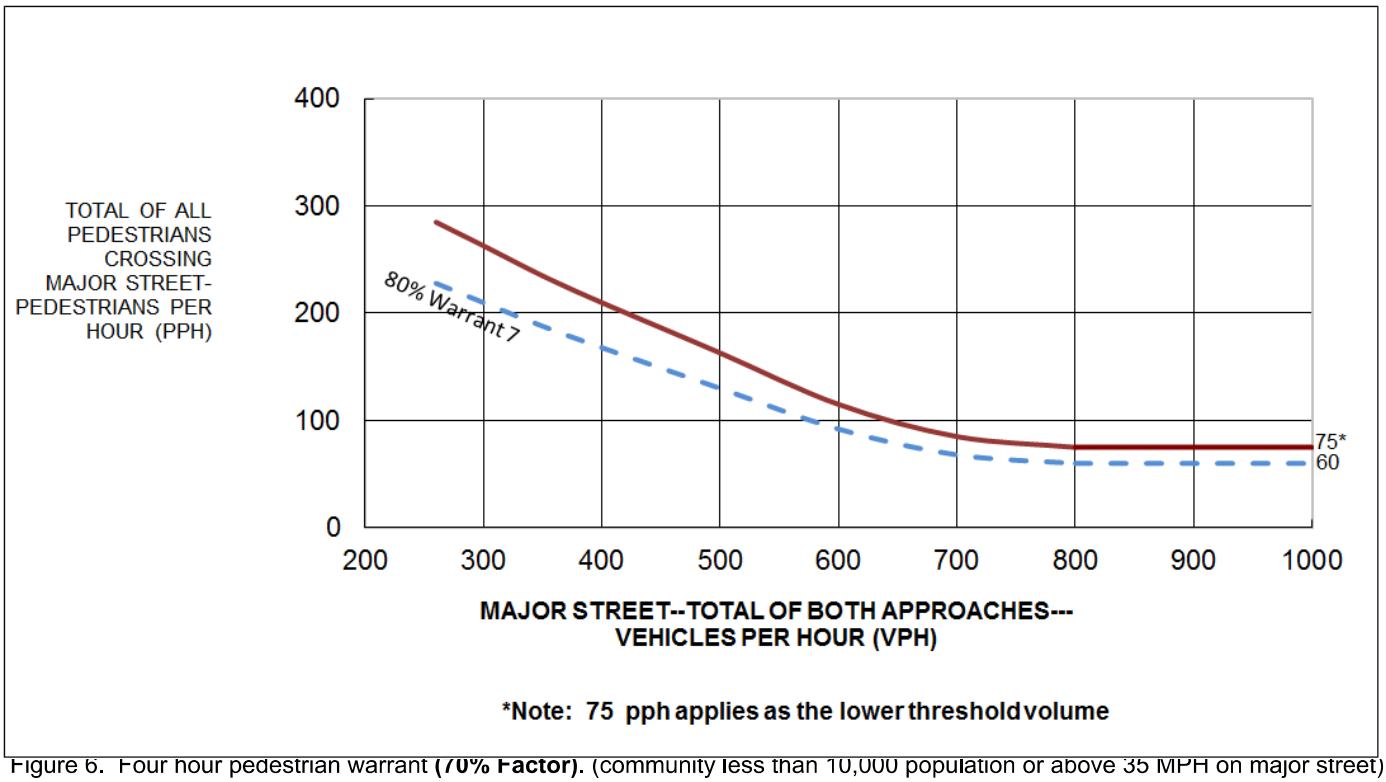


Figure 6. Four hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 35 MPH on major street). (Warrant 4.)

Warrant 4. Peak Hour Pedestrian Volumes

◯ Yes ◉ No Meets Peak Hour Pedestrian (Warrant 4 - see Figure 7 and Figure 8.)

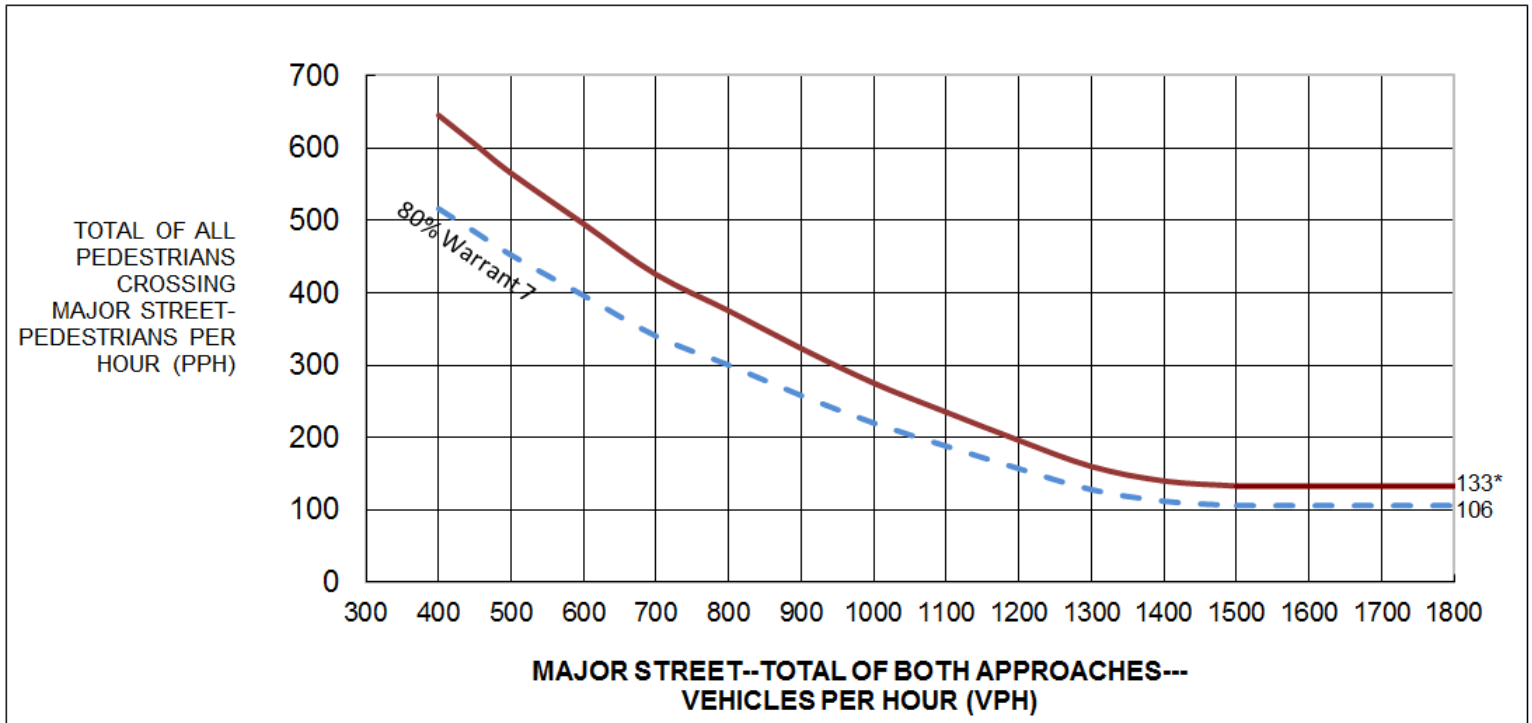


Figure 7. Four hour pedestrian warrant (Warrant 4.)

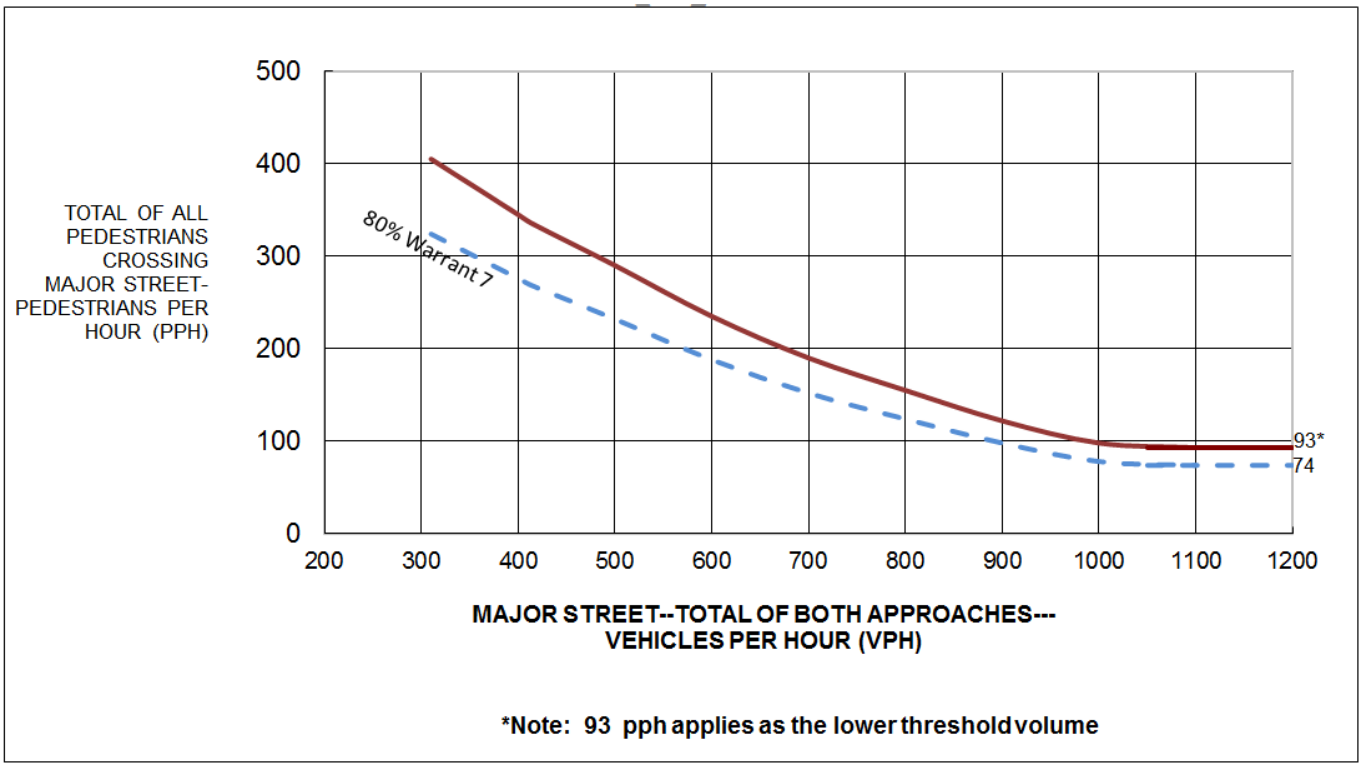


Figure 8. Peak hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 40 MPH on major street). (Warrant 4.)

Warrant 5. School Crossing

◯ Yes	⦿ No	Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?
		- and -
◯ Yes	⦿ No	Are there a minimum of 20 students during the highest crossing hour?
		*- **and** -*
◯ Yes	⦿ No	Is the nearest signal on the major street located more than 300 feet away? (This warrant may be applied if the proposed signal is less than 300 feet and does not restrict the progressive movement of traffic.)

Warrant 6. Coordinated Signal System

◯ Yes	⦿ No	On a one-way street or a street with traffic predominantly in one direction, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur?
		- or -
◯ Yes	⦿ No	On a two-way street, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur and would the proposed and adjacent traffic control signal provide a progressive operation?

Warrant 7. Crash Experience

◯ Yes	⦿ No	Is one of the following conditions met?: ◆ 80% of Condition A or Condition B in Warrant 1 ◆ 56% of Conditions A or B in Warrant 1 (major-street speed exceeding 40 mph and population less than 10,000) ◆ 80% or more of Warrant 4
		- and -
◯ Yes	⦿ No	Have there been 5 or more reported crashes susceptible to correction by a traffic signal in 12 months?

Warrant 8. Roadway Network

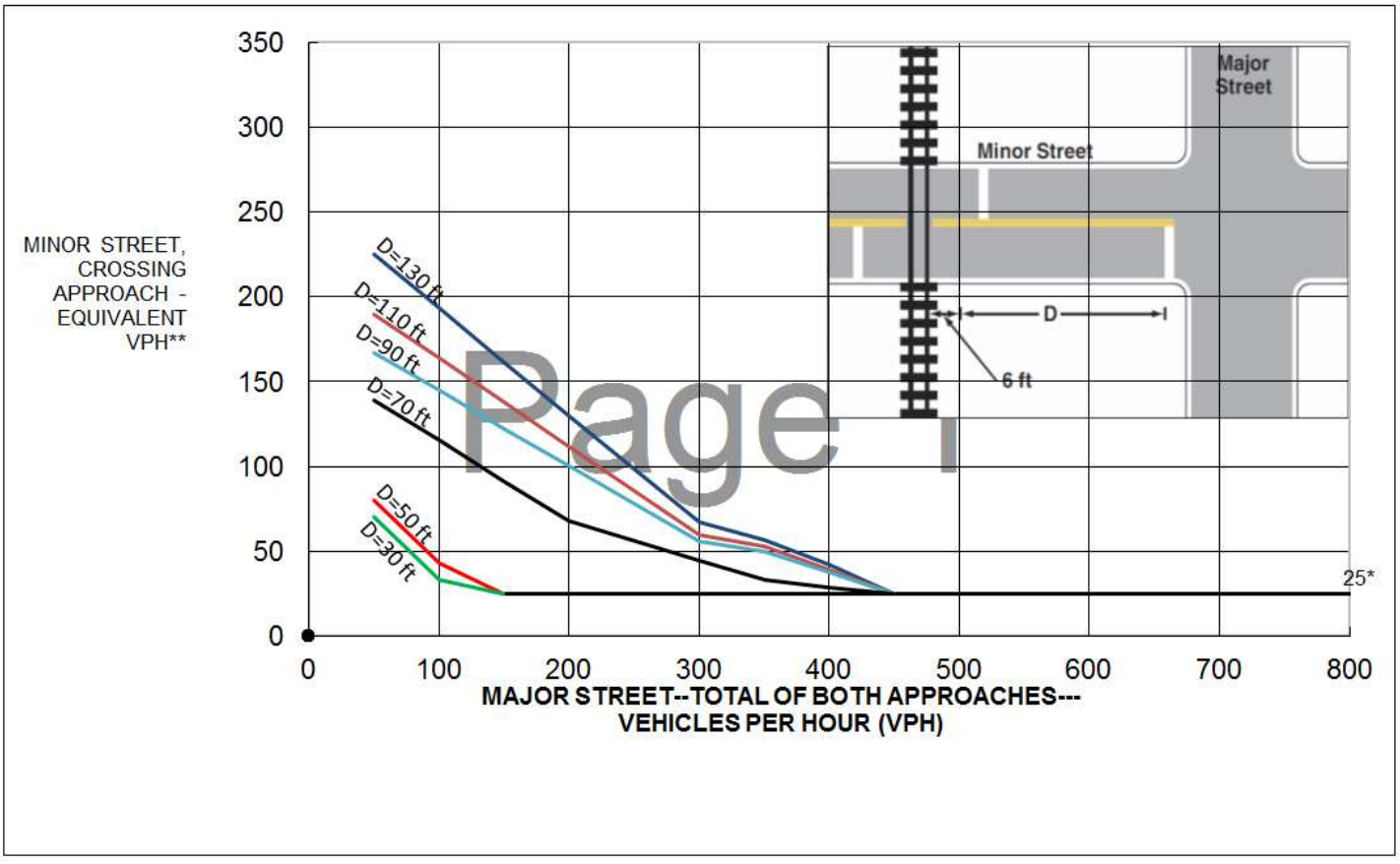
◯ Yes	⦿ No	Is the total existing, or immediately projected, entering volume on all approaches greater than 1000 vehicles for each of any 5 hours of a Saturday and/or Sunday.
		- or -
◯ Yes	⦿ No	Is the total existing, or immediately projected, entering volume greater than 1000 vehicles for the peak hour of a typical weekday, and do the 5 year projected traffic volumes meet one or more of Warrants 1, 2, and 3 during an average weekday?

Check applicable characteristics of each route (only 1 needs to be checked):

Major Street	Minor Street	
◯ Yes	⦿ No	It is part of street or highway system that serves as the principal roadway network for through traffic flow.
◯ Yes	⦿ No	It includes rural or suburban highways outside, entering, or traversing a city.
◯ Yes	⦿ No	It appears as a major route on an official plan such as a major street plan in an urban area traffic and transportation study.
◯ Yes	⦿ No	It connects areas of principal traffic generation.
◯ Yes	⦿ No	It has surface street freeway or expressway ramp terminals.

Warrant 9. Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)

◯ Yes	⦿ No	Meets one High Hour (Warrant 9 - see Figure 9.)



Page 1

Warrant 9. Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)

◯ Yes ◉ No Meets one High Hour (Warrant 9 - see Figure 10.)

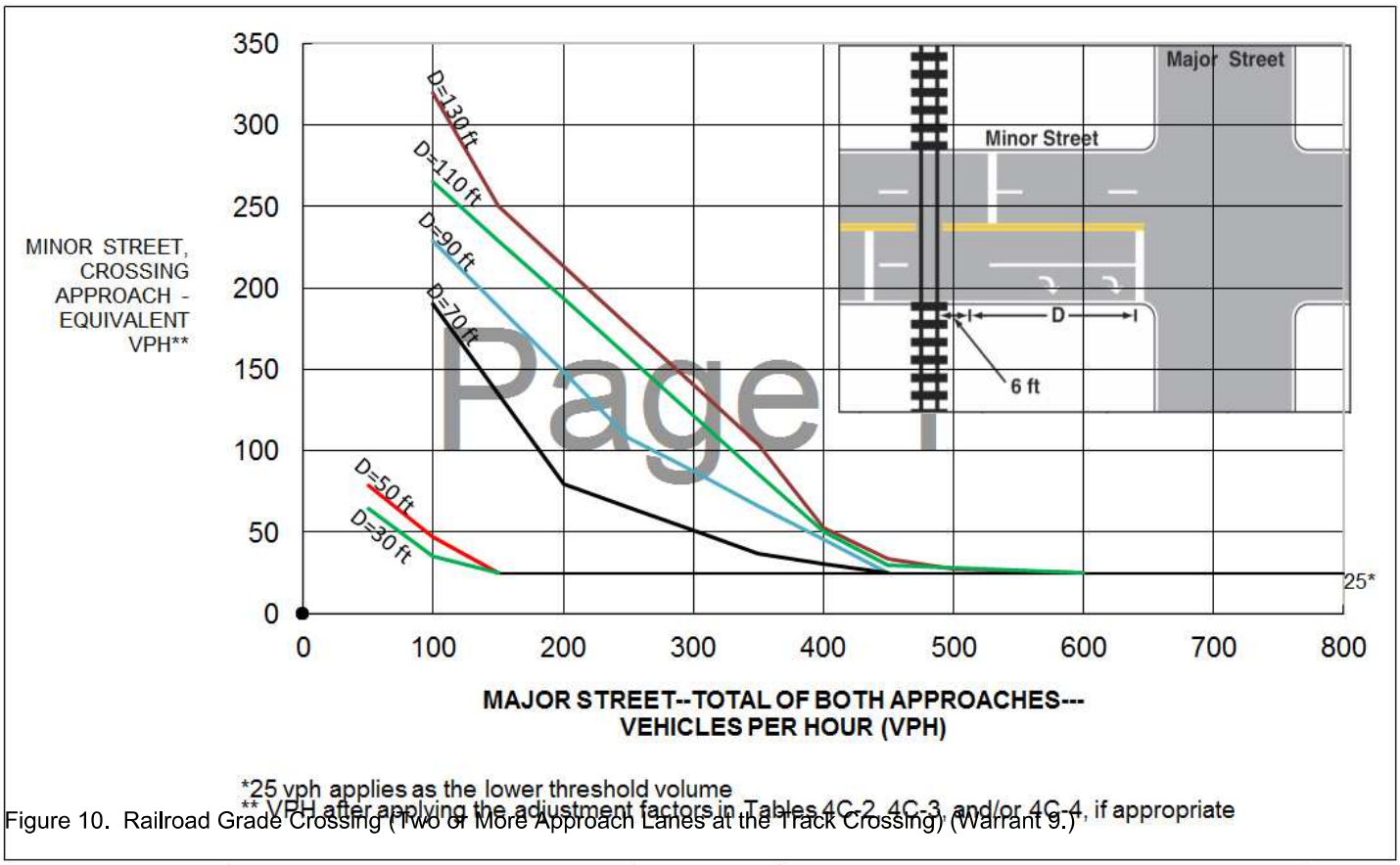


Figure 10. Railroad Grade Crossing (Two or More Approach Lanes at the Track Crossing) (Warrant 9.)

Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

Remarks:

A Traffic Signal Does NOT Warrant At this Intersection

Traffic Survey - Count Analysis
2011 TMUTCD Warrants

Form TFF-TSCA (8/18)
Page of

County: *Brazoria* District: *Houston*

City: *Manvel* Population: Survey Date:

	Route #	Name	Control	Section	85% Speed
Major		*SH 6*			*60*
Minor		*Iowa Lane*			*30*

Eight Highest Hours: Include the same 8 hours for the Major and Minor St. volumes.

Time Ends	Major St. - Both App.		Minor St. - Hi. Vol. App.	
	Veh. Total	Ped. Total	Veh. Total	Ped. Total
5:00 PM	*5,202*	*N/A*	*305*	*N/A*
6:00 PM	*5,022*	*N/A*	*228*	*N/A*
8:00 AM	*4,561*	*N/A*	*110*	*N/A*
7:00 PM	*4,364*	*N/A*	*149*	*N/A*
9:00 AM	*3,833*	*N/A*	*100*	*N/A*
7:00 AM	*2,258*	*N/A*	*46*	*N/A*
11:00 AM	*2,070*	*N/A*	*126*	*N/A*
10:00 AM	*1,940*	*N/A*	*98*	*N/A*

Comments:
2030 Build Conditions

Warrant 1. Eight Hour Vehicular Volume

◯ Yes ◉ No Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition A. ***- or -*** Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition B. ***- or -*** Meets 80%[b] of Conditions A and B. ***- or -*** Meets 56%[d] of Conditions A and B (and major-street speed exceeds 40 mph and population less than 10,000).

◯ Yes ◉ No

◯ Yes ◉ No

◯ Yes ◉ No

Condition A - Minimum Vehicle Volume

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*323%*	100%[a]	80%[b]	70%[c]	56%[d]	*30%*
1	1	500	400	350	280		150	120	105	84	
2 or more	1	600	480	420	336	*1,940*	150	120	105	84	*46*
2 or more	2 or more	600	480	420	336		200	160	140	112	
1	2 or more	500	400	350	280		200	160	140	112	

Condition B - Interruption of Continuous Traffic

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*216%*	100%[a]	80%[b]	70%[c]	56%[d]	*61%*
1	1	750	600	525	420		75	60	53	42	
2 or more	1	900	720	630	504	*1,940*	75	60	53	42	*46*
2 or more	2 or more	900	720	630	504		100	80	70	56	
1	2 or more	750	600	525	420		100	80	70	56	

[a] Basic minimum hourly volume.
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.
[c] May be used when the major-street speed exceeds 40 mph or in a community with a population less than 10,000.
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when major street exceeds 40 mph or in an isolated community with a population of less than 10,000.

Contact/Help

Warrant 2. Four Hour Volumes

◉ Yes ○ No Meets each of 4 Highest Hours (Warrant 2 - see Figure 1 and Figure 2).

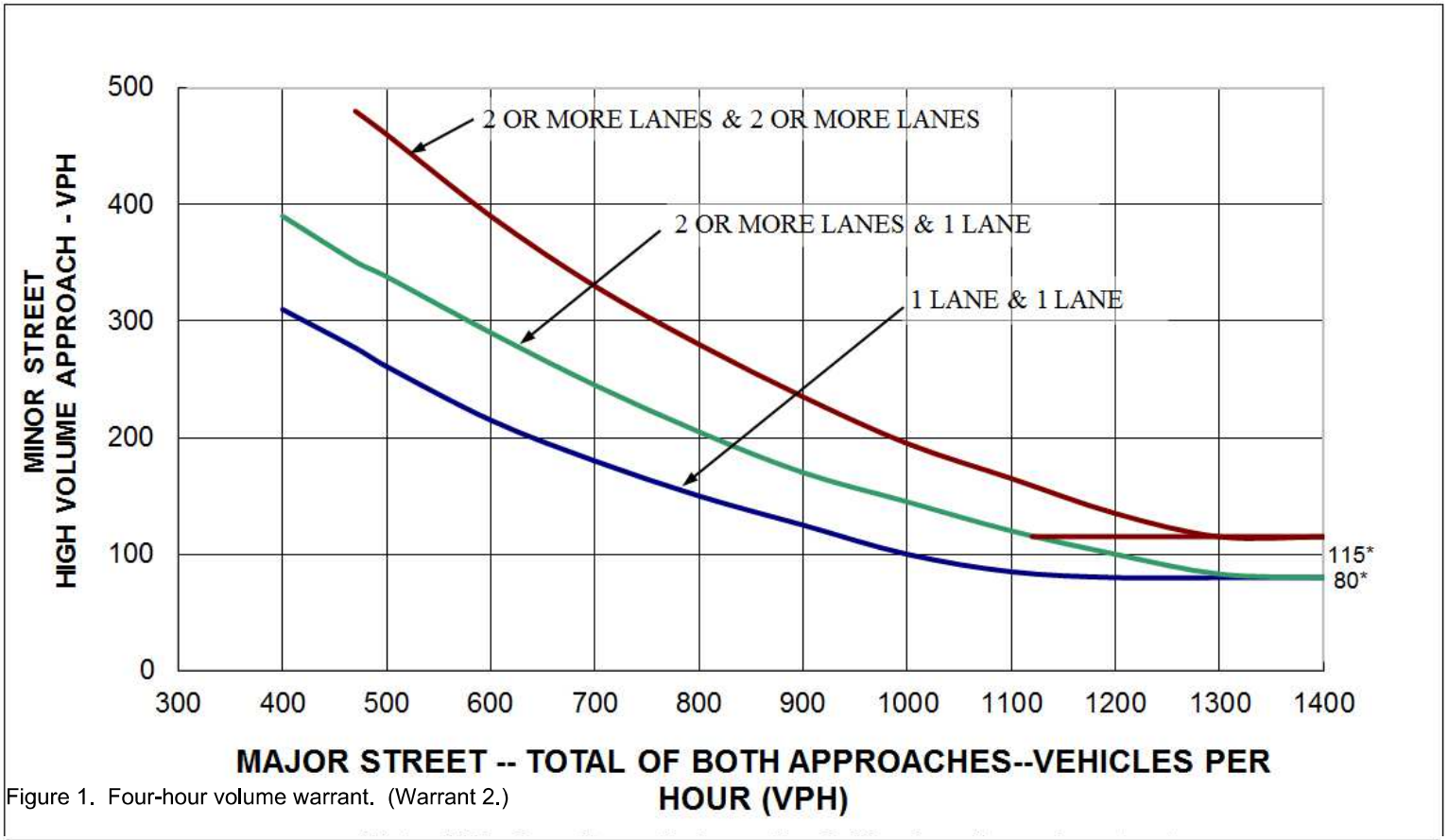


Figure 1. Four-hour volume warrant. (Warrant 2.)

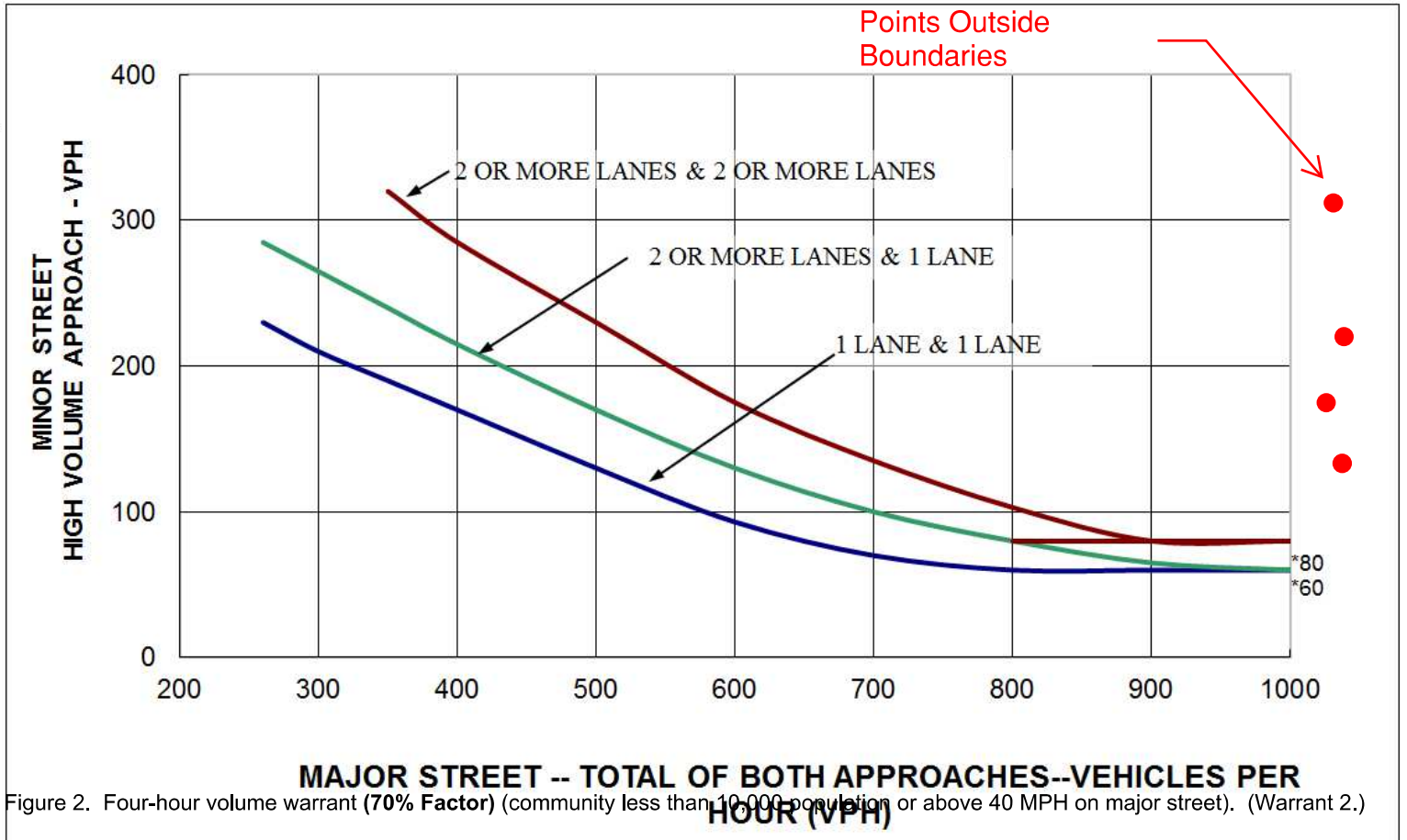


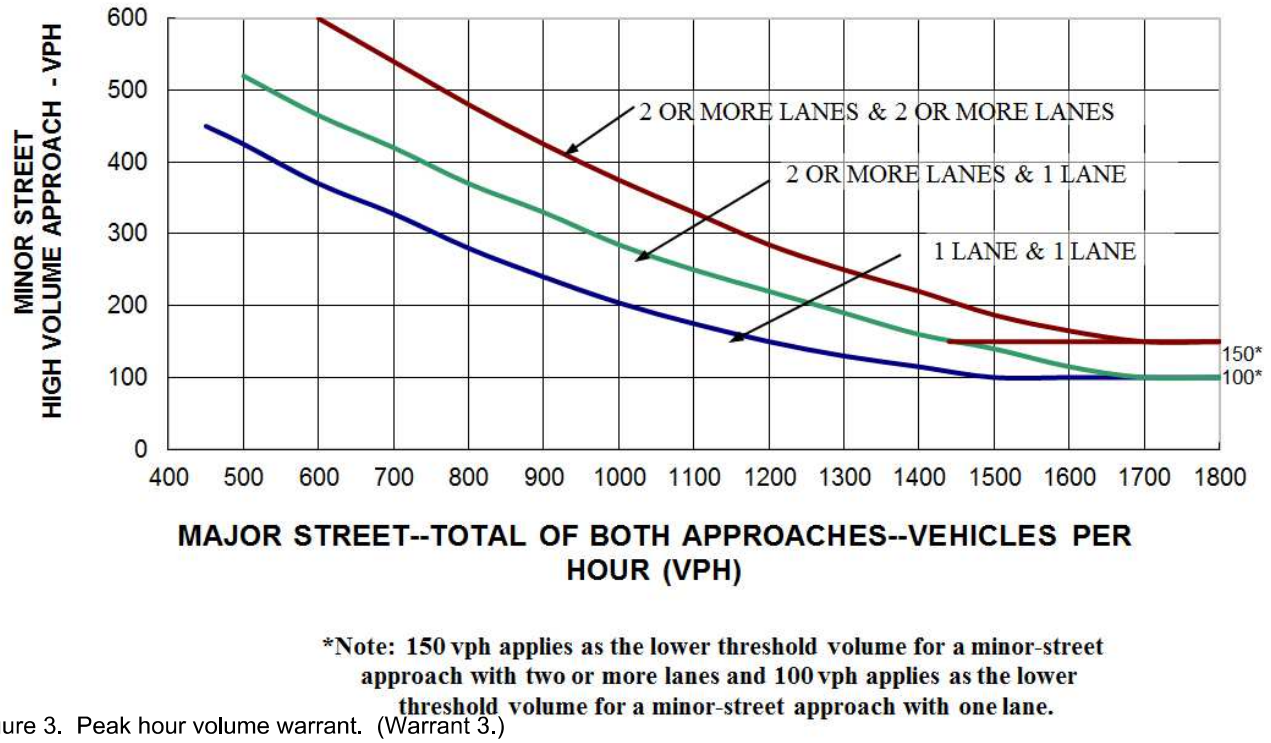
Figure 2. Four-hour volume warrant **(70% Factor)** (community less than 10,000 population or above 40 MPH on major street). (Warrant 2.)

***Note: 80 vph applies as the lower threshold volume for a minor-street**

Warrant 3. Peak Hour

◯ Yes ◉ No Are all of the following conditions true for the same 1 hour (any four consecutive 15 minute periods)?
1. The total stopped time delay experienced by the traffic on one minor street approach (one direction only) controlled by a stop sign equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach, *and*
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, *and*
3. The total entering volume serviced during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four (or more) approaches. **- *or* -** Meets one High Hour (Warrant 3 - see Figure 3 and Figure 4).

◯ Yes ◉ No



***Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.**

Figure 3. Peak hour volume warrant. (Warrant 3.)

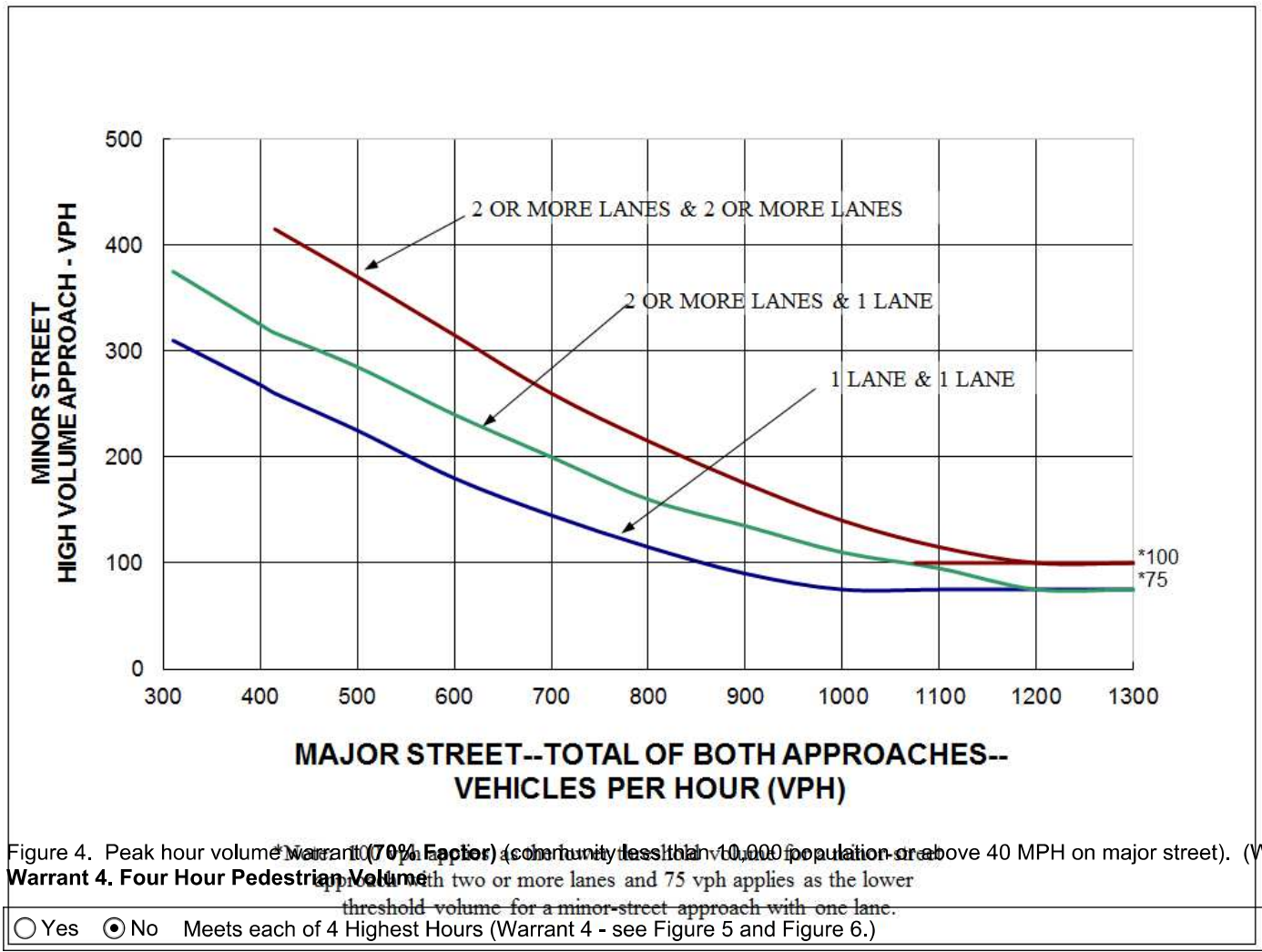
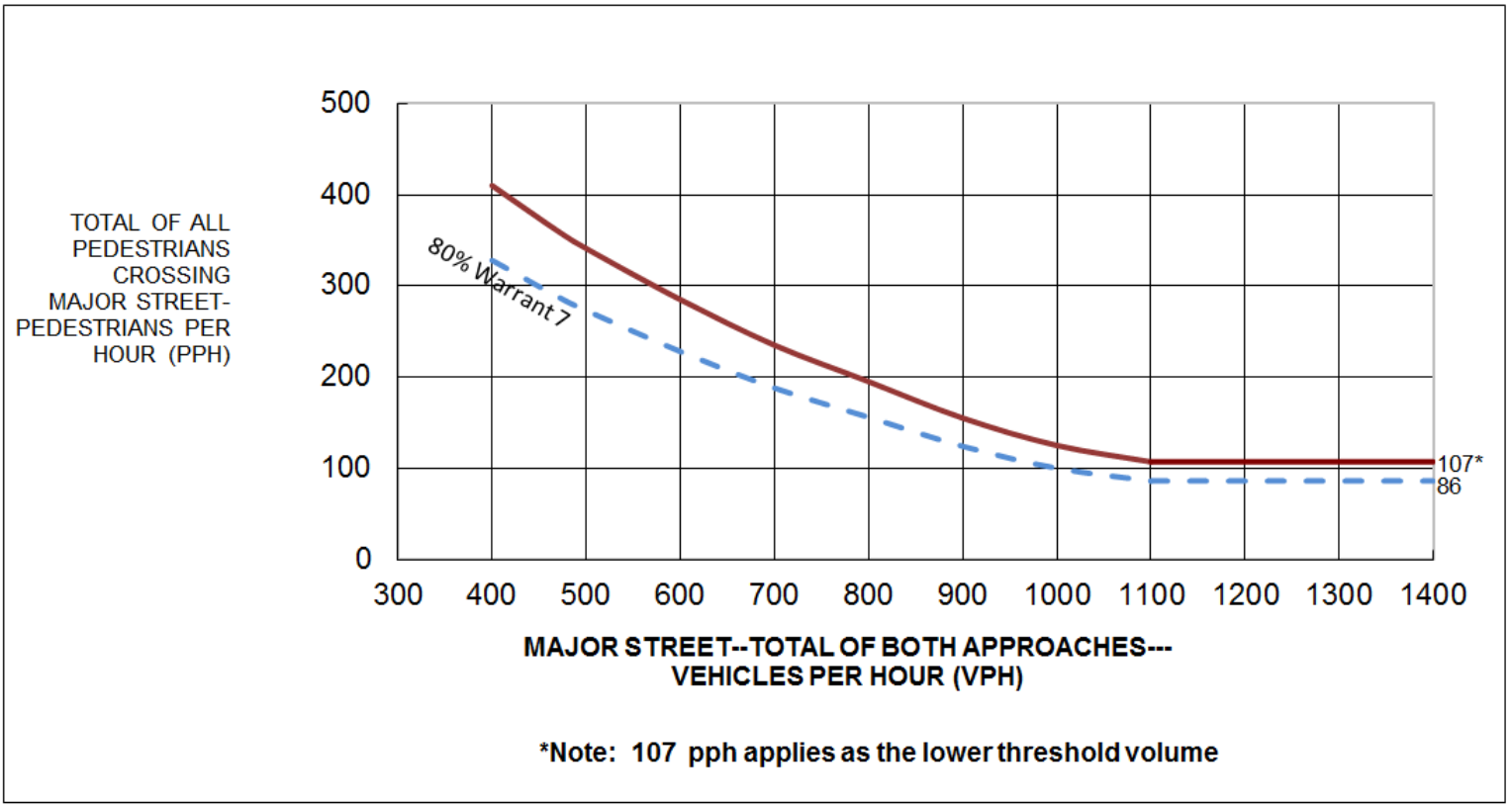


Figure 4. Peak hour volume warrant (**70% Factor**) (community less than 10,000 population or above 40 MPH on major street). (Warrant 3.)

Warrant 4. Four Hour Pedestrian Volume

◯ Yes ◉ No Meets each of 4 Highest Hours (Warrant 4 - see Figure 5 and Figure 6.)



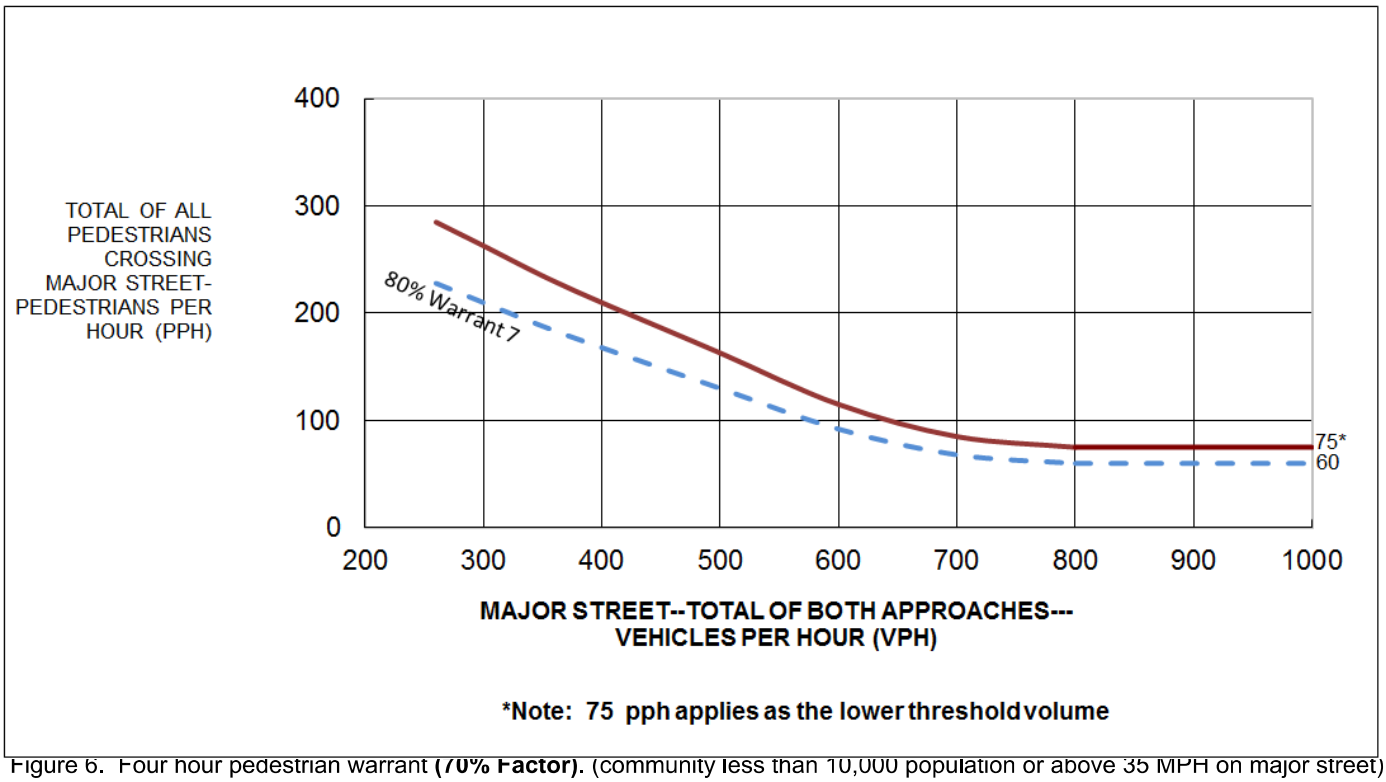


Figure 6. Four hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 35 MPH on major street). (Warrant 4.)

Warrant 4. Peak Hour Pedestrian Volumes

◯ Yes ◉ No Meets Peak Hour Pedestrian (Warrant 4 - see Figure 7 and Figure 8.)

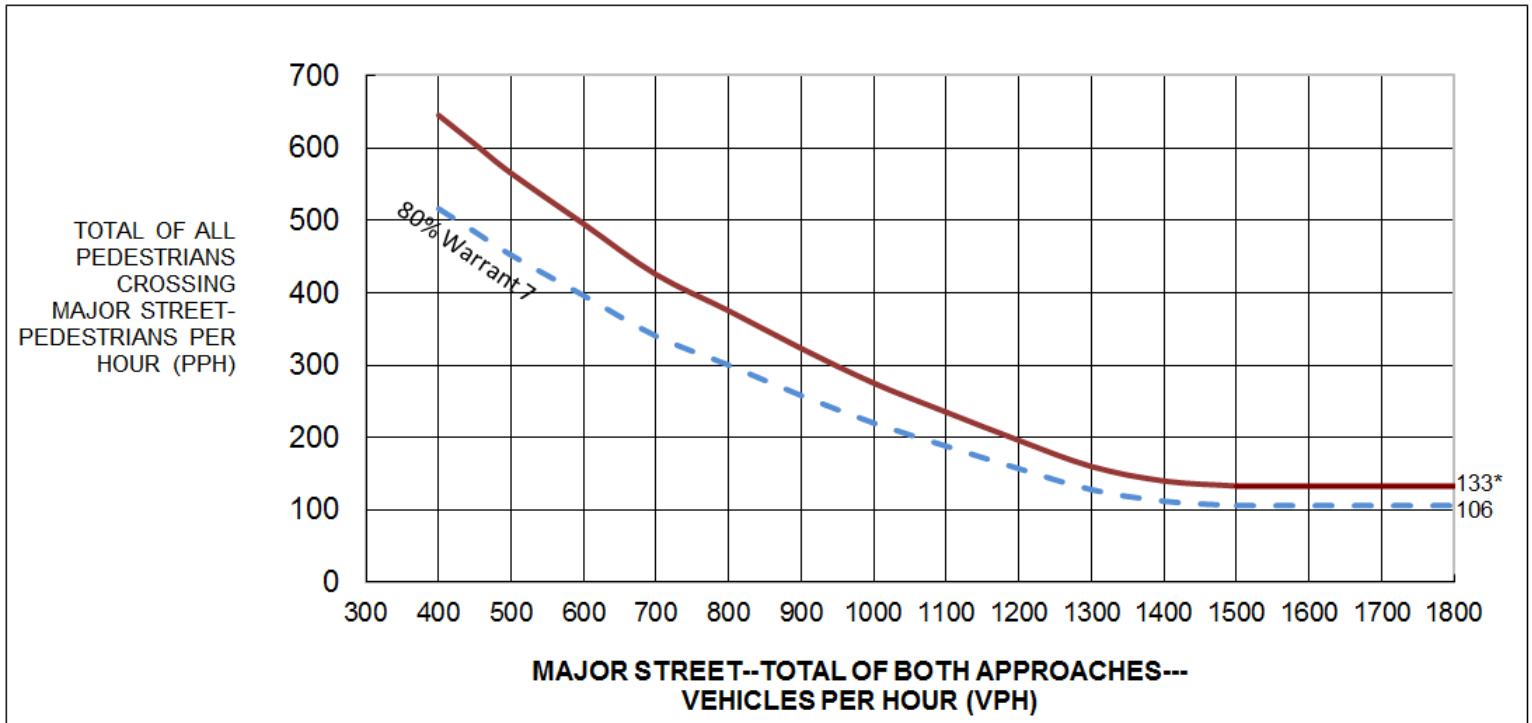


Figure 7. Four hour pedestrian warrant (Warrant 4.)

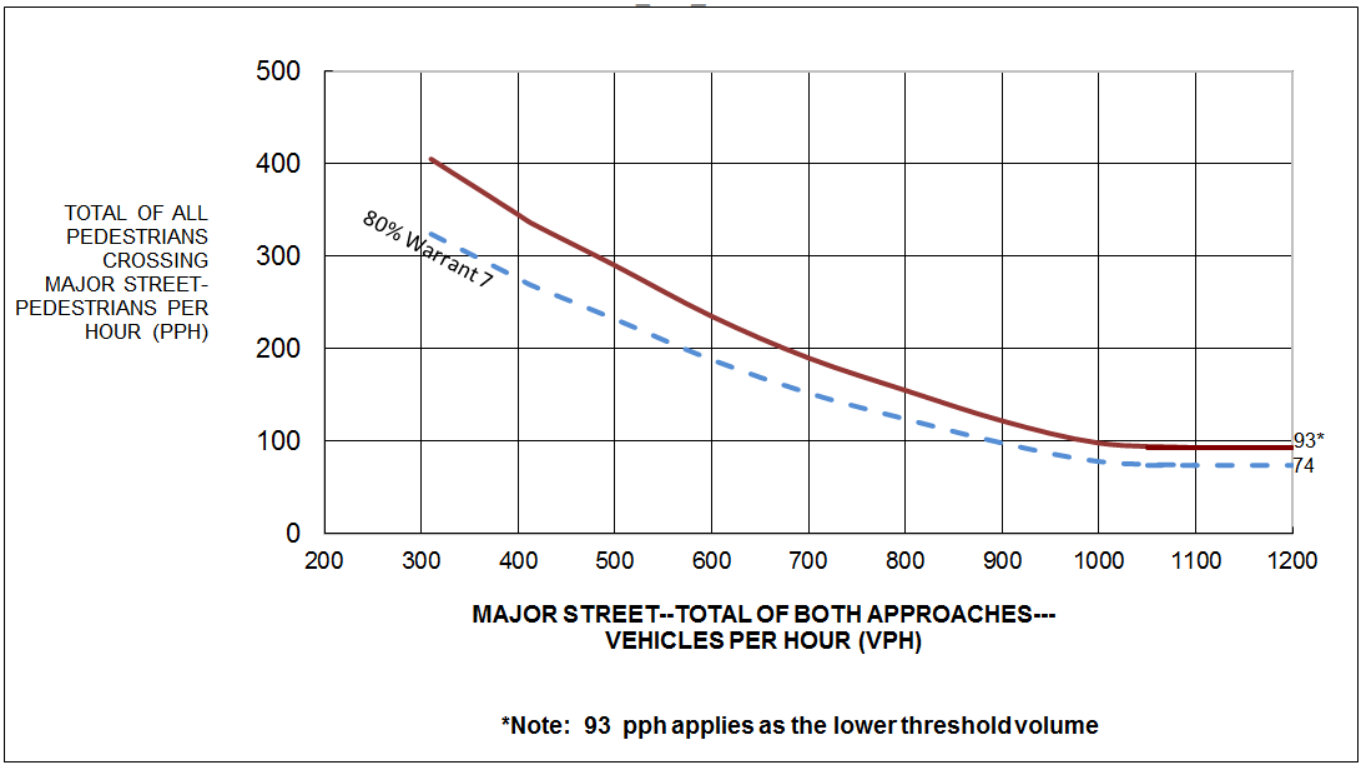


Figure 8. Peak hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 40 MPH on major street). (Warrant 4.)

Warrant 5. School Crossing

◯ Yes	⦿ No	Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?
		- and -
◯ Yes	⦿ No	Are there a minimum of 20 students during the highest crossing hour?
		*- **and** -*
◯ Yes	⦿ No	Is the nearest signal on the major street located more than 300 feet away? (This warrant may be applied if the proposed signal is less than 300 feet and does not restrict the progressive movement of traffic.)

Warrant 6. Coordinated Signal System

◯ Yes	⦿ No	On a one-way street or a street with traffic predominantly in one direction, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur?
		- or -
◯ Yes	⦿ No	On a two-way street, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur and would the proposed and adjacent traffic control signal provide a progressive operation?

Warrant 7. Crash Experience

◯ Yes	⦿ No	Is one of the following conditions met?: ◆ 80% of Condition A or Condition B in Warrant 1 ◆ 56% of Conditions A or B in Warrant 1 (major-street speed exceeding 40 mph and population less than 10,000) ◆ 80% or more of Warrant 4
		- and -
◯ Yes	⦿ No	Have there been 5 or more reported crashes susceptible to correction by a traffic signal in 12 months?

Warrant 8. Roadway Network

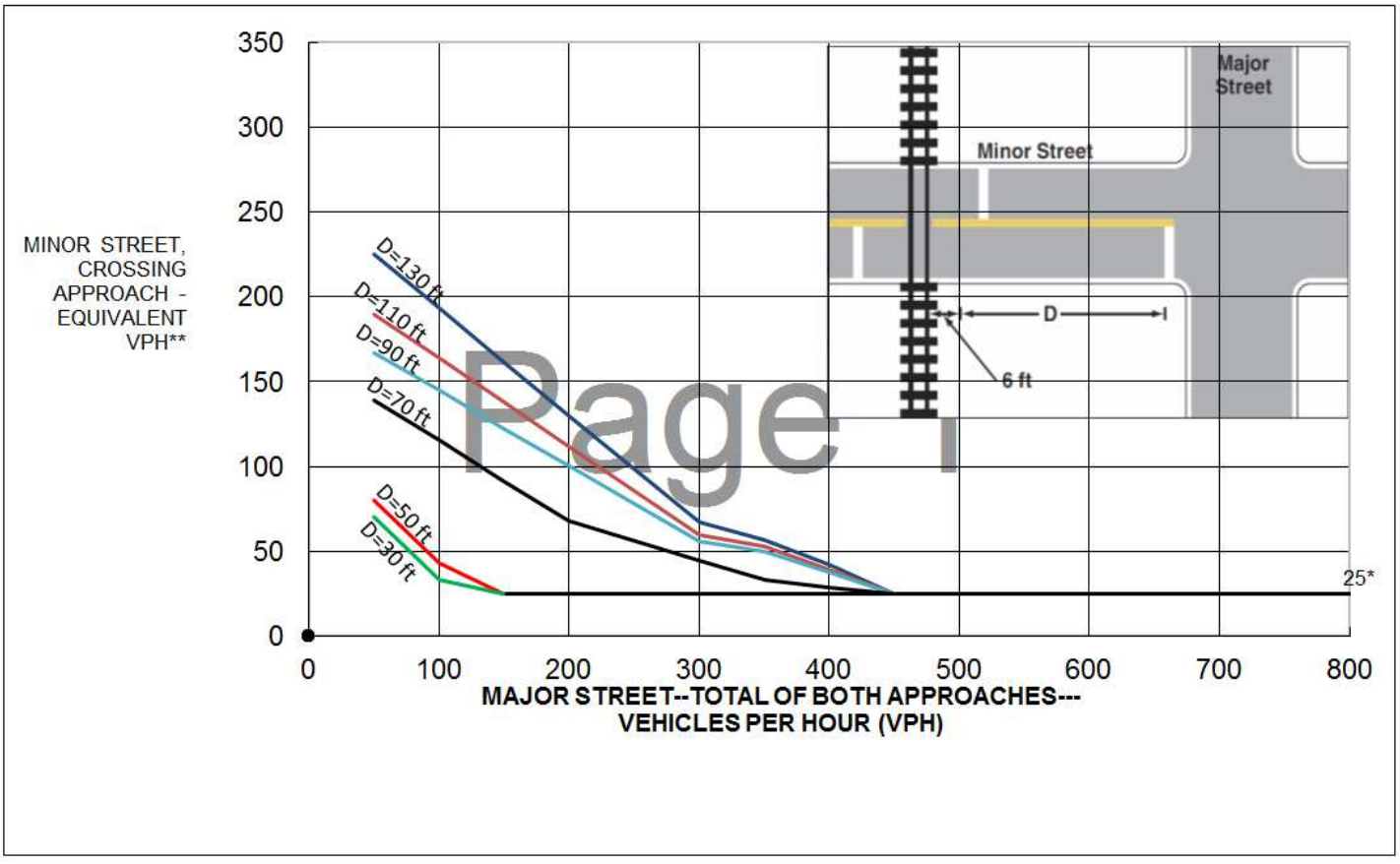
◯ Yes	⦿ No	Is the total existing, or immediately projected, entering volume on all approaches greater than 1000 vehicles for each of any 5 hours of a Saturday and/or Sunday.
		- or -
◯ Yes	⦿ No	Is the total existing, or immediately projected, entering volume greater than 1000 vehicles for the peak hour of a typical weekday, and do the 5 year projected traffic volumes meet one or more of Warrants 1, 2, and 3 during an average weekday?

Check applicable characteristics of each route (only 1 needs to be checked):

Major Street	Minor Street	
◯ Yes	⦿ No	It is part of street or highway system that serves as the principal roadway network for through traffic flow.
◯ Yes	⦿ No	It includes rural or suburban highways outside, entering, or traversing a city.
◯ Yes	⦿ No	It appears as a major route on an official plan such as a major street plan in an urban area traffic and transportation study.
◯ Yes	⦿ No	It connects areas of principal traffic generation.
◯ Yes	⦿ No	It has surface street freeway or expressway ramp terminals.

Warrant 9. Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)

◯ Yes	⦿ No	Meets one High Hour (Warrant 9 - see Figure 9.)



Page 1

Warrant 9. Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)

◯ Yes ⦿ No Meets one High Hour (Warrant 9 - see Figure 10.)

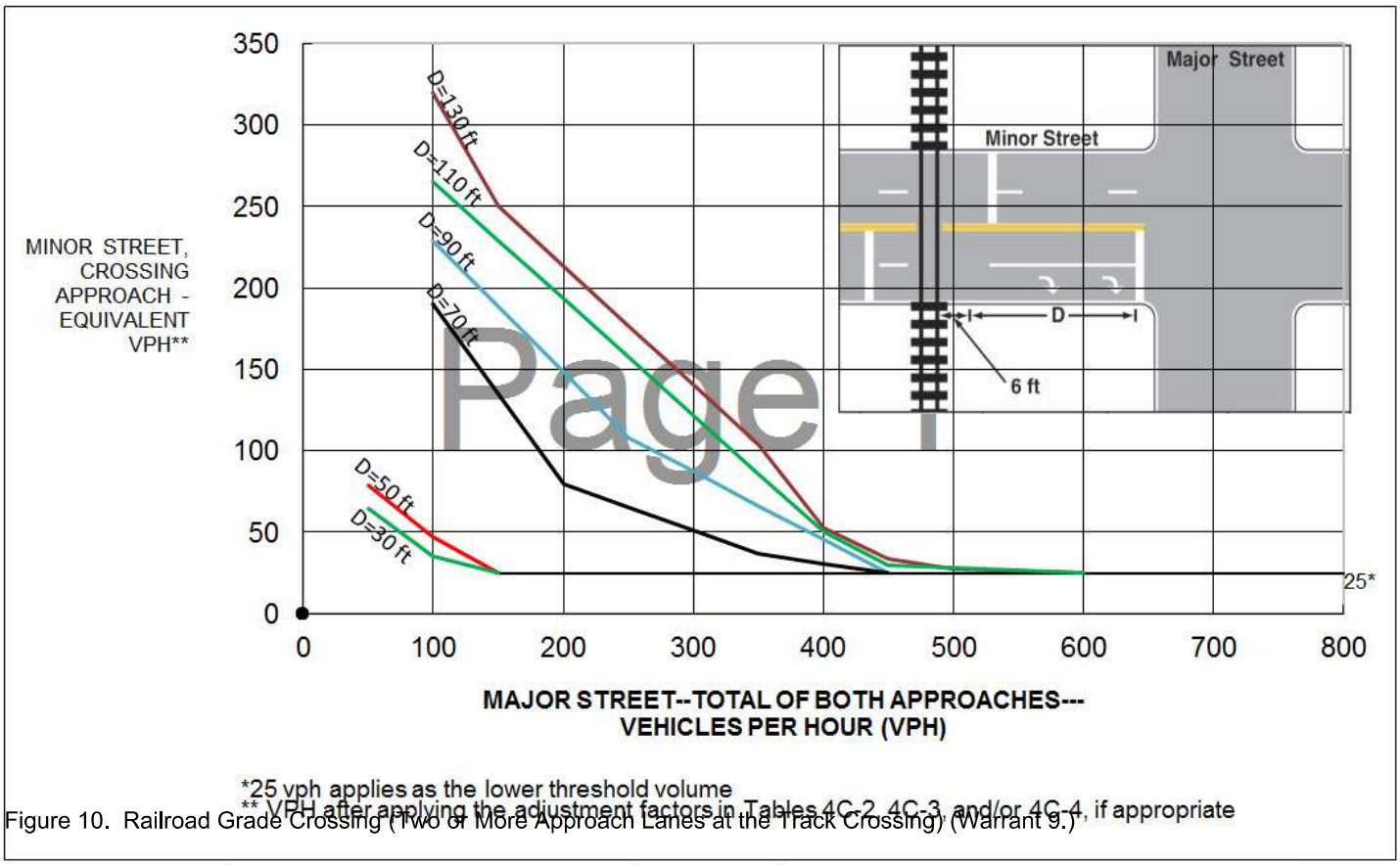


Figure 10. Railroad Grade Crossing (Two or More Approach Lanes at the Track Crossing) (Warrant 9.)

Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

Remarks:

A Traffic Signal Warrants At This Intersection

Traffic Survey - Count Analysis
2011 TMUTCD Warrants

Form TFF-TSCA
(8/18)
Page of

County: *Brazoria* District: *Houston*

City: *Manvel* Population: Survey Date:

	Route #	Name	Control	Section	85% Speed
Major		*Manvel Pkwy*			*40*
Minor		*Charlotte Street*			*35*

Eight Highest Hours: Include the same 8 hours for the Major and Minor St. volumes.

Time Ends	Major St. - Both App.		Minor St. - Hi. Vol. App.	
	Veh. Total	Ped. Total	Veh. Total	Ped. Total
1:00 PM	*1,289*	*N/A*	*289*	*N/A*
5:00 PM	*1,280*	*N/A*	*293*	*N/A*
4:00 PM	*1,246*	*N/A*	*282*	*N/A*
6:00 PM	*1,236*	*N/A*	*284*	*N/A*
2:00 PM	*1,225*	*N/A*	*273*	*N/A*
3:00 PM	*1,182*	*N/A*	*267*	*N/A*
12:00 PM	*1,165*	*N/A*	*261*	*N/A*
7:00 PM	*996*	*N/A*	*225*	*N/A*

Comments:
2030 Build Conditions

Warrant 1. Eight Hour Vehicular Volume

(●) Yes ( ) No Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition A. ***- or -*** Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition B. ***- or -*** Meets 80%[b] of Conditions A and B. ***- or -*** Meets 56%[d] of Conditions A and B (and major-street speed exceeds 40 mph and population less than 10,000).

(●) Yes ( ) No

(●) Yes ( ) No

(●) Yes ( ) No

Condition A - Minimum Vehicle Volume

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*166%*	100%[a]	80%[b]	70%[c]	56%[d]	*113%*
1	1	500	400	350	280		150	120	105	84	
2 or more	1	600	480	420	336		150	120	105	84	
2 or more	2 or more	600	480	420	336	*996*	200	160	140	112	*225*
1	2 or more	500	400	350	280		200	160	140	112	

Condition B - Interruption of Continuous Traffic

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*111%*	100%[a]	80%[b]	70%[c]	56%[d]	*225%*
1	1	750	600	525	420		75	60	53	42	
2 or more	1	900	720	630	504		75	60	53	42	
2 or more	2 or more	900	720	630	504	*996*	100	80	70	56	*225*
1	2 or more	750	600	525	420		100	80	70	56	

[a] Basic minimum hourly volume.
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.
[c] May be used when the major-street speed exceeds 40 mph or in a community with a population less than 10,000.
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when major street exceeds 40 mph or in an isolated community with a population of less than 10,000.

Contact/Help

Warrant 2. Four Hour Volumes

◉ Yes ○ No Meets each of 4 Highest Hours (Warrant 2 - see Figure 1 and Figure 2).

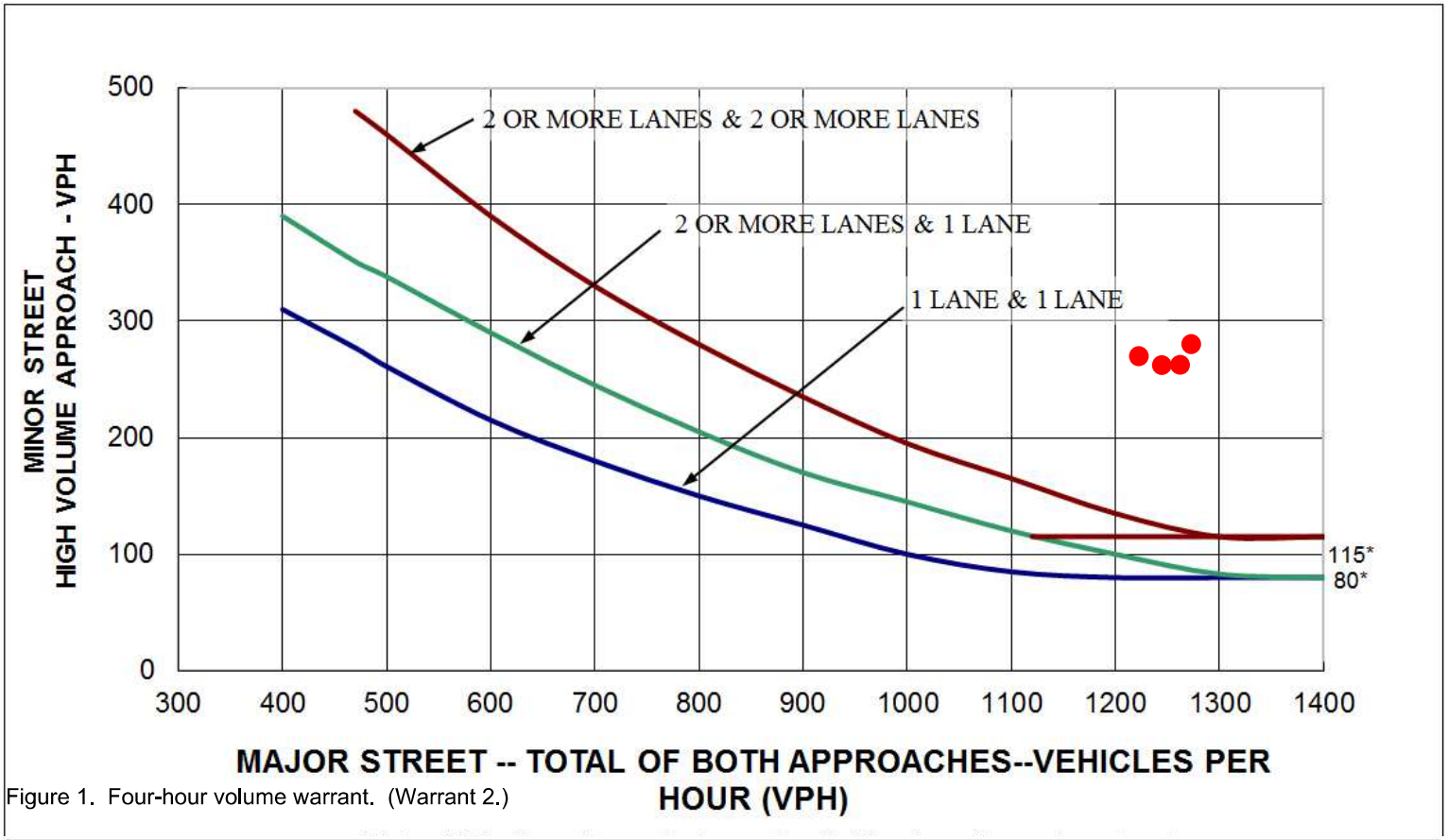


Figure 1. Four-hour volume warrant. (Warrant 2.)

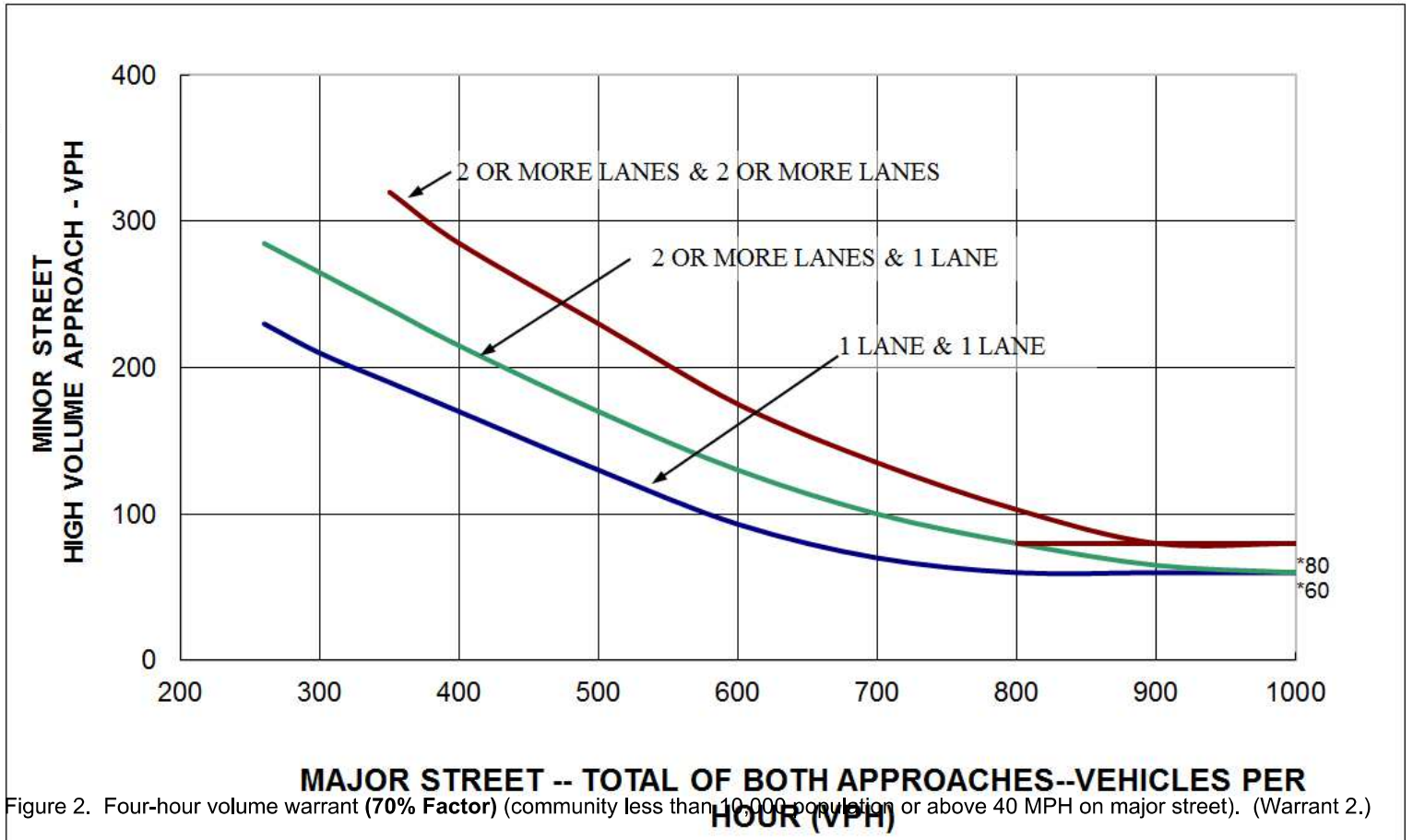


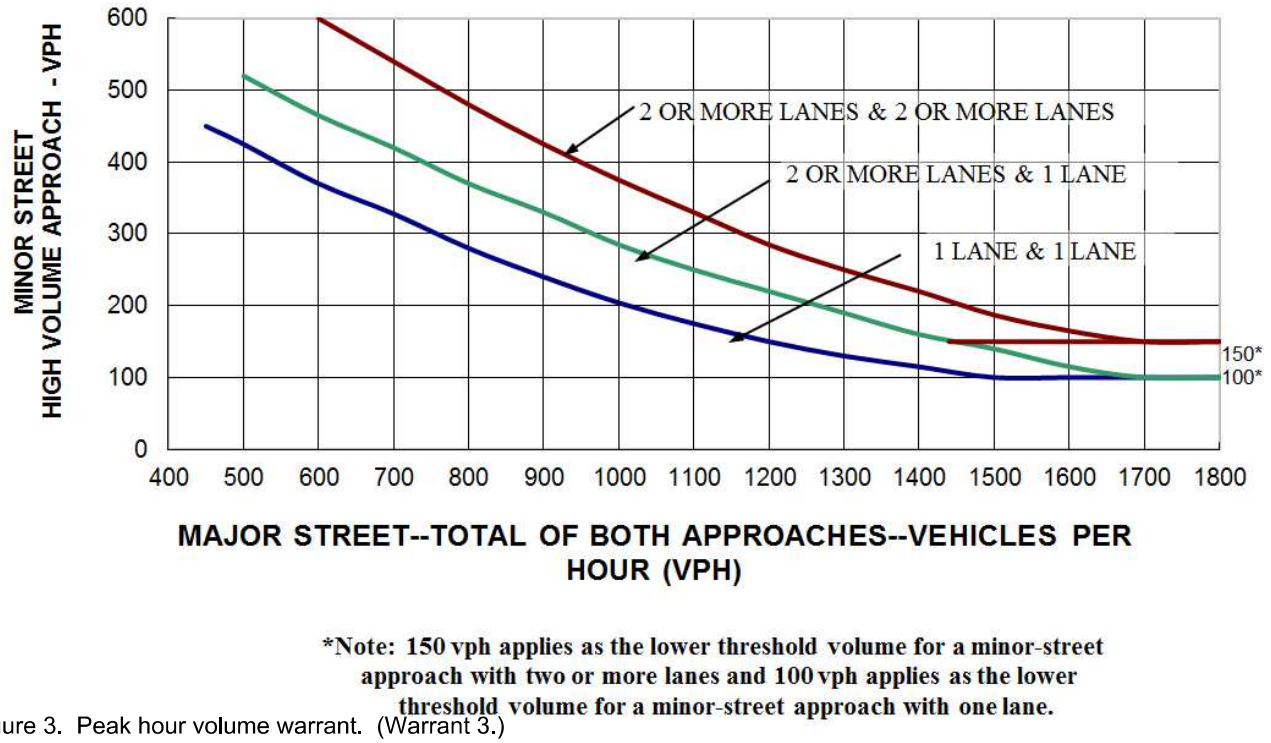
Figure 2. Four-hour volume warrant **(70% Factor)** (community less than 10,000 population or above 40 MPH on major street). (Warrant 2.)

***Note: 80 vph applies as the lower threshold volume for a minor-street**

Warrant 3. Peak Hour

◯ Yes ◉ No Are all of the following conditions true for the same 1 hour (any four consecutive 15 minute periods)?
1. The total stopped time delay experienced by the traffic on one minor street approach (one direction only) controlled by a stop sign equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach, *and*
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, *and*
3. The total entering volume serviced during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four (or more) approaches. **- *or* -** Meets one High Hour (Warrant 3 - see Figure 3 and Figure 4).

◯ Yes ◉ No



***Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.**

Figure 3. Peak hour volume warrant. (Warrant 3.)

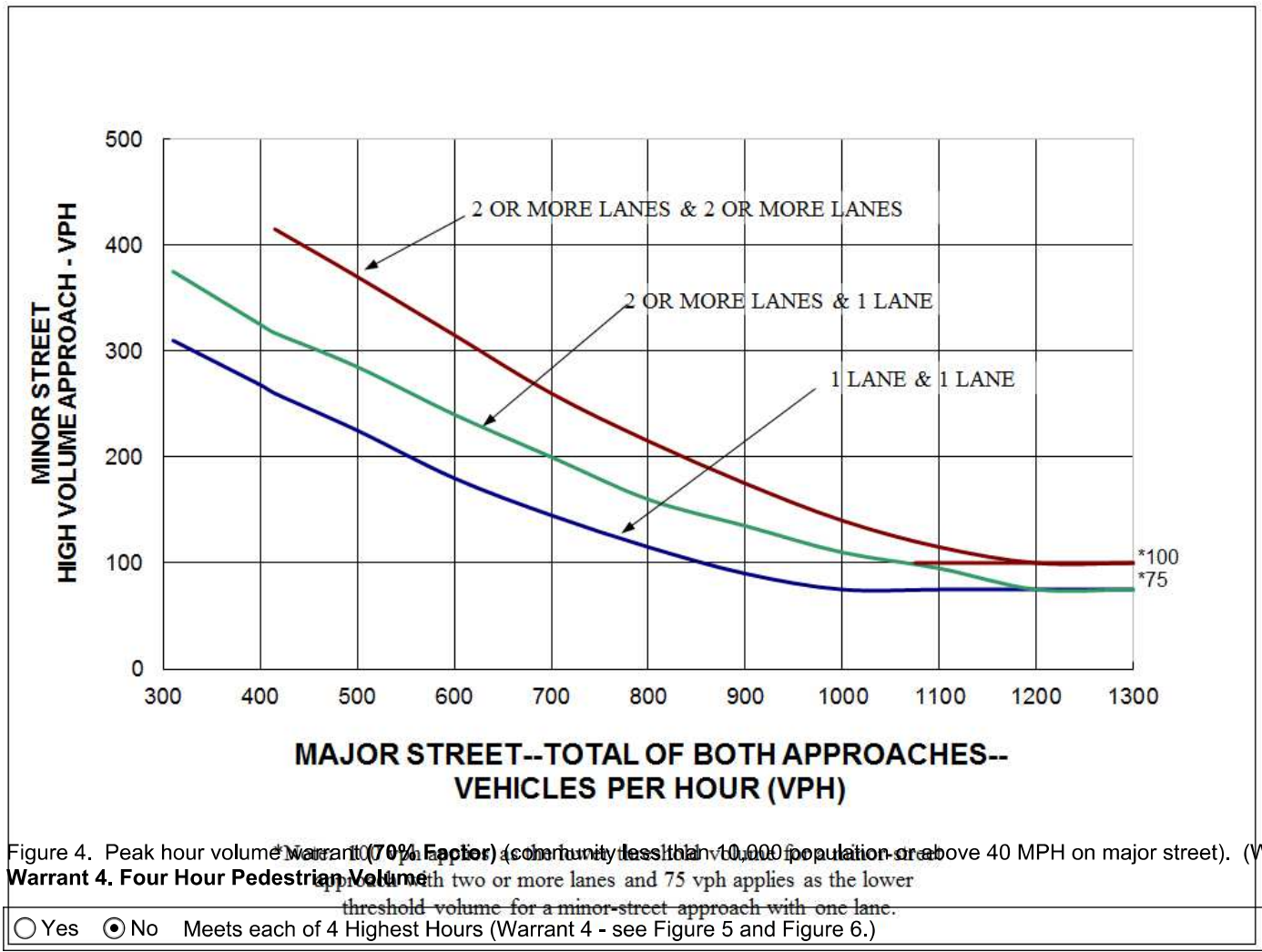
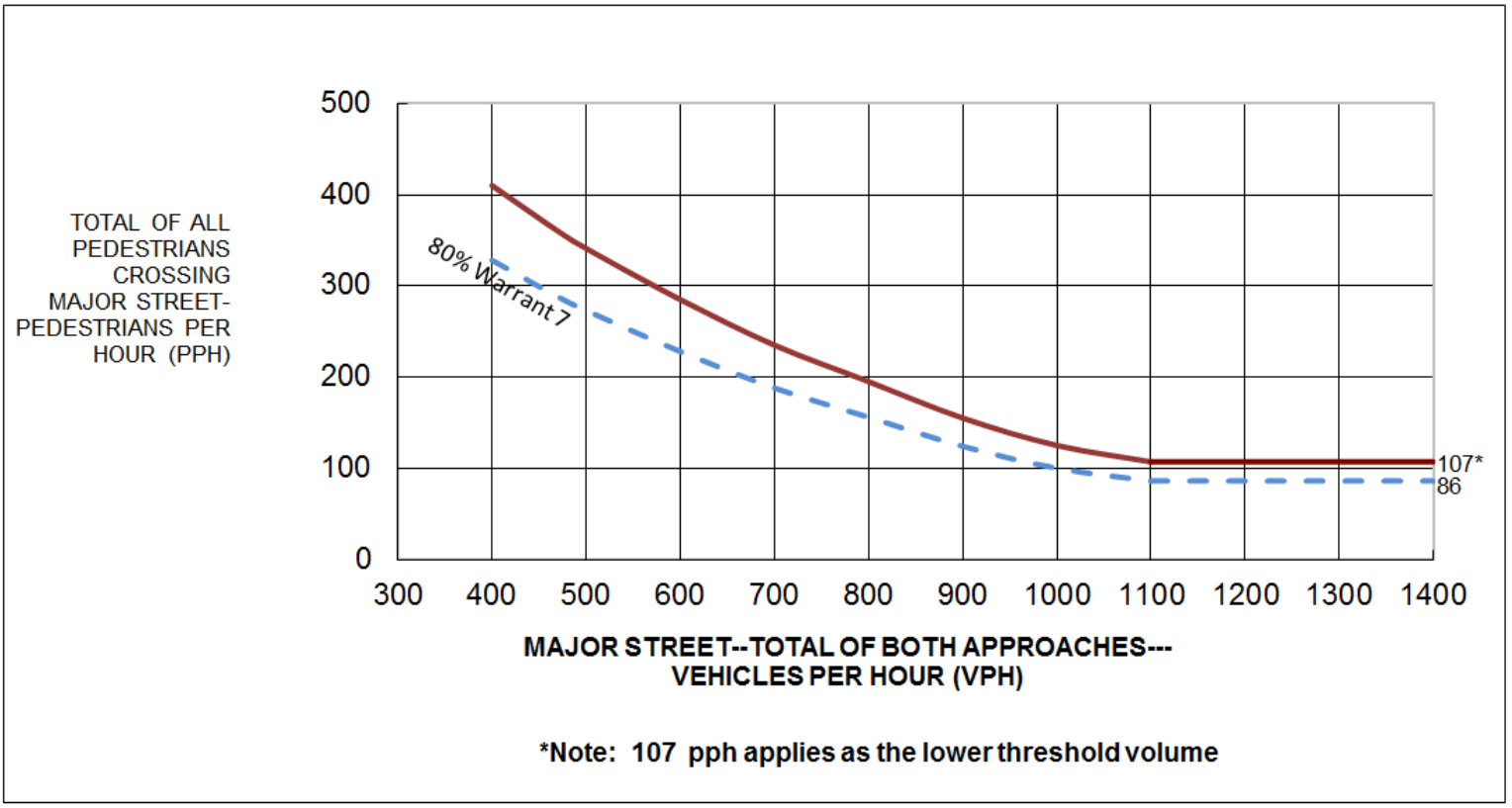


Figure 4. Peak hour volume warrant (**70% Factor**) (community less than 10,000 population or above 40 MPH on major street). (Warrant 3.)

Warrant 4. Four Hour Pedestrian Volume

◯ Yes ◉ No Meets each of 4 Highest Hours (Warrant 4 - see Figure 5 and Figure 6.)



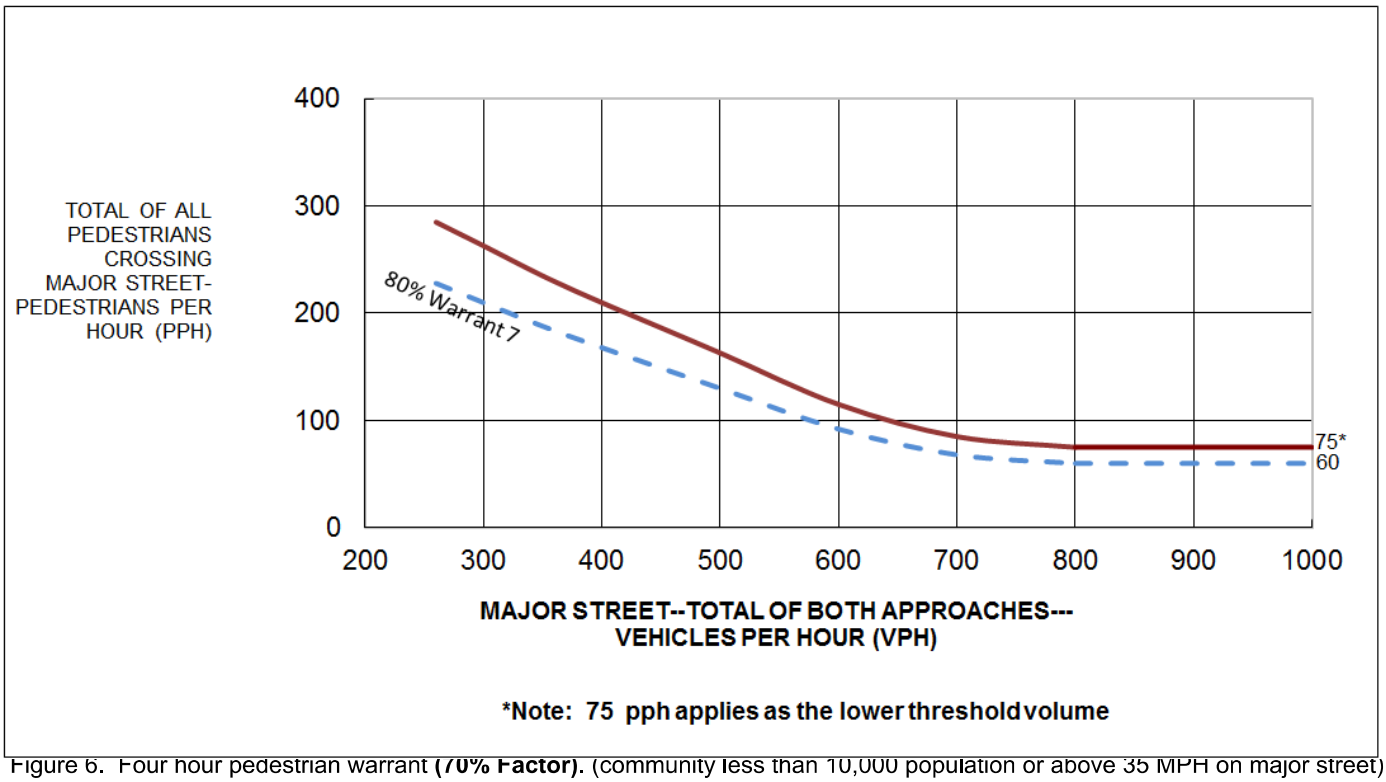


Figure 6. Four hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 35 MPH on major street). (Warrant 4.)

Warrant 4. Peak Hour Pedestrian Volumes

◯ Yes ◉ No Meets Peak Hour Pedestrian (Warrant 4 - see Figure 7 and Figure 8.)

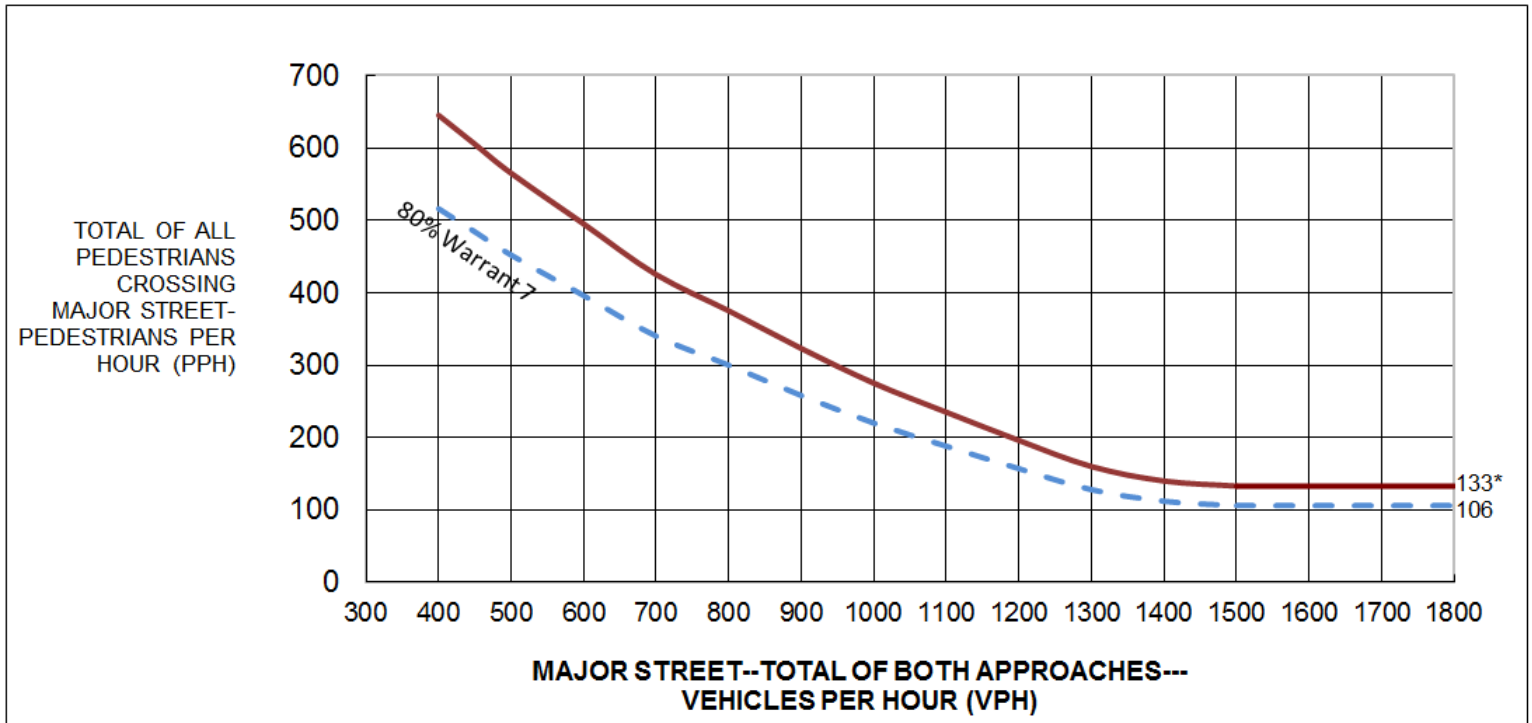


Figure 7. Four hour pedestrian warrant (Warrant 4.)

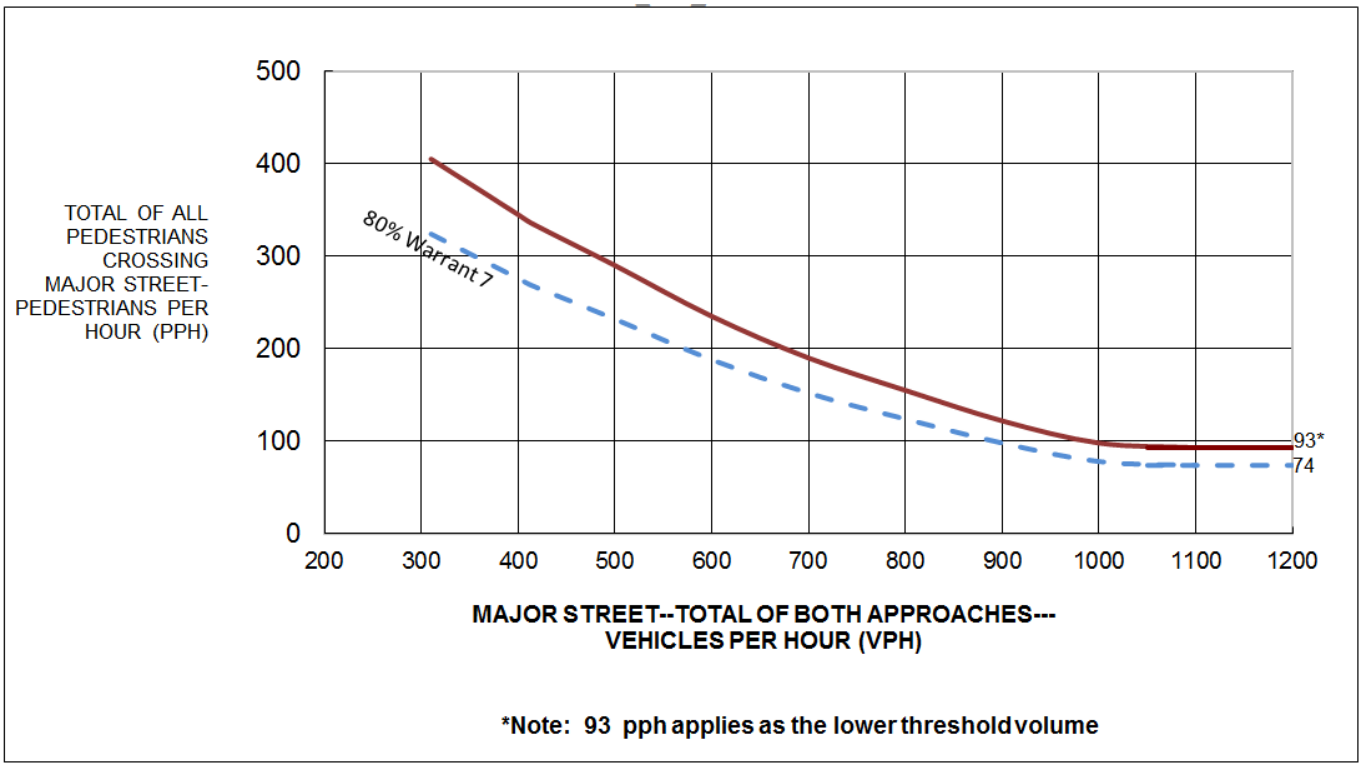


Figure 8. Peak hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 40 MPH on major street). (Warrant 4.)

Warrant 5. School Crossing

◯ Yes	⦿ No	Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?
		- and -
◯ Yes	⦿ No	Are there a minimum of 20 students during the highest crossing hour?
		*- **and** -*
◯ Yes	⦿ No	Is the nearest signal on the major street located more than 300 feet away? (This warrant may be applied if the proposed signal is less than 300 feet and does not restrict the progressive movement of traffic.)

Warrant 6. Coordinated Signal System

◯ Yes	⦿ No	On a one-way street or a street with traffic predominantly in one direction, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur?
		- or -
◯ Yes	⦿ No	On a two-way street, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur and would the proposed and adjacent traffic control signal provide a progressive operation?

Warrant 7. Crash Experience

◯ Yes	⦿ No	Is one of the following conditions met?: ◆ 80% of Condition A or Condition B in Warrant 1 ◆ 56% of Conditions A or B in Warrant 1 (major-street speed exceeding 40 mph and population less than 10,000) ◆ 80% or more of Warrant 4
		- and -
◯ Yes	⦿ No	Have there been 5 or more reported crashes susceptible to correction by a traffic signal in 12 months?

Warrant 8. Roadway Network

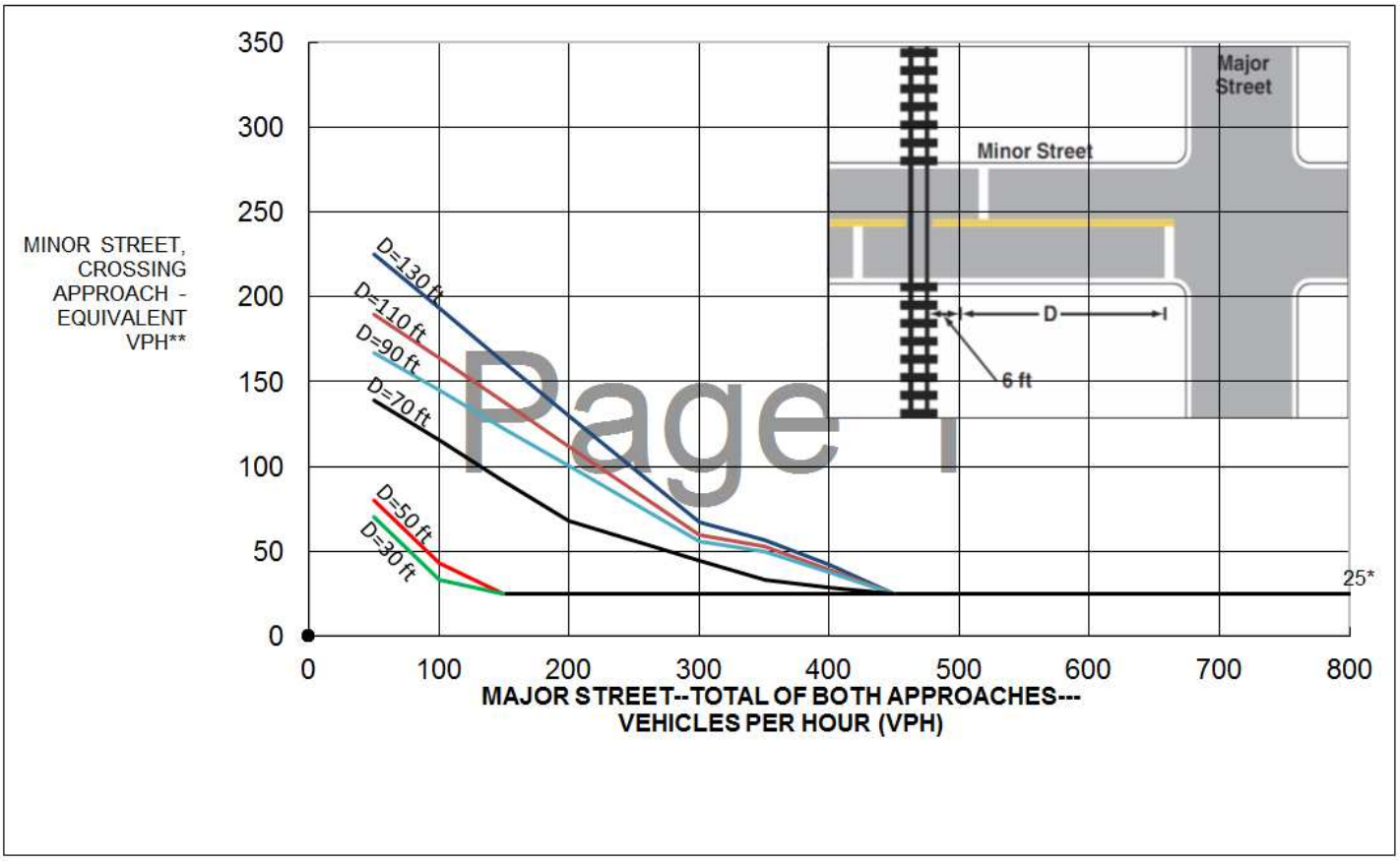
◯ Yes	⦿ No	Is the total existing, or immediately projected, entering volume on all approaches greater than 1000 vehicles for each of any 5 hours of a Saturday and/or Sunday.
		- or -
◯ Yes	⦿ No	Is the total existing, or immediately projected, entering volume greater than 1000 vehicles for the peak hour of a typical weekday, and do the 5 year projected traffic volumes meet one or more of Warrants 1, 2, and 3 during an average weekday?

Check applicable characteristics of each route (only 1 needs to be checked):

Major Street	Minor Street	
◯ Yes	⦿ No	It is part of street or highway system that serves as the principal roadway network for through traffic flow.
◯ Yes	⦿ No	It includes rural or suburban highways outside, entering, or traversing a city.
◯ Yes	⦿ No	It appears as a major route on an official plan such as a major street plan in an urban area traffic and transportation study.
◯ Yes	⦿ No	It connects areas of principal traffic generation.
◯ Yes	⦿ No	It has surface street freeway or expressway ramp terminals.

Warrant 9. Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)

◯ Yes	⦿ No	Meets one High Hour (Warrant 9 - see Figure 9.)



Page 1

Warrant 9. Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)

◯ Yes ⦿ No Meets one High Hour (Warrant 9 - see Figure 10.)

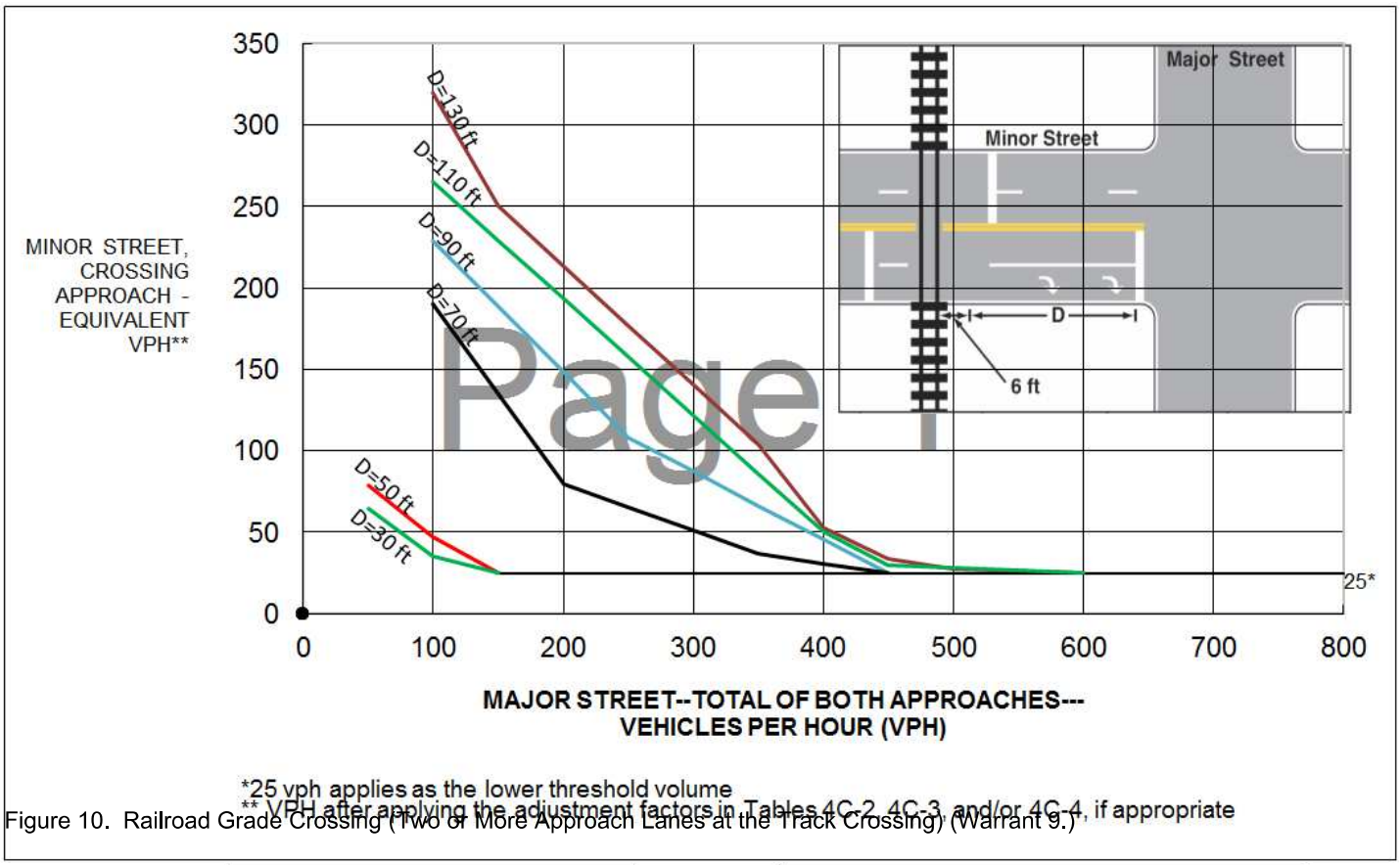


Figure 10. Railroad Grade Crossing (Two or More Approach Lanes at the Track Crossing) (Warrant 9.)

Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

Remarks:

A Traffic Signal Warrants At This Intersection

Traffic Survey - Count Analysis
2011 TMUTCD Warrants

Form TFF-TSCA (8/18)
Page of

County: *Brazoria* District: *Houston*

City: *Manvel* Population: Survey Date:

	Route #	Name	Control	Section	85% Speed
Major		*SH 288 Ramps*			*45*
Minor		*RodeoPalms/Del Bello*			*35*

Eight Highest Hours: Include the same 8 hours for the Major and Minor St. volumes.

Time Ends	Major St. - Both App.		Minor St. - Hi. Vol. App.	
	Veh. Total	Ped. Total	Veh. Total	Ped. Total
5:00 PM	*1,497*	*N/A*	*898*	*N/A*
6:00 PM	*1,355*	*N/A*	*776*	*N/A*
7:00 PM	*1,092*	*N/A*	*849*	*N/A*
4:00 PM	*1,177*	*N/A*	*695*	*N/A*
8:00 AM	*744*	*N/A*	*824*	*N/A*
3:00 PM	*717*	*N/A*	*676*	*N/A*
1:00 PM	*619*	*N/A*	*683*	*N/A*
2:00 PM	*636*	*N/A*	*657*	*N/A*

Comments:
2030 No Build Conditions With Background Volumes

Warrant 1. Eight Hour Vehicular Volume

(●) Yes ( ) No Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition A. ***- or -*** Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition B. ***- or -*** Meets 80%[b] of Conditions A and B. ***- or -*** Meets 56%[d] of Conditions A and B (and major-street speed exceeds 40 mph and population less than 10,000).

( ) Yes (●) No

( ) Yes (●) No

(●) Yes ( ) No

Condition A - Minimum Vehicle Volume

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*103%*	100%[a]	80%[b]	70%[c]	56%[d]	*329%*
1	1	500	400	350	280		150	120	105	84	
2 or more	1	600	480	420	336		150	120	105	84	
2 or more	2 or more	600	480	420	336	*619*	200	160	140	112	*657*
1	2 or more	500	400	350	280		200	160	140	112	

Condition B - Interruption of Continuous Traffic

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*69%*	100%[a]	80%[b]	70%[c]	56%[d]	*657%*
1	1	750	600	525	420		75	60	53	42	
2 or more	1	900	720	630	504		75	60	53	42	
2 or more	2 or more	900	720	630	504	*619*	100	80	70	56	*657*
1	2 or more	750	600	525	420		100	80	70	56	

[a] Basic minimum hourly volume.
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.
[c] May be used when the major-street speed exceeds 40 mph or in a community with a population less than 10,000.
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when major street exceeds 40 mph or in an isolated community with a population of less than 10,000.

Contact/Help

Warrant 2. Four Hour Volumes

◉ Yes ○ No Meets each of 4 Highest Hours (Warrant 2 - see Figure 1 and Figure 2).

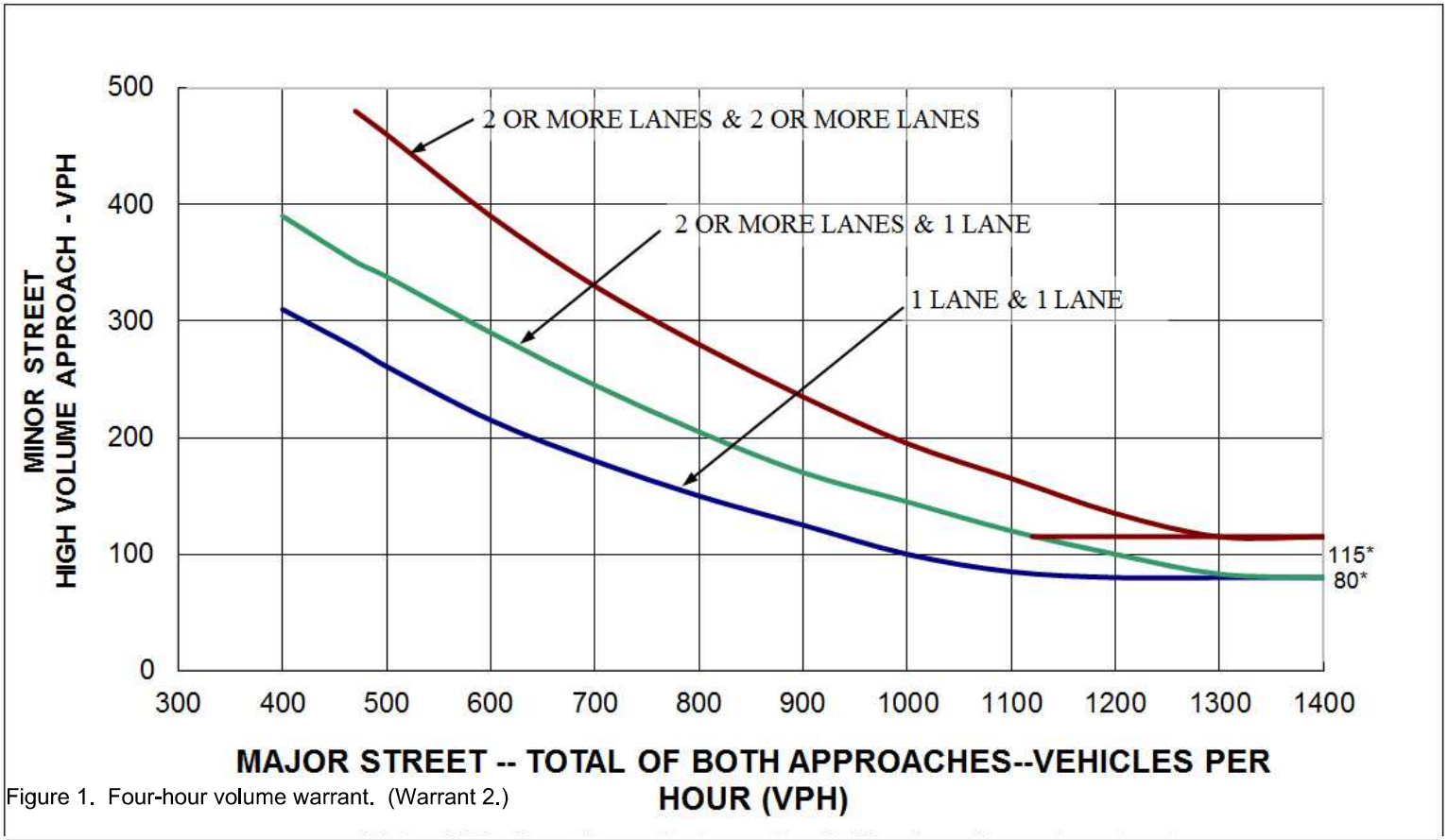


Figure 1. Four-hour volume warrant. (Warrant 2.)

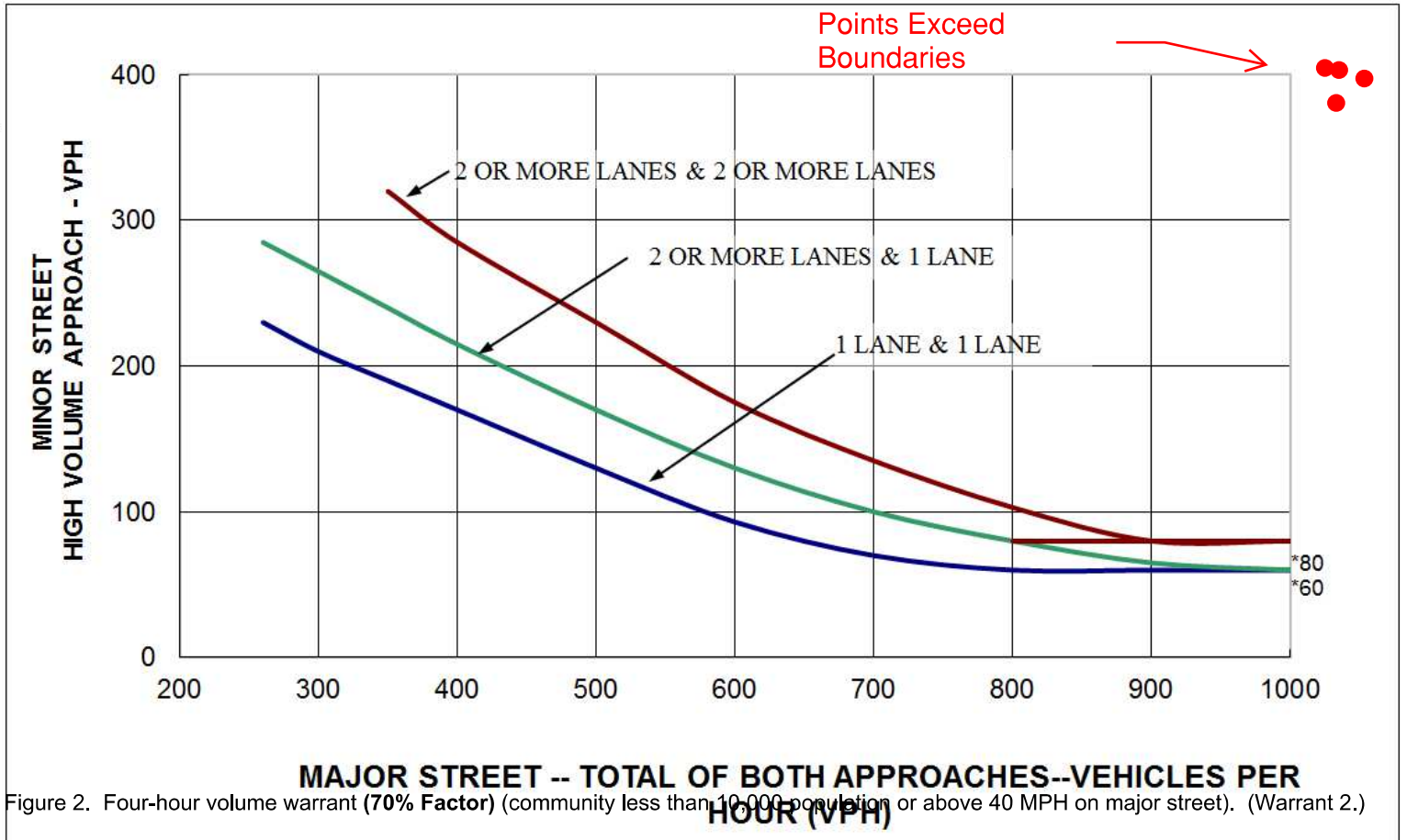


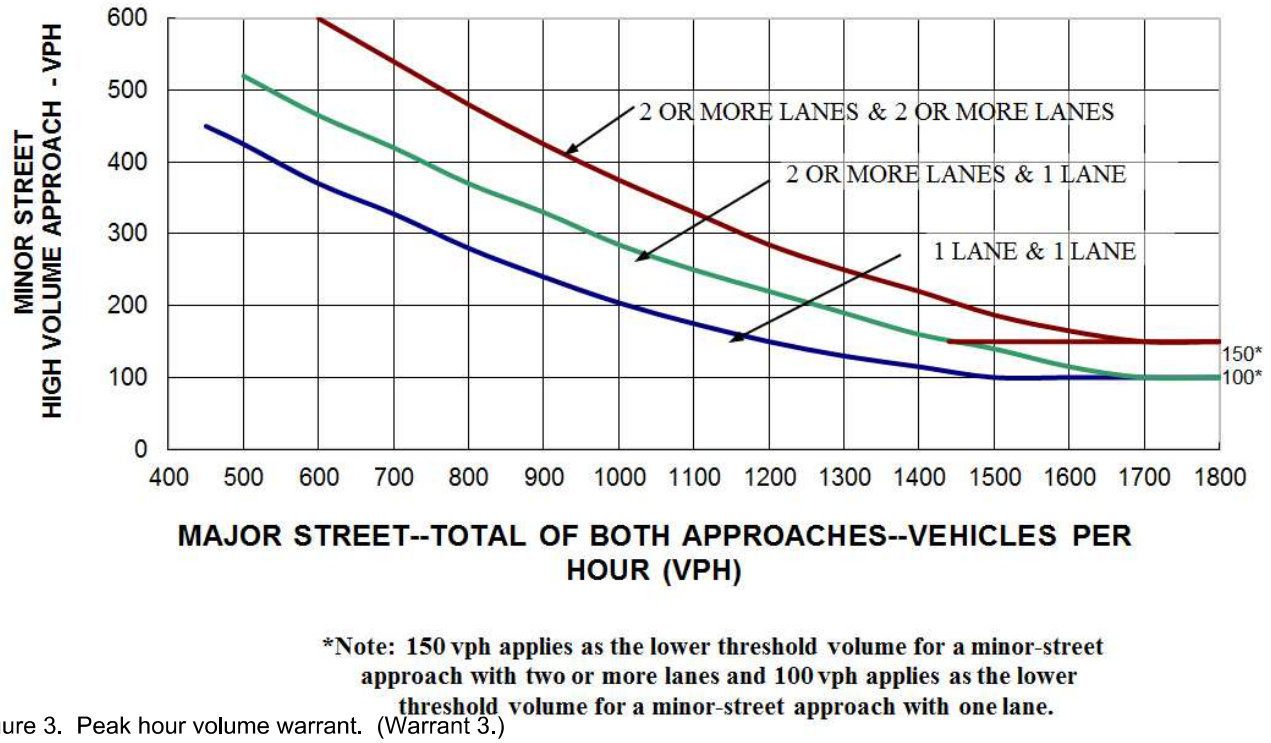
Figure 2. Four-hour volume warrant **(70% Factor)** (community less than 10,000 population or above 40 MPH on major street). (Warrant 2.)

***Note: 80 vph applies as the lower threshold volume for a minor-street**

Warrant 3. Peak Hour

◯ Yes ◉ No Are all of the following conditions true for the same 1 hour (any four consecutive 15 minute periods)?
1. The total stopped time delay experienced by the traffic on one minor street approach (one direction only) controlled by a stop sign equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach, *and*
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, *and*
3. The total entering volume serviced during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four (or more) approaches. **- *or* -** Meets one High Hour (Warrant 3 - see Figure 3 and Figure 4).

◯ Yes ◉ No



***Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.**

Figure 3. Peak hour volume warrant. (Warrant 3.)

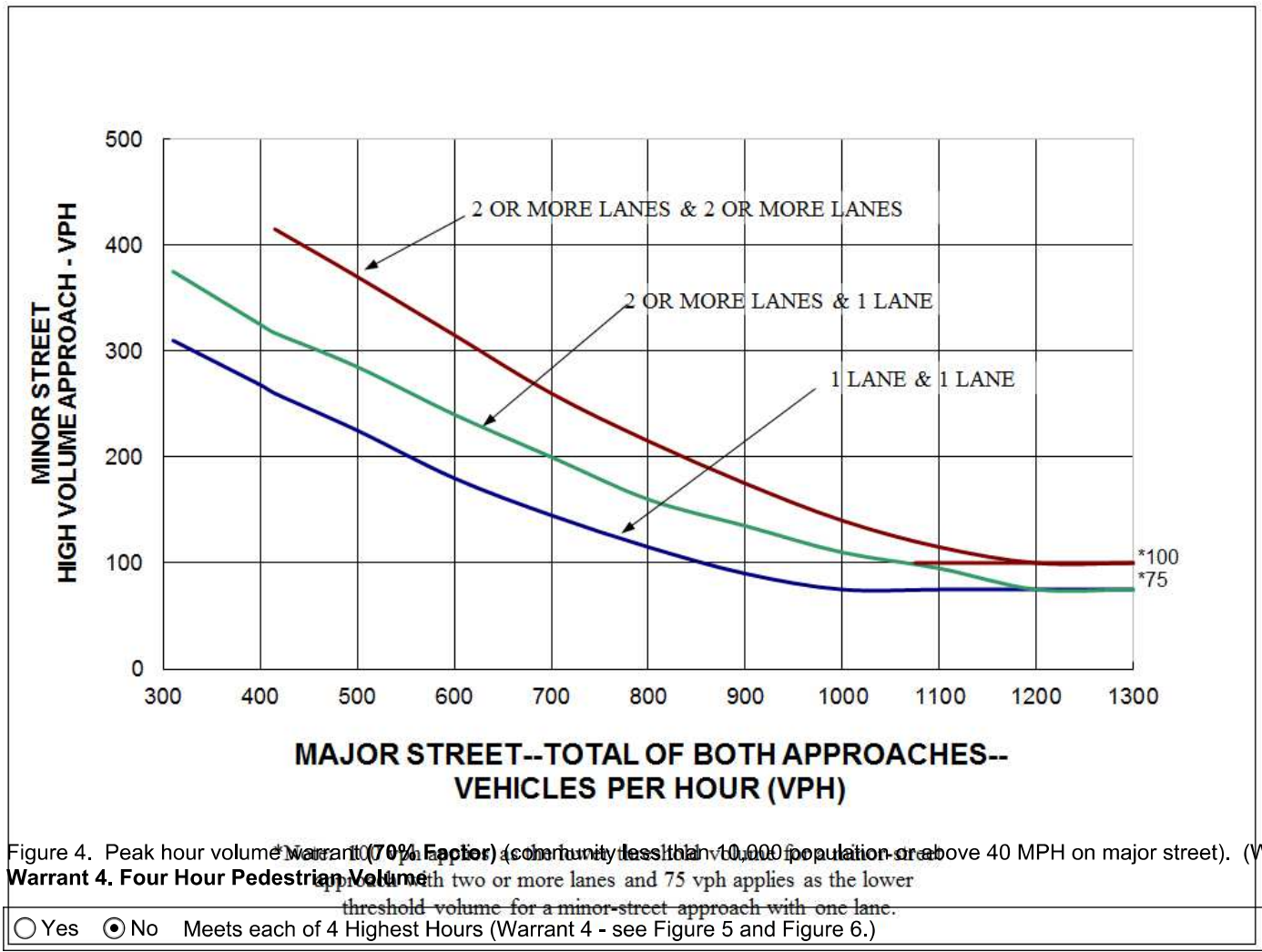
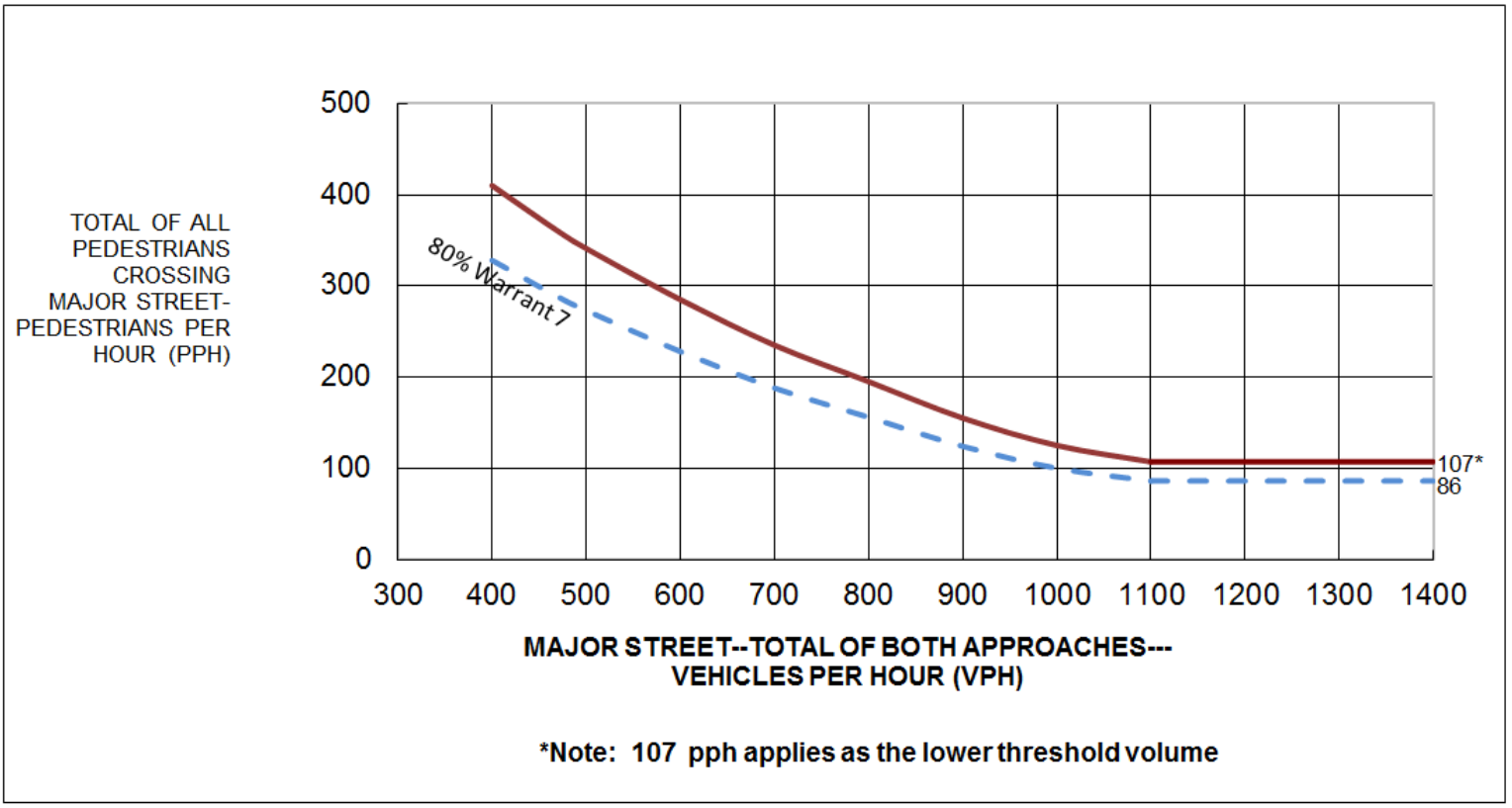


Figure 4. Peak hour volume warrant (**70% Factor**) (community less than 10,000 population or above 40 MPH on major street). (Warrant 3.)

Warrant 4. Four Hour Pedestrian Volume

◯ Yes ◉ No Meets each of 4 Highest Hours (Warrant 4 - see Figure 5 and Figure 6.)



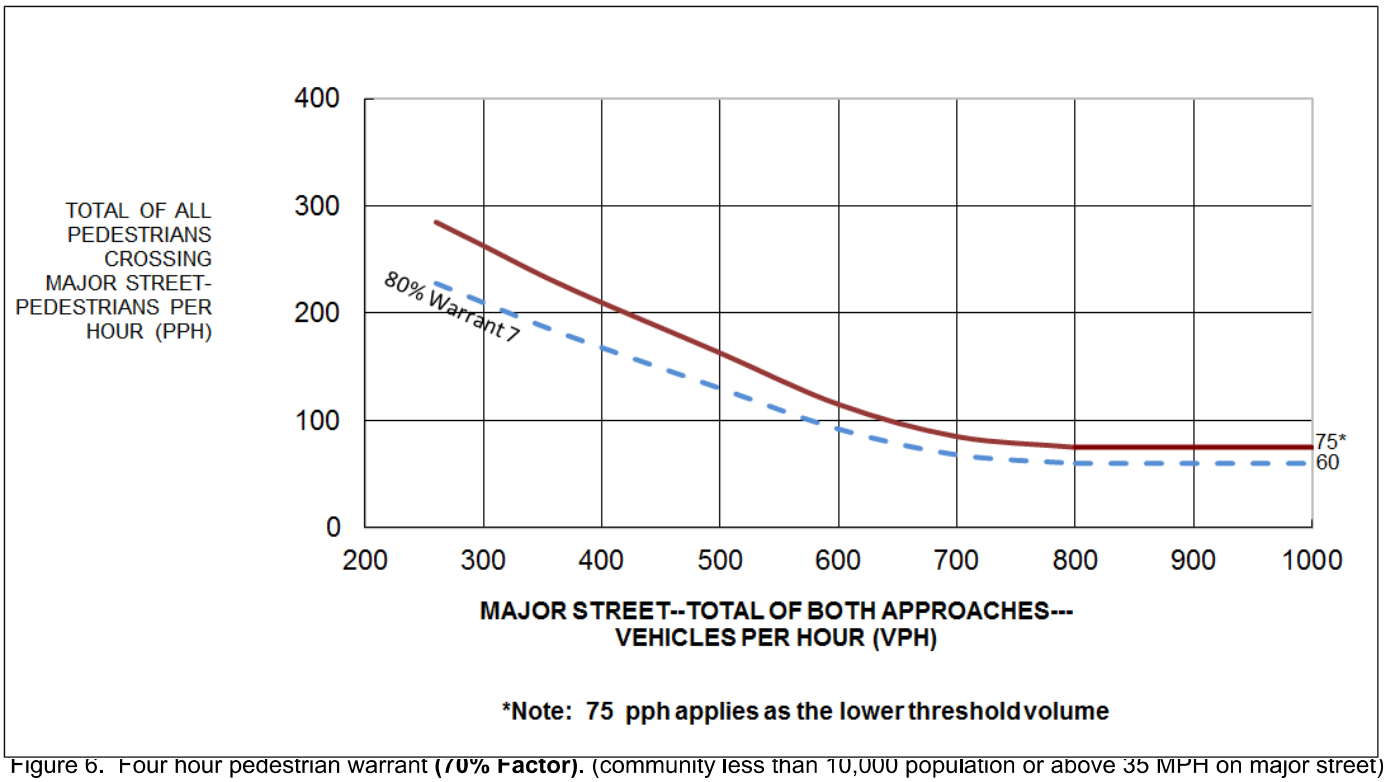


Figure 6. Four hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 35 MPH on major street). (Warrant 4.)

Warrant 4. Peak Hour Pedestrian Volumes

◯ Yes ◉ No Meets Peak Hour Pedestrian (Warrant 4 - see Figure 7 and Figure 8.)

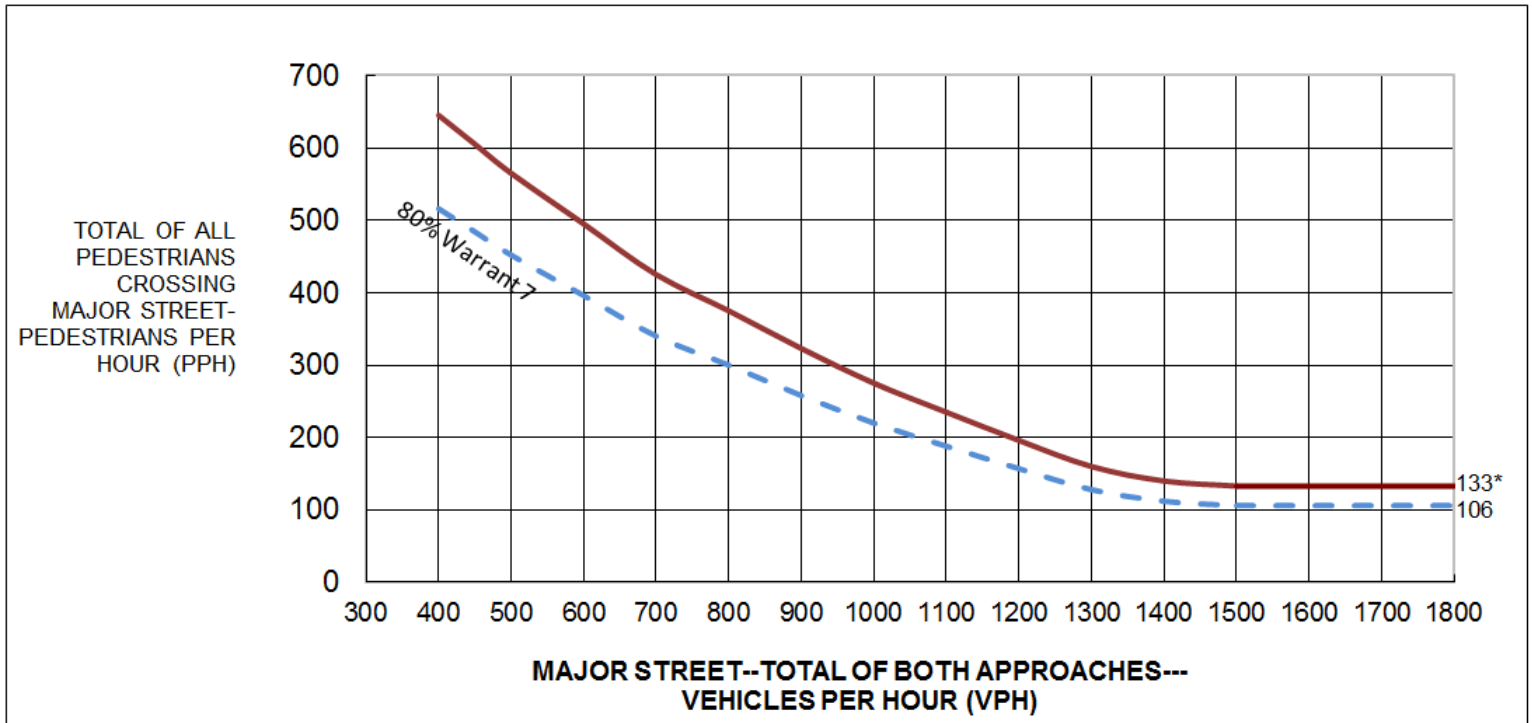


Figure 7. Four hour pedestrian warrant (Warrant 4.)

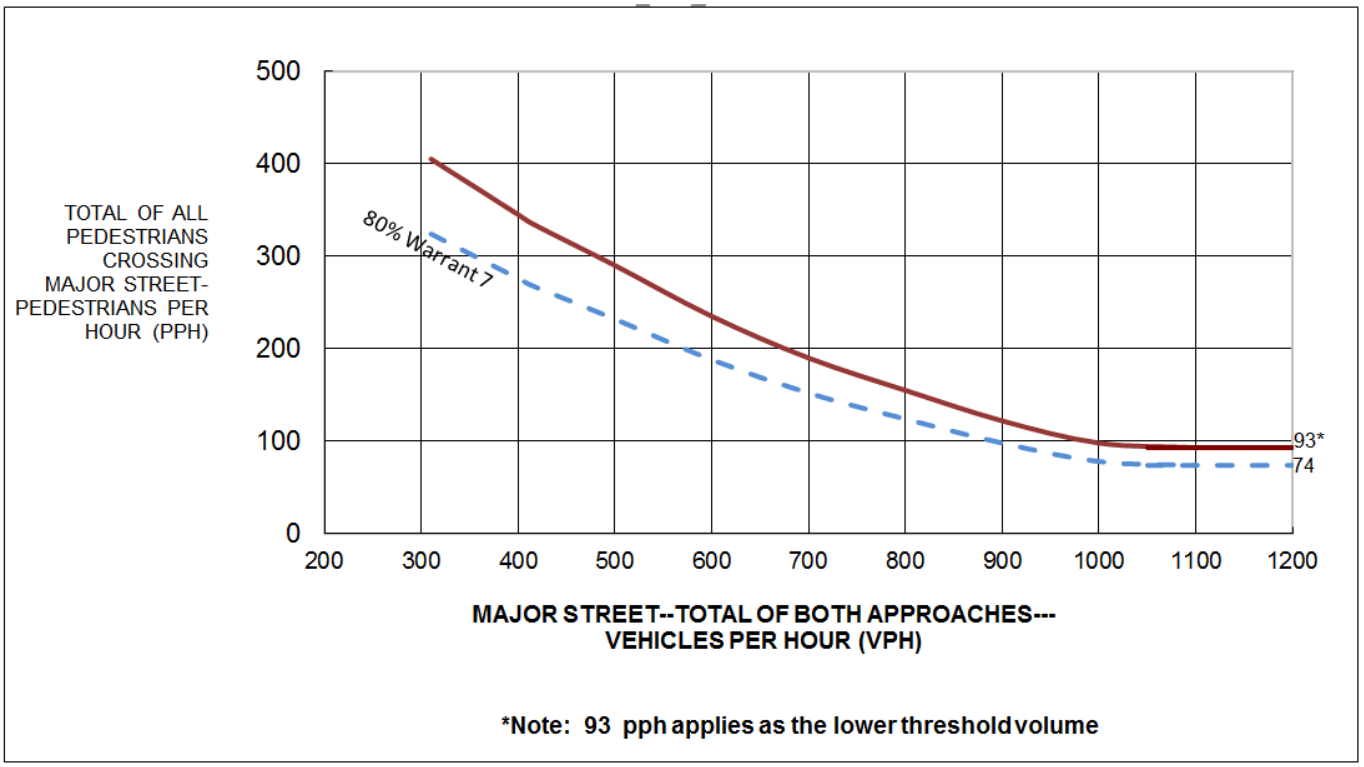


Figure 8. Peak hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 40 MPH on major street). (Warrant 4.)

Warrant 5. School Crossing

○ Yes	◉ No	Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?
		- and -
○ Yes	◉ No	Are there a minimum of 20 students during the highest crossing hour?
		*- **and** -*
○ Yes	◉ No	Is the nearest signal on the major street located more than 300 feet away? (This warrant may be applied if the proposed signal is less than 300 feet and does not restrict the progressive movement of traffic.)

Warrant 6. Coordinated Signal System

○ Yes	○ No	On a one-way street or a street with traffic predominantly in one direction, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur?
		- or -
◉ Yes	○ No	On a two-way street, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur and would the proposed and adjacent traffic control signal provide a progressive operation?

Warrant 7. Crash Experience

◉ Yes	○ No	Is one of the following conditions met?: ◆ 80% of Condition A or Condition B in Warrant 1 ◆ 56% of Conditions A or B in Warrant 1 (major-street speed exceeding 40 mph and population less than 10,000) ◆ 80% or more of Warrant 4
		- and -
○ Yes	○ No	Have there been 5 or more reported crashes susceptible to correction by a traffic signal in 12 months?

Warrant 8. Roadway Network

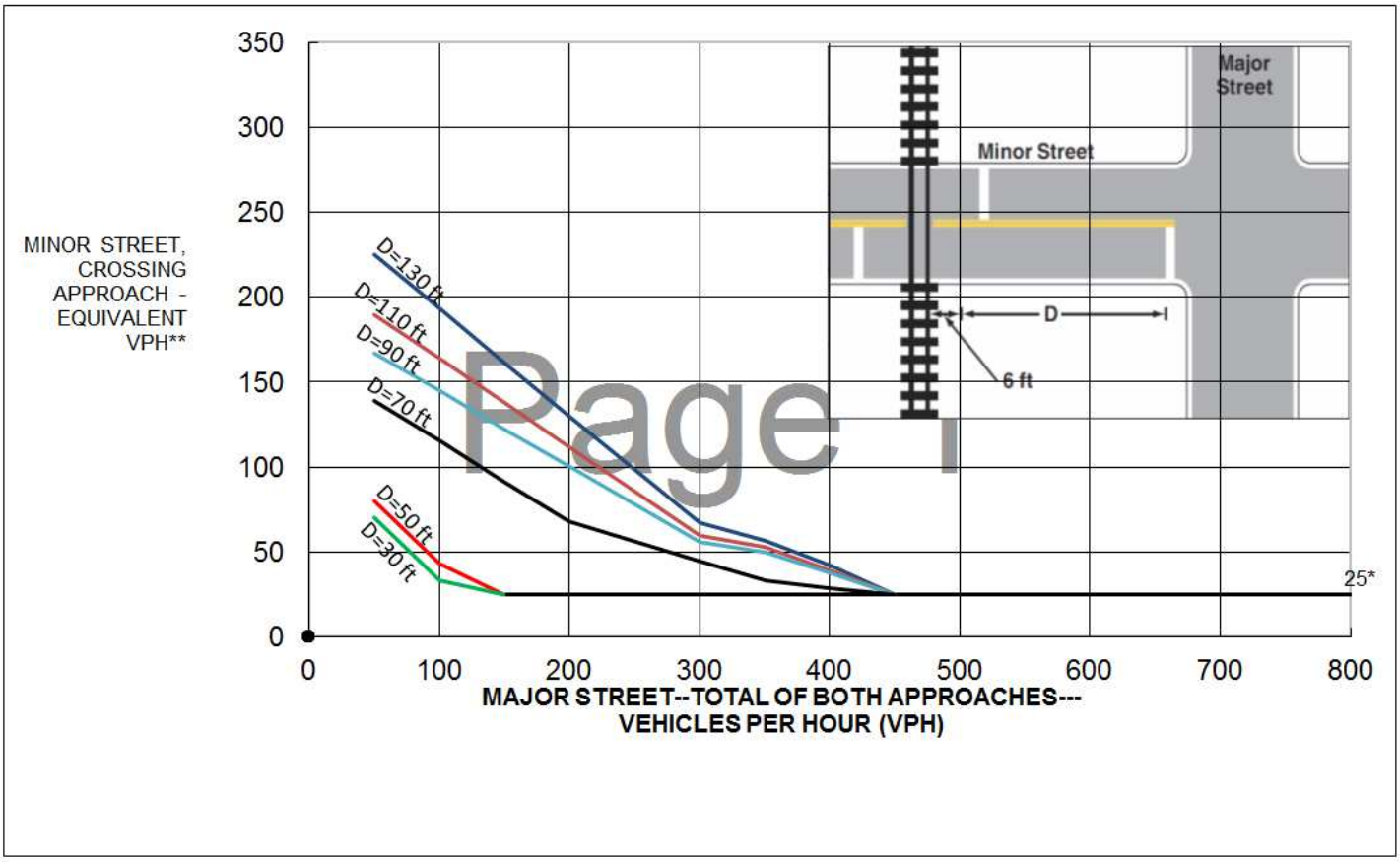
○ Yes	◉ No	Is the total existing, or immediately projected, entering volume on all approaches greater than 1000 vehicles for each of any 5 hours of a Saturday and/or Sunday.
		- or -
○ Yes	◉ No	Is the total existing, or immediately projected, entering volume greater than 1000 vehicles for the peak hour of a typical weekday, and do the 5 year projected traffic volumes meet one or more of Warrants 1, 2, and 3 during an average weekday?

Check applicable characteristics of each route (only 1 needs to be checked):

Major Street	Minor Street	
○ Yes	◉ No	It is part of street or highway system that serves as the principal roadway network for through traffic flow.
○ Yes	◉ No	It includes rural or suburban highways outside, entering, or traversing a city.
○ Yes	◉ No	It appears as a major route on an official plan such as a major street plan in an urban area traffic and transportation study.
◉ Yes	○ No	It connects areas of principal traffic generation.
○ Yes	◉ No	It has surface street freeway or expressway ramp terminals.

Warrant 9. Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)

○ Yes	◉ No	Meets one High Hour (Warrant 9 - see Figure 9.)



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Warrant 9. Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)

◯ Yes ◉ No Meets one High Hour (Warrant 9 - see Figure 10.)

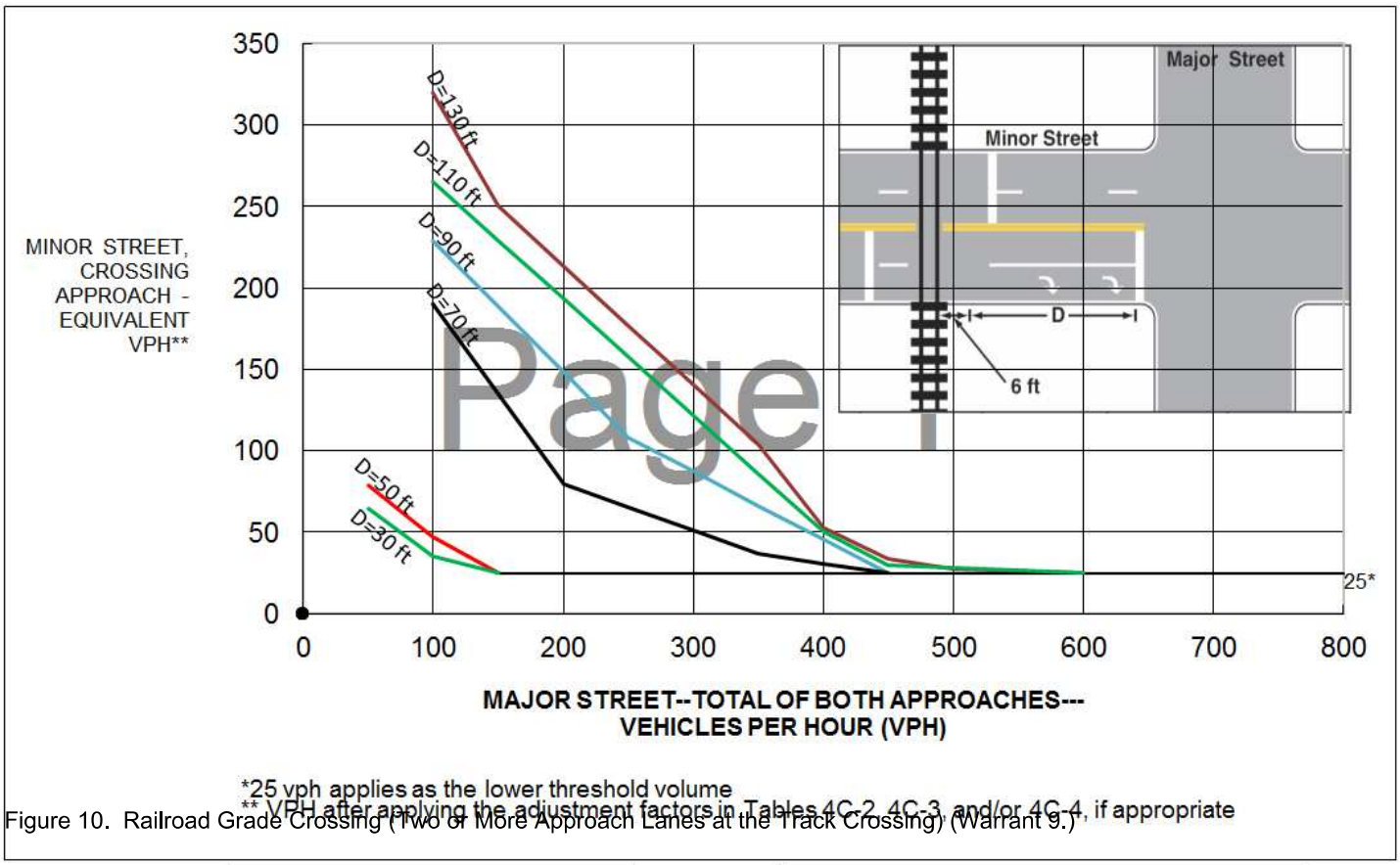


Figure 10. Railroad Grade Crossing (Two or More Approach Lanes at the Track Crossing) (Warrant 9.)

Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

Remarks:

A Traffic Signal Does Warrant

Traffic Survey - Count Analysis
2011 TMUTCD Warrants

Form TFF-TSCA (8/18)
Page of

County: *Brazoria* District: *Houston*

City: *Manvel* Population: Survey Date:

	Route #	Name	Control	Section	85% Speed
Major		*Del Bello Blvd*			*35*
Minor		*Manvel Pkwy*			*40*

Eight Highest Hours: Include the same 8 hours for the Major and Minor St. volumes.

Time Ends	Major St. - Both App.		Minor St. - Hi. Vol. App.	
	Veh. Total	Ped. Total	Veh. Total	Ped. Total
4:00 PM	*1,964*	*N/A*	*137*	*N/A*
6:00 PM	*1,909*	*N/A*	*149*	*N/A*
7:00 PM	*1,946*	*N/A*	*98*	*N/A*
5:00 PM	*1,519*	*N/A*	*106*	*N/A*
3:00 PM	*1,260*	*N/A*	*93*	*N/A*
1:00 PM	*1,075*	*N/A*	*93*	*N/A*
2:00 PM	*982*	*N/A*	*99*	*N/A*
8:00 AM	*921*	*N/A*	*157*	*N/A*

Comments:
2030 No Build Conditions With Background Volumes

Warrant 1. Eight Hour Vehicular Volume

○ Yes ◉ No Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition A. ***- or -*** Meets 70%[c] (and major-street speed exceeds 40 mph and population less than 10,000) *or* 100%[a] (regardless of speed) of Condition B. ***- or -*** Meets 80%[b] of Conditions A and B. ***- or -*** Meets 56%[d] of Conditions A and B (and major-street speed exceeds 40 mph and population less than 10,000).

◉ Yes ○ No

○ Yes ◉ No

◉ Yes ○ No

Condition A - Minimum Vehicle Volume

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*154%*	100%[a]	80%[b]	70%[c]	56%[d]	*62%*
1	1	500	400	350	280		150	120	105	84	
2 or more	1	600	480	420	336	*921*	150	120	105	84	*93*
2 or more	2 or more	600	480	420	336		200	160	140	112	
1	2 or more	500	400	350	280		200	160	140	112	

Condition B - Interruption of Continuous Traffic

Number of Lanes		Vehicles per hour on Major St. (Total of both Approaches)					Vehicles per hour on higher-volume Minor St. approach (One Direction Only)				
Major Street	Minor Street	Required				Existing	Required				Existing
		100%[a]	80%[b]	70%[c]	56%[d]	*102%*	100%[a]	80%[b]	70%[c]	56%[d]	*124%*
1	1	750	600	525	420		75	60	53	42	
2 or more	1	900	720	630	504	*921*	75	60	53	42	*93*
2 or more	2 or more	900	720	630	504		100	80	70	56	
1	2 or more	750	600	525	420		100	80	70	56	

[a] Basic minimum hourly volume.
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures.
[c] May be used when the major-street speed exceeds 40 mph or in a community with a population less than 10,000.
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when major street exceeds 40 mph or in an isolated community with a population of less than 10,000.

Contact/Help

Warrant 2. Four Hour Volumes

◉ Yes ○ No Meets each of 4 Highest Hours (Warrant 2 - see Figure 1 and Figure 2).

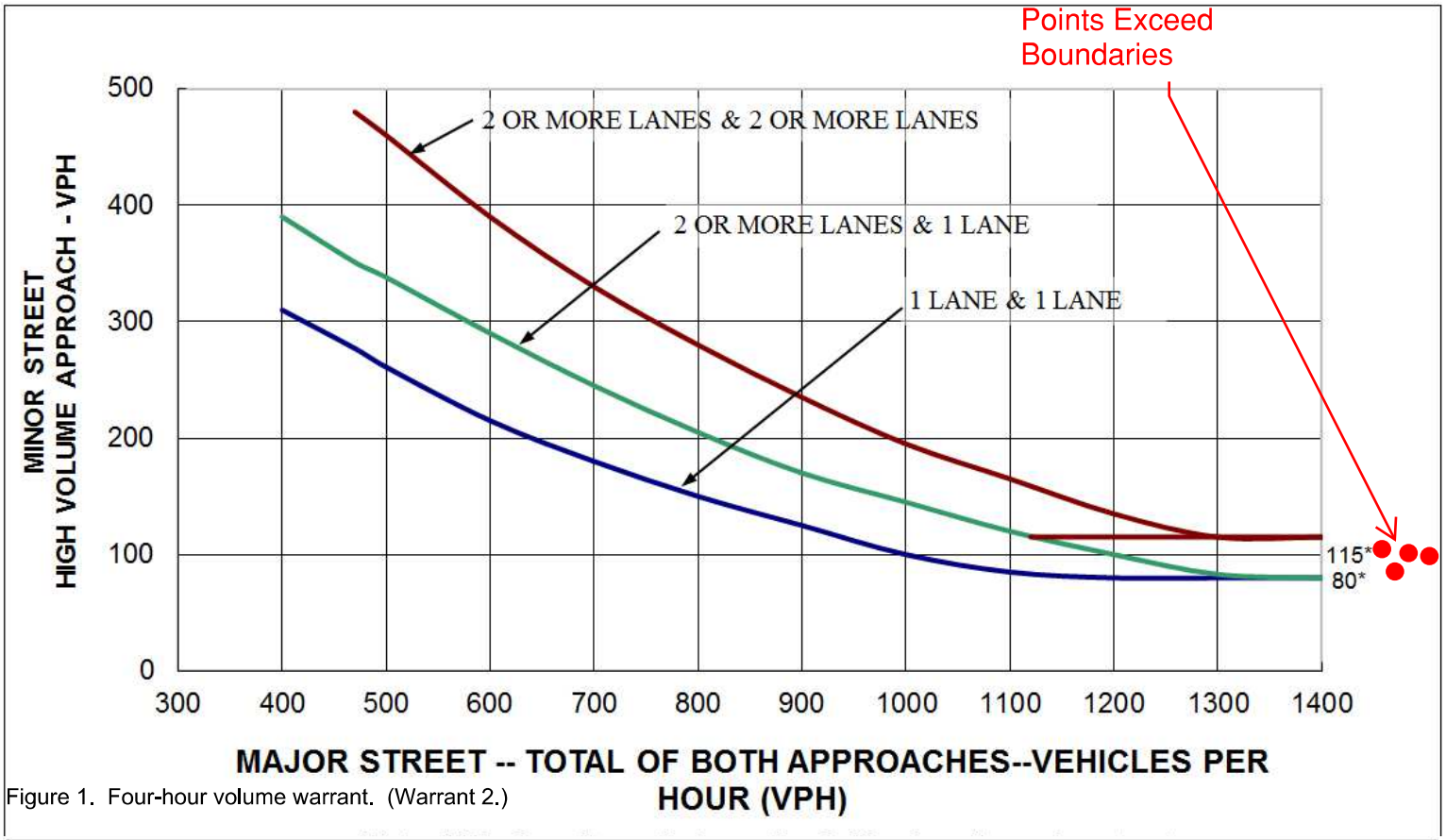


Figure 1. Four-hour volume warrant. (Warrant 2.)

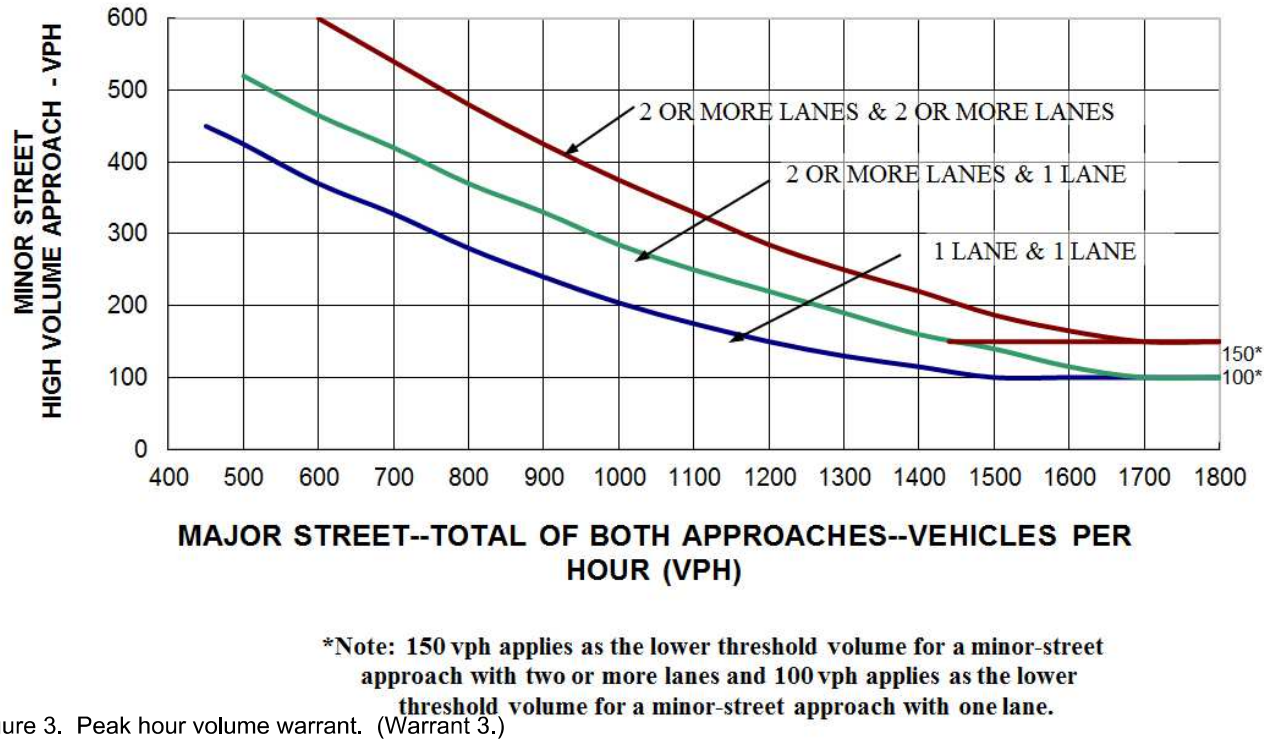


Figure 2. Four-hour volume warrant **(70% Factor)** (community less than 10,000 population or above 40 MPH on major street). (Warrant 2.)

Warrant 3. Peak Hour

◯ Yes ◉ No Are all of the following conditions true for the same 1 hour (any four consecutive 15 minute periods)?
1. The total stopped time delay experienced by the traffic on one minor street approach (one direction only) controlled by a stop sign equals or exceeds 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach, *and*
2. The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic or 150 vph for two moving lanes, *and*
3. The total entering volume serviced during the hour equals or exceeds 650 vph for intersections with three approaches or 800 vph for intersections with four (or more) approaches. **- *or* -** Meets one High Hour (Warrant 3 - see Figure 3 and Figure 4).

◯ Yes ◉ No



***Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.**

Figure 3. Peak hour volume warrant. (Warrant 3.)

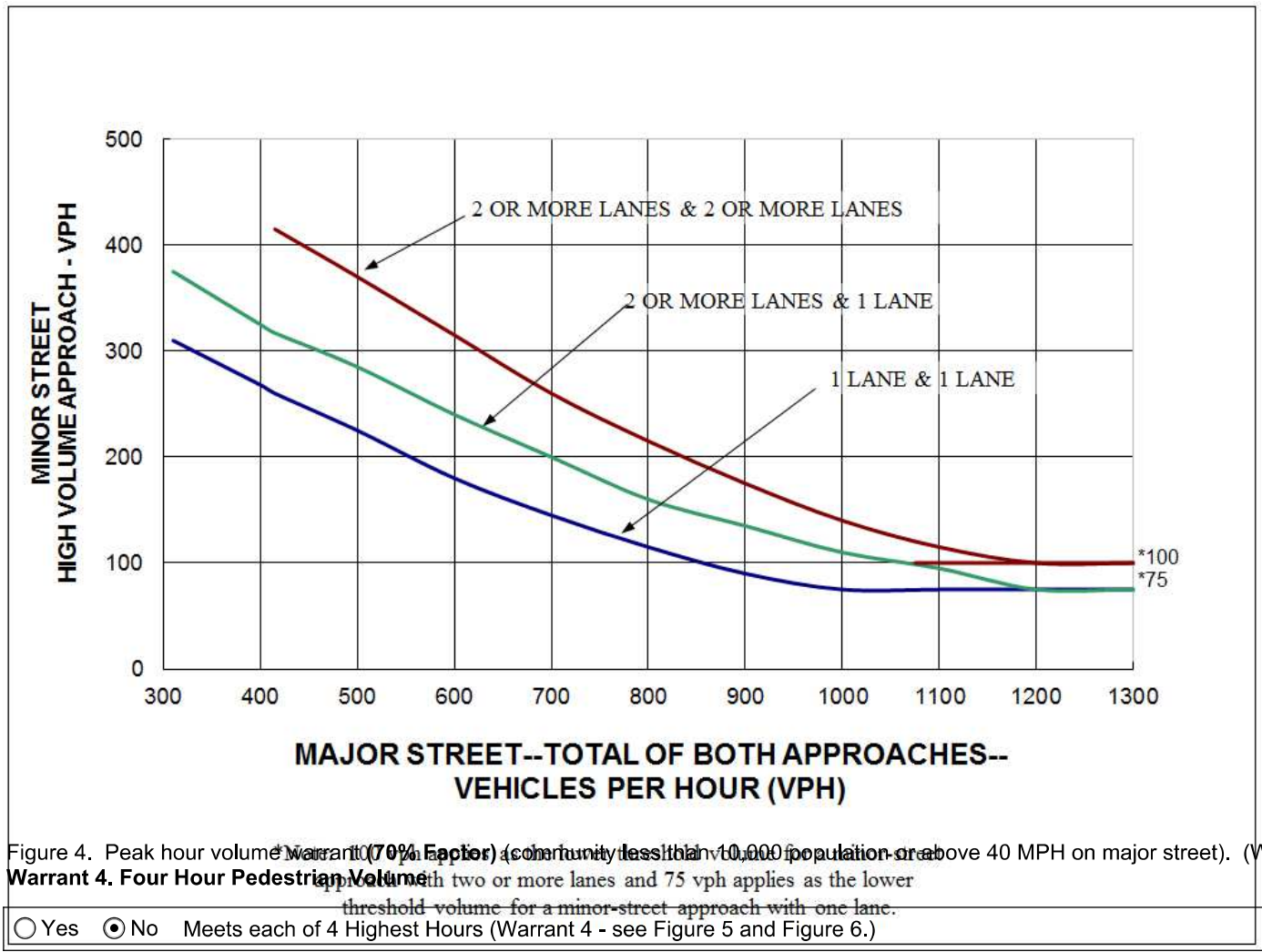
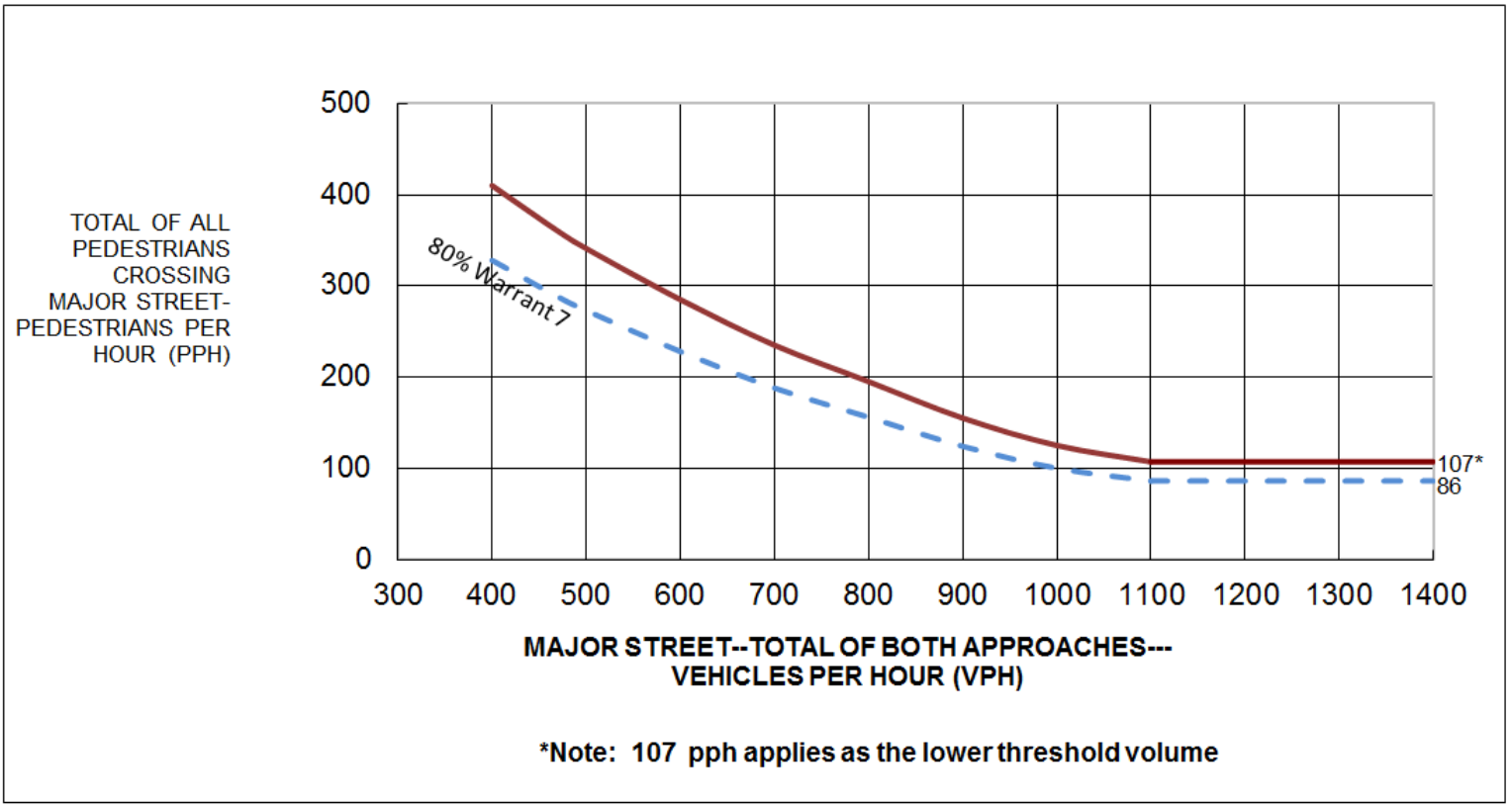


Figure 4. Peak hour volume warrant (**70% Factor**) (community less than 10,000 population or above 40 MPH on major street). (Warrant 3.)

Warrant 4. Four Hour Pedestrian Volume

◯ Yes ◉ No Meets each of 4 Highest Hours (Warrant 4 - see Figure 5 and Figure 6.)



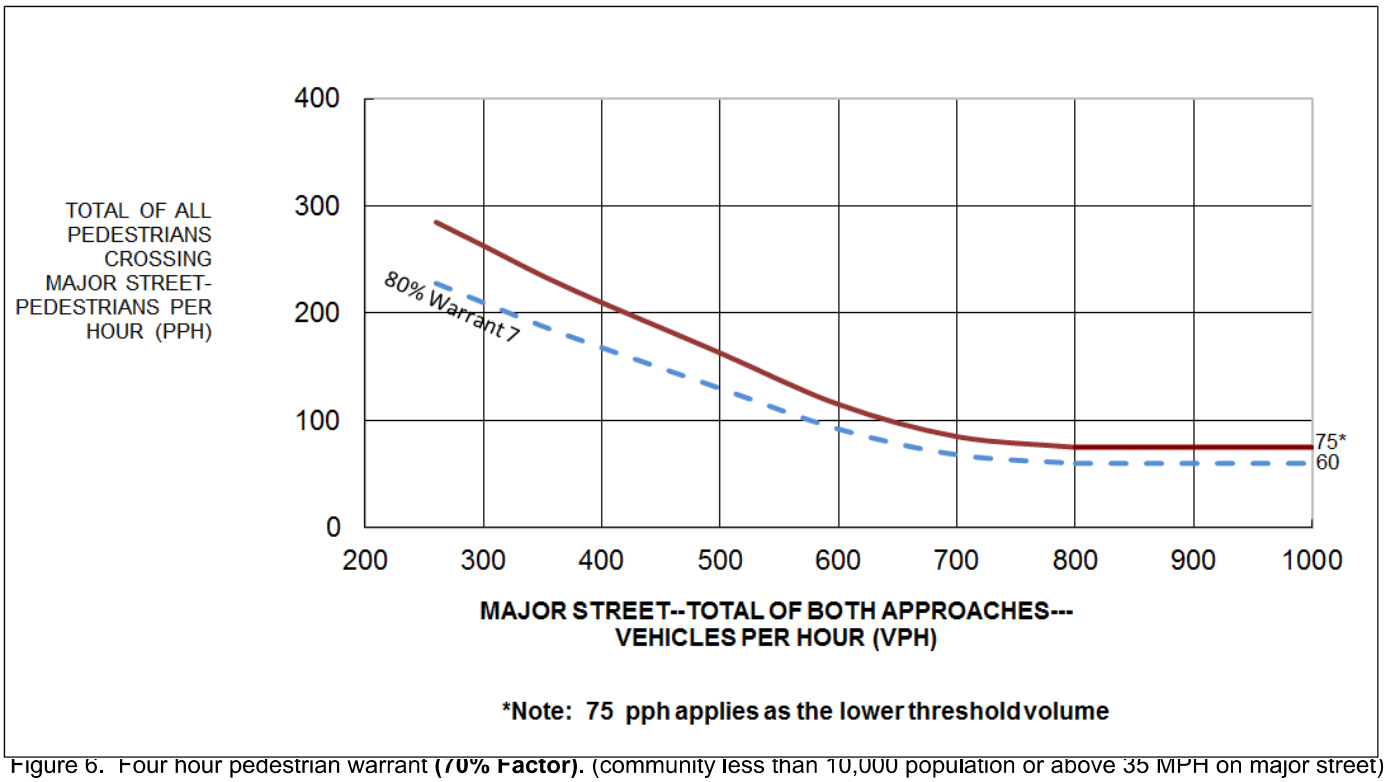


Figure 6. Four hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 35 MPH on major street). (Warrant 4.)

Warrant 4. Peak Hour Pedestrian Volumes

◯ Yes ◉ No Meets Peak Hour Pedestrian (Warrant 4 - see Figure 7 and Figure 8.)

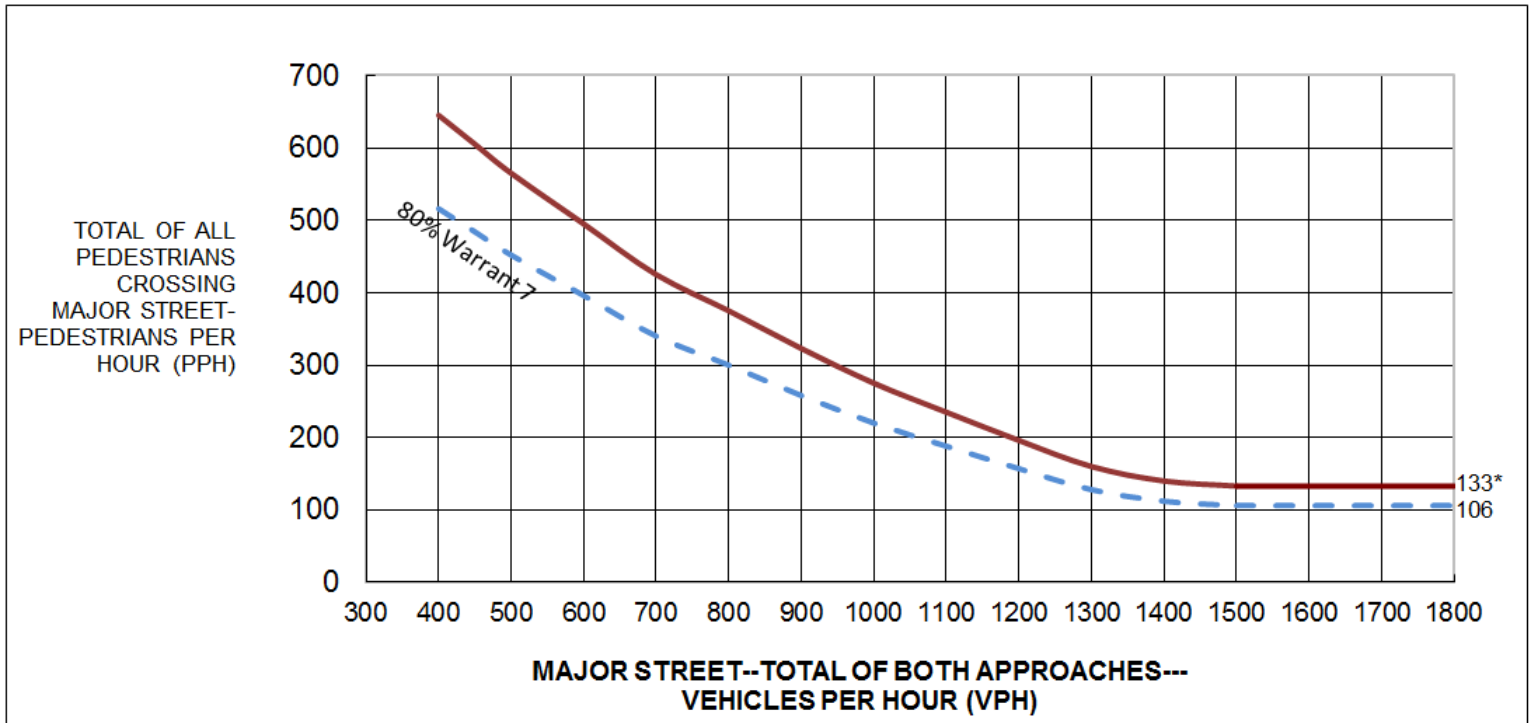


Figure 7. Four hour pedestrian warrant (Warrant 4.)

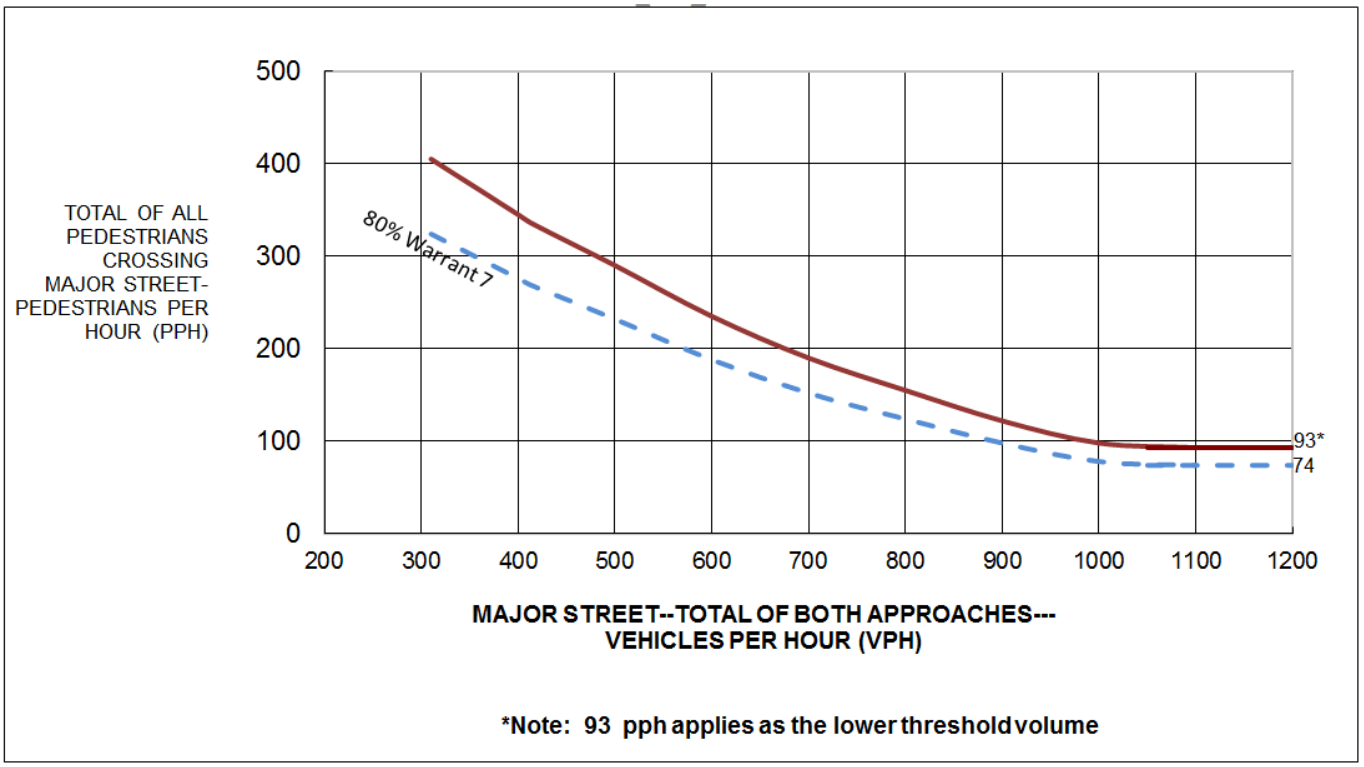


Figure 8. Peak hour pedestrian warrant **(70% Factor)**. (community less than 10,000 population or above 40 MPH on major street). (Warrant 4.)

Warrant 5. School Crossing

○ Yes	◉ No	Is the number of adequate gaps in traffic stream during the period when the children are using the crossing less than the number of minutes in the same period?
		- and -
○ Yes	◉ No	Are there a minimum of 20 students during the highest crossing hour?
		*- **and** -*
○ Yes	◉ No	Is the nearest signal on the major street located more than 300 feet away? (This warrant may be applied if the proposed signal is less than 300 feet and does not restrict the progressive movement of traffic.)

Warrant 6. Coordinated Signal System

○ Yes	○ No	On a one-way street or a street with traffic predominantly in one direction, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur?
		- or -
◉ Yes	○ No	On a two-way street, are the adjacent signals far enough apart that the necessary degree of vehicle platooning does not occur and would the proposed and adjacent traffic control signal provide a progressive operation?

Warrant 7. Crash Experience

◉ Yes	○ No	Is one of the following conditions met?: ◆ 80% of Condition A or Condition B in Warrant 1 ◆ 56% of Conditions A or B in Warrant 1 (major-street speed exceeding 40 mph and population less than 10,000) ◆ 80% or more of Warrant 4
		- and -
○ Yes	○ No	Have there been 5 or more reported crashes susceptible to correction by a traffic signal in 12 months?

Warrant 8. Roadway Network

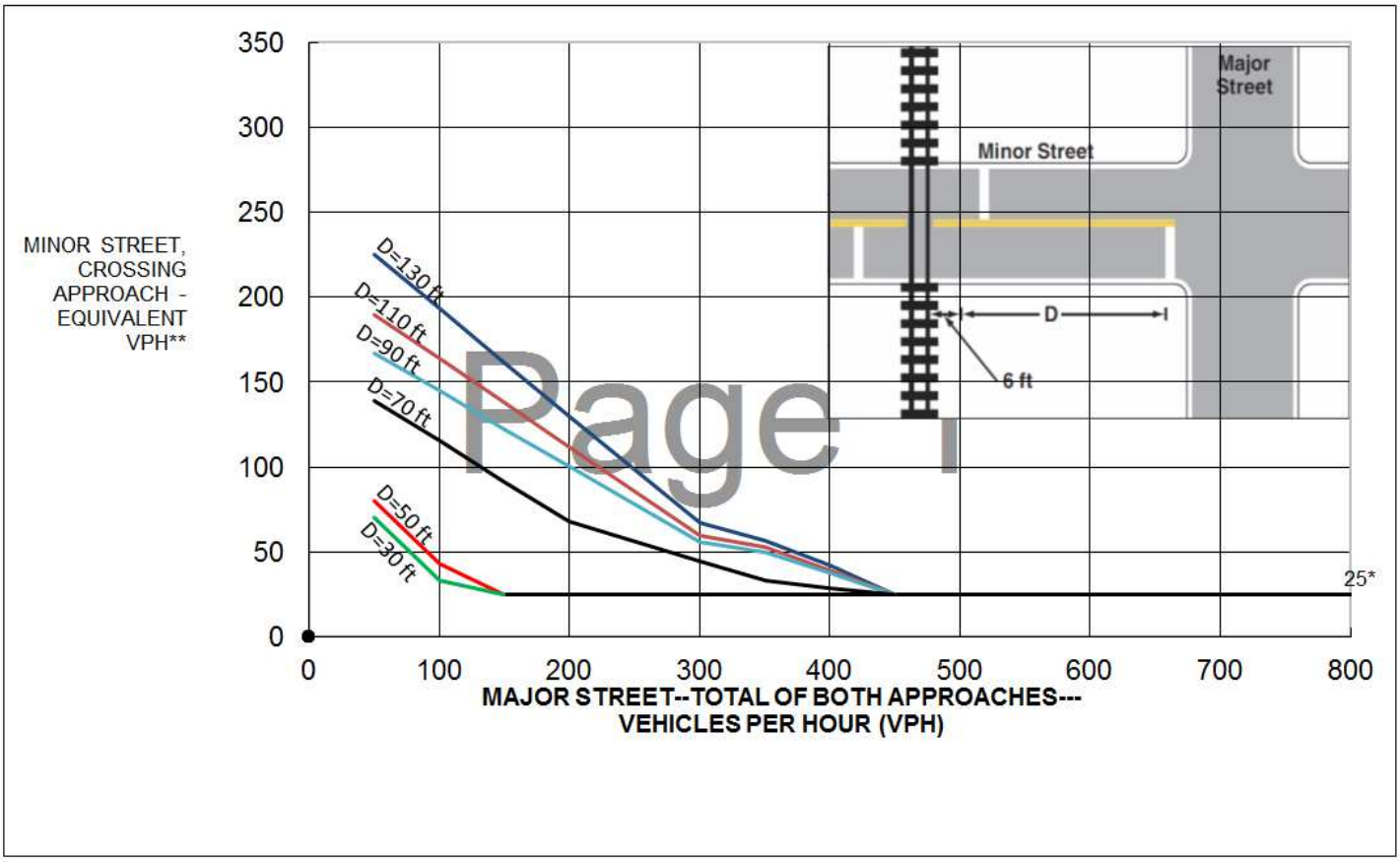
○ Yes	◉ No	Is the total existing, or immediately projected, entering volume on all approaches greater than 1000 vehicles for each of any 5 hours of a Saturday and/or Sunday.
		- or -
○ Yes	◉ No	Is the total existing, or immediately projected, entering volume greater than 1000 vehicles for the peak hour of a typical weekday, and do the 5 year projected traffic volumes meet one or more of Warrants 1, 2, and 3 during an average weekday?

Check applicable characteristics of each route (only 1 needs to be checked):

Major Street	Minor Street	
○ Yes	◉ No	It is part of street or highway system that serves as the principal roadway network for through traffic flow.
○ Yes	◉ No	It includes rural or suburban highways outside, entering, or traversing a city.
○ Yes	◉ No	It appears as a major route on an official plan such as a major street plan in an urban area traffic and transportation study.
◉ Yes	○ No	It connects areas of principal traffic generation.
○ Yes	◉ No	It has surface street freeway or expressway ramp terminals.

Warrant 9. Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)

○ Yes	◉ No	Meets one High Hour (Warrant 9 - see Figure 9.)



Page 1

Warrant 9. Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)

◯ Yes ◉ No Meets one High Hour (Warrant 9 - see Figure 10.)

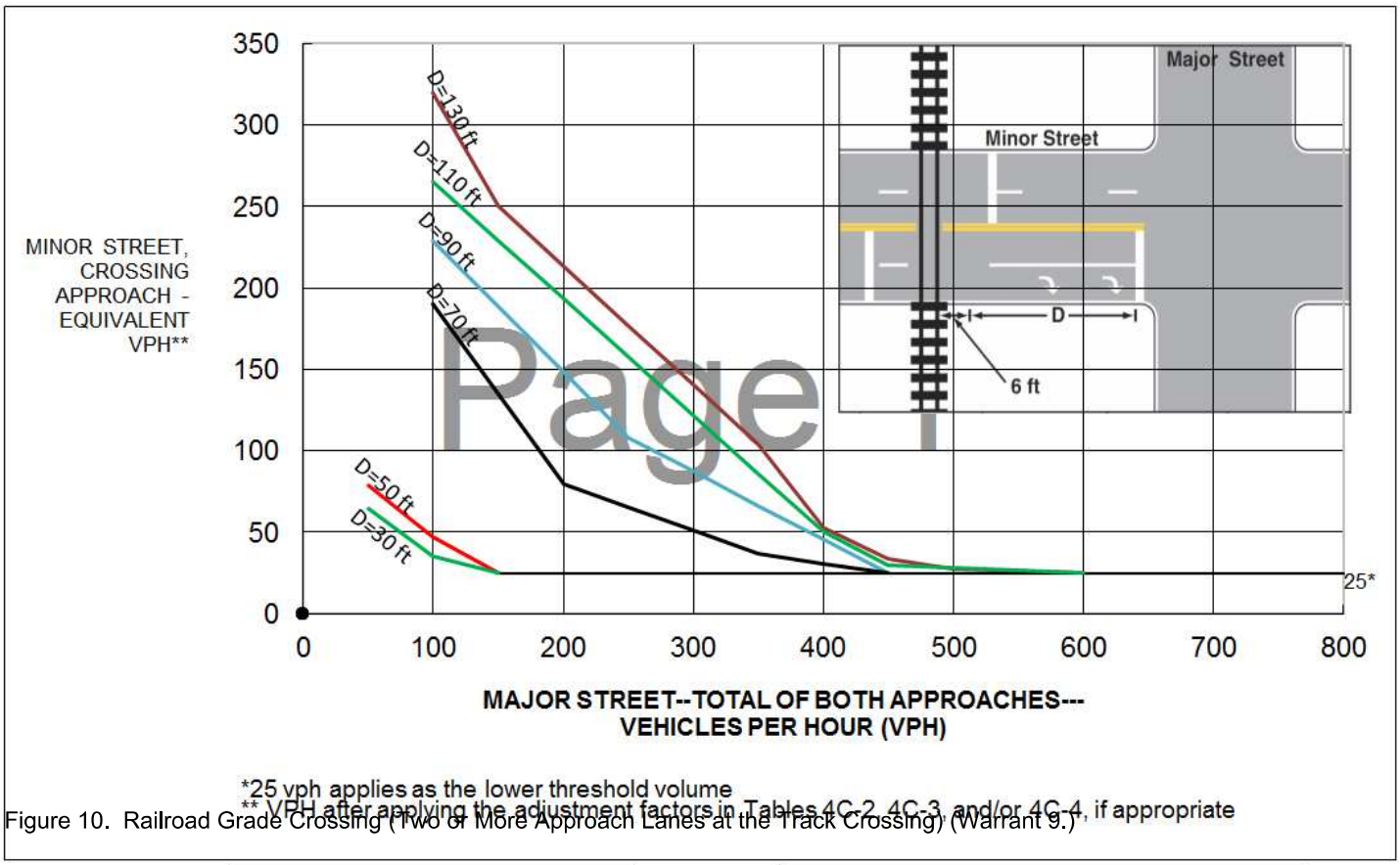


Figure 10. Railroad Grade Crossing (Two or More Approach Lanes at the Track Crossing) (Warrant 9.)

Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

Remarks:

A Traffic Signal Does Warrant

Appendix H

Queue Length Analysis

Intersection: 1: SH 6 & Pollard Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	L	T	T	T	U	T	T	TR	L	R
Maximum Queue (ft)	222	372	369	423	347	744	726	707	350	248
Average Queue (ft)	127	151	171	173	36	423	422	446	271	118
95th Queue (ft)	223	339	352	376	138	700	716	738	369	210
Link Distance (ft)		2533	2533	2533	692	692	692	692	298	298
Upstream Blk Time (%)						2	2	4	23	
Queuing Penalty (veh)						0	0	0	0	
Storage Bay Dist (ft)	475									
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: SH 6 & Iowa Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	TR	L	T	T	T	R	LTR	L	TR
Maximum Queue (ft)	138	265	235	241	55	452	506	568	200	653	114	53
Average Queue (ft)	55	83	96	118	12	237	271	312	96	456	64	27
95th Queue (ft)	110	178	200	229	38	462	502	556	259	807	112	53
Link Distance (ft)		842	842	842		2533	2533	2533		656		440
Upstream Blk Time (%)										42		
Queuing Penalty (veh)										0		
Storage Bay Dist (ft)	540				710				100		265	
Storage Blk Time (%)								29				
Queuing Penalty (veh)								36				

Intersection: 3: SH 6 & Manvel Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	L	T	T	T	T	T	T	R	L	L	R
Maximum Queue (ft)	483	282	169	209	728	782	812	200	122	137	299
Average Queue (ft)	253	81	89	106	365	430	483	74	35	57	134
95th Queue (ft)	409	175	152	173	646	755	807	213	84	103	224
Link Distance (ft)		1259	1259	1259	1007	1007	1007			526	526
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	710							100	230		
Storage Blk Time (%)					0		43				
Queuing Penalty (veh)					0		59				

Intersection: 4: Manvel Pkwy & Driveway 1

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	24	43	76
Average Queue (ft)	14	18	23
95th Queue (ft)	32	34	64
Link Distance (ft)	1179		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	100
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Manvel Pkwy & Charlotte Street

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	65	52	87	70	65	62	72	55	33	26	86
Average Queue (ft)	17	25	28	32	17	23	24	7	5	3	12
95th Queue (ft)	42	46	60	62	46	49	58	26	16	14	44
Link Distance (ft)		1688		634		637	637			850	850
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	100		100		100			100	100		
Storage Blk Time (%)			0								
Queuing Penalty (veh)			0								

Intersection: 6: Driveway 2 & Manvel Pkwy

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	24	99	96	20
Average Queue (ft)	4	29	19	1
95th Queue (ft)	17	53	56	6
Link Distance (ft)	1918			1792
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100	100	
Storage Blk Time (%)		0	0	
Queuing Penalty (veh)		0	0	

Intersection: 7: Manvel Pkwy & Dogwood Ave

Movement	WB
Directions Served	LR
Maximum Queue (ft)	72
Average Queue (ft)	37
95th Queue (ft)	62
Link Distance (ft)	993
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Manvel Pkwy & Del Bello Blvd

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	LT	TR	LT	TR	LT	TR	LTR
Maximum Queue (ft)	52	91	77	118	112	42	30
Average Queue (ft)	32	49	45	64	29	20	16
95th Queue (ft)	52	75	68	96	61	34	39
Link Distance (ft)	1973	1973	948	948	1797	1797	434
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 9: Driveway 3 & Driveway 2

Movement	EB	WB	NB	SB
Directions Served	L	LTR	LTR	LTR
Maximum Queue (ft)	28	29	97	74
Average Queue (ft)	7	3	25	32
95th Queue (ft)	26	16	51	59
Link Distance (ft)		1918	530	144
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Driveway 1/Driveway 3 & Charlotte Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	30	28	78	53
Average Queue (ft)	3	3	29	28
95th Queue (ft)	17	18	66	47
Link Distance (ft)	414	1688	406	530
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: SH 288 NB (Exit/Entrance Ramp) & Charlotte Street

Movement	WB
Directions Served	R
Maximum Queue (ft)	69
Average Queue (ft)	27
95th Queue (ft)	53
Link Distance (ft)	414
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 12: SH 288 NB (Exit/Entrance Ramp) & Driveway 2

Movement	WB
Directions Served	R
Maximum Queue (ft)	101
Average Queue (ft)	49
95th Queue (ft)	92
Link Distance (ft)	329
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: SH 288 NB (Exit/Entrance Ramp) & SH 6

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	LT	T	T	T	T	T	TR	L	LT	R
Maximum Queue (ft)	436	487	481	448	558	770	1142	1160	566	590	125
Average Queue (ft)	287	345	277	214	215	411	453	1014	264	516	100
95th Queue (ft)	415	453	442	359	464	718	814	1538	611	721	179
Link Distance (ft)	465	465	465	465	1143	1143	1143	1143	551	551	
Upstream Blk Time (%)		1	0	0			0	17	6	71	
Queuing Penalty (veh)		8	2	0			0	109	0	0	
Storage Bay Dist (ft)											100
Storage Blk Time (%)										71	7
Queuing Penalty (veh)										149	14

Intersection: 14: SH 6 & SH 288 SB Exit Ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB	SB
Directions Served	T	T	T	TR	L	T	T	T	L	L	TR	R
Maximum Queue (ft)	756	745	756	738	251	44	47	28	208	244	204	223
Average Queue (ft)	681	693	688	660	170	7	5	2	60	187	116	133
95th Queue (ft)	870	829	845	881	260	26	26	12	147	284	221	245
Link Distance (ft)	693	693	693	693	465	465	465	465	204	204	204	204
Upstream Blk Time (%)	68	87	62	26					2	47	0	2
Queuing Penalty (veh)	0	0	0	0					7	195	0	9
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 15: SH 288 NB (Exit/Entrance Ramp) & Del Bello Blvd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	L	LT	T	T	T	TR	LT	T	R
Maximum Queue (ft)	71	66	56	238	274	308	54	54	50
Average Queue (ft)	37	42	36	29	42	169	29	24	25
95th Queue (ft)	56	61	53	93	134	303	49	44	42
Link Distance (ft)	266	266	266	1973	1973	1973	730	730	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									350
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 16: Rodeo Palms Pkwy & SH 288 SB Exit Ramp

Movement	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	T	T	TR	L	LT	T	LT	TR
Maximum Queue (ft)	36	75	160	56	48	44	108	50
Average Queue (ft)	14	30	50	23	24	12	57	25
95th Queue (ft)	27	55	95	41	39	34	90	41
Link Distance (ft)	1237	1237	1237	266	266	266	440	440
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 17: SH 6

Movement	WB	WB	WB	SB
Directions Served	T	T	TR	R
Maximum Queue (ft)	1298	1307	1259	159
Average Queue (ft)	270	427	562	40
95th Queue (ft)	992	1216	1333	110
Link Distance (ft)	1259	1259	1259	343
Upstream Blk Time (%)	0	0	0	
Queuing Penalty (veh)	1	2	1	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: Driveway 1

Movement	NB
Directions Served	LR
Maximum Queue (ft)	53
Average Queue (ft)	14
95th Queue (ft)	41
Link Distance (ft)	343
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 19: SH 288 SB Exit Ramp

Movement	SB	SB	SB	SB	SB
Directions Served	L	T	T	T	T
Maximum Queue (ft)	775	772	792	568	397
Average Queue (ft)	480	525	560	313	172
95th Queue (ft)	788	763	754	600	371
Link Distance (ft)	1011	1011	1011	1011	1011
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 20:

Movement	EB
Directions Served	L
Maximum Queue (ft)	483
Average Queue (ft)	160
95th Queue (ft)	367
Link Distance (ft)	465
Upstream Blk Time (%)	3
Queuing Penalty (veh)	8
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 21: SH 6 & Driveway 5

Movement	SB
Directions Served	R
Maximum Queue (ft)	52
Average Queue (ft)	20
95th Queue (ft)	50
Link Distance (ft)	311
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: SH 6 & Driveway 6

Movement	WB	WB	SB
Directions Served	T	TR	R
Maximum Queue (ft)	19	51	52
Average Queue (ft)	1	2	13
95th Queue (ft)	6	16	37
Link Distance (ft)	842	842	354
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 45:

Movement	EB
Directions Served	L
Maximum Queue (ft)	31
Average Queue (ft)	7
95th Queue (ft)	28
Link Distance (ft)	261
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 46: SH 288 SB Exit Ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 47: SH 288 NB (Exit/Entrance Ramp)

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 48:

Movement	WB
Directions Served	L
Maximum Queue (ft)	30
Average Queue (ft)	3
95th Queue (ft)	17
Link Distance (ft)	225
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 598

Intersection: 1: SH 6/Pollard Blvd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB
Directions Served	L	T	T	T	U	T	T	TR	UL	R
Maximum Queue (ft)	418	271	330	356	707	731	731	755	361	313
Average Queue (ft)	188	103	136	147	643	671	678	681	309	170
95th Queue (ft)	337	236	271	294	962	871	887	892	359	326
Link Distance (ft)		2533	2533	2533	692	692	692	692	298	298
Upstream Blk Time (%)					40	48	68	54	58	8
Queuing Penalty (veh)					0	0	0	0	0	0
Storage Bay Dist (ft)	475									
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: SH 6 & Iowa Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	SB	SB
Directions Served	UL	T	T	TR	L	T	T	T	R	LTR	L	TR
Maximum Queue (ft)	188	272	221	230	35	634	631	663	200	671	189	74
Average Queue (ft)	83	103	109	128	3	376	408	421	72	576	104	32
95th Queue (ft)	149	205	192	218	14	644	668	693	227	862	168	68
Link Distance (ft)		703	703	703		2533	2533	2533		656		440
Upstream Blk Time (%)										74		
Queuing Penalty (veh)										0		
Storage Bay Dist (ft)	540				710				100		205	
Storage Blk Time (%)								46			0	
Queuing Penalty (veh)								35			0	

Intersection: 3: SH 6 & Manvel Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	L	T	T	T	T	T	T	R	L	L	R
Maximum Queue (ft)	408	132	188	195	1083	1094	1099	200	329	570	546
Average Queue (ft)	251	47	68	70	578	619	649	130	151	333	482
95th Queue (ft)	404	115	152	159	1118	1138	1152	272	287	649	655
Link Distance (ft)		1213	1213	1213	1071	1071	1071			523	523
Upstream Blk Time (%)					7	8	9			8	35
Queuing Penalty (veh)					63	70	79			47	202
Storage Bay Dist (ft)	710							100	230		
Storage Blk Time (%)					19		53		0	9	
Queuing Penalty (veh)					0		113		0	16	

Intersection: 4: Manvel Pkwy & Driveway 1

Movement	EB	EB	NB	SB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	1179	200	138	620	661	200
Average Queue (ft)	512	155	46	217	285	48
95th Queue (ft)	1193	264	108	564	633	190
Link Distance (ft)	1171			642	642	
Upstream Blk Time (%)	14				0	
Queuing Penalty (veh)	26				2	
Storage Bay Dist (ft)		100	100			100
Storage Blk Time (%)	16	72	3		47	
Queuing Penalty (veh)	34	74	11		20	

Intersection: 5: Manvel Pkwy & Charlotte Street

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	103	116	106	116	74	102	102	71	54	116	137
Average Queue (ft)	38	48	58	66	29	30	36	20	13	51	76
95th Queue (ft)	82	85	92	105	65	74	81	50	36	105	132
Link Distance (ft)		1688		634		642	642			850	850
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	100		115		100			100	100		
Storage Blk Time (%)	0	1	0	0		0	0			1	
Queuing Penalty (veh)	0	1	0	1		0	1			1	

Intersection: 6: Driveway 2 & Manvel Pkwy

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	45	109	77	56
Average Queue (ft)	9	52	20	3
95th Queue (ft)	29	86	57	22
Link Distance (ft)	1918			1792
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		100	100	
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 7: Manvel Pkwy & Dogwood AVE

Movement	WB
Directions Served	LR
Maximum Queue (ft)	76
Average Queue (ft)	48
95th Queue (ft)	74
Link Distance (ft)	993
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: Manvel Pkwy & Del Bello Blvd

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	LT	TR	LT	TR	LT	TR	LTR
Maximum Queue (ft)	97	98	138	169	67	101	29
Average Queue (ft)	52	63	83	84	30	32	5
95th Queue (ft)	79	89	129	132	52	74	22
Link Distance (ft)	1970	1970	948	948	1797	1797	434
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 9: Driveway 3 & Driveway 2

Movement	EB	WB	NB	SB
Directions Served	L	LTR	LTR	LTR
Maximum Queue (ft)	28	72	73	111
Average Queue (ft)	6	3	31	49
95th Queue (ft)	25	25	55	80
Link Distance (ft)		1918	530	206
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Driveway 1/Driveway 3 & Charlotte Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	31	52	78	75
Average Queue (ft)	7	7	40	34
95th Queue (ft)	28	31	67	56
Link Distance (ft)	414	1688	398	530
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: SH 288 NB (Exit/Entrance Ramp) & Charlotte Street

Movement	WB
Directions Served	R
Maximum Queue (ft)	131
Average Queue (ft)	64
95th Queue (ft)	116
Link Distance (ft)	414
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 12: SH 288 NB (Exit/Entrance Ramp) & Driveway 2

Movement	WB
Directions Served	R
Maximum Queue (ft)	315
Average Queue (ft)	111
95th Queue (ft)	228
Link Distance (ft)	329
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: SH 288 NB (Exit/Entrance Ramp) & SH 6

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	LT	T	T	T	T	T	TR	L	LT	R
Maximum Queue (ft)	327	468	479	465	1229	1228	1209	1229	566	590	125
Average Queue (ft)	197	323	261	195	847	874	892	958	439	554	94
95th Queue (ft)	287	437	449	364	1549	1540	1516	1529	705	666	178
Link Distance (ft)	465	465	465	465	1185	1185	1185	1185	551	551	
Upstream Blk Time (%)		0	0	0	17	17	10	19	5	83	
Queuing Penalty (veh)		4	2	1	149	147	83	167	0	0	
Storage Bay Dist (ft)											100
Storage Blk Time (%)										76	5
Queuing Penalty (veh)										278	14

Intersection: 14: SH 6 & SH 288 SB Exit Ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB	SB
Directions Served	T	T	T	TR	L	T	T	T	L	L	TR	R
Maximum Queue (ft)	734	745	732	745	492	88	69	73	222	241	221	219
Average Queue (ft)	702	708	703	698	416	24	24	24	123	212	130	137
95th Queue (ft)	769	771	784	828	606	60	59	54	242	234	225	229
Link Distance (ft)	693	693	693	693	465	465	465	465	204	204	204	204
Upstream Blk Time (%)	77	90	81	54	12				9	54	2	1
Queuing Penalty (veh)	0	0	0	0	97				44	269	9	7
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 15: SH 288 NB (Exit/Entrance Ramp) & Del Bello Blvd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	L	LT	T	T	T	TR	LT	T	R
Maximum Queue (ft)	66	76	72	71	111	201	74	23	82
Average Queue (ft)	33	42	44	28	37	84	27	3	30
95th Queue (ft)	48	68	67	49	69	139	54	15	56
Link Distance (ft)	266	266	266	1970	1970	1970	593	593	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									350
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 16: Rodeo Palms Pkwy & SH 288 SB Exit Ramp

Movement	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	T	T	TR	L	LT	T	LT	TR
Maximum Queue (ft)	41	68	91	70	126	49	476	470
Average Queue (ft)	9	37	41	36	40	28	415	328
95th Queue (ft)	22	60	68	63	74	53	588	570
Link Distance (ft)	1243	1243	1243	266	266	266	450	450
Upstream Blk Time (%)							26	1
Queuing Penalty (veh)							150	8
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 17: SH 6 & Driveway 4

Movement	EB	EB	EB	WB	WB	WB	SB
Directions Served	T	T	T	T	T	TR	R
Maximum Queue (ft)	592	960	865	1254	1251	1256	72
Average Queue (ft)	18	51	48	566	576	584	31
95th Queue (ft)	186	386	360	1502	1524	1543	61
Link Distance (ft)	1185	1185	1185	1213	1213	1213	211
Upstream Blk Time (%)				0	1	3	
Queuing Penalty (veh)				5	16	29	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 18: Driveway 4 & Driveway 1

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	320	31	31
Average Queue (ft)	38	4	16
95th Queue (ft)	198	20	41
Link Distance (ft)	517	1171	211
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 19: SH 288 SB Exit Ramp

Movement	SB	SB	SB	SB	SB
Directions Served	L	T	T	T	T
Maximum Queue (ft)	675	697	696	648	337
Average Queue (ft)	515	547	599	296	143
95th Queue (ft)	803	770	780	546	335
Link Distance (ft)	1011	1011	1011	1011	1011
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 20:

Movement	EB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	484	22	298
Average Queue (ft)	213	1	21
95th Queue (ft)	487	7	140
Link Distance (ft)	465	183	183
Upstream Blk Time (%)	4		2
Queuing Penalty (veh)	16		14
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 21: SH 6 & Driveway 5

Movement	WB	WB	WB	SB
Directions Served	T	T	TR	R
Maximum Queue (ft)	554	546	542	182
Average Queue (ft)	104	105	108	39
95th Queue (ft)	433	441	451	80
Link Distance (ft)	527	527	527	285
Upstream Blk Time (%)	3	3	5	
Queuing Penalty (veh)	25	23	44	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 22: SH 6 & Driveway 6

Movement	WB	WB	WB	SB
Directions Served	T	T	TR	R
Maximum Queue (ft)	591	614	634	118
Average Queue (ft)	35	45	45	38
95th Queue (ft)	241	266	276	79
Link Distance (ft)	703	703	703	314
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 45:

Movement	EB
Directions Served	L
Maximum Queue (ft)	30
Average Queue (ft)	7
95th Queue (ft)	27
Link Distance (ft)	277
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 46: SH 288 SB Exit Ramp

Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	513	531	518
Average Queue (ft)	283	363	338
95th Queue (ft)	684	691	684
Link Distance (ft)	479	479	479
Upstream Blk Time (%)	53	55	52
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 47:

Movement	WB
Directions Served	L
Maximum Queue (ft)	31
Average Queue (ft)	10
95th Queue (ft)	34
Link Distance (ft)	235
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 48: SH 288 NB (Exit/Entrance Ramp)

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

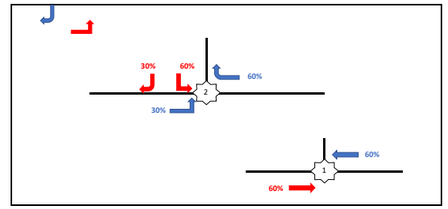
Network Summary

Network wide Queuing Penalty: 2397

Appendix I

Total AM & PM Distribution

	IN	OUT
Outside	100%	100%
Inside	100%	100%



Rodeo Palms Pkwy

Del bello Blvd

Del bello Blvd

Manvel PKWY

Dogwood Avenue

Driveway 2

Driveway 3

Driveway 1

Charlotte Street

Charlotte Street

Iowa Lane

Pollard Blvd

SH 6

SH 6

SH 6

SH288SB

SH288NB

SH 288 NB RAMP

SH 288 NB

SH 288 SB

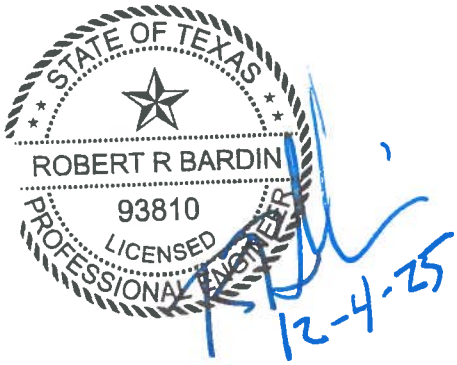
Turn

U-Turn

Drainage Impact Analysis
Presidio at Manvel

December 2025

Drainage Impact Analysis
Presidio at Manvel



Prepared for
Brazoria Drainage District No. 4
Brazoria County

December 2025

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EXECUTIVE SUMMARY

Presidio at Manvel is an approximately 358-acre development in the upper reaches of the Chocolate Bayou watershed. The project is bordered to the west by State Highway 288, the south by Highway 6, the east by Cooper Ditch, and the north by Del Bello. The entire site is located within the jurisdiction of the Brazoria Drainage District No. 4 (BDD4), which is responsible for approving outfall drainage for the tract. This drainage plan addresses the ultimate level of development to demonstrate that the proposed development will not adversely impact the watershed and current drainage within it.

In its undeveloped condition, this area is a part of a larger drainage area that ultimately routes under SH 6 and through a siphon under the Gulf Coast Water Authority's Canal, just south of 6. The allowable flow from the proposed detention facility is governed by the capacity of two existing 72-inch CMP siphons under the Gulf Coast Water Authority (GCWA) canal. The capacity of each culvert is approximately 111 cfs for the 100-year event. Therefore, the total capacity of the siphon is approximately 222 cfs.

The two existing 72-inch CMP siphons under the GCWA canal and 4 existing 8' x 4' reinforced concrete box (RCB) culverts limit the depth of an outfall channel and substantial land area would be needed to construct a traditional detention facility. Therefore, the developers of BCMUD 30 are proposing a combination of gravity/pumped detention, limiting the peak discharge to a pro rata share, or 37 cfs, of the total siphon capacity. **Figure ES-1** shows the development limits and existing drainage features in the vicinity of the tract.

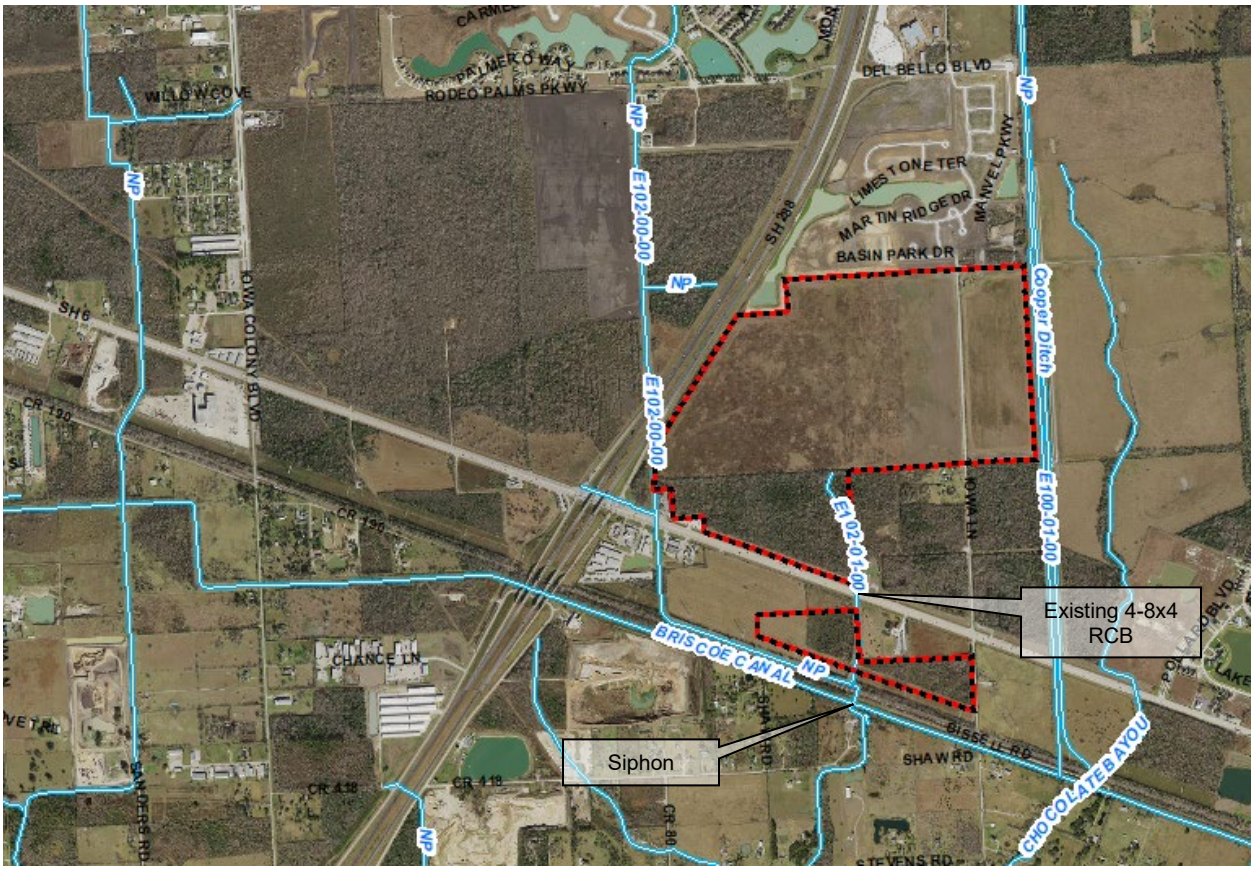


Figure ES-1 Presidio at Manvel Analysis Area

A series of detention ponds and culverts will be constructed to provide detention and conveyance for the proposed development. The ponds are a combination of gravity and pumped outfalls that will provide adequate detention and conveyance for the site. The allowable discharge from the siphon was pro-rated to the allowable discharge from the development area contributing to the siphon. In order to demonstrate no adverse impacts, the existing flows into the siphon will not exceed the pro rated capacity. The downstream limits of the analysis are located just upstream of the siphons under the canal.

The allowable discharge through the existing SH6 culverts was also considered in this study. Based on a comparison to the resulting discharges at SH6 from a prior study titled Brazoria County Municipal Utility District No. 30 Final Drainage Analysis dated June 29, 2005 by LJA Engineering, Inc., the post project flows from the Presidio development will not exceed allowable flows. The June 2005 (revised existing) and post project peak discharges are compared in **Table ES-1**.

Table ES-1
Discharge Comparisons

Outfall ID	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.
	2-year Q			10-year Q			100-year Q		
Hwy6	525**	269	-256	673	464	-209	869	818	-51
Siphon	--	--	--	--	--	--	37.1	37.0	-0.1

*Obtained from June 2005 DIA ICPR model results for BCMUD 30
**From DCM as of 2005. Current DCM now requires a 2yr analysis.

It should be noted that the June 2005 analysis did not reflect Atlas 14 precipitation, whereas the flows computed for the Presidio drainage used Atlas 14 precipitation in accordance with the current BDD4 DCM. Additionally, the revised existing conditions flow from the 2005 DIA was based on a 3-year storm event. The post project flows are based on a 2-year Atlas 14 storm event. These assumptions incur some conservatism in the drainage recommendations for the proposed development.

According to the Brazoria County Flood Insurance Rate Map (FIRM) Panel 48039C0110K, dated December 30, 2020, approximately 31.5 acres will be developed within a Special Flood Hazard Area (SFHA) Zone AO. Zone AO indicates that no base flood elevation has been determined, but shallow flooding occurs, usually from sheet flow, and is indicated as a depth on the FIRM. The AO Zone depth affecting the development is 2 feet. Approximately 1.7 acres of the SFHA area will be reclaimed for development, thus displacing approximately 3.4 acre-feet of floodplain volume. The remaining 29.8 acres are in an area that is proposed for a detention facility and will remain a SFHA. 13.63 acre-feet of compensating storage is provided in the freeboard for Basin D. Additionally, because the flooding occurs due to backflow, filling in the floodplain will not affect conveyance in Chocolate Bayou.

Presidio at Manvel will be developed in phases, whereas this report details the ultimate conditions development. The detention ponds for the tract will provide approximately 479 acre-feet of storage for mitigating increased runoff resulting from the development, as well as offsite areas draining to the site. This results in a detention rate of 1.34 acre-feet per acre.

Storage will be provided in four detention ponds that will connect through equalizer culverts until the ultimate outfall from Basin D into the siphon. Three of the ponds, located upstream of SH 6 will rely on gravity-based discharge, the fourth pond, located south of SH 6 and north of the canal, will provide a combination of gravity and pumped detention. The pump activates only when water levels are too low for gravity discharge. In this case, the proposed pump will operate only when water surface elevations in Basin D are below 47.44'. **Table ES-2** summarizes the detention provided by the proposed drainage system.

Table ES-2 **Detention Summary**				
Description				
Detention Service Area (ac)	358.4			
Pond ID	Basin A	Basin B	Basin C	Basin D
100-year Water Surface Elevation (ft)	53.71	53.60	53.31	52.92
10-year Water Surface Elevation (ft)	51.84	51.80	51.71	46.69
2-year Water Surface Elevation (ft)	50.85	50.84	50.80	41.35
Highbank Elevation (ft)	54.75	54.75	54.50	54.50
100-year Freeboard (ft)	1.04	1.15	1.19	1.58
100-year Detention Volume (ac-ft)	84.06	69.09	15.94	309.92
100-year Detention Rate (ac-ft/ac)*	1.34 ac-ft/ac			
Required Floodplain Mitigation (ac-ft)	3.4 ac-ft			
Provided Floodplain Mitigation (ac-ft)	13.6 ac-ft*			
Total 100yr Detention Volume (ac-ft)	479.01 ac-ft			
Pumped Volume (ac-ft)	196.62 ac-ft (41% Total Volume)			
Gravity Volume (ac-ft)	282.39 ac-ft (59% Total Volume)			

*Provided in the freeboard above the 100-year detention WSE.

Proposed improvements for mitigating the developed runoff are summarized below:

- Approximately 479.01 acre-feet of storage will be provided during a 100-year storm event in 4 ponds totaling 63 acres per the land plan used in this analysis.
- Basin A will discharge via 100% gravity into Basin B through 3-7x5 Reinforced Concrete Box (RCB) culverts with flowlines of 41.5 (sufficiently deep enough to be submerged below the amenity water level).
- Basin B will discharge via 100% gravity into Basin C through 4-7x5 RCB culverts with a flowline of 41.50’ (submerged below the amenity water level).
- Basin C will discharge across SH6 via 100% gravity into Basin D through the existing 4-8x4 Reinforced Concrete Box (RCB) culverts with an upstream flowline of approximately 48.44’.
- Basin D will discharge into the siphon under the Brisco Canal through a combination pump and gravity discharge.
- A proposed pump discharge of 16,600 gpm (37 cfs) will provide drainage when water surface elevations in Basin D are below the flowline of the gravity discharge (47.50’).
- Gravity discharge will provide drainage for the development through 1-27” RCP culvert when the water surface elevation in Basin D is higher than 47.50’.

Construction of the proposed improvements as recommended will mitigate the impacts from the increased discharges, runoff volume, and floodplain fill, resulting in no adverse impacts to the receiving stream and adjacent properties for storm events up to and including the 100-year storm event.

The analysis presented in this report was prepared from a conceptual development plan, and LiDAR topography was used for determining physical geometries and, thus, resulting water surface elevations. However, relative comparisons of pre project and post project conditions conclude that the proposed drainage plan will be sufficient for mitigating the 2-, 10-, and 100-year storm events. As development progresses and changes occur, or more details become available, the analysis will be updated to reflect such changes in future amendments.

1.0 INTRODUCTION

This report supports a drainage impact analysis (DIA) for the proposed ~360-acre development, called Presidio at Manvel, in the Chocolate Bayou watershed in Brazoria County, approximately 20 miles south of downtown Houston, and 2 miles northwest of Manvel. Jurisdiction over the Tract is provided by Brazoria County Drainage District No. 4 (BDD4). The development is located in the upper reaches of the Chocolate Bayou watershed. The objective, methodology, results, and conclusions for the detailed hydrologic and hydraulic analysis are discussed in this report.

1.1 Site Location and Description

Presidio at Manvel is an approximately 360 acre planned development in Brazoria County within the city limits of Manvel, Texas. The site is located at the northeastern intersection of SH 288 and SH 6, approximately 20 miles south of downtown Houston, Texas and two miles northwest of Manvel. Jurisdictional boundaries, major roadways, and streams are illustrated in **Exhibit 1.1**.

Currently undeveloped, the site's topography is relatively flat with elevations ranging from 56 feet at the north end to 53 feet in the south (based on lidar data). **Figure 1-1** illustrates the existing topography in the vicinity of the Tract. Cooler, green colors reflect lower elevations and warmer, maroon/red colors reflect the higher elevations.

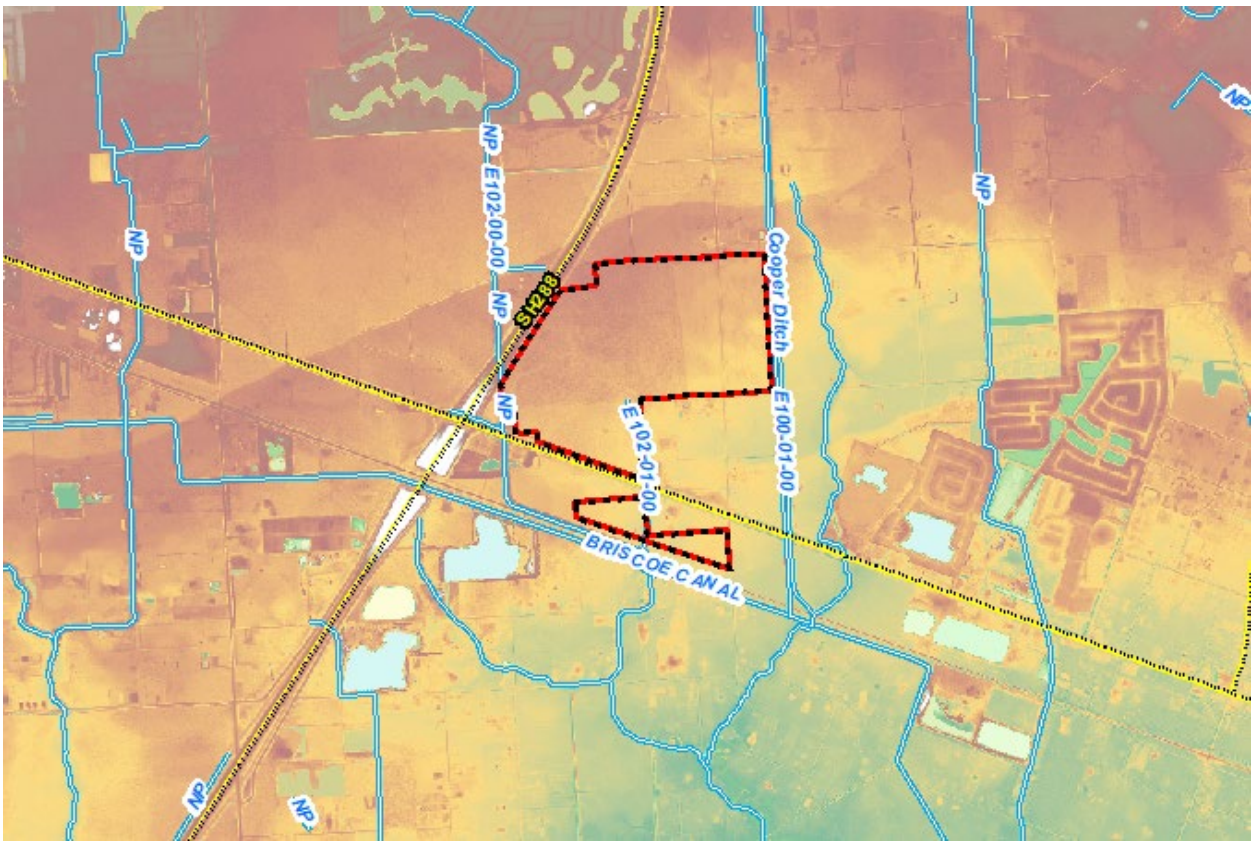


Figure 1-1 Existing Topography

Existing ground cover consists of open-pastures in the northern sections while the southern portion is comprised of varying vegetation common to post-clear cutting regrowth that includes marshy grasses, dense underbrush, and sparsely placed pine and oak trees throughout the area. Soils in the area are mostly Lake Charles clay, Bernard clay loam, or Bernard-Edna complex, which is about 60 percent Bernard clay and 40 percent Edna fine sandy loam. All of these soils are represented by Soil Conservation Service (SCS) soil Group D, which indicates they are somewhat poorly drained and very slowly permeable (less than 0.06 inches per hour in saturated soil).

Annual rainfall averages 52 inches, with periods of intense rainfall associated with tropical storms and localized thunderstorms occurring frequently throughout the year. About 60 percent of the precipitation usually occurs from April to September. **Exhibit 1.2** provides a wider topographic illustration with contour elevations and existing land cover.

1.2 Purpose and Objective

The objective of this analysis is to determine the necessary drainage features to mitigate impacts associated with the development. This report was prepared for submittal to BDD4 and the City of Manvel with the following objectives:

- Describe the proposed land use within the Tract and summarize the drainage elements necessary to convey runoff from the tract into Chocolate Bayou.
- Evaluate the proposed development's impacts of increased rainfall runoff on Chocolate Bayou for the 2-, 10-, and 100-year storm events.
- Demonstrate no adverse impacts (increases) to the flows and water surface elevations from pre-project conditions riverine analysis in the watershed using dynamic 1D modeling (XP-SWMM)

1.3 Prior Studies

The analysis presented in this report uses information from prior studies. The prior studies used in this analysis were not updated, or in any way altered in this analysis unless specified. Information from the following studies was used in this analysis, and to prepare this report.

- Brazoria County Municipal Utility District No. 30 Final Drainage Analysis, June 29, 2005, LJA Engineering, Inc.
- Southpoint Crossing Drainage Impact Analysis, July 24, 2018, LJA Engineering, Inc.
- BCMUD 30 and BCMUD 43 Prorated Siphon Capacity, January 10, 2007, LJA Engineering, Inc

1.4 Project Datum

Because prior studies of Presidio (BCMUD 30) are tied to the National Geodetic Vertical Datum (NGVD) 1987 adjustment, equations were established to adjust the elevations to the project datum and topography datum for Presidio (NAVD 88, 2001 adj). The following equations were obtained from the June 2005 DIA to adjust prior vertical datums:

- NAVD 88, 2001 adjustment = NAVD 29, 1987 adjustment - 0.32 feet
- NGVD 29, 1987 adjustment = NGVD 29, 1973 adjustment - 1.27 feet
- NAVD-88, 2001 adjustment = NGVD 29, 1973 adjustment - 1.59 feet

Elevations referenced in this report are on NAVD 88, 2001 adjustment, unless otherwise noted.

1.5 Effective Floodplain

According to the Brazoria County Flood Insurance Rate Map (FIRM) Panel 48039C0110K, dated December 30, 2020, approximately 31.5 acres will be developed within a Special Flood Hazard Area (SFHA) designated as Zone AO. Zone AO indicates that no base flood elevation has been determined, but shallow flooding occurs, usually from sheet flow, and is indicated as a depth on the FIRM. The AO Zone depth affecting the development is 2 feet. **Exhibit 1.3** shows the Effective Special Flood Hazard Area in the vicinity of the Tract.

Of the 31.5 acres that encroach into the Zone AO SFHA, approximately 1.5 acres will be filled to reclaim land for development. The remaining ~30 acres lie within a proposed pond easement and will remain Zone AO post development. Based on the AO depth of 2 feet, the volume displaced by fill in the floodplain is approximately 3 acre-feet.

Upon completion of the fill, a Letter of Map Revision based on Fill (LOMR-F) can be requested from FEMA to revise the Zone AO delineation.

1.6 Proposed Development

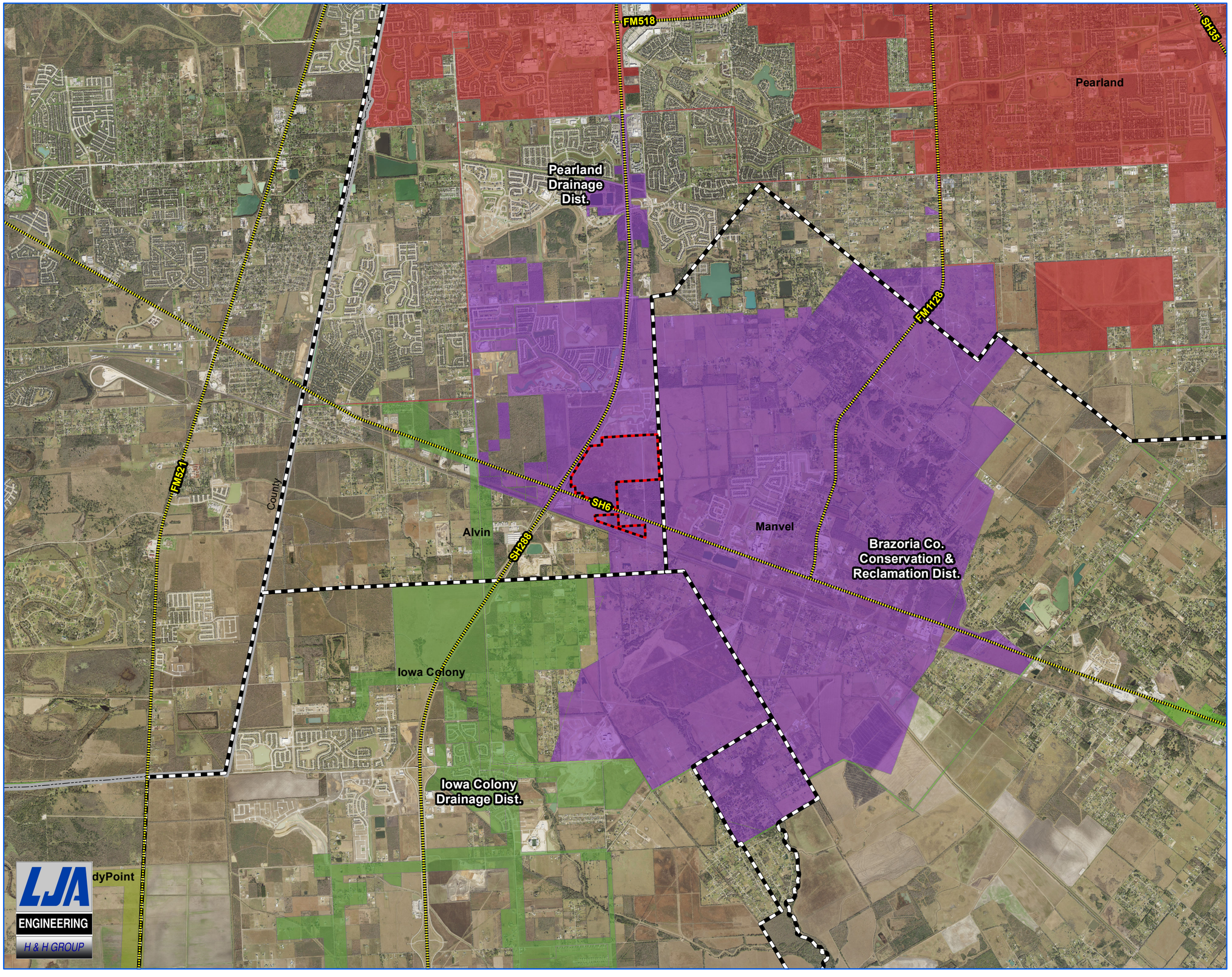
The proposed development will add 160.15 acres of commercial use, 84.80 acres of single family use, 18.01 acres of multi-family use, 63.43 acres of detention ponds, 8.01 acres of improved easements and buffers, 24.00 acres of collector roads. The remaining areas consist of existing ROWs and channel easements that will remain unchanged. **Exhibit 1.4** illustrates the proposed land use in the Presidio Tract. The excess runoff from the development will be captured and attenuated in 4 proposed ponds. Mitigation for the developed runoff and lost floodplain storage will be provided with the drainage improvements summarized below.

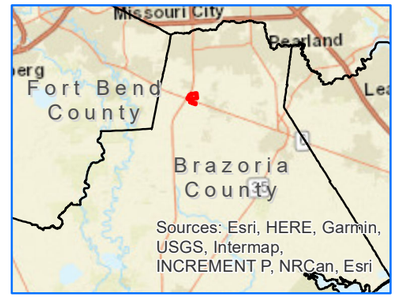
1.7 Regulatory Jurisdictions

The Tract lies within both Brazoria County and the City Manvel City Limits. The Tract is also within the boundaries of Brazoria Drainage District No. 4 (BDD4). Brazoria County and the City of Manvel are participants in the National Flood Insurance Program (NFIP) and as such are required to regulate new development to comply with the minimum requirements of the NFIP, including coordination with adjoining jurisdictions. In its enabling legislation BDD4 was given all of the powers of a conservation and reclamation district created under Section 52, Article III, or Section 39, Article XVI, Texas Constitution, and governed by Chapters 50 and 56, Texas Water Code. Therefore, BDD4 is responsible for the “improvement of rivers, creeks, and streams to prevent overflows" and must ensure that any proposed improvements comply with BDD4’s adopted drainage criteria.

This analysis has been conducted to comply with all drainage criteria outlined by BDD4’s Rules, Regulations, and Guidelines, adopted August 8, 2023 and amended March 6, 2024. BDD4 will approve the proposed drainage plan if the following conditions are met:

- There is no increase in the 2-year, 10-year, and 100-year peak discharge from the site and no increase in the 10-year and 100-year peak discharge or water levels in the affected drainage artery.
- Adequate provisions are made to detain the drainage peak discharge to offset any increased in the 2-year, 10-year, and 100-year site runoff discharge rate, as well as the 10-year and 100-year peak discharge or water levels in the affected drainage artery; or
- Drainage artery deficiencies are corrected or improved, at developer's expense, to carry any projected additional load resulting from the proposed development to a regional detention facility.





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One Inch Equals 1 Mile

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

- Development Limits
- Drainage Districts
- Manvel City Limits
- Iowa Colony City Limits

Exhibit 1.1

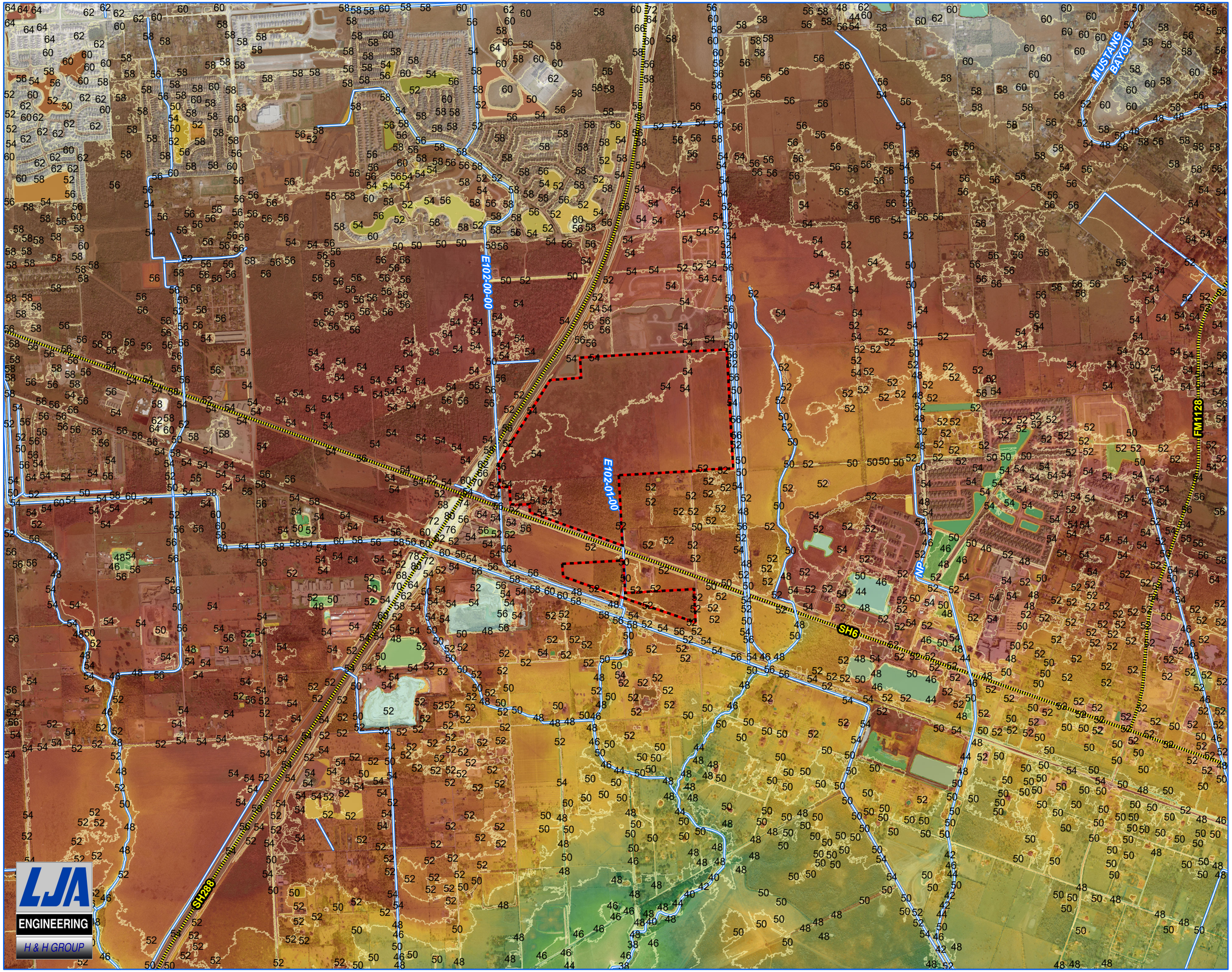
PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

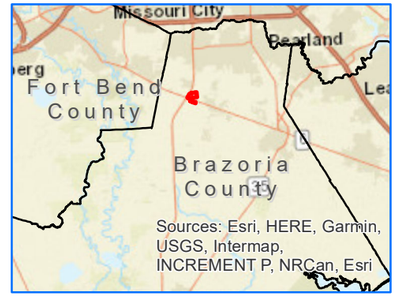
VICINITY MAP

Date: November 2025 Job No. 2013-2512

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One Inch Equals 2000 feet

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

- Development Limits
- 2' Interval Contour (TNRIS)

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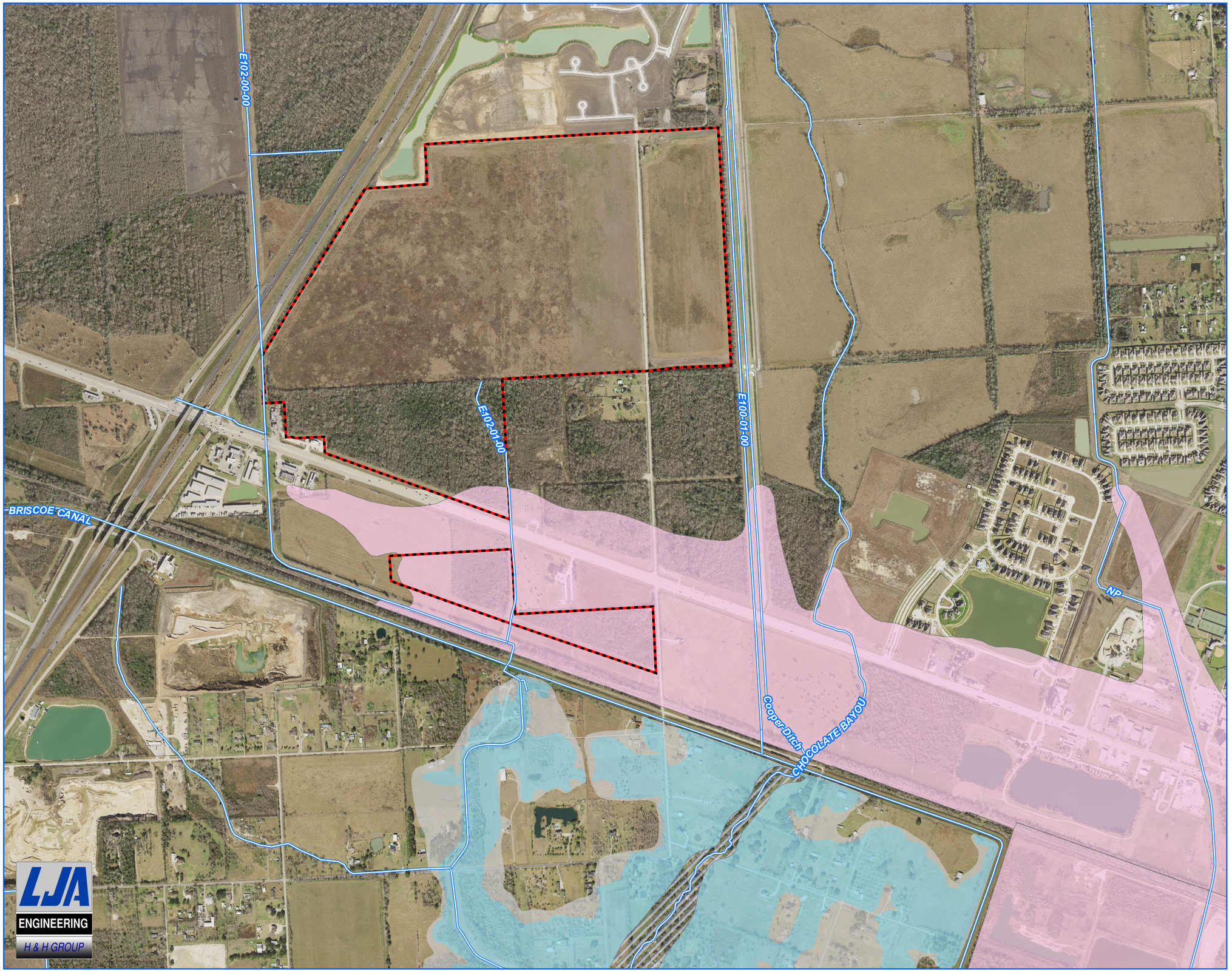
Exhibit 1.2

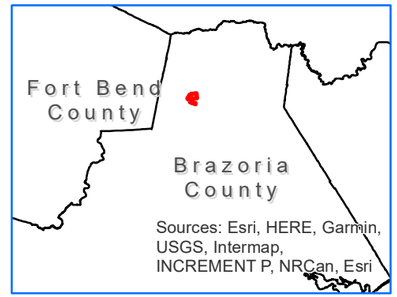
PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

EXISTING TOPOGRAPHY

Date: November 2025 Job No. 2013-2512

LJA LAND DEVELOPMENT







Feet
0 500 1,000 2,000
One Inch Equals 1000 feet

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

- Development Limits
- HEC-RAS Cross Section
- 18.2 Effective 100-Year WSE
- Effective 100-Year Floodplain
- Effective Regulatory Floodway
- Effective 500-Year Floodplain
- Effective Zone AO Floodplain (2')

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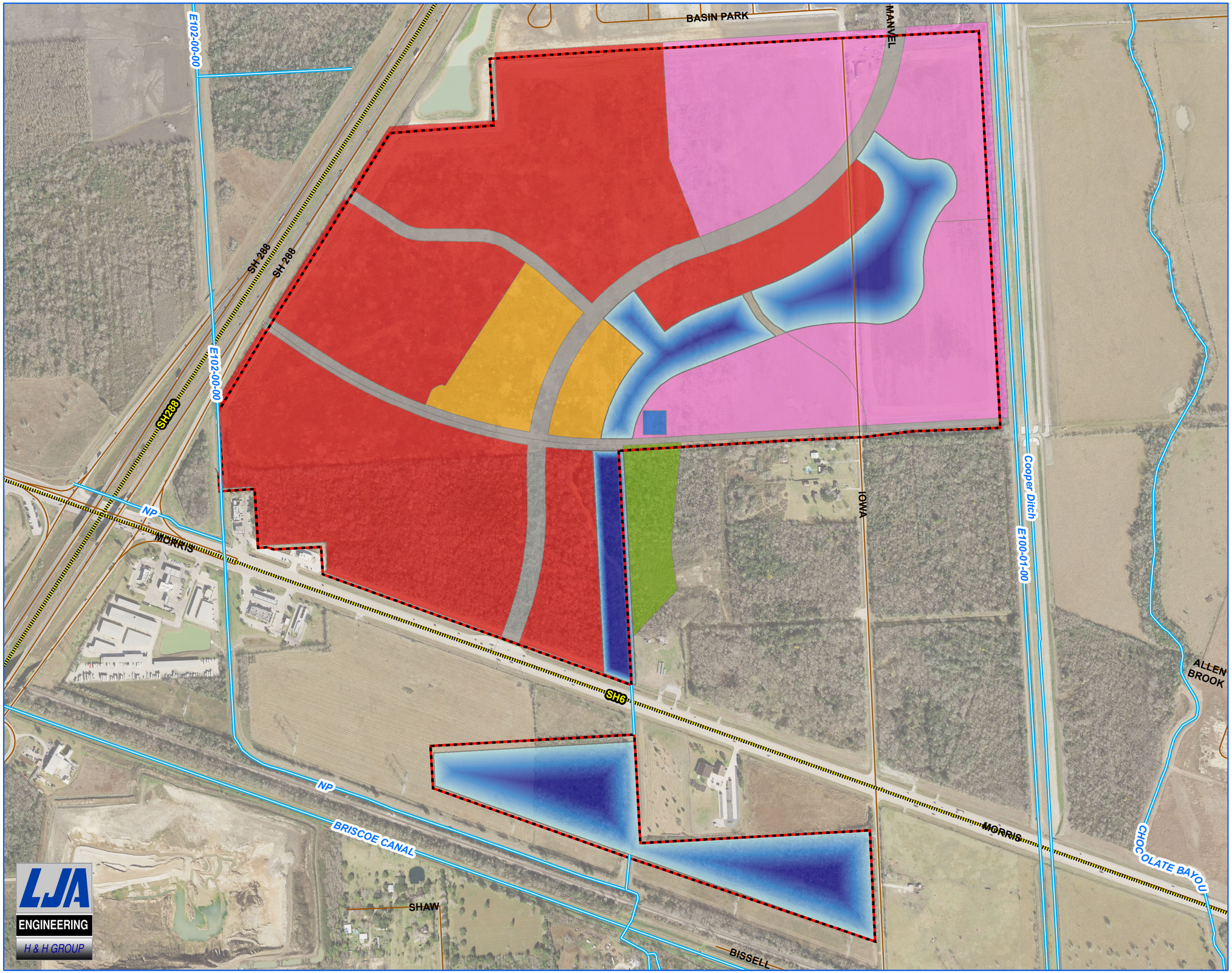
Exhibit 1.3

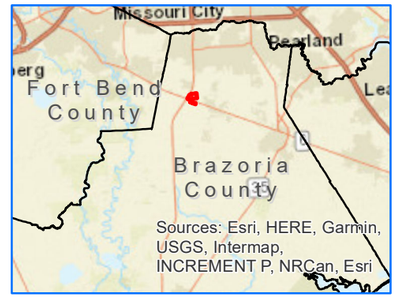
PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

FEMA EFFECTIVE SFHA

Date: November 2025 Job No. 2013-2512

LJA LAND DEVELOPMENT





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Feet
0 300 600 1,200
One Inch Equals 600 feet

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

Development Limits

PROPOSED LAND USE

- SF Residential (84.80 acres)
- Detention (63.40 acres)
- Multi Family (18.00 acres)
- Commercial (160.15)
- Open Area (8.01 acres)
- Roadway (24.01 acres)

Exhibit 1.4

PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

PROPOSED DEVELOPMENT

Date: November 2025 Job No. 2013-2512

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2.0 HYDROLOGY

The Chocolate Bayou Watershed experiences annual rainfall averages of 52 inches, with periods of intense rainfall associated with tropical storms and localized thunderstorms occurring frequently throughout the year. To effectively convey runoff from a development without adversely impacting the watershed or its receiving streams, drainage criteria has been established that provides a method for draining runoff so that property upstream or downstream of the proposed development is not impacted.

The drainage criteria used for the analysis of Presidio at Manvel follows Section 32 of the BDD4 Criteria amended March 6, 2024. The methodology of the hydrologic models for the development follows these criteria and is described in the following sections.

2.1 Hydrologic Methodology

The methodology used to determine the peak rainfall runoff for Presidio at Manvel adheres to the method recommended in the Regulations, and Guidelines of Brazoria County Drainage District No. 4, effective date August 8, 2023, which calls for the Rational Method to be used in determining peak flows for areas less than 300 acres.

Runoff hydrographs for each drainage area were generated using the Clark's Unit Hydrograph method in HEC-HMS. Clark's Time of Concentrations (Tc) was estimated using a velocity-based method. The storage coefficient (R) was calibrated until the peak flow from HEC-HMS matched the peak flow calculated using Site Runoff Curves.

2.1.1 Peak Discharge Calculations

In areas smaller than 300 acres, peak discharges were calculated using Rational Method as presented in the DCM to determine the peak discharge for the 2-year, 10-year, and 100-year events. The Rational Method uses drainage area, a runoff coefficient, and rainfall intensity to calculate the peak runoff from a drainage area. The equation for calculating the peak flow using Rational Method is shown below:

$$Q = CiA$$

where Q = peak runoff for a given storm event (cfs)
C = runoff coefficient
i = rainfall intensity (in/hr)
A = area of the sub-watershed (acres)

The rainfall intensity is the average rainfall rate in inches per hour, which is considered for a particular basin and is selected on the basis of design rainfall duration and design frequency of occurrence. The intensity is calculated from rainfall runoff coefficients and Time of Concentration using the following equation:

$$\mathrm{i} = \frac{\mathrm{b}}{(\mathrm{Tc}+\mathrm{d})^{\mathrm{e}}}$$

The e,b,d coefficients along with the time of concentration are used to calculate the rainfall intensity. Table 34-3 of the DCM includes the e, b, d coefficients recommended by BDD4. The e, b, d coefficients used in this analysis are shown in **Table 2.1**

Table 2.1 **EBD Coefficients – Brazoria County Drainage District No. 4**			
Return period	e	b	d
2-year	0.754	57.44	11.511
5-year	0.712	58.019	9.236
10-year	0.676	57.515	7.777
25-year	0.618	52.78	5.022
50-year	0.574	49.157	3.081
100-year	0.533	46.316	1.555

Time of concentration (Tc) was determined from velocity based calculations as a function of the longest flow path for overland flow, shallow concentrated flow, and channel flow conditions. The time of concentration for various flow regimes, including sheet flow, shallow concentrated flow, and channel flow, can be approximated by the following equation:

$$T_c = \frac{L}{60\mathrm{V}} + Ti$$

where Tc = Time of Concentration (channel)
L = Channel flow length (Feet)
Ti = Initial Time (min)\

The initial time is 10 minutes for developed flows and 15 minutes for undeveloped flows. Various flow conditions and their associated velocities are presented in **Table 2.2**.

Table 2.2 **Representative Velocities for Varying Flow Conditions**		
Flow Condition	**Min Velocity (fps)**	**Max Velocity (fps)**
Thick Vegetation	0.25	0.35
Grass	0.35	0.50
Bare Ground	1.50	1.50
Paved Area	1.50	1.50
Ditch/Channel	2.00	2.50
Storm Sewer	3.00	3.00

The computed time of concentration from the Rational Method was used as the Clark's Time of Concentration to calculate the runoff hydrograph using Clark's Unit Hydrograph Method for areas less than 300 acres. To match the resulting peak flow from Clark's Unit Hydrograph Method to that computed from the Rational Method, the Storage Coefficient (R) was adjusted until the peak flow from HEC-HMS matched the peak flow calculated with the Rational Method.

2.1.2 Clark's Unit Hydrograph Method

The Clark Unit Hydrograph method is the preferred methodology to generate a storm runoff hydrograph representative of a drainage area. The Clark Unit Hydrograph is described by three parameters: the Time of concentration (TC) , storage coefficient (R) and a time-area curve. The Army Corps of Engineers HEC-HMS (Version 3.5) computer program was used to generate storm runoff hydrographs for the proposed development.

2.1.3 Design Storm Rainfall Distribution

BDD4 requires the 50% annual chance (2-year), 10% annual chance (10-year), and 1% annual chance (100-year) events to be analyzed to demonstrate no impacts from the proposed development. Rainfall distribution is based on the National Oceanic Atmospheric Administration's (NOAA) Atlas 14 rainfall data. The rainfall distribution used for this Drainage Impact analysis is shown below in **Table 2.3**.

Table 2.3
Rainfall Distribution for Brazoria County Drainage District No. 4

Duration	Recurrence Interval (Years)						
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr
	Depth (Inches)						
5 min	0.60	0.74	0.86	1.04	1.17	1.31	1.65
10 min	0.95	1.18	1.3	1.65	1.87	2.09	2.59
15 min	1.21	1.49	1.73	2.07	2.34	2.61	3.27
30 min	1.73	2.13	2.47	2.94	3.30	3.68	4.66
60 min	2.31	2.86	3.33	3.99	4.50	5.05	6.56
2 hr	2.90	3.63	4.32	5.36	6.24	7.23	9.91
3 hr	3.25	4.11	4.97	6.29	7.48	8.84	12.50
6 hr	3.88	4.99	6.15	7.97	9.66	11.60	17.00
12 hr	4.55	5.98	7.43	9.72	11.80	14.30	21.20
24 hr	5.27	7.05	8.83	11.60	14.10	17.00	25.30

2.1.4 Basin Delineations

According to prior studies summarized in Section 1.3, the proposed development lies within Drainage Areas 2 and Drainage Area 3 according to TxDOT construction plans for SH6 and SH288 improvements dated February 1, 1993. Drainage Area 2 drains across SH6 through 3-8x4 RCB culverts by way of E102-01-00. Downstream of SH6, E102-01-00 combines with E102-00-00 before its confluence with the siphons under the Brisco Canal. Drainage areas were not provided in the report, and the referenced TxDOT construction plans were too illegible to distinguish drainage area features from other linework. Therefore, the pre development drainage areas are not illustrated. However, the TxDOT plans found in the June 2005 study are included in the Appendix of this drainage analysis.

Proposed condition drainage areas were delineated based on the proposed land use concept.

2.1.5 Infiltration Losses

Precipitation abstractions were calculated using the Green and Ampt method. Analysis parameters are provided in **Table 2.4**.

Table 2.4
Green and Ampt Parameters for Chocolate Bayou

Parameter	Value
Initial Content	0.1 inches
Saturated Content	0.385 inches
Suction	12.45 inches
Conductivity	0.024 inches/hour

Impervious cover values were obtained from the BDD4 DCM. Typical values for Imperviousness and Runoff Coefficients are shown in **Table 2.5**.

Table 2.5 Brazoria County Drainage District 4 Impervious and Rational 'C' Values		
Land Use Type	**Impervious (%)**	**Rational Coefficient**
Paved Areas/Major Thoroughfares	90	1.00
Multi-Family/Apartments	85	0.85
Commercial/Industrial	95	0.95
Lakes/Ponds/Detention Facilities	100	1.00
Undeveloped	0	0.20
Residential – Lots 8000 sf - ¼ acre	40	0.55

2.2 Base Conditions Hydrology

Hydrologic models for existing conditions were not utilized for this analysis because the no impact conclusion is based on a comparison to the resulting discharges and water surface elevations at SH6 and the siphon from the June 2005 drainage impact analysis. **Table 2.6** summarizes the peak discharges across SH6 and the pro rated discharge at the siphon based on the June 2005 DIA.

Table 2.6 Base Condition Peak Discharges in E102-01-00*			
	3yr**	10yr	100yr
State Highway 6	525	673	869
Canal Siphons	32.4	32.4	32.4

*Obtained from June 2005 DIA ICPR model results for BCMUD 30
**From DCM as of 2005. Current DCM now requires a 2yr analysis.

2.3 Revised Existing Conditions Hydrology

The peak discharges for the canal siphons are based on a pro rata share of the total contributing drainage area for that discharge point as explained in the 2005 DIA. The contributing drainage area to the siphons has since been modified as a result of development, thus affecting the pro rata share of the peak discharge. The revised existing conditions hydrology was analyzed with consideration to development, which changed the drainage area contributing runoff to the siphons.

2.3.1 Siphon Capacity

The siphon capacity was determined from the headloss across the siphon and flowline and size of the siphon taken from survey. This information was used to compute a peak flow through the siphon. The June 2005 DIA explains this in more detail. **Table 2.7** summarizes the siphon capacity for each storm event.

Table 2.7 Siphon Capacity for Each Storm Event			
	3yr**	10yr	100yr
2-72" CMP Siphons	124 cfs	166 cfs	222 cfs

**From DCM as of 2005. Current DCM now requires a 2yr analysis.

According to the June 2005 DIA and TxDOT construction plans for SH 6, two drainage areas contribute runoff to the existing siphons; TxDOT Drainage Area 1 drains to four 10-foot by 8-foot box culverts under SH 6 by way of E-102-00-00. E-102-00-00 then turns to the east and abuts the GCWA canal, joining with E-102-01-00 just upstream of the siphons. The BCMUD 30 development will not change the flow regime for the E102-00-00 drainage area. TxDOT Drainage Area 2 drains approximately 428 acres to three 8-foot by 4-foot box culverts by way of E-102-01-00. Approximately 105 acres south of SH 6 also drains to the siphons. Therefore, the total drainage area contributing runoff to the siphons is approximately 2,287 acres.

Since the June 2005 DIA, development has occurred within the siphon area described above, thus altering the flow regime. The Del Bello development north of Presidio has since been constructed, and runoff now drains to Cooper Ditch rather than E102-01-00. A proposed development, identified as the Morris Tract, southeast of Presidio, will also divert runoff from E102-01-00 to E100-00-00. Therefore, the total drainage area contributing to the siphons as of the date of this report is 1,889 acres. **Figure 2-1** illustrates the revised existing siphon area relative to the proposed development.

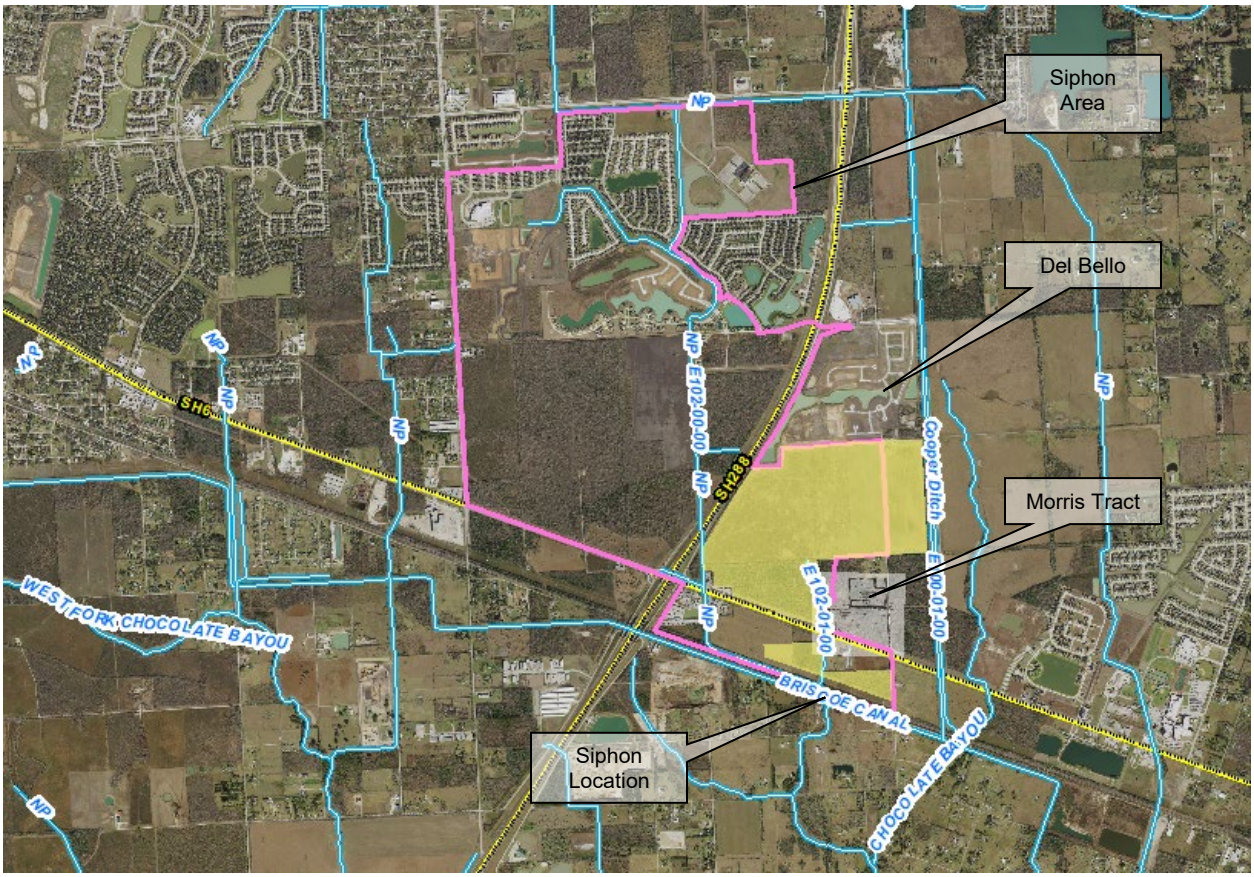


Figure 2-1 Revised Existing Siphon Area

Approximately 44 acres of the 358-acre Presidio Tract do not drain to E-102-01-00. Therefore, the total area within the Tract that currently drains to the siphons is approximately 314 acres, or approximately 16.6 percent of the total area draining to the siphons. The pro-rated capacity of the siphons is, therefore, 16.7 percent of 222 cfs, or 37.1 cfs.

Table 2.8 summarizes the revised existing peak discharges across SH6 and the pro rated discharge at the siphon.

Table 2.8
Revised Existing Condition Peak Discharges in E102-01-00*

	3yr**	10yr	100yr
State Highway 6	525	673	869
Canal Siphons	37.1	37.1	37.1

*Obtained from June 2005 DIA ICPR model results for BCMUD 30
**From DCM as of 2005. Current DCM now requires a 2yr analysis.

The discharges from the proposed Presidio detention system will not exceed the pre-developed rates at State Highway 6 or the siphon.

2.4 Proposed Conditions Hydrology

The post-project drainage areas were delineated based on a proposed land use concept to reflect the proposed development. **Figure 2-2** illustrates the post project drainage areas and land use for Presidio.

Peak discharges from the proposed condition drainage areas were input into a post project conditions XP-SWMM model of the internal drainage and detention system to analyze the effects of the development during various storm events.



Figure 2-2 Post-Project Internal Drainage Areas

The proposed conditions Rational Method parameters and peak flows for the 2-, 10-, and 100-year events are shown in **Table 2.9**. The HMS calibrated R-values and peak flows for the proposed conditions are shown in **Table 2.10**. The proposed condition drainage areas and flow parameters are shown in **Exhibit 2.3**.

Table 2.9
Proposed Condition Rational Method Peak Flows

Drainage Area	Area	Runoff Coef.	% Imp	Tc	I_2	I_{10}	I_{100}	$*Q_2$	$*Q_{10}$	$*Q_{100}$
	ac			min	in/hr	in/hr	in/hr	cfs	cfs	cfs
BasinA	103.00	0.69	58.11	20.46	4.2	6.0	8.9	299.3	427.1	633.2
BasinB	138.32	0.90	87.77	21.30	4.1	5.9	8.7	515.7	735.7	1090.6
BasinC	87.51	0.89	86.37	28.20	3.6	5.1	7.6	278.2	396.8	590.2
BasinD	29.50	1.00	100.0	14.44	4.9	7.1	10.6	145.4	208.5	311.7

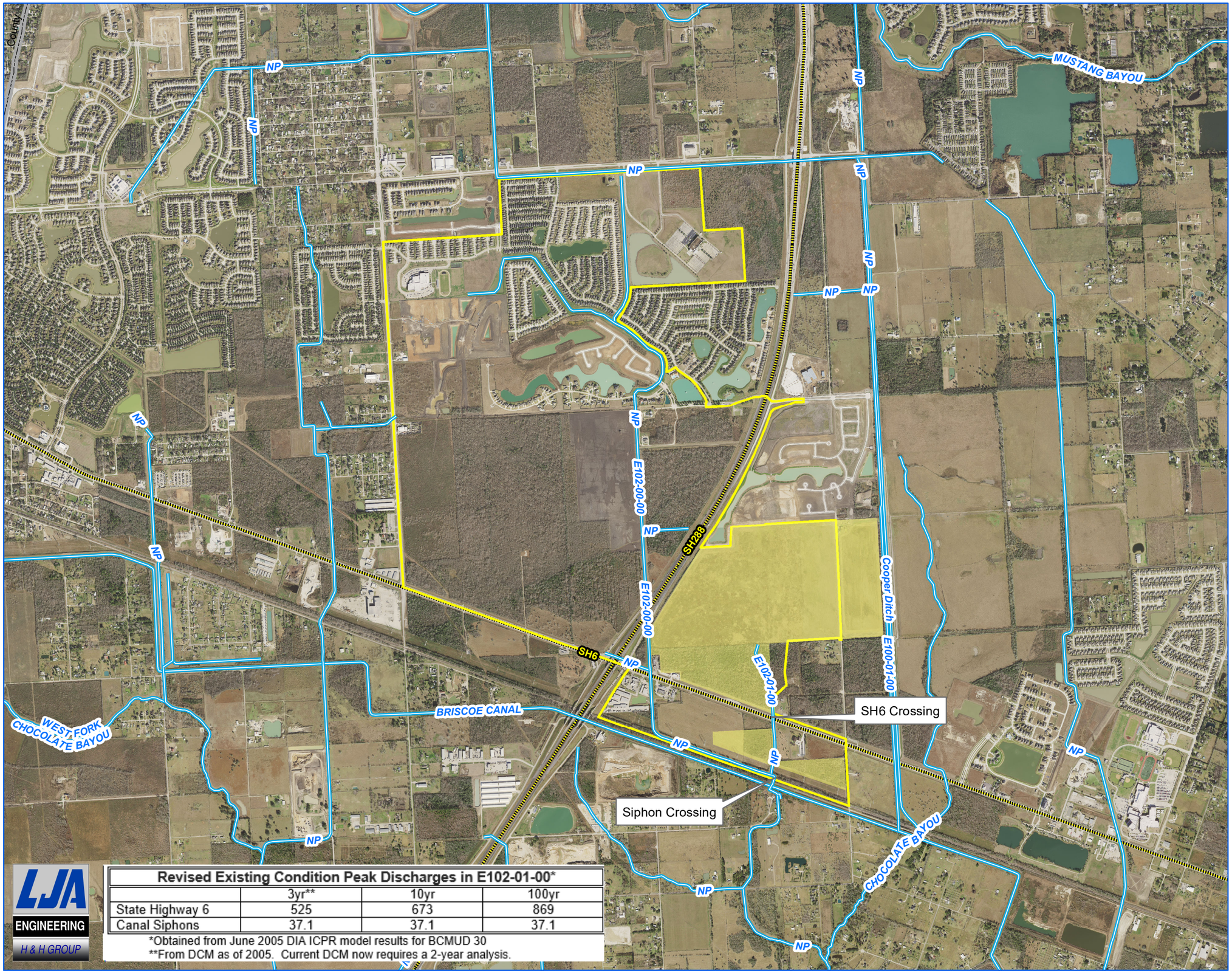
*Rational Method calculations may vary slightly from calibrated HMS flows in Table 2.9

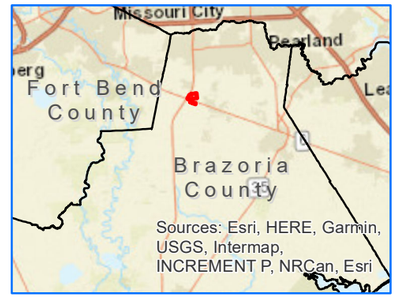
Table 2.10
Proposed Condition HMS Peak Flows

Drainage Area	Area	Tc	R_2	R_{10}	R_{100}	*Q_2	*Q_{10}	*Q_{100}
	mi^2	hr	hr	hr	Hr	cfs	cfs	cfs
BasinA	0.161	0.34	0.340	0.355	0.391	299.6	427.1	634.1
BasinB	0.216	0.35	0.161	0.167	0.185	515.8	736.0	1090.6
BasinC	0.137	0.47	0.232	0.243	0.265	278.2	396.5	590.7
BasinD	0.046	0.24	0.050	0.048	0.052	145.4	208.4	311.6

*From HMS Results; used in proposed condition hydraulic routing

The proposed conditions hydrologic models and supporting data for all the storm events can be found in the Appendix.





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Feet
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One Inch Equals 2000 feet

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

- Development Limits
- Current Siphon Area

Revised Existing Condition Peak Discharges in E102-01-00*			
	3yr**	10yr	100yr
State Highway 6	525	673	869
Canal Siphons	37.1	37.1	37.1

*Obtained from June 2005 DIA ICPR model results for BCMUD 30
**From DCM as of 2005. Current DCM now requires a 2-year analysis.

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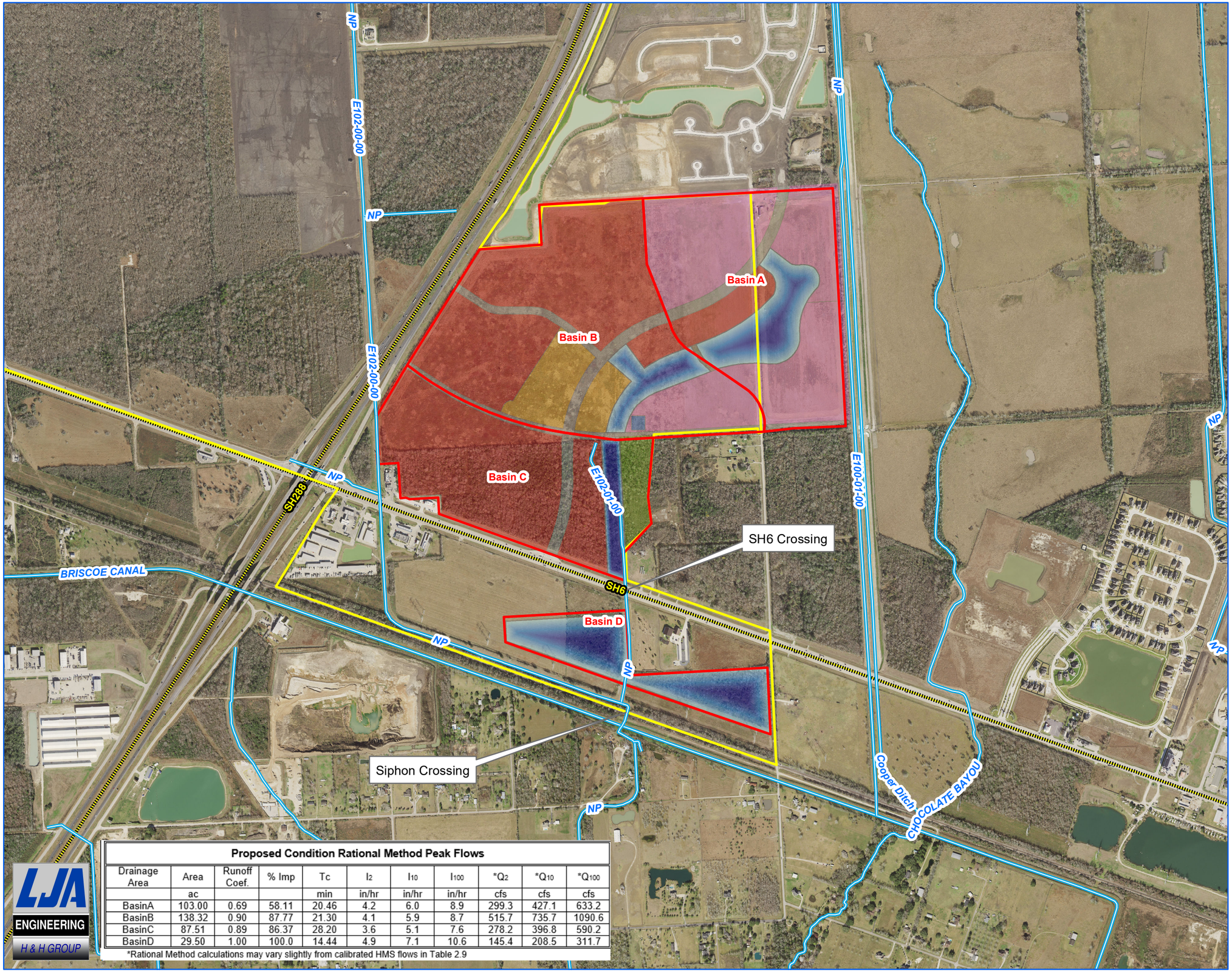
Exhibit 2.1

PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

REVISED EXISTING HYDROLOGY

Date: November 2025 Job No. 2013-2512

LJA LAND DEVELOPMENT

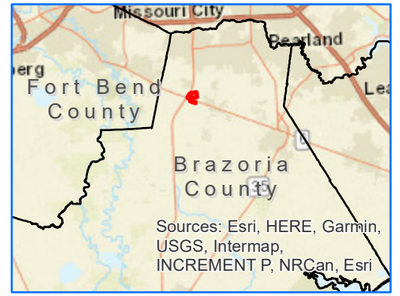


Proposed Condition Rational Method Peak Flows

Drainage Area	Area	Runoff Coef.	% Imp	Tc	I_2	I_{10}	I_{100}	$*Q_2$	$*Q_{10}$	$*Q_{100}$
	ac			min	in/hr	in/hr	in/hr	cfs	cfs	cfs
BasinA	103.00	0.69	58.11	20.46	4.2	6.0	8.9	299.3	427.1	633.2
BasinB	138.32	0.90	87.77	21.30	4.1	5.9	8.7	515.7	735.7	1090.6
BasinC	87.51	0.89	86.37	28.20	3.6	5.1	7.6	278.2	396.8	590.2
BasinD	29.50	1.00	100.0	14.44	4.9	7.1	10.6	145.4	208.5	311.7

*Rational Method calculations may vary slightly from calibrated HMS flows in Table 2.9

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Feet
0 500 1,000 2,000
One Inch Equals 1000 feet

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

- Development Limits
- Current Siphon Area
- Proposed Site Drainage Areas

Exhibit 2.2

PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

PROPOSED HYDROLOGY

Date: November 2025 Job No. 2013-2512

LJA LAND DEVELOPMENT

3.0 HYDRAULICS

Dynamic 1D hydraulic modeling with XP-SWMM v2021 was performed to evaluate the peak discharge and freeboard in the proposed drainage system during a 2-, 10-, and 100-year storm event.

3.1 Hydraulic Methodology

XP-SWMM was selected as the preferred software for the detailed detention analysis because of its ability to simulate a variety of complex conveyance systems including looped systems. XP-SWMM dynamically routes storm water through ponds, open channels, and/or closed conduits, and can simulate a variety of complex conveyance systems, including looped systems. The calculation accurately models backwater effects, flow reversal, surcharging, pressure flow, and interconnected ponds. This means that bi-directional flow can be modeled and the tail water elevation at an outfall is considered in the calculations. Therefore, for analyzing a series of lakes, connected by culverts or controlled by weirs, XP-SWMM provides a more “real world” model.

3.2 Existing Conditions Hydraulics

Existing conditions hydraulics were not analyzed in this drainage study. The no impact conclusion is based on a comparison to the resulting water surface elevations and discharges at SH6 from the June 2005 DIA, and the current existing conditions discharges at the siphon as discussed in Section 2.3.

3.3 Proposed Conditions Hydraulics

The purpose of the hydraulic analysis is to route developed discharges through a proposed system of ponds and control structures to determine the detained peak discharge at the outfall into the siphon to demonstrate no increases in peak flows when compared to allowable peak discharges at the same locations. The hydraulic analysis of Presidio excludes consideration of backwater effects from the receiving streams, thus resulting in a worst-case discharge scenario and to demonstrate adequate freeboard in the ponds and detention rate for the proposed development pursuant to the DCM.

XP-SWMM uses a link→node concept to represent real-world systems. This concept requires that the drainage system be simplified into a network of nodes and links. A node is a discrete location in the drainage system where conservation of mass or continuity is maintained. Nodes are placed upstream and downstream of any structure (e.g., weirs, culverts, drop structures). In the XP-SWMM model, a node is placed at each point where a stage calculation is needed. Runoff hydrographs are assigned to nodes. All of the lakes and storage facilities are specified as nodes. Additional nodes can be added at the upstream and downstream ends of culverts or channel reaches to properly model these connections.

Links are connections between nodes and are used to transfer or convey water through the system. The entire system of nodes and links forms the nodal network and serves as the computation framework for XP-SWMM.

The proposed drainage system for Presidio will consist of 4 interconnected ponds (nodes) that will drain through a series of equalizer culverts (links), then ultimately draining to the siphon (downstream boundary condition) through a combination pump and gravity outfall.

In accordance with BDD4 DCM, the proposed pumped volume will not total more than 75% of the total detention volume. Additionally, the pump shall not operate at elevations above the gravity discharge elevation.

Figure 3-1 illustrates the node-link schematic for the proposed drainage system in the Tract.

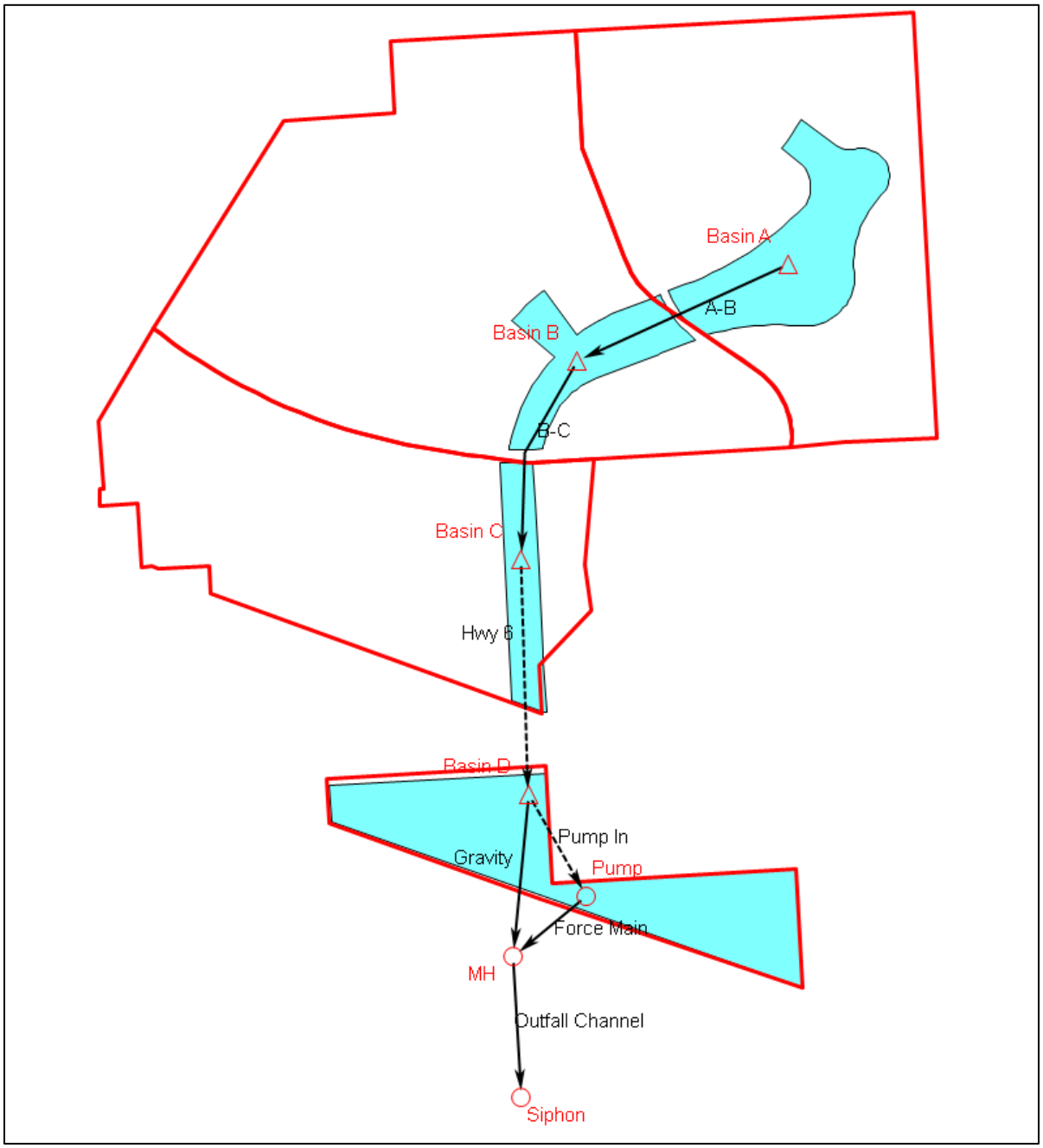


Figure 3-1 Proposed XP-SWMM Drainage Schematic

3.3.1 Boundary Conditions

Every drainage system must have boundaries, or limits. While the upstream boundaries of a system typically do not require special consideration, downstream boundaries are important. The drainage system for Presidio at Manvel uses normal depth outfall at the downstream limits of the model to simulate a free outfall.

3.3.2 Lake Modeling

In XP-SWMM lakes are modeled as level pools. This implies that the water surface within the storage area is flat and rises or falls uniformly across the surface. A single node is used to model each lake's sub-area with a stage-area relationship to describe the water holding capacity of the lakes. The proposed drainage system for the tract includes four proposed ponds. A stage-area curve shown in **Table 3.1** was used to represent the storage capacity in each pond. The area reflects only the wet surface and does not include area for maintenance berms or other easements.

Table 3.1
Detention Pond Stage vs. Volume Relationship

Basin A			**Basin B**		
Elevation (ft)	Area (ac)	Volume (ac-ft)	Elevation (ft)	Area (ac)	Volume (ac-ft)
48.50*	15.12	0.00	48.50*	12.71	0
48.75	15.21	3.79	48.75	12.78	3.19
49.00	15.30	7.61	49.00	12.86	6.39
49.25	15.40	11.44	49.25	12.94	9.62
49.50	15.49	15.30	49.50	13.02	12.86
49.75	15.58	19.19	49.75	13.11	16.13
50.00	15.68	23.09	50.00	13.19	19.41
50.25	15.77	27.03	50.25	13.27	22.72
50.50	15.87	30.98	50.50	13.35	26.05
50.75	15.96	34.96	50.75	13.44	29.40
51.00	16.06	38.96	51.00	13.52	32.77
51.25	16.15	42.99	51.25	13.60	36.16
51.50	16.25	47.04	51.50	13.68	39.57
51.75	16.34	51.11	51.75	13.77	43.00
52.00	16.44	55.21	52.00	13.85	46.45
52.25	16.53	59.33	52.25	13.93	49.93
52.50	16.63	63.47	52.50	14.02	53.42
52.75	16.72	67.64	52.75	14.10	56.93
53.00	16.82	71.83	53.00	14.18	60.47
53.25	16.92	76.05	53.25	14.27	64.03
53.50	17.01	80.29	53.50	14.35	67.60
53.75	17.11	84.56	53.75	14.43	71.20
54.00	17.20	88.85	54.00	14.52	74.82
54.25	17.30	93.16	54.25	14.60	78.46
54.50	17.40	97.50	54.50	14.68	82.12
54.75**	17.50	101.86	54.75**	14.78	85.80
Basin C			**Basin D**		
Elevation (ft)	Area (ac)	Volume (ac-ft)	Elevation (ft)	Area (ac)	Volume (ac-ft)
48.50*	2.67	0.00	35.00*	12.46	0.00
49.00	2.80	1.37	35.50	12.70	6.29
49.50	2.93	2.80	36.00	12.95	12.70
50.00	3.06	4.29	36.50	13.20	19.24
50.50	3.20	5.86	37.00	13.46	25.90
51.00	3.33	7.49	37.50	13.72	32.70
51.50	3.47	9.19	38.00	13.98	39.62
52.00	3.61	10.97	38.50	14.24	46.68
52.50	3.75	12.80	39.00	14.50	53.86
53.00	3.89	14.71	39.50	14.76	61.18
53.50	4.03	16.69	40.00	15.03	68.63
54.00**	4.17	18.74	40.50	15.29	76.21
--	--	--	41.00	15.56	83.92

Table 3.1 Detention Pond Stage vs. Volume Relationship					
--	--	--	41.50	15.83	91.77
--	--	--	42.00	16.10	99.75
--	--	--	42.50	16.37	107.87
--	--	--	43.00	16.64	116.13
--	--	--	43.50	16.92	124.52
--	--	--	44.00	17.19	133.04
--	--	--	44.50	17.47	141.71
--	--	--	45.00	17.74	150.51
--	--	--	45.50	18.02	159.45
--	--	--	46.00	18.30	168.53
--	--	--	46.50	18.58	177.75
--	--	--	47.00	18.87	187.12
--	--	--	47.50	19.15	196.62
--	--	--	48.00	19.43	206.27
--	--	--	48.50	19.73	216.06
--	--	--	49.00	20.43	226.10
--	--	--	49.50	20.74	236.39
--	--	--	50.00	21.04	246.83
--	--	--	50.50	21.35	257.43
--	--	--	51.00	21.66	268.18
--	--	--	51.50	21.97	279.09
--	--	--	52.00	22.28	290.15
--	--	--	52.50	22.59	301.37
--	--	--	53.00	22.90	312.74
--	--	--	53.50	23.22	324.27
--	--	--	54.00**	23.54	335.96

*Normal Pool Elevation
**High Bank Elevation

3.3.3 Major Surface Water Inflow Points

In XP-SWMM, all inflows are assigned to nodes (point loading). This means that the rainfall runoff is assigned to specific nodes for routing through the drainage system. Hydrographs generated by HEC-HMS discussed in Section 2 were imported directly into corresponding nodes in the XP-SWMM model of the drainage system as inflow hydrographs. **Table 3.2** summarizes the inflow locations in the XP-SWMM model.

Table 3.2 Proposed Condition XP-SWMM Flow Locations					
HMS Node	Peak Inflow			Boundary Type	XP Node
	2yr	10yr	100yr		
Basin A	299.6	427.1	634.1	Flow Hydrograph	Basin A
Basin B	515.8	736.0	1090.6	Flow Hydrograph	Basin B
Basin C	278.2	396.5	590.7	Flow Hydrograph	Basin C
Basin D	145.4	208.4	311.6	Flow Hydrograph	Basin D

3.3.4 Conduit Modeling

Generally, closed conduits, weirs, and channels comprise the links used to connect the lake system. In XP-SWMM the flow direction can be set to both, positive only, or no flow. "Both" is the normal setting and allows for flow reversals to occur. The positive flow option allows flow only in the direction indicated by designating a "from" node and a "to" node. The outfalls for Basins A through C are set to "both" to allow equalization between the ponds. The Basin D gravity outfall is set to positive only to reflect a proposed flap-gate on the downstream end so that pumped discharge cannot backflow into the system. The Basin D pumped discharge (forcemain) outfall is also set to positive only since only pumped discharge can occur through this conduit. Details of the proposed major drainage elements within the Tract are summarized in **Table 3.3**.

Table 3.3
Proposed Drainage System Components

XP Link ID	From Node (U/S)	To Node (D/S)	Flow line (U/S)	Flow line (D/S)	Link Description
A-B**	Basin A	Basin B	41.50'	41.50'	3-7x5 RCB, 200'L
B-C**	Basin B	Basin C	41.50'	41.50'	4-7x5 RCB, 215'L
Hwy6	Basin C	Basin D	48.44'	48.36'	3-8x4 RCB, 285'L
Gravity	Basin D	MH	47.50'	47.40'	1-27" RCP, 200'L
Pump In	Basin D	Pump	--	--	16,600gpm (Firm Cap.)*
Force Main	Pump	MH	47.40'	47.40'	1-30" RCP, 100'L
Outfall Channel	MH	Siphon	47.40'	47.20'	Existing Natural Channel

*Firm capacity reflects the largest pump inoperable.
**Submerged culvert

3.3.5 Hydraulic Results

Table 3.4 summarizes the detention routing results for the 2-, 10-, and 100-year storm events. The freeboard will provide a factor of safety for storm events greater than the 100-year event.

Table 3.4
Detention Summary

Pond ID	Static WSE/FL	Highbank Elev.	100yr WSE	100yr Freeboard (ft)	100-year Volume (ac-ft)
Basin A	48.50	54.75	53.71	1.04	84.06
Basin B	48.50	54.75	53.60	1.15	69.09
Basin C	48.50	54.50	53.31	1.19	15.94
Basin D	35.00	54.50	52.92	1.58	309.92
				Total	**478.79**

The total detention volume provided by the proposed detention system is 479.01 acre-feet. This volume equates to a detention rate of 1.34 acre-feet per acre of detention provided for the 358.4 acres of development.

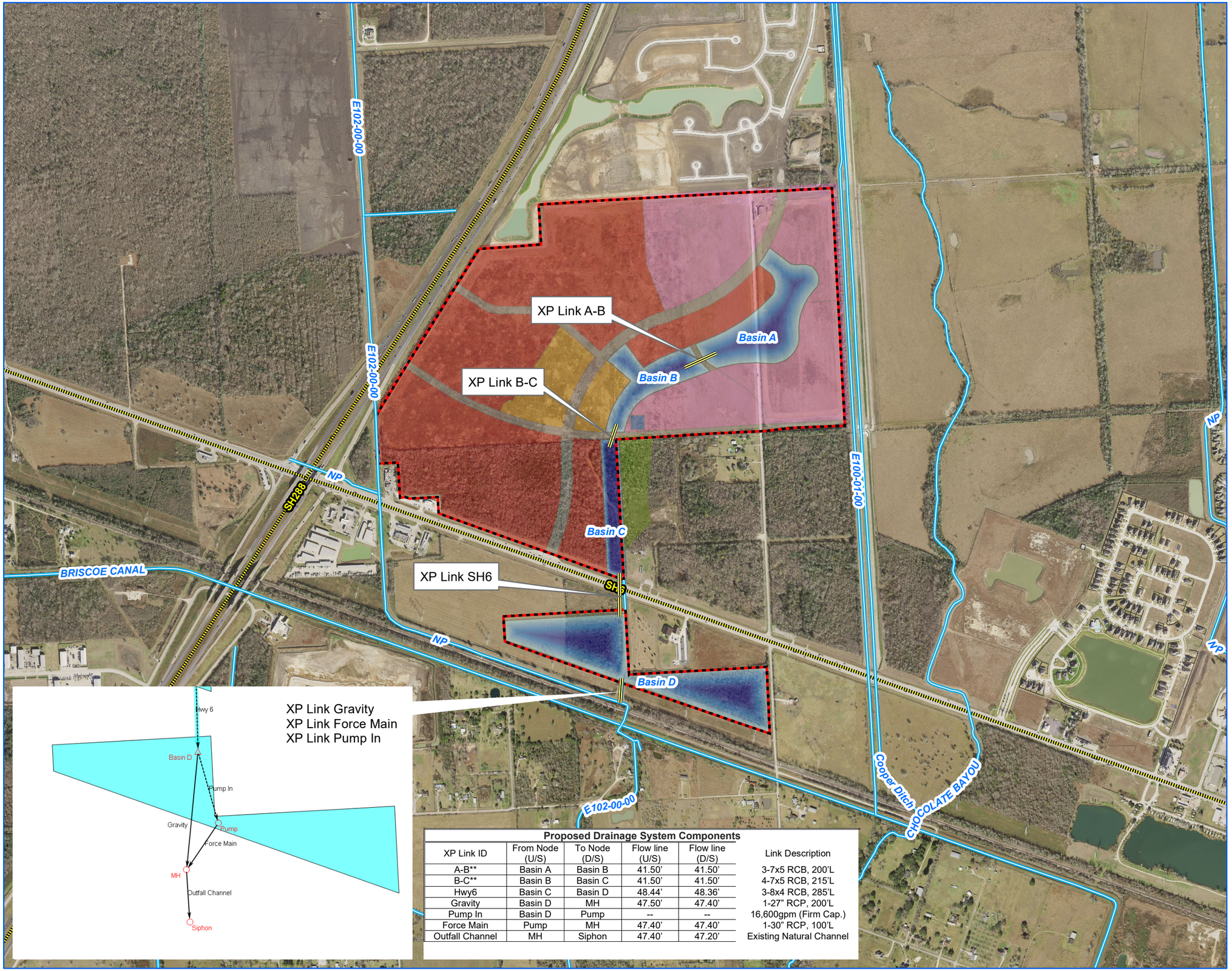
The volume of storage available in the freeboard is 13.6 acre-feet, which is sufficient surplus for mitigating lost floodplain storage due to fill.

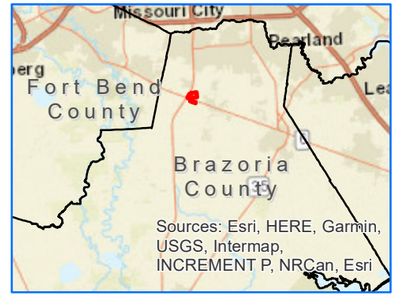
The XP-SWMM results also produced peak water surface elevations for the 2-year, 10-year, and 100-year storm events. **Table 3.5** provides the peak water surface elevations at key locations within the proposed system for these events.

Table 3.5
Water Surface Elevation Summary

Pond ID	Static WSE/FL	Highbank Elev.	2yr WSE	10yr WSE	100yr WSE	100-year Freeboard
Basin A	48.50	54.75	50.85	51.84	53.72	1.04
Basin B	48.50	54.75	50.84	51.80	53.60	1.15
Basin C	48.50	54.50	50.80	51.71	53.31	1.19
Basin D	35.00	54.50	41.35	46.69	52.88	1.58

Extreme event conveyance will be facilitated in the streets so that runoff is channeled to a receiving pond. Extreme event overflows between the ponds can occur across sags in the streets in the vicinity of the ponds. Extreme event features will be analyzed in more detail as development progresses, and more details are made available.





Proposed Drainage System Components

XP Link ID	From Node (U/S)	To Node (D/S)	Flow line (U/S)	Flow line (D/S)	Link Description
A-B**	Basin A	Basin B	41.50'	41.50'	3-7x5 RCB, 200'L
B-C**	Basin B	Basin C	41.50'	41.50'	4-7x5 RCB, 215'L
Hwy6	Basin C	Basin D	48.44'	48.36'	3-8x4 RCB, 285'L
Gravity	Basin D	MH	47.50'	47.40'	1-27" RCP, 200'L
Pump In	Basin D	Pump	--	--	16,600gpm (Firm Cap.)
Force Main	Pump	MH	47.40'	47.40'	1-30" RCP, 100'L
Outfall Channel	MH	Siphon	47.40'	47.20'	Existing Natural Channel



Feet
0 500 1,000 2,000
One Inch Equals 1000 feet

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

- Development Limits
- Proposed XP Link

Exhibit 3.1

PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

PROPOSED HYDRAULICS

Date: December 2025 Job No. 2013-2512

LJA LAND DEVELOPMENT

4.0 RESULTS AND CONCLUSIONS

4.1 Presidio Local Storm Event

Detention routing was performed on the proposed drainage system for Presidio to demonstrate that sufficient freeboard and detention volume is provided in the proposed development as discussed in Section 3. This analysis reflects a local storm event over the development and normal depth discharge at the outfalls (no backwater effects from Chocolate Bayou). Results of the local event detention routing are summarized in **Table 4.1**. Results from this table demonstrate sufficient freeboard and peak discharges. Consideration should be given to other water surface elevations such as FEMA SFHA's and previous watershed studies for grading or setting minimum slab elevations.

Table 4.1
Detention Summary – Presidio Local Storm Event

Pond ID	Static WSE/FL	Highbank Elev.	2yr WSE	10yr WSE	100yr WSE	100yr Frbd. (ft)	100-year Vol (ac-ft)
Basin A	48.50	54.75	50.85	51.84	53.72	1.04	84.06
Basin B	48.50	54.75	50.84	51.80	53.60	1.15	69.09
Basin C	48.50	54.50	50.80	51.71	53.31	1.19	15.94
Basin D	35.00	54.50	41.35	46.69	52.88	1.58	309.92
						Total	**479.01**

During a 100-year storm event, approximately 479.01 ac-ft of developed runoff will be stored in the detention ponds. This detention rate equates to 1.34 acre-feet per acre for 358.4 acres of development.

The Presidio detention analysis also produced peak discharges at the outfalls, which were compared to the revised existing condition peak discharges summarized in Table 2.7. The revised existing and post project peak discharges are compared in **Table 4.2**.

Table 4.2
Discharge Comparisons

Outfall ID	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.
	2-year Q			10-year Q			100-year Q		
Hwy6	525**	269	-256	673	464	-209	869	818	-51
Siphon	--	--	--	--	--	--	37.1	37.0	-0.1

*Obtained from June 2005 DIA ICPR model results for BCMUD 30
**From DCM as of 2005. Current DCM now requires a 2yr analysis.

It should be noted that the June 2005 analysis did not reflect Atlas 14 precipitation, whereas the flows computed for the Presidio drainage used Atlas 14 precipitation in accordance with the current BDD4 DCM. Additionally, the revised existing conditions flow from the 2005 DIA was based on a 3-year storm event. The post project flows are based on a 2-year Atlas 14 storm event. These assumptions incur some conservatism in the drainage recommendations for the proposed development.

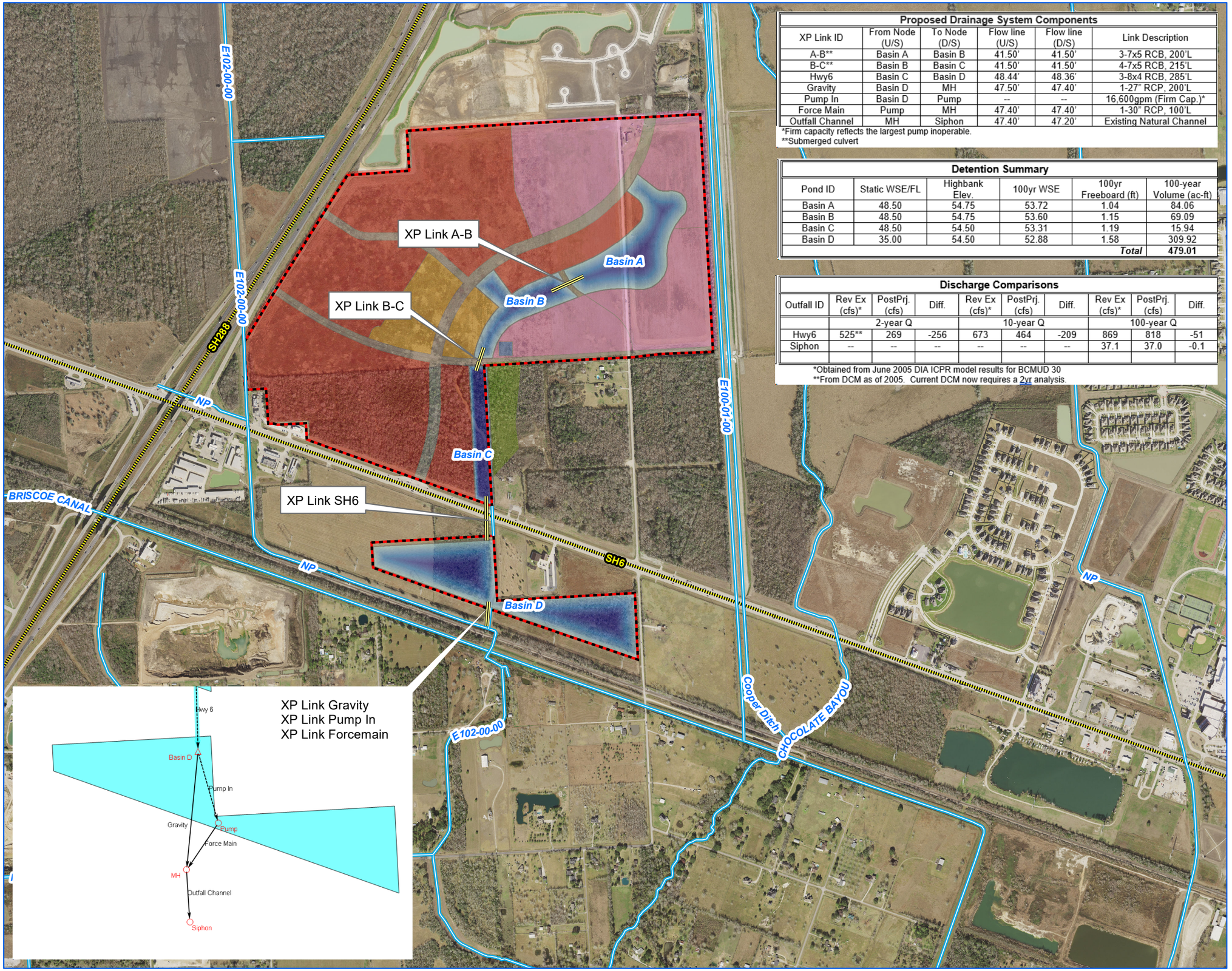
4.2 Conclusion

The proposed Presidio at Manvel development will add approximately 360 acres of development within the Chocolate Bayou Watershed. Results from the drainage analysis presented in this report show that the proposed development and corresponding drainage improvements can be constructed without adversely impacting the watersheds for storm events up to and including the 100-year storm event.

The proposed development will include reclaiming approximately 1.5 acres of land from the floodplain defined in the FEMA Effective Flood Insurance Rate Map. The lost floodplain storage can be mitigated with the proposed drainage improvements, which include floodplain and conveyance mitigation. As fill is placed in the FEMA regulatory floodplain, Letters of Map Change will be requested, as needed, to revise the effective flood insurance rate maps (FIRMs).

The analysis presented in this report was prepared from a conceptual development plan, and LiDAR topography was used for determining physical geometries and, thus, resulting water surface elevations. However, relative comparisons of pre project and post project conditions conclude that the proposed drainage plan will be sufficient for mitigating the 2-, 10-, and 100-year storm events. As development progresses and changes occur, or more details become available, the analysis will be updated to reflect such changes in future amendments.

For development to occur orderly and economically, proper planning is essential. The drainage analysis presented in this report was performed in accordance to BDD4 drainage criteria current as of the date of this report. The analysis shows that the proposed development can occur with no adverse impacts to the watershed provided it is constructed as designed. As development progresses and changes, additional and cumulative drainage reports supporting the proposed development will be submitted as needed.



Proposed Drainage System Components

XP Link ID	From Node (U/S)	To Node (D/S)	Flow line (U/S)	Flow line (D/S)	Link Description
A-B**	Basin A	Basin B	41.50'	41.50'	3-7x5 RCB, 200'L
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*Firm capacity reflects the largest pump inoperable.
**Submerged culvert

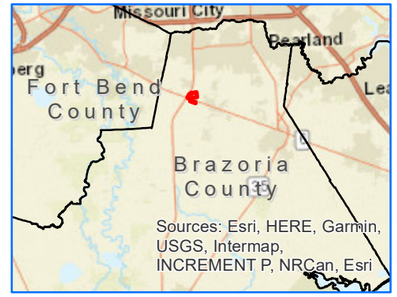
Detention Summary

Pond ID	Static WSE/FL	Highbank Elev.	100yr WSE	100yr Freeboard (ft)	100-year Volume (ac-ft)
Basin A	48.50	54.75	53.72	1.04	84.06
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Basin C	48.50	54.50	53.31	1.19	15.94
Basin D	35.00	54.50	52.88	1.58	309.92
				Total	**479.01**

Discharge Comparisons

Outfall ID	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.	Rev Ex (cfs)*	PostPrj. (cfs)	Diff.
	2-year Q			10-year Q			100-year Q		
Hwy6	525**	269	-256	673	464	-209	869	818	-51
Siphon	--	--	--	--	--	--	37.1	37.0	-0.1

*Obtained from June 2005 DIA ICPR model results for BCMUD 30
**From DCM as of 2005. Current DCM now requires a 2yr analysis.



N
W E
S

Feet
0 500 1,000 2,000
One Inch Equals 1000 feet

Note:
This exhibit shows pertinent items necessary to illustrate the information described in the text and is not intended to include all physical characteristics of the area.

Data Source:
HGAC_2020_Aerials

LEGEND

Development Limits

Proposed XP Link

Exhibit 4.1

PRESIDIO AT MANVEL
DRAINAGE IMPACT ANALYSIS

PROPOSED DRAINAGE PLAN

Date: December 2025 Job No. 2013-2512

LJA LAND DEVELOPMENT

Doc# 2007053227

P57
CO

ORDINANCE NO. 2007-O-26

AN ORDINANCE AMENDING THE CODE OF ORDINANCES OF THE CITY OF MANVEL, TEXAS AMENDING CHAPTER 77 THEREOF, SAID CHAPTER BEING THE ZONING ORDINANCE OF THE CITY, ORDINANCE NO. 2001-14 PASSED, APPROVED AND ADOPTED ON THE 28TH DAY OF JUNE, 2001; MAKING CERTAIN FINDINGS; APPROVING A DEVELOPMENT PLAN PURSUANT TO SECTION 77-29 OF SAID CODE OF ORDINANCES FOR A CERTAIN TRACT OF LAND TOTALLING 394.232 ACRES, SAID TRACT BEING LOCATED IN THE KATE R. EHRMANN SURVEY (H.T.&B.R.R. COMPANY SURVEY, SECTION 72), A-460, THE H.T.&B.R.R. COMPANY SURVEY, SECTION 65, A-285 AND THE H.T.&B.R.R. COMPANY SURVEY, SECTION 71, A-291, BRAZORIA COUNTY, TEXAS, WITHIN THE CITY LIMITS OF THE CITY; PROVIDING FOR SEVERABILITY; AND PROVIDING A PENALTY IN AN AMOUNT NOT TO EXCEED $2,000 FOR EACH DAY OF VIOLATION OF ANY PROVISION HEREOF.

* * * * *

WHEREAS, Diversified Asset Planning and the Milestone Companies are the owners and/or developers (the "Owner") of a certain 394.232 acre tract of land, more particularly described in the development plan marked Exhibit "A" and attached hereto and incorporated herein by this reference for all purposes (the "Property"); and

WHEREAS, the Property is presently zoned Open Planned Unit Development (O-PUD), pursuant to the City's Zoning Ordinance, as amended; and

WHEREAS, pursuant to Section 77-29 of the Code of Ordinances of the City of Manvel, the Owner has prepared a development plan covering the Property; and

WHEREAS, the Planning, Development, and Zoning Commission and the City Council have conducted, in the time and manner required by law and the Zoning Ordinance of the City, a public hearing on said development plan; and

WHEREAS, the Planning, Development, and Zoning Commission has recommended approval of the development plan and the City Council adopt such development plan as an

RECORDER'S MEMORANDUM:
At the time of recordation, this instrument was found to be inadequate for the best photographic reproduction because of illegibility, carbon, or photo-copy, discolored paper, etc. All blockouts, additions and changes were present at the time the instrument was filed and recorded.

ordinance of the City, subject to certain regulations, restrictions, and conditions as set forth herein; now, therefore,

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MANVEL, TEXAS:

Section 1. The facts and matters set forth in the preamble of this Ordinance are hereby found to be true and correct.

Section 2. The City Council has reviewed the development plan attached hereto as Exhibit "A" (the "Development Plan") and makes the following findings in accordance with Section 77-29 (c) of the Code of Ordinances:

a. The Development Plan outlines development within the Open – Planned Unit Development ("O-PUD") District to encourage pedestrian circulation between structures and open spaces;

b. The mixture of proposed uses contained within the O-PUD District, as described in the Development Plan, is complimentary in function, encourages complimentary use, and is designed to pose minimal impact on the quality of life of others;

c. Vehicular circulation within the O-PUD District, as defined in the Development Plan, is pedestrian friendly, emphasizing slow vehicular speeds, and safe crosswalks wherever necessary;

d. The development within the O-PUD District, as demonstrated in the Development Plan, emphasizes professionally designed, constructed, and maintained landscape areas with shaded pedestrian gathering areas, landscaped parking lots, and landscaping all of which visually enhance the structures within the District;

e. Open space, either active or passive, has been included in the Development Plan and is designed and located in a manner to best serve the prospective users;

f. Signage within the O-PUD District shall comply with all City regulations governing signs, shall not compete with view of buildings, shall not impede pedestrian or vehicular flow, and shall use natural products to the greatest extent possible; and

g. The development within the O-PUD District, as described in the Development Plan, is visually and functionally compatible with surrounding developed property.

Section 3. The Development Plan attached to this Ordinance as Exhibit "A" is hereby adopted by the City as a part of this Ordinance, to have full force and effect as any other ordinance of the City. In adopting the Development Plan, the City Council specifically finds that the Development Plan does not fully satisfy the requirements of Section 77-29 (d) of the City's Code of Ordinances and that the Owner must amend this Development Plan to provide the additional information required by Section 77-29 (d) prior to any building permit being issued for construction of any structure on the Property. The additional information required from the Owner shall be approved in the manner set out in the City's Zoning Ordinance for the approval of a Development Plan for an O-PUD District.

Section 4. This Ordinance shall in no manner amend, change, supplement, or revise any provision of any ordinance of the City of Manvel, save and except to approve the Development Plan for the Property, attached hereto as Exhibit "A."

Section 5. In the event any section, paragraph, subdivision, clause, phrase, provision, sentence, or part of this Ordinance or the application of the same to any person or circumstance shall for any reason be adjudged invalid or held unconstitutional by a court of competent jurisdiction, it shall not affect, impair, or invalidate this Ordinance as a whole or any part or provision hereof other any part or provision hereof other than the part declared to be invalid or unconstitutional; and the City Council of the City of Manvel, Texas, declares that it would have passed each and every part of the same notwithstanding the omission of any and every part of the same notwithstanding the omission of any such part thus declared to be invalid or unconstitutional, or whether there be one or more parts.

Section 6. Any person who shall intentionally, knowingly, recklessly or with criminal negligence violate any provision of this Ordinance shall be deemed guilty of a misdemeanor and upon conviction, shall be fined in an amount not to exceed $2,000.00. Each day of violation shall constitute a separate offense.

PASSED AND APPROVED on first reading this 27th day of August, 2007.

PASSED, APPROVED, AND ADOPTED on second and final reading this _____, 2007.

Delores M. Martin
Delores Martin, Mayor

ATTEST:

Tammy Bell, City Secretary



The Presidio at Manvel

Brazoria County Municipal Utility District 30

Open Planned Unit Development

City of Manvel

City Council
&
Planning, Development & Zoning Commission

August 27, 2007

Submitted on behalf of

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The Presidio at Manvel

Brazoria County Municipal Utility District 30

Open Planned Unit Development

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Executive Summary

This application was prepared on behalf of Diversified Asset Planning and The Milestone Companies pursuant to the City of Manvel's ordinances related to Open-Planned Unit Development District (O-PUD). As contemplated in the City's zoning ordinance, the O-PUD designation will allow the implementation of this comprehensively planned project providing flexibility of development.

This site is programmed to be developed within an urban framework with approximately 165 acres, roughly 42% of the gross acreage, being Commercial Tracts promoting the opportunity of retail, entertainment, and employment services within aesthetically pleasing unified "themed" districts that are easily accessible and inviting. If market conditions determine other type(s) of retail or commercial concepts are more conducive at the time of development then alternate programming of these districts will be developed. Housing opportunities within the proposed Urban Density Residential District, totaling ±18.5 acres/4.7% of the gross acreage, would include patio homes, townhomes, brownstones, lofts and/or other higher density residential products. We acknowledge that since high density residential land uses are not allowed in an O-PUD designated tract per City of Manvel Zoning Ordinance, it will be necessary to submit a Re-zoning application to the City for the tract(s) that proposes such land use. The proposed density for this tract considers a range between 20 to 30 dwelling units per acre not to exceed 552 dwelling units total. The Single-Family detached residential component comprises ±77.5 acres/19.6% including pedestrian trails and common open space. Housing opportunities within this district would include minimum lot widths of 60', with a minimum lot square footage averaging 6,300 square feet, and a density range between 3.5 to 5.0 dwelling units per acre not to exceed 388 dwelling units in this parcel. The detached housing district shall be complimented with recreational opportunities such as a recreation center, common open space, an amenity/detention lake, and a connecting walkway/trail system. This pedestrian trail system is proposed to connect to all components of the development along drainage channels and a proposed micro-pool system. Refer to the Amenities, Open Space & Pedestrian Circulation section for an explanation of the micro-pool system.

Another recommendation this development proposes is the dual use of a

detention basin for recreational purposes. This development will meet the City's Park Land dedication requirements as per Ordinance No. 2003-O-09. The project will include a Waste Water Treatment Plant and a Water Plant.

The project will benefit the City by providing quality housing, retail, and employment opportunities with strong architectural schemes and tax revenues will be much greater than those accrued from the existing or conventional zoning. In addition, the proposed 120' R.O.W. Manvel Parkway will provide an important segment to the City of Manvel's major thoroughfare system. It is important to mention that this development provides a ±5.3 acre civic center site for the City of Manvel that considers a City Hall site.
The proposed O-PUD shall comply with all ordinances of the City of Manvel, unless specifically mentioned in the O-PUD as being revised.

I. Definitions

Accessory building – An "accessory use or structure" is a structure that is incidental and secondary to permitted use and is located on the same lot as the primary structure, and is not attached to the primary building. These structures shall include garages, greenhouses, tool sheds, bath house and swimming pools.
Brownstone Style Homes – Architectural style inspired in the 1800's through the 1900's of attached, narrow row of homes, usually no wider than 28' and rising two to four stories tall. Generally known for high architectural charm.
Dwelling Unit – Any building or portion thereof which is designed or used exclusively for residential purposes.
Gross Acreage – Total land area of land inclusive of all encumbrances, i.e., roadways, drainage right-of-ways, pipeline easements, detention facilities, parks and open space.
Lot, Tract, or Parcel – A designated area of land established by a properly recorded subdivision plat or otherwise permitted by law to be separately owned, used, developed or built upon.
Net Acreage – Land area exclusive of Major Thoroughfares, collectors, drainage rights-of-ways, detention facilities, pipeline easements and external parks and open space, and inclusive of developable lots, internal street right-of-way,

internal tot lots and landscape reserves.

Patio Home – A patio home is a detached single family residence in which one of the side lot lines is a zero lot line.

Single Family Residential Home – A single family detached residence, not a mobile or manufactured home, primarily designed for occupancy by one family or individual.

Townhouse – One (1) of a group of attached single family residences, separated by fire rated wall and each residence is located on a separate lot. Each townhouse will be owned separately and a subdivision plat will be filed to indicate that each unit constitutes a separate lot.

Urban Density Residential – A tract that comprises higher density residential products for own or rent such as patio homes, townhomes, brownstones, lofts and/or multi-family.

II. Existing Conditions

SITE DESCRIPTION

The Presidio at Manvel Open Planned Unit Development (Brazoria County Municipal Utility District 30) is a proposed ±394.24 acre mixed-use development bounded generally on the west by Nolan Ryan Expressway (Texas Route 288), the south by Texas Route 6, the east by a Brazos River Authority Canal Easement and on the north by unimproved agricultural land use. The site is entirely within the City of Manvel corporate limits. Refer to Exhibit 1 – Area Location.

Consistent with property in the region, the subject tract is relatively flat with elevations ranging from approximately 58 feet in the northwest corner to approximately 52 feet in the southeast corner. Surface drainage runoff from the site eventually flows into Chocolate Bayou. No wetland areas have been determined within the property.

The site is generally void of quality vegetation with the majority acreage void of any vegetation, consisting of open cultivated farm use. There is an existing tree line along the Nolan Ryan Expressway (Texas Route 288).

Acreage fronting Texas Route 6 consists of low quality vegetation, primarily Chinese Tallow (Sapium sebiferum).

Based on the fault study by The Murillo Company Geotechnical Consultants the site is located between two northeast-southwest surface fault lines. The Iowa Colony Fault line is located northwest of the project site and the Stevens Road Fault line is located southeast of the project site. Currently there has been no evidence of faulting observed within the property.

Existing physical constraints affecting development of the property include impaired access to the ±2,660 linear feet of frontage along Texas Route 288 which is currently denied by TXDOT. There are also a 22' wide H.L.&P. (CenterPoint Energy) easement and a 250' wide H.L.&P. (CenterPoint Energy) easement running northwest to southeast through the southernmost parcels of the site south of Texas Route 6, in addition to the Topeka and Santa Fe Railroad following a similar alignment along the south boundary lines of these parcels. The American Canal runs adjacent to and south of the rail right-of-way. These parcels are reserved for detention basins. The limited size of box culverts and drainage pipes both under Texas Route 6, the railroad and the canal will need to be addressed with this project to insure the natural flow of surface and storm drainage from the property into tributaries of the Chocolate Bayou. Chocolate Bayou, which is the natural drainage basin for the M.U.D. 30 area, accommodates the proposed improvements.

SURROUNDING LAND USE

Land uses surrounding *The Presidio at Manvel O-PUD* include undeveloped agricultural land to the north and east. The Texas Route 288 corridor bounds the site on the west. Land uses to the south include commercial and some light industrial uses along the Texas Route 6 corridor mixed with mostly unimproved parcels currently being marketed for commercial development. The Texas Route 6 corridor is primarily zoned for light commercial and industrial uses within the City. There is some single tract residential within the area surrounding the site, but not within any developed subdivision.

Refer to Exhibit 2 – Existing Conditions for an aerial photograph of Existing Conditions and Surrounding Land Use. Refer to Exhibit 3 – Topography.

III. Project Objectives

The goals of *The Presidio at Manvel O-PUD* are to provide guidelines for the creation of a planned long-term development that provides community cohesiveness, variety and options in housing and retail uses, uniformity in building construction, long-term sustainability, orderly growth and desired visual results. Further, the goals reflect the flexibility to achieve a quality mixed-use development in a coordinated suburban setting.

The goals and objectives will be achieved through the implementation of a series of planning strategies designed to maintain flexibility in the market place. The variety offered for single-family detached and other type residential development is intended to appeal to a broad spectrum of buyers and lifestyles. The proposed development will provide retail opportunities, office and other commercial uses as well as service and employment centers. These components will be coupled with park and recreational uses, aesthetic common open space paired with other community and neighborhood amenities, and a walk/trail system for recreational uses as well as connecting pedestrian movement from the residential to the projects' varied components.

Orderly growth will be achieved through a master plan. This will ensure a completed project that is consistent in character and content, providing residents, businesses, and visitors with a clear sense of community. The goals and objectives outlined in the following matrix are intended to facilitate a successful long-term development offering variety.

Goal	**Objective**
▪Flexible Growth	Provide the ability for flexibility in the development program to respond to

	market demands.
▪Orderly Growth	Provide orderly and controlled growth via mechanisms that ensure thoughtful application of flexible regulations.
▪Balanced Community	Provide compatible and functional land uses for employment, shopping, living and recreational activities.
▪Long-term Sustainability	Provide the certainty produced through land use controls, utilizing the flexibility needed to respond to changes in the market while creating a continuous series of quality neighborhoods and the associated facilities and amenities.
▪Quality and Character of Community	Provide a high level of planning, architecture, creative design and aesthetic standards.
▪Multiple Housing Options	Provide flexibility of housing options, lifestyles and price ranges in identifiable neighborhoods.

The community's strong character will be ensured through guidelines and controls for architectural and design aesthetics, open space and landscaping, perimeter treatments and neighborhood amenities, such as sidewalks and neighborhood recreation spaces.

Long-term sustainability will be provided for the community through the adoption of a land use plan and restrictions that provide maximum flexibility. These restrictions will be submitted to the City of Manvel during the subdivision platting process.

A cohesive community will be accomplished by mixing compatible and functional land uses that provide service industries, employment, shopping, living, and recreational activities. The combination of commercial and residential uses in a coordinated and controlled environment will provide the residents with the

quality and convenience essential to the community.

In summary, the planning strategies that will be implemented in *The Presidio at Manvel O-PUD* will ensure the future success of the community and its neighborhoods, providing flexible land use controls, high quality planning, thoughtful architectural and aesthetic guidelines, and meaningful neighborhood recreation spaces.

IV. Project Description & Quantitative Data

Quantitative Data

The Presidio at Manvel O-PUD consists of ±394.24 acre mixed-use project located within the City of Manvel, Texas. This application was prepared on behalf of Diversified Asset Planning and The Milestone Companies pursuant to the City of Manvel ordinances related to Open Planned Unit Development (O-PUD). The purpose of the O-PUD is to encourage flexibility in the use and development of land in order to promote the most appropriate uses, and to provide a variety of housing opportunities both in design and price range, surrounded by adjacent recreational amenities and open space.

The proposed development will consist primarily of Commercial Districts and a Single-Family Residential Tract with approximately 20.7% of the overall land dedicated to recreation, walkways, trails and common open space. Table 1 illustrates the composition of land uses proposed by the Developer.

Table – 1. Composition of Land Uses

Use	Approximate Acres
Commercial Districts (including Office and Hotel)	**176.9**
Single-Family Residential	**77.5**
Urban Density Residential	**18.4**
Civic (Manvel Town Center)	**5.2**
Common Open Space/Detention/Amenity Lakes	**81.6**
Waste Water Treatment Plant	**3.3**
Water Plant Site	**1.0**
Circulation	**30.3**
Total Acreage	**394.2**

The Presidio at Manvel O-PUD will establish a comprehensive land use plan and zoning regulations to guide future improvements within the development. The plan and ordinance will provide a flexible guideline for development. It will ensure the character of the community, promote the efficient use of land through land use controls, design standards, and quality planning while offering to potential residents and businesses amenities, housing options, and open space. The O-PUD provisions will ensure the long-term aesthetic continuity of the development and preserve the character of *The Presidio at Manvel* over time.

LAND USE

The property will be comprised of multiple land uses dominated by commercial and single-family detached residential. Other anticipated uses include urban density residential, civic, and common open space with a trail system that connects the residential component to the rest of the development. The uses are illustrated on Exhibit 4 – Proposed Land Use.

The Proposed Land Use Plan illustrates a collection of individual commercial and residential cells formed by the various constraints (existing and proposed) associated with the subject property including easements, drainage facilities and the collector/thoroughfare street system. The commercial and pad tracts are generally situated along the frontage of Texas Route 6 and Texas Route 288 frontage with primary access to the project from Route 6. Commercial Land Use is the largest individual component of *The Presidio at Manvel O-PUD,* by land area being approximately 165.2 Acres. If market conditions determine other type(s) of retail or commercial concepts are more conducive at the time of development then alternate programming of these tracts will be developed. Another component in the development include Urban Density Residential tracts that consider land uses such as Patio Homes, Townhomes, Brownstones, Lofts, and/or other higher density residential products. The developer of *The Presidio at Manvel O-PUD* acknowledges that urban density land use is not allowed in an O-PUD designated zone per City of Manvel Zoning Ordinance. It is understood that it will be necessary to submit a Re-zoning application to the City for the

tract(s) that proposes such land use. The two tracts allowed for these uses are approximately 18.4 Acres in size and propose a density of 20 to 30 dwelling units per acre not to exceed 552 dwelling units total in these two tracts. *The Presidio at Manvel O-PUD* hosts the Manvel Civic Center, being a tract of approximately 5.3 acres that considers a City Hall site. Commercial Tracts COM-18 and COM-19 are physically separated from the rest of the developable land within the project and are situated at the corner of existing Brazoria County Road 82 (Iowa Lane) and Texas Route 6. These tracts comprise approximately 30.9 acres.

The single-family residential component is situated toward the eastern portion of the overall site. This component of the proposed development is comprised of approximately 77.5 acres of Single-Family medium density detached housing complimented with a recreation center, common open space, a connecting walkway/trail system, and an amenity/detention lake. Housing opportunities in this tract would propose minimum lot square footages of 6,300 square feet, a minimum lot width of 60', and a proposed density range of 3.5 to 5.0 dwelling units per acre not to exceed 388 dwelling units total in this parcel.

The following table lists the various land uses illustrated on the Proposed Land Use Plan (Exhibit 4), along with their respective acreages and percentage of the gross land area.

Table 2 - Acreage per Land Use Summary

Land Use Category	±Acreage	% Of Gross Acreage
CONSTRAINTS	**86.0 Ac**	**21.8%**
Collector Streets	30.3 Ac	
Proposed Drainage / Detention Facilities	55.7 Ac	
COMMUNITY ELEMENTS	**31.1 Ac**	**7.9%**
Manvel Town Center	5.2 Ac	
Common Open Space, & Trails*	25.9 Ac	
FACILITIES	**4.3 Ac**	**1.1%**

Land Use Category	±Acreage	% Of Gross Acreage
Waste Water Treatment Plant	3.3 Ac	
Water Plant	1.0 Ac	
Commercial (Pad, Office, Hotel)	**176.9 Ac**	**44.9%**
Single-Family Detached Residential*	**77.5 Ac**	**19.6%**
Urban Density Residential	**18.4 Ac**	**4.7%**
TOTALS	**394.2 Ac**	**100.0%**

*A portion of this acreage considers drainage/detention pertinent requirements.

LAND USE CATEGORIES

Existing and surrounding Zoning Categories.

The subject property is zoned O-PUD. Surrounding undeveloped properties are zoned Light Commercial (LC), Open Planned Unit Development (O-PUD), and Open Single Family (OSF). Refer to Exhibit 5 for Re-zoning Boundary and Survey.

Proposed Land Use Categories.

The proposed land use categories include land uses consistent with the current City of Manvel Zoning regulations and additional proposed land use categories. Proposed land use categories include: Single Family Residential (SF), Urban Density Residential (UDR), Retail/Commercial (COM), Pad/Retail (PAD), Office (O), Hotel (H), and Manvel Town Center (MTC). Of these categories listed, SF is a current City of Manvel Zoning category; all other categories are considered proposed specifically for *The Presidio at Manvel* development. The total number of residential units shall not exceed 940 dwelling units, including all housing types.

This mix of land use categories intends to appeal to a broad range of potential residents and lifestyles by providing shopping, recreational uses, aesthetic open space, connectivity trails, and other neighborhood and community amenities.

Land use categories shall be regulated on a total gross acreage basis. Individual land use acreages may be increased by up to 10% by the developer without required approval from the Planning and Zoning Commission and City

Council. This fluctuation in acreage does not apply to open space category. The percentage land use area range is required to ensure the success of the development by maintaining the flexibility to modify land use size dictated by changes in economic and market conditions.

By allowing a variation in the percentage of land uses *The Presidio at Manvel* is ensured to remain competitive in the real estate market.

Category Descriptions.

The Single Family Residential (SF) tract provides for single family detached dwelling units. The lot width sizes are a minimum of 60'. The average area of a Single Family Residential lot is 6,300 square feet minimum. Building lines and setbacks are as follows:

- Front Building Line minimum of twenty (20) feet including cul-de-sacs,
- Interior side minimum five (5) foot setback with an aggregate of ten (10) feet,
- Corner lots minimum ten (10) foot side setback along street,
- Rear setback minimum fifteen (15) feet with a detached garage,
- Accessory buildings shall be located behind the front building line and behind the corner building line; however, along the rear or interior side, the accessory building may be located no closer to the property line than the designated utility easement or five (5) feet, whichever is greater.

The Urban Density Residential (UDR) category includes land uses such as Patio Homes, Townhomes, Brownstones, Lofts, and /or other higher density residential products. The density proposed for these tracts is between twenty (20) and thirty (30) dwelling units per acre.

The maximum building height of any building in an Urban Density Residential development shall not exceed fifty (50) feet measured from the finished grade to the highest point of the roof, not including ancillary structure such as chimneys. Minimum Setbacks for Urban Density Residential development are as follows:

- Front setbacks adjacent to a street shall be a minimum of five (5) feet,
- Rear or side yard setbacks not adjacent to a street shall be a minimum of fifteen (15) feet and five (5) feet for accessory structures.

Townhome land use provides for maximum density attached single family lots. One (1) of a group of attached dwelling units, separated by fire rated wall and a maximum of one (1) dwelling unit on a lot. The minimum lot size for Townhomes shall be 2,500 square feet with a minimum lot width of twenty-five

(25) feet and a density not to exceed seven (7) dwelling units per net acreage. Building lines are as follows:

- Front building line minimum twenty (20) feet,
- Corner side building lines minimum ten (10) feet,
- Rear building line minimum five (5) feet,
- Minimum distance between buildings ten (10) feet.

Rear loaded townhouse:

- Front building line minimum ten (10) feet,
- Corner side building lines minimum ten (10) feet,
- Rear building line minimum five (5) feet,
- Minimum of ten (10) feet between buildings.

The Commercial district within *The Presidio at Manvel* incorporates a mixed use of commercial, retail, hotel and office land uses. An example of mixed use would include restaurant/retail on the first floor and medical office/office on the second floor. Landscaping will be required as a buffer between different categories. The landscaping requirements will be detailed with Landscaping guidelines to follow. The building lines are as follows:

- Front building line minimum ten (10) feet,
- Side and rear building lines are zero (0) if adjacent to commercial/retail or ten (10) feet if adjacent to Urban Density Residential.

Land uses may be relocated within the boundaries of *The Presidio at Manvel O-PUD*, provided that they are in compliance with the acreage restrictions referred to above and otherwise conform to existing City of Manvel regulations for such changes. *The Presidio at Manvel O-PUD* will comply with the standards as outlined for each land use category unless otherwise noted. The land uses permitted will be based upon those categories that are permitted in the Zoning Ordinance unless otherwise noted. Refer to Exhibit 4 – Proposed Land Use Plan for land use designations for each parcel within *The Presidio at Manvel O-PUD*.

AUTOMOBILE CIRCULATION

The Presidio at Manvel O-PUD will have superior traffic mobility and connectivity with the implementation of the planned arterial system and to the Texas Route 6 corridor and Texas Route 288.

The site possesses significant frontage along Texas Route 6. Access along Route 6 will be limited to enhance the efficiency of that facility in conformance with intersection and driveway guidelines as dictated by TXDOT.

Most of the project will be served by a proposed 120' wide Manvel Parkway right-of-way that traverses the project's central area in a north/south axis from Texas Route 6 through the site and connecting to the primary contiguous land mass. This roadway is designated by the City of Manvel's Major Thoroughfare Plan as a major thoroughfare. A traffic signal is programmed for the intersection of this proposed Manvel Parkway R.O.W. and Texas Route 6. At this intersection Manvel Parkway's R.O.W. is increased to 150' in width and tapers down for the next 150' to 120' in R.O.W. width.
Based on H-GAC's Brazoria County Thoroughfare Map, updated in 2005, Iowa Lane is a proposed 120' north/south thoroughfare right-of-way traversing through the eastern portion of the project. Through the proposed development's site improvements, Iowa Lane is suggested to be re-aligned north of Texas Route 6, on a south/north-west axis, eventually intersecting the proposed Manvel Parkway. It is also proposed to revise its ROW width from 120' to 80' thus downgrading its Major Thoroughfare category to Collector Road. A traffic signal is also considered at the intersection of Iowa Lane and Texas Route 6. Lewis Lane is a designated 80' right-of-way collector road within a minor transportation corridor. This is a road that originates intersecting Iowa Lane and connecting the project site to the east through the proposed residential tracts. These roadway alignments are proposed to be improved as part of *The Presidio at Manvel O-PUD* development plan.

Minimum Right-of-ways are as follows:

- Manvel Parkway: Minimum one hundred twenty (120) feet in width. Paving section comprised of two (2) twenty-five (25) foot wide paving sections with landscaped medians. Medians along Manvel Parkway have

a minimum width of thirty (30) feet except at turning lanes.

- Iowa Lane, Lewis Lane, and Collector Streets: Minimum eighty (80) feet in width with a paving section of twenty-eight (28) to thirty-six (36) feet depending upon the location either within the commercial district or the residential area. Parking will not be allowed on the twenty-eight (28) feet paving section unless separate parallel parking is provided in addition to the twenty-eight (28) foot section.
- Non collector/auxiliary streets: Minimum of sixty (60) foot right-of-way.

Note that at this time the Developer of *The Presidio at Manvel O-PUD* is in discussions with TXDOT for possible access to the Texas Route 288 Right-of-Way.

Refer to Exhibit 6 – Proposed Arterial Plan.

AMENITIES, COMMON OPEN SPACE & PEDESTRIAN CIRCULATION

A recreation center is proposed to serve the Single-Family detached residential community. The opportunity for pocket parks and/or tot lots will be explored with the planning of each individual residential cell to encourage neighborhood play and social activities.

Common Open space accounts for approximately 5.2% (±20.6 acres) of the gross acreage within *The Presidio at Manvel O-PUD*. A pedestrian trail system is planned to connect tracts within the development with the various amenities located throughout the project, including parks and amenity lakes.

The pedestrian trail system is intended to connect the proposed micro-pool concept within the 185' wide common open space easements as well as connecting the single family and the urban density residential tracts with the Commercial Districts, thus allowing for pedestrian and bicycle movement to and from the residential tracts, the recreational/open space opportunities and the Commercial Districts.

The micro-pool concept allows for the enhancement of drainage channels (conveyance systems) and easements without impairing the intended function of these facilities. In lieu of the traditional v-shaped pilot channel, with uniform slopes, this alternative introduces fluctuation of grades along the primary channel introducing high as well as low points. At the low points, small "pools" of water, typically from 1 to 3 acres are integrated into the

channel. A pilot channel is defined by grading away from the pool or basin. Berms and other variations in grading are introduced to provide a look more similar to that of nature as an aesthetic component that mimics a natural stream bed. Native grasses, some trees and other vegetation are introduced along the "stream bed" to provide a more natural setting without impairing "peak flow" water movement. This approach requires less mowing and maintenance needs, promotes vegetative areas of native plant materials and reinforces habitat.

Typically, concrete walkways that are aligned in a serpentine way fluctuate from higher elevations along the perimeter of the easement to the lower elevations in close proximity to the "stream bed" allowing ample opportunities for connectivity to other pedestrian trails and/or pathways. It is to be expected that during extreme events, these walks could potentially be submerged, typically only for short periods of time. Experience has shown that when properly constructed, there are no potential maintenance problems or damage to the walks.

The end product is an aesthetically pleasing linear park with a series of small pools or lakes very attractive and inviting to users, unlike typical drainage systems where the traditional channel is unappealing to the eye, non inviting and in general requires more maintenance. The Army Corps of Engineers endorses the 'micro-pool' concept, considered a creditable solution as a bio-filter, and one that is recognized by the U.S. Green Building Council for LEED Certification.

The Presidio at Manvel's pedestrian pathway system calls for a single 6' wide "serpentine" pathway along the collector street system in lieu of traditional back of curb sidewalks along both sides of the collector. This pedestrian pathway is suggested to be on both sides of Manvel Parkway and Iowa Lane to maximize connectivity between residential parcels and the commercial district. The wider walkway on one side of the street with an accompanying greenbelt has proven to be a more practical and functional element for pedestrians utilizing the walkway/trail system. Compliance with the City of Manvel's typical sidewalk requirements will be maintained throughout the balance of the project, completing the overall pedestrian network.

The detention/drainage way system will be integral to The Presidio at Manvel's amenity system. Detention facilities will be comprised of both wet and dry

facilities. Dry detention area DET-1 provides double land use by allowing amenity opportunities with improvements such as proposed sports fields and encircled by a pedestrian trail.

Compliance with Parks and Open Space City of Manvel requirements states that one acre of land for every 100 proposed dwelling units be dedicated to the City of Manvel for the use of parks. Considering the maximum estimated number of dwelling units, *The Presidio at Manvel O-PUD* will be required to provide ±9.4 acres of park land.

Compliance with the Parks and Open Space Requirements for land dedication will be achieved by the provision of ±20.62 acres of Common Open Space (parcels COS-1 through COS-3 showcase the micro-pool concept as described above) and including amenities and improvements to the Dry Detention DET-1. The Homeowners Association and/or Commercial Property Owners Association will also be responsible for maintaining all landscaped areas, recreation center, and open spaces utilized by the neighborhood residents as amenity spaces. Refer to Exhibit 7 – Conceptual Amenities Plan.

DEVELOPMENT DESIGN STANDARDS

The Presidio at Manvel developer will create design criteria and guidelines for residential and commercial uses. It is proposed that at final platting approval for the commercial developments, detailed site plans will be submitted to the City for review and approval to ensure compliance with the zoning ordinance. The developer will also provide copies of its deed restriction and development covenants to the City for review and comment at least 30 days prior to filing same. These covenants and restrictions shall provide for a common development aesthetic covering the development in its entirety.

GENERAL LANDSCAPE TREATMENT AND SIGNAGE

Landscape.

The public areas of *The Presidio at Manvel O-PUD* will be thoroughly landscaped along the streets and common areas. Street trees will be planted along thoroughfares, collectors and interior streets. The project will have fully landscaped entry statements utilizing trees, shrubs, seasonal plantings and ground covers. Utility facilities will be fully landscaped, screened and

buffered. Entry statements, major streetscape improvements, as well as screened and buffered areas will be irrigated. The landscaping guidelines will at the least comply with the City of Manvel current landscape regulations. Detailed landscape guidelines and plans will be submitted prior to final plat approval.

Signage.

In order to keep cohesiveness within *The Presidio at Manvel*, an unified signage program will be developed, separate from this document for the development in its entirety. The proposed signage program will be forthcoming and will require review and approval by the City of Manvel City Council, independent from this O-PUD plan approval.

V. Proposed Land Use Revisions & Regulatory Compliance

In order to implement the Proposed Land Plan each of the proposed land uses has been assigned zoning categories consistent with the current City of Manvel Zoning regulations. Land use shall be regulated on a total acreage basis. It is proposed that either the accumulative acreage of each proposed land use and/or each land use/zoning category may be increased or decreased in acreage by up to 10% during the actual development of the phases. The percentage land use area change is required to ensure the success of the development by maintaining the flexibility to modify land use sizes in response to changes in economic and market conditions. This will allow the project to remain competitive in the real estate market over the life of the project and the ability to make adjustments as necessary to accommodate specific end users in a timely manner.

Land uses may be interchanged within the boundaries of the O-PUD, provided they are in compliance with the acreage restrictions referred to above and otherwise conform to the City of Manvel regulations for such uses. In the event a proposed land use exceeds the established acreage by more than 10%, a variance must be requested and approved by the City of Manvel City Council.

VI. Phasing and Development Schedule

It is anticipated that *The Presidio at Manvel O-PUD* will be developed in three phases over a 5 to 15 year period. It is the developer's intention to start the project as soon as feasibly possible. The initial phases of Manvel Parkway, Iowa Lane, project entry statements and monumentation, as well as landscaping are scheduled for construction as part of the initial phasing of the project, estimated to start in approximately 18 months. There will be milestones developed that tie the implementation of infrastructure to the residential development schedule as shown in the Proposed Phasing Plan exhibit. The implementation of Lewis Lane will be tied to the development of the residential schedule. The location and timing of future phases might be dependent upon market driven forces and the Country's economy. Refer to Exhibit 8 – Proposed Phasing Plan.

VII. Utilities

The Presidio at Manvel O-PUD shares a common boundary with Brazoria County Municipal Utility District 30.

1. Proposed Improvements

A complete utility system is planned to include a water distribution system, a wastewater collection system and a storm drainage system including onsite detention and outfall channel improvements. Design and construction of these facilities will be in conformance with criteria published by the City of Manvel, Brazoria County Engineering Department, and the Texas Commission on Environmental Quality ("TCEQ").

The proposed District is planned to serve a total of approximately 396.48 acres. The construction of the water distribution system, wastewater collection, and storm drainage for the proposed District will be achieved by phasing construction of the improvements to coincide with the overall rate of development. The District will construct its internal water distribution system, wastewater collection system, and storm drainage. After the District serves

500 equivalent single family connections with water, the City may, after giving the District notice six months in advanced, require that upon completion of a District Facility in accordance with all permits and approvals (including any then-existing Facilities), the District will convey such Facility (and all existing Facilities) to the City, free and clear of all liens and encumbrances (but subject to the rights of reimbursement for funds advanced to the District with respect thereto), for ownership, operation and maintenance by the City. Once the City exercises this option, all future Facilities shall be conveyed to the City in the same manner. All utilities will be designed in accordance with the criteria established by the City of Manvel, Brazoria County, TCEQ and the Texas Department of Health.

2. Existing Utilities & Easements

There is a 60' canal easement running east to west along the northwest boundary of the District. There are also a 22' H.L.&P. easement and a 250' H.L.&P. easement running northwest to southeast through the south region of the District between Texas Route 6 and the Topeka and Santa Fe Railroad. The Brazos River Authority Canal easement runs north to south along the east boundary of the District.

3. Water Supply and Distribution System

This section describes the water supply and distribution system necessary to serve the District at full development. At full development, the District will have 2,146 equivalent single-family connections (ESFC), two water wells will be required to supply the proposed water supply and distribution system. The District will construct, and at the appropriate time the District will convey the facilities to the City of Manvel and the City will own and operate the system.

b. Design Criteria

All water distribution facilities will be designed to meet or exceed the City of Manvel and 30 TAC 290.45 (b) (1) (D) requirements.

c. Proposed Water Supply and Distribution Facilities

The water distribution facilities required by the design criteria listed above and as described in 30 TAC 290.45(b) (1) (D) will be constructed in phases to coincide with the rate of development. The water distribution system for the proposed District will be looped where feasible to provide alternate service routes during emergencies and maintenance periods, and to equalize pressure in the systems.

There are no existing water production facilities in the vicinity of the proposed District that are adequate to provide the projected demand of the District. The District will construct a water plant facility to serve its needs. Refer to Exhibit 9 – Water Distribution System.

4. Wastewater Collection System

a. General

The wastewater generated by the development within the District will flow by gravity through internal sanitary sewer lines. It will be conveyed to the Districts' wastewater treatment plant by a combination of gravity trunk lines and force mains where necessary.

At full development, the ultimate ESFC's of the proposed District will be 2,146. The wastewater generated by this development is estimated as 751,100 gpd (average dry weather flow) and 3,004,400 gpd (maximum wet weather flow).

Currently, there is no existing wastewater treatment facilities in the vicinity of the proposed District that can provide the wastewater treatment capacity required for the District.

b. Proposed Wastewater Collection System

The wastewater collection system for full development of the proposed District will consist of gravity sewer lines ranging in size from 8-inches to 20-inches in diameter. Refer to Exhibit 10 – Wastewater Collection System.

c. Wastewater Treatment

The treatment facilities will be designed to accommodate average daily flows of 350 gallons per ESFC and a peak flow of four times the average daily flow. Effluent quality shall conform to the requirements of the TCEQ currently being applied for Chocolate Bayou.

5. Storm Drainage System

a. General

The storm water runoff within the District will be routed through a curb and gutter street system to collector lines that will outfall into detention lakes throughout the District and ultimately into Chocolate Bayou. The District will construct all storm water trunk lines and detention facilities for storm water collection.

b. Design Criteria

All storm drainage improvements will be designed in accordance with criteria established by the City of Manvel and Brazoria County Drainage District.

The U.S. Army Corps of Engineers HEC-1 and HEC-2 computer models were used to model the proposed detention system. The proposed internal detention lake system was sized to contain the difference between the developed and undeveloped run-off

resulting from a 24-hour 100-year frequency rainfall event while maintaining a minimum freeboard of one foot.

c. Proposed Storm Sewer System

The District's internal storm sewer system will consist of a concrete curb and gutter street system with inlets and reinforced concrete pipe and box culverts. Reinforced concrete storm sewer pipe will range in size from 24 inches to 72 inches in diameter. The storm sewers will discharge directly into the internal detention lake within the development.

The District will provide approximately 9,628 linear feet of storm trunk lines ranging in size from 18 inches in diameter reinforced concrete pipe to 10ft. x 6 ft. reinforced concrete boxes. In addition, it also has approximately 58 acres of lakes for amenity and detention purposes. Box culverts and pipes are designed to connecting all the lakes together. Headwalls are also constructed at the edge of all culverts connecting the lakes. Refer to Exhibit 11 – Storm Sewer System.

Other Utilities

Dry utilities are available from the local public utility companies that serve the area. A list of the utility companies and the services to be provided are as follows:

1. Telephone service – AT&T Telephone
2. Electrical Service – Centerpoint Energy
3. Gas Service – Centerpoint Energy
4. Cable Service – Texas Mid Gulf Cable Vision

VIII. Legal Description

Legal Description
City of Manvel, Texas
The Presidio at Manvel (Brazoria County Municipal Utility District 30)

DESCRIPTION OF
394.232 ACRES

All those certain tracts or parcels containing a total of 394.232 acres of land in the Kate R. Ehrmann Survey, (H.T.& B.R.R. Company Survey, Section 72), A-460, the H.T.& B.R.R. Company Survey, Section 65, A-285 and the H.T.& B.R.R. Company Survey, Section 71, A-291, Brazoria County, Texas, and being more particularly described as Part One containing 1.033 acres; Part Two containing 260.308 acres; Part Three containing 54.522 acres; Part Four containing 32.821 acres and Part Five containing 45.548 acres by metes and bounds as follows, all bearings referenced to the Texas State Plane Coordinate System, South Central Zone (NAD 83);

PART ONE
1.033 ACRES

All of that certain tract or parcel containing 1.033 acres of land in the H.T.& B.R.R. Company Survey, Section 71, A-291, Brazoria County, Texas, being part of the called 1.06 acre residue of Lot No. 58, (called 10.2 acres less 9.140 acres in State Highway 288), of the Emigration Land Company Subdivision Of Section 71, a subdivision of record in Volume 2, Page 81 of the Map Records of said Brazoria County, being all of said Lot No. 58 that lies east of the east right-of-way line of State Highway No. 288 conveyed to Milestone South Six Development, Ltd., by an instrument of record in said File No. 03-061748 of the Public Records of said Brazoria County and being more particularly described by metes and bounds as follows;

COMMENCING for reference at an old one (1) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision, same being in the west right-of-way line of County Road No. 82, (Iowa Lane), varying width;

Thence South 86° 49' 17" West, with the north line of said Lot No. 254 and with the north lines of Lot No. 253, Lot No. 252, Lot No. 251 and Lot No, 250 and with a south line of that certain 25.0 feet wide Platted Roadway (not open) as shown on said subdivision, at 3155.39 feet pass a found 5/8-inch iron rod and continue with the north line of Lot No. 250 and Lot No. 249 in all a total of 4139.40 feet to a point;

Thence North 02° 56' 34" West, 50.00 feet to the southeast corner of the aforesaid Lot No. 58 and the POINT OF BEGINNING of the herein described tract;

Thence South 86° 49' 17" West, 240.35 feet with the south line of said Lot No. 58 to a point for corner on the easterly right-of-way line of State Highway No. 288, varying width, and from said point a found TxDOT concrete monument bears South 29° 41' 19" West, 115.09 feet;

Thence North 29° 41' 19" East, 445.72 feet with a westerly line of said residue of Lot No. 58 and with an easterly right-of-way line of said State Highway No. 288 to a point for corner on the westerly line of a 40.0 foot wide Platted Roadway (not open) from which point a found TxDOT concrete monument bears North 29° 41' 19" East, 567.07 feet;

Thence South 02° 56' 34" East, 374.37 feet with an east line of said residue of Lot No. 58 and with the west right-of-way line of said 40.0 foot wide Platted Roadway (not open) to the POINT OF BEGINNING and containing 1.033 acres of land.

PART TWO
260.308 ACRES

All that certain tract or parcel containing 260.308 acres of land in the H.T.& B.R.R. Company Survey, Section 65, A-285, and the Kate R. Ehrmann Survey, A-460, Brazoria County, Texas, being all of those certain tracts called 120.000 acres and 23.595 acres both conveyed to Sonmar of Albuquerque, L.L.C., by an instrument of record in File No. 2006018645 of the B.C.P.R. and all of that certain tract called 95.710 acres conveyed to Sonmar of Scottsdale, L.L.C., by an instrument of record in File No. 2006021816 of the B.C.P.R. and part of those certain tracts called 194.7158 acres, the residue of a called 38.1005 acre and 38.1231 acre tracts, the residue of a called 6.115 acre tract, the residue of a called 3.8029 acre tract and the residue of a called 0.3515 acre tract all conveyed to Milestone South Six Development, Ltd., by an instrument of record File No. 03-061748 of the B.C.P.R. and part of that certain tract called 10.82 acres conveyed to Global New Millenium Partners, Ltd., by an instrument of record in File No. 01-054877 of the B.C.P.R. as well as part of that certain 25.0 foot wide platted roadway (not open), and part of that certain 40.0 foot wide platted roadway (not open) as shown on the Emigration Land Company Subdivision of the H.T.& B.R.R. Company Survey, Section 65, A-285, a subdivision of record in Volume 2, Page 81 of the Map Records of said Brazoria County, Texas;

BEGINNING at a 5/8-inch iron rod with a "Kalkomey" cap found at the intersection or the north line of said 23.595 acre tract with the west right-of-way line of County Road 82 (Iowa Lane), 60.0 feet wide at this point, same being the southeast corner of that certain tract called 41.0900 acres conveyed to SLP 288 & Rodeo Palms III, L.P., by an instrument of record in File No. 2005-007053 of the B.C.P.R.;

Thence South 02° 29' 45" East, 2595.70 feet departing said north and south lines and with said west right-of-way line and the east line of the aforesaid 95.710 acre tract to a point for corner, the southeast corner of said 95.710 acre tract and on the common line between the aforesaid Ehrmann Survey and the H.T.&B.R.R. Company Survey, Section 65, A-285, and on the north line of a 25.0 foot wide platted roadway (not open) as shown on the Emigration Land Company Subdivision of the H.T.&B.R.R. Company Survey, Section 65, A-285 as shown on Volume 2, Page 81 of the Map Records of said Brazoria County;

Thence South 86° 49' 17" West, 1512.55 feet with said common survey lines, with the south line of said 95.710 acre tract, with the south line of said 23.595 acre tract and with the north line of said 25.0 foot wide platted roadway (not open) to a point for corner;

Thence South 02° 56' 05" East, departing said survey lines and said north and south lines, at 25.00 feet pass the northeast corner of the aforesaid 38.1005 and 38.123 acre tracts, the northwest corner of that certain tract called

7.41 acres conveyed to Fredrick Lee Huffman, et al, by an instrument of record in File No. 01-052769 of the B.C.P.R. and the common north corner of Lot No. 252 and Lot No. 253 of the aforesaid Emigration Land Subdivision, and continue with the common line between said 38.1005 and 38.123 acre tracts and that certain tract called 10 acres conveyed to Jane Meadows Cotter Allen, Trustee, by an instrument of record in File No. 03-043040 of the B.C.P.R., at 1173.79 feet pass the southeast corner of said 38.1005 and 38.1231 acre tracts, the southwest corner of said 10 acre tract, the common south corner of Lot No. 230 and Lot No. 231 of said Emigration Land Company Subdivision, on the north line of a 40.0 foot wide platted roadway (not open) as shown on the aforesaid Emigration Land Company Subdivision, at 1213.79 feet pass the northeast corner of the aforesaid 3.8029 acre tract and the northwest corner of that certain tract called 3.030 acres conveyed to Todd Properties, Ltd., by an instrument of record in File No. 98-036507 of the B.C.P.R., same being the common north corner of Lot No. 226 and Lot No. 227 of said subdivision, being on the south line of said 40 foot wide platted roadway (not open) and continue with the common line between said 3.8029 acre and 3.030 acre tracts in all a total of 1549.24 feet to a point for corner, the southwest corner of said 3.030 acre tract and on the northerly right-of-way line of State Highway No. 6, 200.0 feet wide, and from said point a previously found TxDOT brass disk in concrete bears South 70° 28' 11" East, 1588.41 feet;

Thence North 70° 28' 11" West, 2147.18 feet departing said 3.030 acre tract and with the northerly right-of-way line of said State Highway No. 6 to a point for corner, the southeast corner of the residue of that certain tract called 1.116 acres conveyed to Land Three, Ltd., by an instrument of record in File No. 02-48633 of the B.C.P.R., same being the southwest corner of the aforesaid residue of 6.115 acre tract

Thence North 02° 37' 58" West, 206.42 feet with the common line between said residue of 6.115 acre and 1.166 acre tracts to a point for corner, the common north corner of said residue of 6.115 acre and 1.166 acre tracts and on the south line of the aforesaid 10.82 acre tract;

Thence South 86° 42' 16" West, 416.54 feet with the south line of said 10.82 acre tract, the north line of said 1.166 acre tract and with the common line between Lot 234 and Lot 249 of said subdivision to a point for corner;

Thence North 03° 28' 32" West, 384.02 feet departing said south and north lines and said common line to a point for corner;

Thence South 86° 32' 02" West, 226.68 feet to a point for corner on the east line of the aforesaid 40.0 foot wide platted roadway (not open), on the west line of said 10.82 acre tract and on the west line of said Lot 249;

Thence North 03° 22' 47" West, 106.87 feet with said east, west and common lines to a point for corner, the northwest corner of Lot 249 of said Emigration Land Company Subdivision, same being the northwest corner of said 10.82 acre tract and at the intersection of the south line of a 25.0 foot wide platted roadway (not open) with the east line of a 40.0 foot wide platted roadway (not open) as shown on said subdivision;

Thence North 86° 49' 17" East, 36.01 feet departing said east line, with the north line of Lot 249 of said subdivision, with the north line of said 10.82 acre tract and with the south line of said 25.0 foot wide platted roadway (not open) to a point for corner;

Thence North 02° 56' 34" West, departing said south and north lines, at 25.00 feet pass the north line of said 25.0 foot wide platted roadway (not open), the southerly southwest corner of the aforesaid 120.000 acre tract and continuing with said west line in all a total of 486.68 feet to a point for corner, the northerly southwest corner of said

120.000 acre tract and on an easterly right-of-way line of the aforesaid State Highway No. 288 and from which point a found TxDOT concrete monument bears South 29° 41' 19" West, 634.98 feet;

Thence North 29° 41' 19" East, 492.89 feet with said easterly right-of-way line and with the westerly line of said 120.000 acre tract to a 4 inch x 4 inch TXDOT concrete monument found for corner;

Thence North 33° 09' 08" East, 1573.96 feet continuing with said easterly and westerly lines to a 5/8-inch iron rod found marking the northwest corner of said 120.000 acre tract, same being on the easterly right-of-way line of State Highway No. 288, varying width, on the south line of that certain tract called 130.00 acres conveyed to William E. Allen by an instrument of record in File No. 97-023860 of the B.C.P.R. and from which point a 4 inch x 4 inch TxDOT concrete monument found on said easterly right-of-way line bears North 33° 08' 08" East, 529.07 feet;

Thence North 86° 41' 20" East, 701.40 feet, departing said easterly right-of-way line and with the common line between said 120.000 acre tract and said 130.00 acre tract to a point for corner;

Thence North 02° 56' 28" West, 443.42 feet continuing with said common line to a point for corner;

Thence North 86° 40' 24" East, 685.77 feet continuing with said common line to a one (1) inch iron pipe found for corner, the southeast corner of said 130.00 acre tract and the southwest corner of that certain tract called 41.0900 acres conveyed to SLP 288 and Rodeo Palms III, L.P., by an instrument of record in File No. 2005-007053 of the B.C.P.R.;

Thence North 86° 38' 04" East, 1547.42 feet with the common line between said 23.595 acre tract and said 41.0900 acre tract to the POINT OF BEGINNING and containing 260.308 acres of land.

PART THREE

54.522 ACRES

All that certain tract or parcel containing 54.522 acres of land in the Kate R. Ehrmann Survey, A-460, Brazoria County, Texas, being all of that certain tract called 53.948 acres conveyed to Sonmar of Scottsdale, L.L.C., by an instrument of record in File No. 2006021816 of the B.C.P.R. and part of that certain tract called 41.4819 acres, described as Tract No. 3 conveyed to Milestone Real Estate, Inc., by an instrument of record in File No. 98-195159 of the B.C.P.R.;

BEGINNING at a 1/2-inch iron rod found on the north line of said 53.948 acre tract, same being on the east right-of-way line of County Road No. 82, (Iowa Lane), 60.0 feet wide, and on the south line of that certain tract called 24.6261 acres conveyed to SLP 288 and Rodeo
Palms III, L.P., by an instrument of record in File No. 2005-007053 of the B.C.P.R.;

Thence North 86° 38' 47" East, 900.43 feet departing said County Road No. 82 and with the common line between said 53.948 acre and 24.6261 acre tracts to a point for corner, the northwest corner of that certain tract called 6.676 acres conveyed to the Brazos River Authority in that certain judgment in Cause No. 54, 761A of the 149 th Judicial Court Of Brazoria County, Texas;

Thence South 03° 20' 50" East, 1190.80 feet departing said common line and with the west line of said 6.676 acre tract to a point for corner;

Thence South 02° 19′ 46″ West, 101.10 feet continuing with said west line to a point for corner;

Thence South 03° 20′ 50″ East, 1307.16 feet continuing with said west line to a point for corner on the south line of the aforesaid 41.4819 acre tract and on the common line between the aforesaid Kate R. Ehrmann Survey, A-460 and the H.T.& B.R.R. Company Survey, Section 65, A-285;

Thence South 86° 50′ 08″ West, 929.00 feet with the south line of said 41.4819 acre tract and with said common survey lines to a point for corner on the east line of County Road No. 82, (Iowa Lane);

Thence North 02° 29′ 45″ West, 2595.79 feet departing said south and common survey lines, with the east right-of-way line of said County Road No. 82, (Iowa Lane), to the POINT OF BEGINNING and containing 54.522 acres of land.

PART FOUR
32.821 ACRES

All that certain tract or parcel containing 32.821 acres of land in the H.T. & B.R.R. Company Survey, Section 65, A-285, being part of Lot No. 203, Lot 227, Lot No. 228, and Lot No. 229 of said Emigration Land Company Subdivision, more particularly being part of those certain tracts called 3.3719 acres, 17.1449 acres and 12.7523 acres all conveyed to Milestone South Six Development, Ltd., by an instrument of record in File No. 03061748 of the Public Records of said Brazoria County (B.C.P.R.); all of that certain tract called 1.000 acre conveyed to Sonmar of Albuquerque, L.L.C., by an instrument of record in File No. 2006018645 of the B.C.P.R. and part of that certain 40.0 foot wide Platted Roadway (not open) that lies between Lot 227, Lot 228, Lot 229 and Lot 230 of said Emigration Land Company Subdivision and being more particularly described by metes and bounds as follows;

COMMENCING for reference at an old one (1) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision, same being on the west right-of-way line of County Road No. 82 (Iowa Lane), varying width, and the northeast corner of that certain tract called 9.51 acres conveyed to B.J. Reynolds, et al, Trustee, by an instrument of record in File No. 97-004363 of the B.C.P.R.;

Thence South 02° 37′ 36″ East, 489.15 feet with the east line of Lot No. 254, the west right-of-way line of said County Road No. 82 and the east line of said 9.51 acre tract to the POINT OF BEGINNING of the herein described tract, same being the southeast corner of said 9.51 acre tract, the southeast corner of said Lot No. 254, the northeast corner of the aforesaid 12.7523 acre tract and the northeast corner of Lot No. 229 of said subdivision;

Thence South 02° 37′ 36″ East, with the west right-of-way line of said County Road No. 82, with the east line of said Lot No. 229 and the east line of said 12.7523 acre tract, at 660.82 feet pass the southeast corner of said Lot No. 229, the southeast corner of said 12.7523 acre tract and the north line of the aforesaid 40.0 foot wide Platted Roadway (not open), at 700.83 feet pass the northeast corner of Lot No. 228 of said subdivision, the northeast corner of said 17.1449 acre tract and the south line of said 40.0 foot wide Platted Roadway (not open) and continue with said west right-of-way line, the east line of Lot No. 228 and Lot No. 203, with the east line of said 17.1449 acre tract and with the east line of the aforesaid 3.3719 acre tract in all a total of 1631.61 feet to a point for corner from which a TxDOT brass disk in concrete bears South 40° 25′ 35″ East, 1.22 feet;

Thence South 53° 19' 57" West, 30.42 feet departing said east and west lines to a point for corner on the northerly right-of-way line of State Highway No. 6, 200.0 feet wide;

Thence North 70° 28' 11" West, 1231.29 feet with said northerly right-of-way line to a point for corner on a west line of the aforesaid 17.1449 acre tract and on the east line of that certain tract called 3.030 acres conveyed to Todd Properties, Ltd., by an instrument of record in File No. 98-036507 of the B.C.P.R.;

Thence North 02° 46' 47" West, with the common line between said 17.1449 acre and 3.030 acre tracts, at 472.70 feet pass the common north corner of said 17.1449 acre and 3.030 acre tracts, same being on the south line of the aforesaid 40.0 foot wide Platted Roadway (not open), and continue in all a total of 492.70 feet to a point for corner on the centerline of said 40.0 foot wide Platted Roadway (not open);

Thence North 86° 50' 47" East, 329.67 feet with the centerline of said 40.0 foot wide Platted Roadway (not open) to a point for corner;

Thence North 03° 18' 49" West, departing said centerline, at 20.00 feet pass the common south corner of Lot No. 229 and Lot No. 230 of said subdivision, the southwest corner of the aforesaid 12.7523 acre tract, the southeast corner of that certain tract called 10.0 acres conveyed to Jayne Meadows Cotter Allen, Trustee, by an instrument of record in File No. 03-043040 of the B.C.P.R. and continue with the common line between Lot No. 229 and Lot No. 230 and with the common line between said 12.7523 acre and 10.0 acre tracts in all a total of 680.20 feet to a point for corner, the common north corner of Lot No. 229 and Lot No. 230, the common north corner of said 12.7523 acre and 10.0 acre tracts, the common south corner of Lot No. 253 and Lot No. 254, the common south corner of the aforesaid 9.51 acre tract and that certain tract called 7.41 acres conveyed to Fredrick Lee Huffman, et al, by an instrument of record in File No. 01-052769 of the B.C.P.R.;

Thence North 86° 48' 20" East, with the common line between said Lot No. 229 and Lot No. 254 and with the common line between said 12.7523 acre and 9.51 acre tracts, at 605.67 feet pass the northwest corner of the aforesaid 1.000 acre tract, at 815.43 feet pass the northeast corner of said 1.000 acre tract and continue with the common line between said Lot No. 229 and Lot No. 254 and with the common line between said 12.7523 acre and 9.51 acre tracts in all a total of 845.43 feet to the POINT OF BEGINNING and containing 32.821 acres of land.

PART FIVE

45.548 ACRES

All that certain tract or parcel containing 45.548 acres of land in the H.T. & B.R.R. Company Survey, Section 65, A-285, being part of that certain tract called 19.1938 acres and part of that certain tract called 25.5279 acres both conveyed to Milestone South Six Development, Ltd., by an instrument of record in File No. 03-061748 of the B.C.P.R. and all of that certain tract called 30.244 acres conveyed to Sonmar of Albuquerque, L.L.C., by an instrument of record in File No. 2006018645 of the B.C.P.R. and part of a 40.0 foot wide platted roadway (not open) as shown on the aforesaid Emigration Land Company Subdivision;

COMMENCING for reference at an old one (1) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision and on the west right-of-way line of County Road No. 82 (Iowa Lane), varying width;

Thence South 02° 37' 36" East, with said west right-of-way line and with the east line of said subdivision, at 1189.97 feet pass the south line of a 40.0 foot wide platted road (not open) and the northeast corner of Lot No. 228 of said subdivision, at 2509.88 feet pass the southeast corner of Lot No. 203 of said subdivision, the southeast corner of that certain tract called 6.327 acres conveyed to William G. Neumann, Jr., by an instrument of record in File No. 97-014478 of the B.C.P.R. and on the north line of a 40.0 foot wide platted roadway (not open) and continue in all a total of 2549.88 feet to the POINT OF BEGINNING of the herein described tract, same being on the south line of said 40.0 foot wide platted roadway (not open), the northeast corner of Lot 202 of said subdivision, the northeast corner of the aforesaid 25.5279 acre tract and the northeast corner of the 30.244 acre tract;

Thence South 02° 37' 36" East, 962.69 feet continuing with said west right-of-way line, with the east line of said subdivision, with the east line of said Lot No. 202 and with the east of said 25.5279 acre tract, to a point for corner, the southeast corner of said Lot 202, the southeast corner of said 25.5279 acre tract and on the northerly right-of-way line of the Topeka & Santa Fe Railroad Company's 150.00 foot wide right-of-way line;

Thence North 70° 28' 24" West, departing said east and west lines, with the south line of said Lot No. 202 and Lot No. 201 of said subdivision, with the south line of said 25.5279 acre tract and with said northerly right-of-way line, at 2494.26 feet pass the west corner of said Lot No. 201, the west corner of said 25.5279 acre tract and on the south line of a 40.0 foot wide platted roadway (not open), at 2597.90 feet pass the north right-of-way line of said 40.0 foot wide platted road (not open), the westerly southeast corner of Lot No. 206 of said subdivision, a westerly southeast corner of the aforesaid 19.1938 acre tract and continue with said northerly right-of-way line and with a south line of said 19.1938 acre tract in all a total of 3029.05 feet to a point for corner, the southwest corner of Lot No. 206 and the southwest corner of said 19.1938 acre tract, same being the southeast corner of Lot No. 207 and that certain tract called "All of Lot No. 207, Lot No. 208 and Lot No. 225" conveyed to Fred McCutcheon by an instrument of record in File No. 99-030488 of the B.C.P.R.;

Thence North 03° 08' 59" West, 493.86 feet with the common line between said 19.1938 acre tract and said McCutcheon tract and with the common line between said Lot No. 206 and Lot No. 207 to a point for corner on the east line of said Lot No. 207, same being the northwest corner of said Lot No. 206, the northwest corner of said 30.244 acre tract and the southwest corner of said Lot No. 225;

Thence North 86° 46' 37" East, with the north line of said 30.244 acre tract, the south line of said McCutcheon tract, the south line of that certain tract called 3.696 acres conveyed to Douglas B. Wilson, Trustee, by an instrument of record in File No. 02-048631 of the B.C.P.R., with the common line between Lot No. 206 and Lot No. 225 and Lot No. 205 and Lot No. 226, at 1314.41 feet pass a found one (1) inch iron pipe and continue in all a total of 1317.67 feet to a point for corner, the northeast corner of said 30.244 acre tract and the common corner of Lot No. 204, Lot No. 205, Lot No. 226 and Lot No. 227 of said subdivision and on a west line of that certain tract called 5.021 acres conveyed to Grace United Methodist Church of Manvel and Iowa Colony, Texas by an instrument of record in File No. 2004-039311of the B.C.P.R.;

Thence South 03° 03' 09" East, with the east line of said 30.244 acre tract, with the west line of said 5.021 acre tract and with the common line between said Lot No. 205 and Lot No. 204, at 661.35 feet pass the common south

corner of the aforesaid 19.1938 acre and 5.021 acre tracts and the common south corner of said Lot No. 205 and Lot No. 204 and continue in all a total of 701.35 feet to a point for corner on the south line of the aforesaid 40.0 foot wide platted road (not open) and on the north line of said 30.244 acre tract;

Thence North 86° 49' 27" East, 1487.21 feet with the south line of said 40.0 foot wide platted roadway (not open) and the north line of said 30.244 acre tract to the POINT OF BEGINNING and containing 45.548 acres of land.

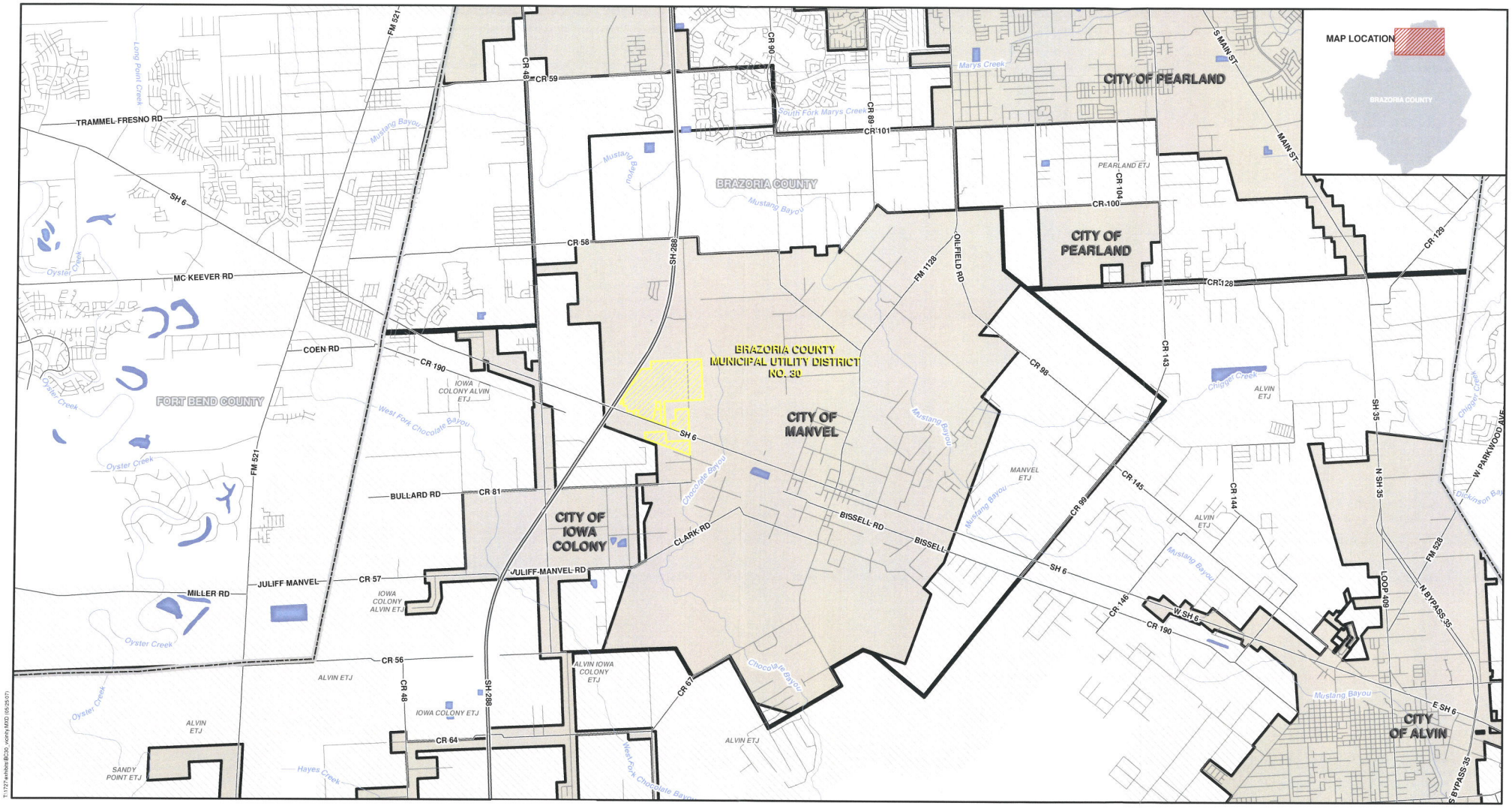
Said Part One, Part Two, Part Three, Part Four and Part Five containing a total of 394.232 acres of land.

LJA Engineering & Surveying, Inc.

IX. Exhibits

The Exhibits section begins on the next page and includes the following exhibits:

- Exhibit 1 - AREA LOCATION
- Exhibit 2 - EXISTING CONDITIONS
- Exhibit 3 - TOPOGRAPHY
- Exhibit 4 - PROPOSED LAND USE PLAN
- Exhibit 5 - RE-ZONING BOUNDARY SURVEY/LEGAL DESCRIPTION
- Exhibit 6 - PROPOSED ARTERIAL PLAN
- Exhibit 7 - CONCEPTUAL AMENITIES PLAN
- Exhibit 8 - PROPOSED PHASING PLAN
- Exhibit 9 - WATER DISTRIBUTION SYSTEM
- Exhibit 10 - WASTEWATER COLLECTION SYSTEM
- Exhibit 11 - STORM SEWER SYSTEM
- Exhibit 12 - BOUNDARY SURVEY



0 3,000 6,000 12,000 18,000

Feet

SCALE: 1" = 6000 FEET

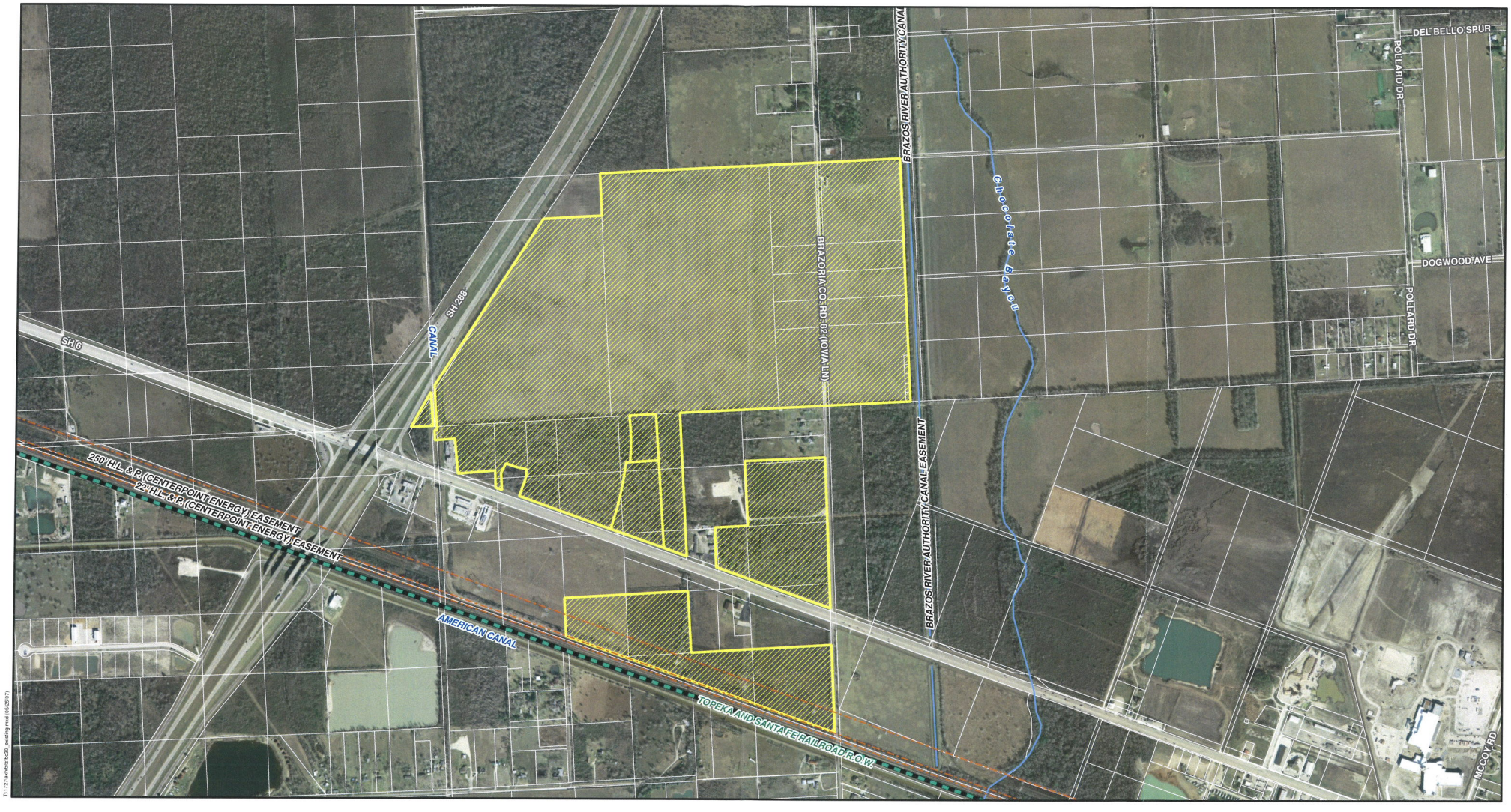
ENGINEERING
GIS Group

Planning & Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture

LJA Engineering & Surveying, Inc.
2929 Briarpark Drive, Suite 600
Houston, Texas 77042-3703
713.953.5200 F 713.953.5026

EXHIBIT 1
The Presidio at Manvel
BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NUMBER 30
±394.24 ACRES
AREA LOCATION

AUGUST, 2007



ENGINEERING
GIS Group

1,000 500 0 1,000 2,000
Feet

SCALE: 1" = 1000 FEET

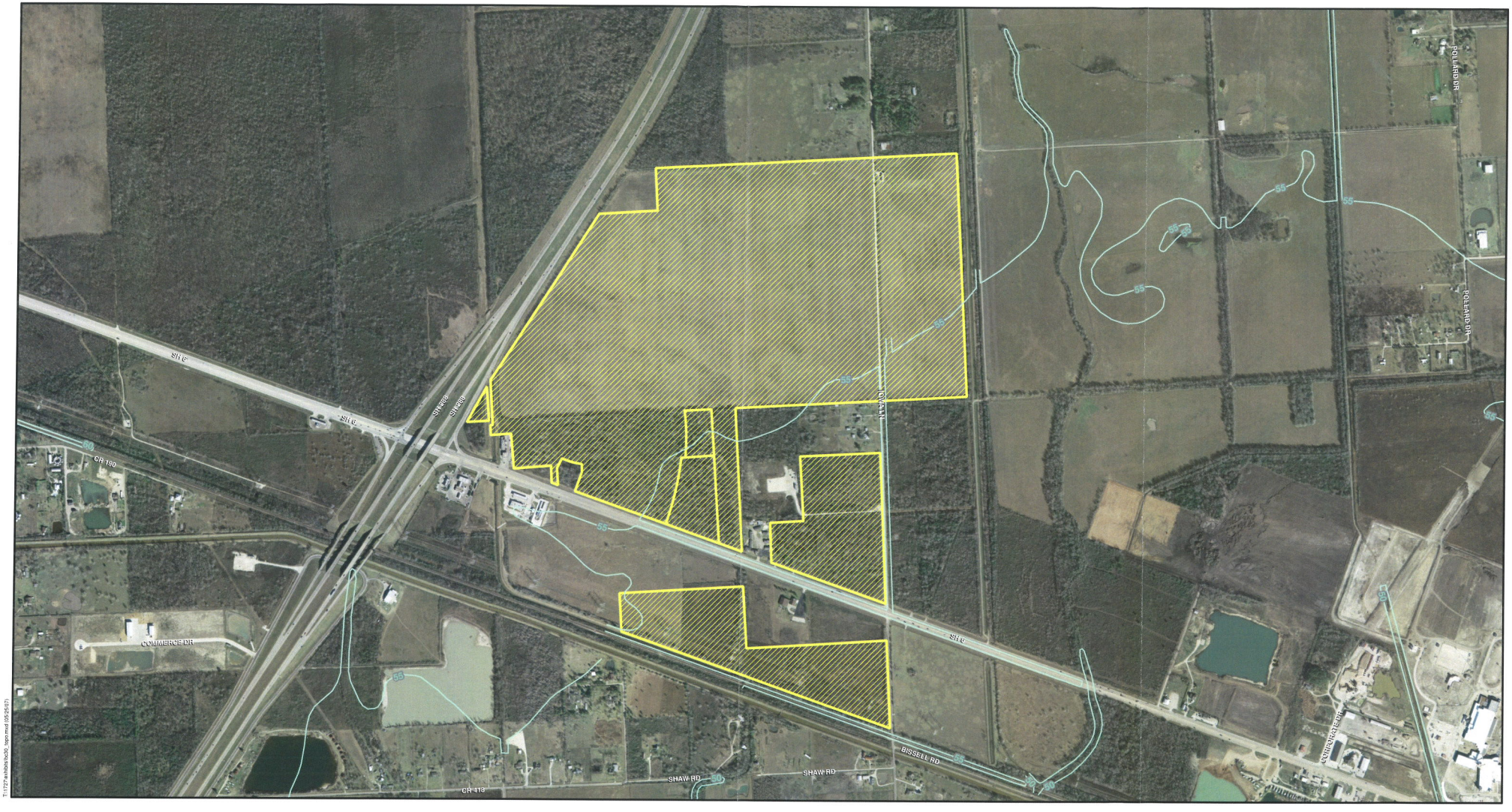
AERIAL PHOTOGRAPH DATE: JANUARY 2006

Planning & Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture

LJA Engineering & Surveying, Inc.
2929 Briarpark Drive, Suite 600
Houston, Texas 77042-3703
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EXHIBIT 2
The Presidio at Manvel
BRAZORIA COUNTY MUNICIPAL
UTILITY DISTRICT NUMBER 30
±394.24 ACRES
EXISTING CONDITIONS

AUGUST, 2007



ENGINEERING
GIS Group

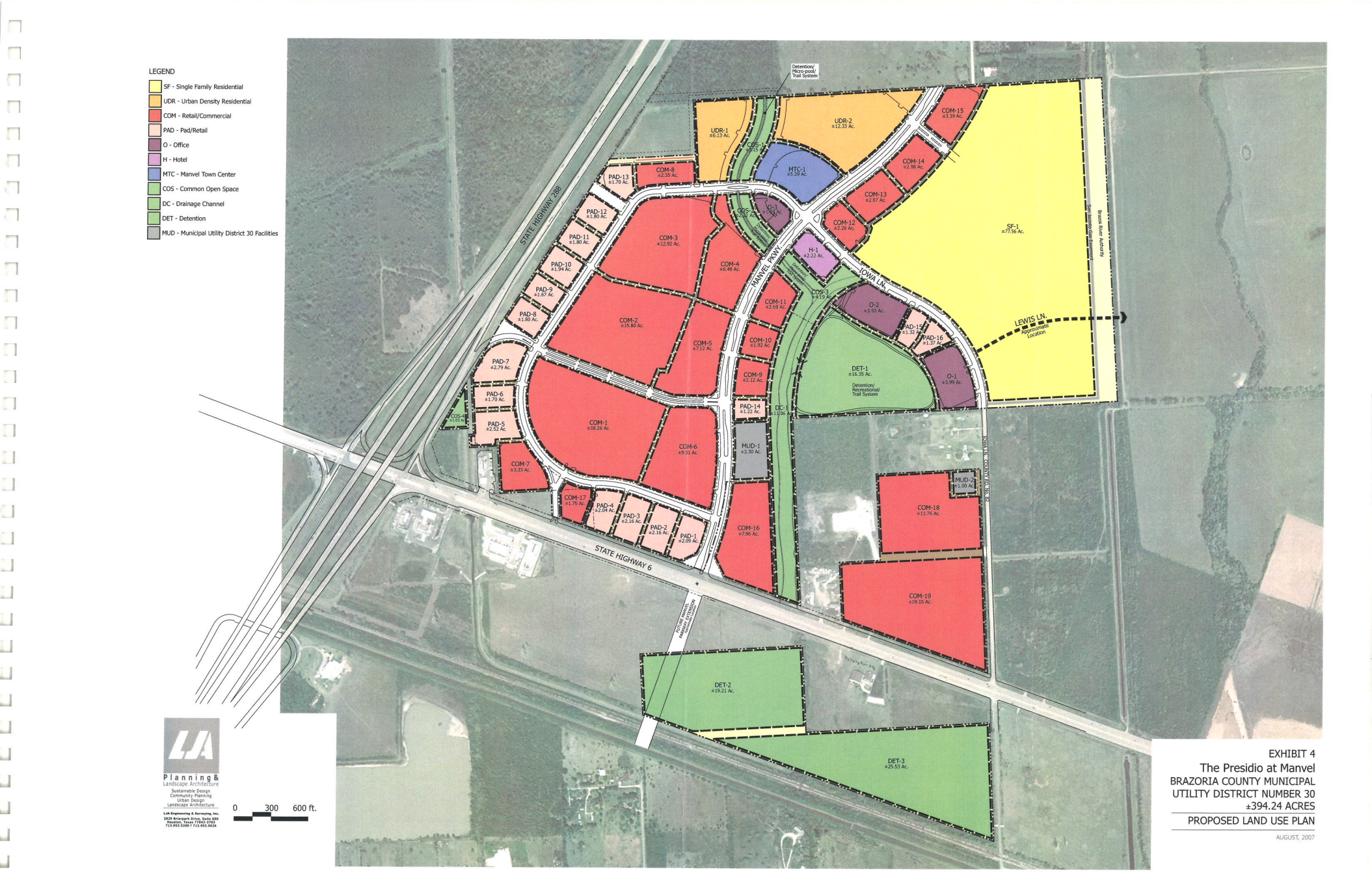
0 500 1,000 2,000 3,000
FEET

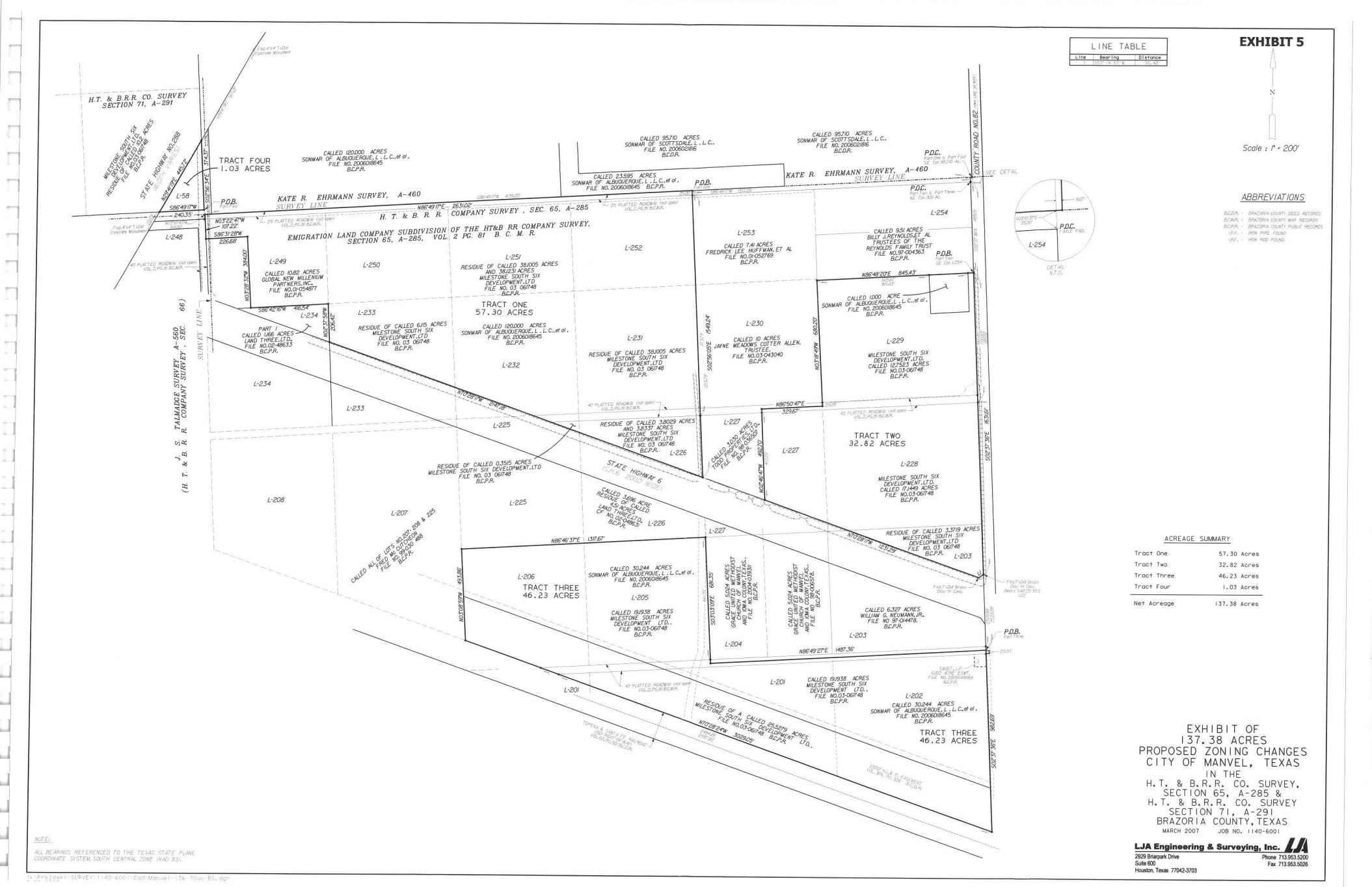
SCALE: 1" = 1000 FEET

AERIAL PHOTOGRAPH DATE: JANUARY 2006
TOPOGRAPHIC DATA SOURCE: USGS

Planning&
Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture
LJA Engineering & Surveying, Inc.
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Houston, Texas 77042-3703
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EXHIBIT 3
The Presidio at Manvel
BRAZORIA COUNTY MUNICIPAL
UTILITY DISTRICT NUMBER 30
±394.24 ACRES
TOPOGRAPHY
AUGUST, 2007


LEGEND
SF - Single Family Residential
UDR - Urban Density Residential
COM - Retail/Commercial
PAD - Pad/Retail
O - Office
H - Hotel
MTC - Manvel Town Center
COS - Common Open Space
DC - Drainage Channel
DET - Detention
MUD - Municipal Utility District 30 Facilities
STATE HIGHWAY 288
STATE HIGHWAY 6
MANVEL PKWY.
IOWA LN.
LEWIS LN.
Approximate Location
Detention/ Micro-pool/ Trail System
Brazos River Authority
Transmission Easement
UDR-1 ±6.13 Ac.
UDR-2 ±12.33 Ac.
COS-1 ±3.15 Ac.
MTC-1 ±5.29 Ac.
COM-1 ±18.26 Ac.
COM-2 ±15.80 Ac.
COM-3 ±12.92 Ac.
COM-4 ±6.48 Ac.
COM-5 ±7.12 Ac.
COM-6 ±9.31 Ac.
COM-7 ±3.33 Ac.
COM-8 ±2.35 Ac.
COM-9 ±2.12 Ac.
COM-10 ±1.92 Ac.
COM-11 ±2.69 Ac.
COM-12 ±2.26 Ac.
COM-13 ±2.97 Ac.
COM-14 ±2.98 Ac.
COM-15 ±3.39 Ac.
COM-16 ±7.96 Ac.
COM-17 ±1.75 Ac.
COM-18 ±11.76 Ac.
COM-19 ±19.15 Ac.
SF-1 ±77.56 Ac.
PAD-1 ±2.09 Ac.
PAD-2 ±2.16 Ac.
PAD-3 ±2.16 Ac.
PAD-4 ±2.04 Ac.
PAD-5 ±2.52 Ac.
PAD-6 ±1.70 Ac.
PAD-7 ±2.79 Ac.
PAD-8 ±1.80 Ac.
PAD-9 ±1.67 Ac.
PAD-10 ±1.94 Ac.
PAD-11 ±1.80 Ac.
PAD-12 ±1.80 Ac.
PAD-13 ±1.70 Ac.
PAD-14 ±1.22 Ac.
PAD-15 ±1.32 Ac.
PAD-16 ±1.37 Ac.
COS-2 ±1.93 Ac.
COS-3 ±4.19 Ac.
COS-4 ±1.07 Ac.
H-1 ±2.22 Ac.
O-1 ±3.99 Ac.
O-2 ±3.93 Ac.
O-3 ±1.93 Ac.
DET-1 ±16.35 Ac.
Detention/ Recreational/ Trail System
DET-2 ±19.21 Ac.
DET-3 ±25.53 Ac.
DC-1 ±1.06 Ac.
MUD-1 ±3.30 Ac.
MUD-2 ±1.00 Ac.
IOWA LN. COUNTY RD. 59
ALVIN-MANVEL FREIGHT EXTENSION
Planning& Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture
LJA Engineering & Surveying, Inc.
2929 Briarpark Drive, Suite 600
Houston, Texas 77042-3703
713.953.5200 | 713.953.5026
0 300 600 ft.
EXHIBIT 4
The Presidio at Manvel
BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NUMBER 30
±394.24 ACRES
PROPOSED LAND USE PLAN
AUGUST, 2007



LJA Engineering & Surveying, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042-3703
Phone 713.953.5200
Fax 713.953.5026

EXHIBIT 5
RE-ZONING BOUNDARY & SURVEY from LC to O-PUD
March 29, 2007
Approved on Manvel City Council Meeting 05.29.2007
Job No. 1140-6001

DESCRIPTION OF
137.38 ACRES
MILESTONE SOUTH SIX DEVELOPMENT, LTD.
AND
SONMAR OF ALBUQUERQUE, L.L.C., ET AL
PROPOSED ZONING CHANGE
CITY OF MANVEL, TEXAS

All those certain tracts or parcels containing a total of 137.38 acres of land in the H.T. & B.R.R. Company Survey, Section 65, A-285, and the H.T. & B.R.R. Company Survey, Section 71, A-291, Brazoria County, Texas, being part of the Emigration Land Company Subdivision of the H.T. & B.R.R. Company Surveys as recorded in Volume 2, Page 81 of the Map Records of said Brazoria County and being more particularly described as Tract One containing 57.30 acres, Tract Two containing 32.82 acres, Tract Three containing 46.23 acres and Tract Four containing 1.03 acres by metes and bounds as follows, all bearings referenced to the Texas State Plane Coordinate System, South Central Zone (NAD 83);

TRACT ONE

57.30 ACRES

Being part of Lot 225, Lot 226, Lot 231, Lot 232, Lot 233, Lot 249, Lot 250, Lot 251 and Lot 252 of said Emigration Land Company Subdivision, more particularly being part of those certain tracts called 3.8029 acres and 3.8337 acres; part of that certain tract called 38.1005 acres and 38.1231 acres and part of that certain tract called 6.115 acres all conveyed to Milestone South Six Development, Ltd., by an instrument of record in File No. 03061748 of the Public Records of said Brazoria County (B.C.P.R.); part of that certain tract called 120.000 acres conveyed to Sonmar of Albuquerque, L.L.C., et al, by an instrument of record in File No. 2006018645 of the B.C.P.R.; and part of that certain tract called 10.82 acres conveyed to Global New Millennium Partners, Inc, by an instrument of record in File No. 01054877 of the B.C.P.R. as well as that certain 25.0 foot wide Platted Roadway (not open) lying north of Lot 252, Lot 251, Lot 250 and Lot 249 and part of that 40.0 foot wide Platted Roadway (not open) lying north of Lots 225 and 226 of said Emigration Land Company Subdivision and being more particularly described by metes and bounds as follows;

COMMENCING for reference at the southeast corner of that certain tract called 95.710 acres conveyed to Sonmar of Scottsdale, L.L.C., by an instrument of record in File No. 2006021816 of the B.C.P.R., same being at the intersection of the common line between said H.T. & B.R.R. Company Survey and the Kate R. Ehrmann Survey, A-460, and on the west right-of-way line of County Road No. 82 (Iowa Lane), 60.0 feet wide;

Thence South 86° 49' 17" West, with the common line between said surveys, at 8.07 feet pass an old axle found marking the northeast corner of Lot No. 254 of said subdivision that bears South 03° 10' 37" East, 25.0 feet and continue with the common line between said surveys and with the north line of the aforesaid 25.0 foot wide Platted Roadway (not open) in all a total of 1512.55 feet to the POINT OF BEGINNING of the herein described tract;

Thence South 02° 56' 05" East, departing said common line and north lines, at 25.0 feet pass the common north corner of Lot 252 and 253 of the aforesaid Emigration Land Company Subdivision, and continue with the common line between said Lot 252 and Lot 253, Lot No. 230 and Lot No. 231, at 1173.79 feet pass the common south corner of said Lot No. 230 and 231, same being on the north line of a 40.0 foot wide Platted Roadway (not open), at 1213.79 feet pass the common north corner of Lot No. 226 and Lot No. 227, same being on the south line of said 40.0 foot wide Platted Roadway (not open) and continue with the

common line between said Lot No. 226 and Lot No. 227 in all a total of 1549.24 feet to a point for corner on the north right-of-way line of State Highway 6 (S.H. 6), 200.0 feet wide;

Thence North 70° 28' 11" West, 2147.18 feet with the north right-of-way line of said S.H. 6 to a point for corner on the common line between Lot No. 233 and Lot No. 234 of the aforesaid Emigration Land Company Subdivision, on the west line of the aforesaid called 6.115 acre tract and on the east line of that certain tract called 1.166 acres conveyed to Land Three, Ltd., by an instrument of record in File No. 02-48633 of the B.C.P.R.;

Thence North 02° 37' 58" West, 206.42 feet with the common line between said Lot No. 233 and Lot No. 234 and with the common line between said 6.115 acre and 1.166 acre tracts to a point for corner, the common north corner of said 6.115 acre and 1.166 acre tracts, the common corner of Lot No. 233, Lot No. 234, Lot No. 249 and Lot No. 250 of said Emigration Land Company Subdivision and on the south line of the aforesaid called 10.82 acre Global New Millennium Partners, Inc. tract;

Thence South 86° 42' 16" West, 416.54 feet with the common line between said Lot No. 234 and Lot No. 249 and with the common line between said 1.166 acre and 10.82 acre tracts to a point for corner;

Thence North 03° 28' 32" West, 384.00 feet departing said common lines to a point for corner;

Thence South 86° 31' 28" West, 226.68 feet to a point for corner on the east line of the aforesaid 40.0 foot wide platted roadway (not open) on the west line of said 10.82 acre tract and on the west line of said Lot 249;

Thence North 03° 22' 47" West, 107.22 feet with said east, and west lines to a point for corner on the north right-of-way line of the aforesaid 25.0 foot wide Platted Roadway (not open), and on the common line between the aforesaid H.T. & B.R.R. Company Survey and Kate R. Ehrmann Survey;

Thence North 86° 49' 17" East, 2631.02 feet with said common survey line with the north line of said Platted Roadway (not open) and with a north line of said Emigration Land Company Subdivision to the POINT OF BEGINNING and containing 57.30 acres of land.

TRACT TWO
32.82 ACRES

Being part of Lot No. 203, Lot 227, Lot No. 228, and Lot No. 229 of said Emigration Land Company Subdivision, more particularly being part of those certain tracts called 3.3719 acres, 17.1449 acres and 12.7523 acres all conveyed to Milestone South Six Development, Ltd., by an instrument of record in File No. 03061748 of the Public Records of said Brazoria County (B.C.P.R.); all of that certain tract called 1.000 acre conveyed to the aforesaid Sonmar of Albuquerque, L.L.C., in the aforesaid File No. 2006018645 of the B.C.P.R. and part of that certain 40.0 foot wide Platted Roadway (not open) that lies between Lot 227, Lot 228, Lot 229 and Lot 230 of said Emigration Land Company Subdivision and being more particularly described by metes and bounds as follows;

COMMENCING for reference at an old one (1) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision, same being on the west right-of-way line of County Road No. 82 (Iowa Lane), varying

width, and the northeast corner of that certain tract called 9.51 acres conveyed to B.J. Reynolds, et al, Trustee, by an instrument of record in File No. 97-004363 of the B.C.P.R.;

Thence South 02° 37' 36" East, 489.15 feet with the east line of Lot No. 254, the west right-of-way line of said County Road No. 82 and the east line of said 9.51 acre tract to the POINT OF BEGINNING of the herein described tract, same being the southeast corner of said 9.51 acre tract, the southeast corner of said Lot No. 254, the northeast corner of the aforesaid 12.7523 acre tract and the northeast corner of Lot No. 229 of said subdivision;

Thence South 02° 37' 36" East, with the west right-of-way line of said County Road No. 82, with the east line of said Lot No. 229 and the east line of said 12.7523 acre tract, at 660.82 feet pass the southeast corner of said Lot No. 229, the southeast corner of said 12.7523 acre tract and the north line of the aforesaid 40.0 foot wide Platted Roadway (not open), at 700.83 feet pass the northeast corner of Lot No. 228 of said subdivision, the northeast corner of said 17.1449 acre tract and the south line of said 40.0 foot wide Platted Roadway (not open) and continue with said west right-of-way line, the east line of Lot No. 228 and Lot No. 203, with the east line of said 17.1449 acre tract and with the east line of the aforesaid 3.3719 acre tract in all a total of 1631.61 feet to a point for corner from which a TxDOT brass disk in concrete bears South 40° 25' 35" East, 1.22 feet;

Thence South 53° 19' 57" West, 30.42 feet departing said east and west lines to a TxDOT concrete monument with a brass disk found for corner on the northerly right-of-way line of State Highway No. 6, 200.0 feet wide;

Thence North 70° 28' 11" West, 1231.29 feet with said northerly right-of-way line to a point for corner on a west line of the aforesaid 17.1449 acre tract and on the east line of that certain tract called 3.030 acres conveyed to Todd Properties, Ltd., by an instrument of record in File No. 98-036507 of the B.C.P.R.;

Thence North 02° 46' 47" West, with the common line between said 17.1449 acre and 3.030 acre tracts, at 472.70 feet pass the common north corner of said 17.1449 acre and 3.030 acre tracts, same being on the south line of the aforesaid 40.0 foot wide Platted Roadway (not open), and continue in all a total of 492.70 feet to a point for corner on the centerline of said 40.0 foot wide Platted Roadway (not open);

Thence North 86° 50' 47" East, 329.67 feet with the centerline of said 40.0 foot wide Platted Roadway (not open) to a point for corner;

Thence North 03° 18' 49" West, departing said centerline, at 20.00 feet pass the common south corner of Lot No. 229 and Lot No. 230 of said subdivision, the southwest corner of the aforesaid 12.7523 acre tract, the southeast corner of that certain tract called 10.0 acres conveyed to Jayne Meadows Cotter Allen, Trustee, by an instrument of record in File No. 03-043040 of the B.C.P.R. and continue with the common line between Lot No. 229 and Lot No. 230 and with the common line between said 12.7523 acre and 10.0 acre tracts in all a total of 680.20 feet to a point for corner, the common north corner of Lot No. 229 and Lot No. 230, the common north corner of said 12.7523 acre and 10.0 acre tracts, the common south corner of Lot No. 253 and Lot No. 254, the common south corner of the aforesaid 9.51 acre tract and that certain tract called 7.41 acres conveyed to Fredrick Lee Huffman, et al, by an instrument of record in File No. 01-052769 of the B.C.P.R.;

Thence North 86° 48' 20" East, with the common line between said Lot No. 229 and Lot No. 254 and with the common line between said 12.7523 acre and 9.51 acre tracts, at 605.67 feet pass the northwest corner of the aforesaid 1.000 acre tract, at

815.43 feet pass the northeast corner of said 1.000 acre tract and continue with the common line between said Lot No. 229 and Lot No. 254 and with the common line between said 12.7523 acre and 9.51 acre tracts in all a total of 845.43 feet to the POINT OF BEGINNING and containing 32.82 acres of land.

TRACT THREE

46.23 ACRES

Being part of Lot No. 201, Lot No. 202, Lot No. 205 and Lot No. 206 of the aforesaid Emigration Land Company Subdivision, more particularly being part of those certain tracts called 19.1938 acres and 25.5279 acres conveyed to Milestone South Six Development, Ltd., by an instrument of record in the aforesaid File No. 03061748 of the B.C.P.R.; part of that certain tract called 30.244 acres conveyed to Sonmar of Albuquerque, L.L.C., et al, by an instrument of record File No. 2006018645 of the B.C.P.R. and part of that certain 40.0 foot wide Platted Roadway between Lots 201 and 202 and Lots No. 203, 204, 205 and 206 of said Emigration Land Company Subdivision;

COMMENCING for reference at an old one (1) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision and on the west right-of-way line of County Road No. 82 (Iowa Lane), varying width;

Thence South 02° 37' 36" East, with said west right-of-way line and with the east line of said subdivision, at 1189.97 feet pass the south line of a 40.0 foot wide Platted Roadway (not open) and the northeast corner of Lot No. 228 of said subdivision, at 2509.88 feet pass the southeast corner of Lot No. 203 of said subdivision, the southeast corner of that certain tract called 6.327 acres conveyed to William G. Neumann, Jr., by an instrument of record in File No. 97-014478 of the B.C.P.R. and on the north line of a 40.0 foot wide Platted Roadway (not open) and continue in all a total of 2529.88 feet to the POINT OF BEGINNING of the herein described tract and on the centerline of the aforesaid 40.0 foot wide Platted Roadway (not open);

Thence South 02° 37' 36" East, continuing with said west right-of-way line, at 20.00 feet pass the northeast corner of the aforesaid Lot No. 202 and the easterly northeast corner of the aforesaid 30.244 acre tract and the northeast corner of the aforesaid 25.5279 acre tract and continue with said west right-of-way line and with the east lines of said 30.244 acre and 25.5279 acre tracts in all a total of 982.69 feet to a point for corner, the southeast corner of said 25.5279 acre tract and on the northerly line of the Topeka & Santa Fe Railroad Company's 150.0 foot wide right-of-way;

Thence North 70° 28' 24" West, with the south line of said 25.5279 acre tract and with the north line of said Topeka & Santa Fe Railroad Company's right-of-way, at 2494.26 feet pass the south line of the aforesaid 40.0 foot wide Platted Roadway (not open), at 2597.90 feet pass the north line of said 40.0 foot wide Platted Roadway (not open) and an east corner of the aforesaid 19.1938 acre tract and continue with the north line of said Topeka & Santa Fe Railroad Company's right-of-way and with a south line of said 19.1938 acre tract and with a south line of the aforesaid Lot No. 206 in all a total of 3,029.05 feet to a point for corner, the southwest corner of said 19.1938 acre tract and the southwest corner of Lot No. 206, same being the southeast corner of Lot No. 207 of said Emigration Land Company Subdivision and the southeast corner of that certain tract conveyed to Fred McCutcheon by an instrument of record in File No. 99-030488 of the B.C.P.R.;

Thence North 03° 08' 59" West, 493.86 feet with the common line between said 19.1938 acre tract and said McCutcheon tract, with the common line between said Lot No. 206 and Lot 207 of said subdivision and with the west line of the aforesaid 30.244 acre tract to a point for corner, the northwest corner of said 19.1938 acre tract, the northwest corner of said 30.244 acre tract and the common corner of Lot No. 206 and Lot No. 225 of said subdivision;

Thence North 86° 46' 37" East, 1317.67 feet with the common line between Lot No. 205, Lot No. 206, Lot No. 225 and Lot No. 226, with the north line of said 19.1938 acre tract and with the north line of said 30.244 acre tract to a point for corner, the common corner of Lot No. 204, Lot No. 205, Lot No. 226 and Lot No. 227, the northeast corner of said 19.1938 acre tract, the northeast corner of said 30.244 acre tract and the northwest corner of that certain tract called 5.024 acres conveyed to Grace United Methodist Church of Manvel And Iowa Colony, Texas by an instrument of record in File No. 2004039311 of the B.C.P.R.;

Thence South 03° 03' 09" East, with the east line of said 19.1938 acre tract, with an east line of said 30.244 acre tract, with the common line between said Lot No. 204 and Lot No. 205 and with the west line of said 5.024 acre tract, at 661.35 feet pass the common south corner of Lot No. 204 and Lot No. 205, the southeast corner of said 19.1938 acre tract, the southwest corner of said 5.024 acre tract and the north right-of-way line of the aforesaid 40.0 foot wide Platted Roadway (not open) and continue in all a total of 681.35 feet to a point for corner in the centerline of said 40.0 foot wide Platted Roadway (not open);

Thence North 86° 49' 27" East, 1487.36 feet with said centerline to the POINT OF BEGINNING and containing 46.23 acres of land.

TRACT FOUR
1.03 ACRES

All of that certain tract or parcel containing 1.03 acres of land in the H.T.&B.R.R. Company Survey, Section 71, A-291, Brazoria County, Texas, being part of the called 1.06 acre residue of Lot No. 58, (called 10.2 acres less 9.140 acres in State Highway 288), of the Emigration Land Company Subdivision Of Section 71, a subdivision of record in Volume 2, Page 81 of the Map Records of said Brazoria County, being all of said Lot No. 58 that lies east of the east right-of-way line of State Highway No. 288 conveyed to Milestone South Six Development, Ltd., by an instrument of record in said File No. 03-061748 of the Public Records of said Brazoria County and being more particularly described by metes and bounds as follows;

COMMENCING for reference at an old one (1) inch axle found marking the northeast corner of Lot No. 254 of said Emigration Land Company Subdivision, same being in the west right-of-way line of County Road No. 82, Iowa Lane, varying width;

Thence South 86° 49' 17" West, 4139.20 feet with the north line of said Lot No. 254 and with the north lines of Lot No. 253, Lot No. 252, Lot No. 251, Lot No, 250 and Lot 249 and with a south line of that certain 25.0 feet wide Platted Roadway (not open) as shown on said subdivision to a point;

Thence North 03° 10' 43" West, 50.00 feet to the southeast corner of the aforesaid Lot No. 58 and the POINT OF BEGINNING of the herein described tract;

Thence South 86° 49' 17" West, 240.35 feet with the south line of said Lot No. 58 to a point for corner on the easterly right-of-way line of State Highway No. 288, varying width and from said point a found TxDOT concrete monument bears South 29° 41' 19" West, 115.09 feet;

Thence North 29° 41' 19" East, 445.72 feet with a westerly line of said residue of Lot No. 58 and with an easterly right-of-way line of said State Highway No. 288 to a point for corner on the westerly line of a 40.0 foot wide Platted Roadway (not open) from which point a found TxDOT concrete monument bears North 29° 41' 19" East, 567.07 feet;

Thence South 02° 56' 34" East, 374.37 feet with the east line of said residue of Lot No. 58 and with the west right-of-way line of said 40.0 foot wide Platted Roadway (not open) to the POINT OF BEGINNING and containing 1.03 acres of land.

Said Tract One, Tract Two, Tract Three and Tract Four containing a total of 136.70 acres of land.

LJA Engineering & Surveying, Inc.

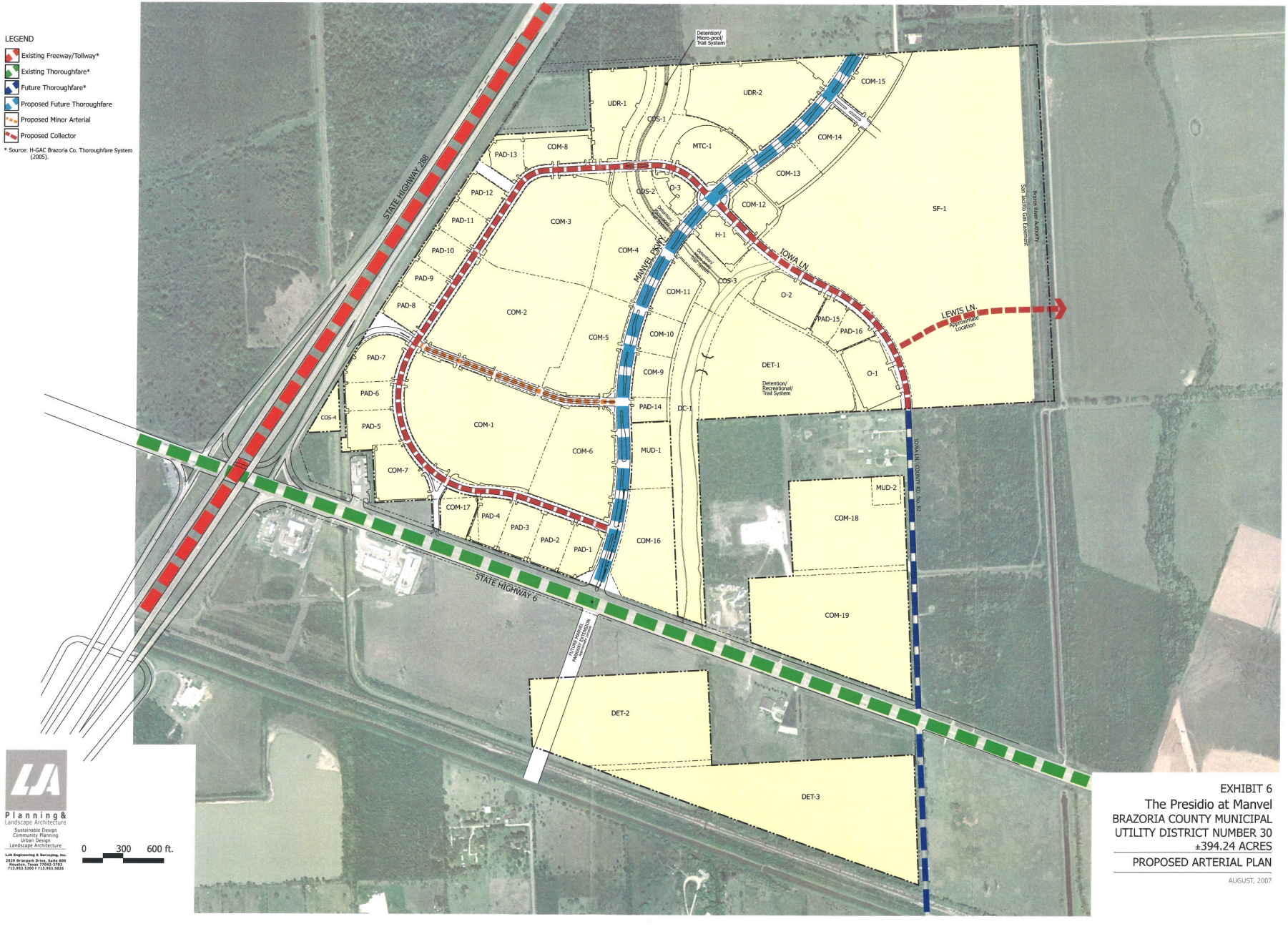


EXHIBIT 6

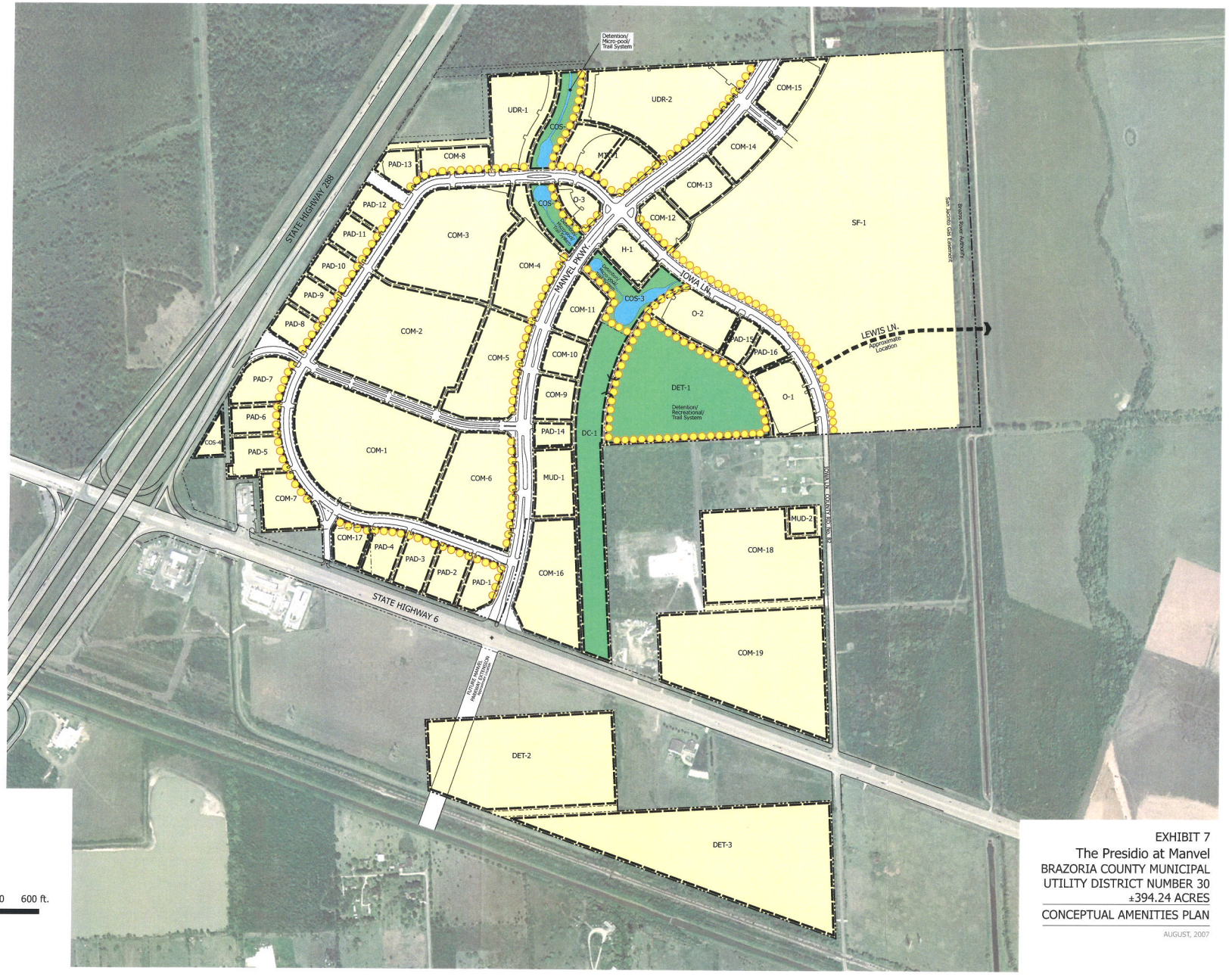
The Presidio at Manvel

BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NUMBER 30

±394.24 ACRES

PROPOSED ARTERIAL PLAN

AUGUST, 2007



LJA
Planning&
Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture
LJA Engineering & Surveying, Inc.
2929 Briarpark Drive, Suite 600
Houston, Texas 77042-3703
713.953.5200 F 713.953.5026

0 300 600 ft.

EXHIBIT 7

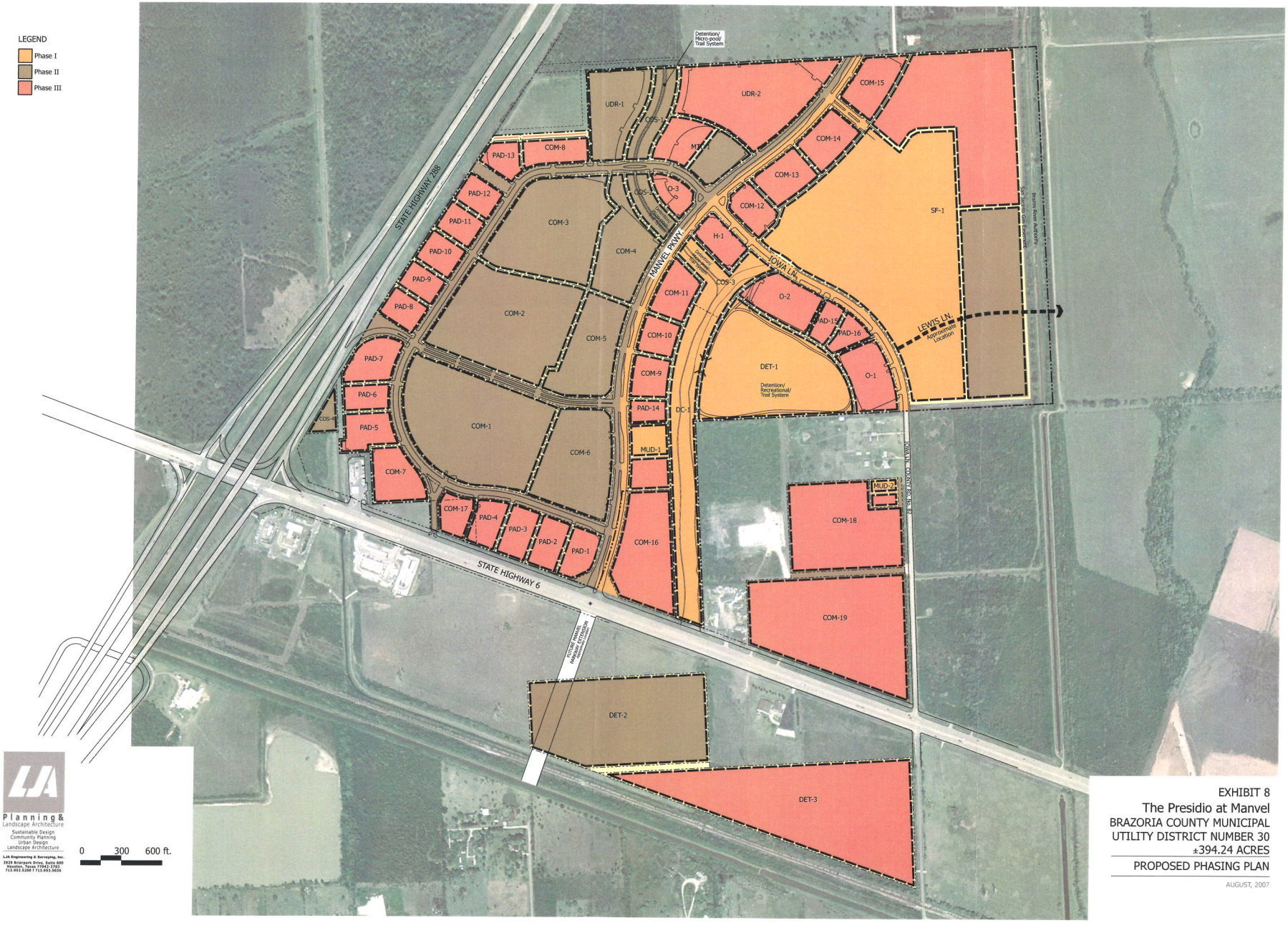
The Presidio at Manvel

BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NUMBER 30

±394.24 ACRES

CONCEPTUAL AMENITIES PLAN

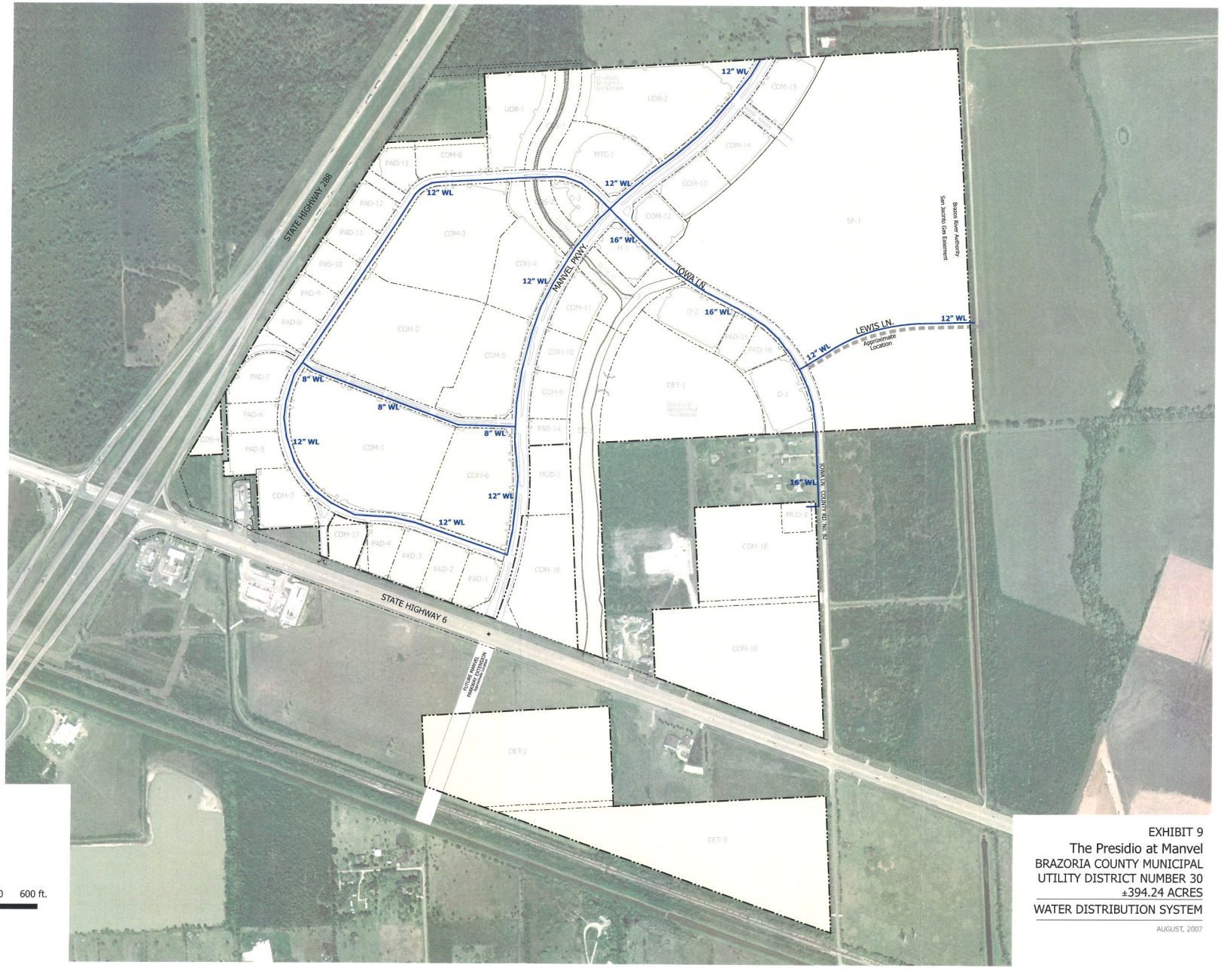
AUGUST, 2007



Planning & Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture

LJA Engineering & Surveying, Inc.
2929 Briarpark Drive, Suite 600
Houston, Texas 77042-3703
713.953.5200 F 713.953.5026

EXHIBIT 8
The Presidio at Manvel
BRAZORIA COUNTY MUNICIPAL
UTILITY DISTRICT NUMBER 30
±394.24 ACRES
PROPOSED PHASING PLAN
AUGUST, 2007



LJA Planning & Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture

LJA Engineering & Surveying, Inc.
2929 Briarpark Drive, Suite 600
Houston, Texas 77042-3703
713.953.5200 T 713.953.5026

0 300 600 ft.

EXHIBIT 9
The Presidio at Manvel
BRAZORIA COUNTY MUNICIPAL
UTILITY DISTRICT NUMBER 30
±394.24 ACRES
WATER DISTRIBUTION SYSTEM

AUGUST, 2007



Planning&
Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture

LJA Engineering & Surveying, Inc.
2929 Briargate Drive, Suite 400
Houston, Texas 77042-3703
713.953.5200 f 713.953.5026

0 300 600 ft.

EXHIBIT 10
The Presidio at Manvel
BRAZORIA COUNTY MUNICIPAL
UTILITY DISTRICT NUMBER 30
±394.24 ACRES
WASTEWATER COLLECTION SYSTEM

AUGUST, 2007



LJA
Planning&
Landscape Architecture
Sustainable Design
Community Planning
Urban Design
Landscape Architecture

LJA Engineering & Surveying, Inc.
2929 Briarpark Drive, Suite 600
Houston, Texas 77042-3703
713.953.5200 T 713.953.5026

0 300 600 ft.

EXHIBIT 11

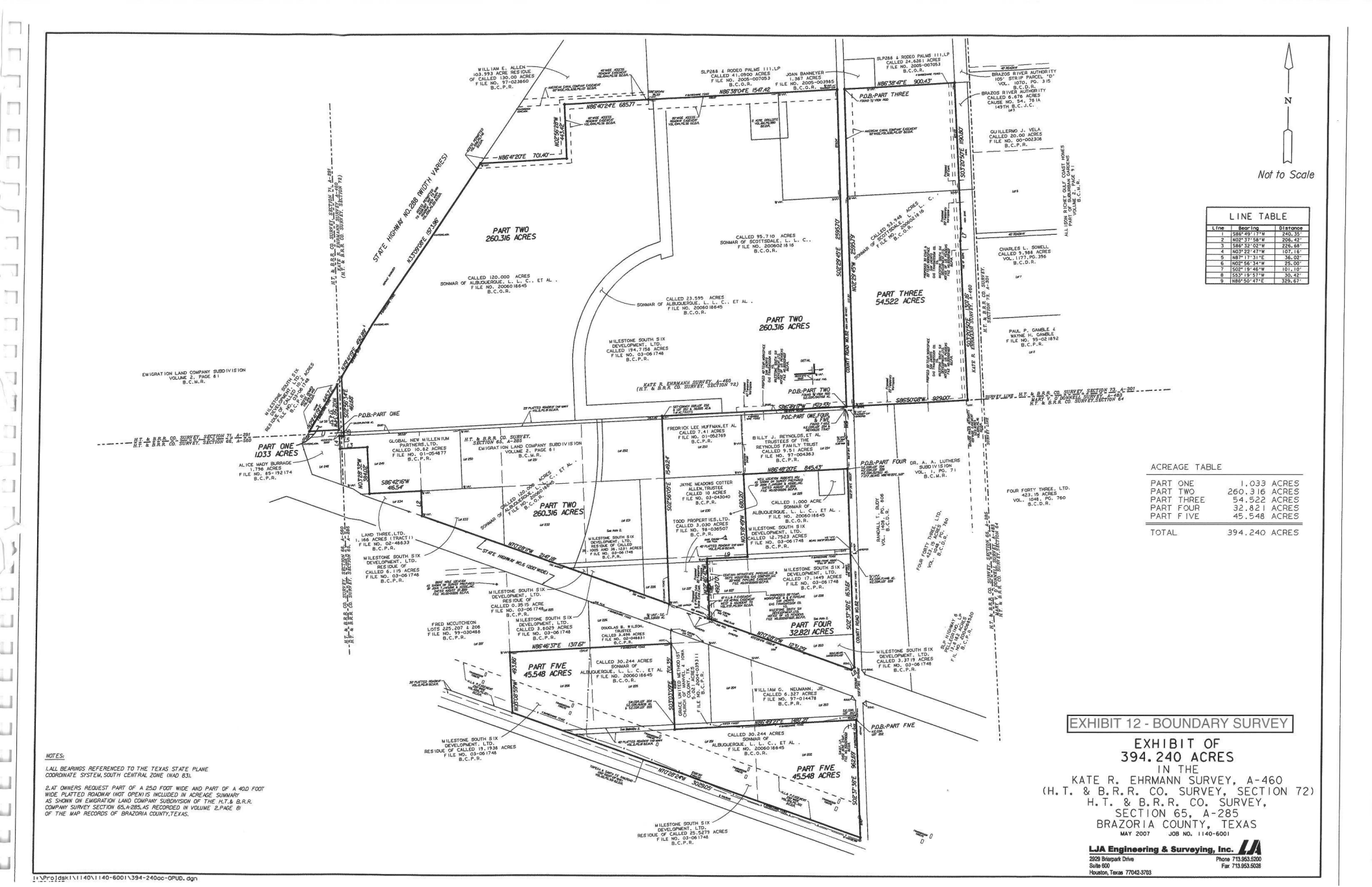
The Presidio at Manvel

BRAZORIA COUNTY MUNICIPAL UTILITY DISTRICT NUMBER 30

±394.24 ACRES

STORM SEWER SYSTEM

AUGUST, 2007



LINE TABLE		
Line	Bearing	Distance
1	S86°49'17"W	240.35'
2	N02°37'58"W	206.42'
3	S86°32'02"W	226.68'
4	N03°22'47"W	107.16'
5	N87°17'31"E	36.02'
6	N02°56'34"W	25.00'
7	S02°19'46"W	101.10'
8	S53°19'57"W	30.42'
9	N86°50'47"E	329.67'

ACREAGE TABLE	
PART ONE	1.033 ACRES
PART TWO	260.316 ACRES
PART THREE	54.522 ACRES
PART FOUR	32.821 ACRES
PART FIVE	45.548 ACRES
TOTAL	394.240 ACRES

NOTES:

1. ALL BEARINGS REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83).

2. AT OWNERS REQUEST PART OF A 25.0 FOOT WIDE AND PART OF A 40.0 FOOT WIDE PLATTED ROADWAY (NOT OPEN) IS INCLUDED IN ACREAGE SUMMARY AS SHOWN ON EMIGRATION LAND COMPANY SUBDIVISION OF THE H.T.& B.R.R. COMPANY SURVEY SECTION 65, A-285, AS RECORDED IN VOLUME 2, PAGE 81 OF THE MAP RECORDS OF BRAZORIA COUNTY, TEXAS.

EXHIBIT 12 - BOUNDARY SURVEY

EXHIBIT OF 394.240 ACRES IN THE KATE R. EHRMANN SURVEY, A-460 (H.T. & B.R.R. CO. SURVEY, SECTION 72) H.T. & B.R.R. CO. SURVEY, SECTION 65, A-285 BRAZORIA COUNTY, TEXAS

MAY 2007 JOB NO. 1140-6001

LJA Engineering & Surveying, Inc.
2929 Briarpark Drive
Suite 600
Houston, Texas 77042-3703
Phone 713.953.5200
Fax 713.953.5026

I:\Projdsk\1140\1140-6001\394-240ac-OPUD.dgn

DEVELOPMENT SERVICES DEPARTMENT
20025 HIGHWAY 6
MANVEL, TX 77578
PHONE: 281-489-0630
FAX: 281-489-0634

SUBDIVISION VARIANCE APPLICATION

SITE INFORMATION

Project Name: Ruby Gardens Estates

Site Address or Legal Description: 2043 County Road 206 Alvin TX 77511

Parcel/Tax ID# (s): See Filled Responses PG3 Property Platted: YES ☐ NO ☒

Current Zoning: Not Zoned Located in Manvel ETJ Total Acreage: 2.48 Total Lots: 2

Project Description: Affordable, Family Friendly, manufactured home sites for lease.

OWNER & APPLICANT INFORMATION

Applicant Name: Brandon Seay, Company Name: Sweet Olive homes

Address: City:

Phone #: Email:

Owner Name: Sweet Olive homes Company Name: " "

Address: " " City: State: Zip:

Phone #: " " Email: " "

SUBDIVISION VARIANCE INFORMATION

The subdivision variance requested is (cite section from Chapter 62, *Subdivisions*, in the *Code of Ordinances*):

SEE Responses PG 3. - 1

Are there special circumstances or conditions affecting the property?

SEE Responses PG 3 - 2

Will enforcement of the provisions of Chapter 62, *Subdivisions*, deprive the owner/applicant of a substantial property right?

SEE Responses PG 3 - 3

DEVELOPMENT SERVICES DEPARTMENT
20025 HIGHWAY 6
MANVEL, TX 77578
PHONE: 281-489-0630
FAX: 281-489-0634

SUBMITTAL CHECKLIST

So that we may efficiently review your request in a timely manner, it is important that all required documents and fees listed on the "Submittal Checklist" below are submitted with your application. One or more of the required documents may be waived due to the nature of the request; however, it is incumbent upon the applicant to inquire about these exceptions **before** submitting an application. Answers to subdivision variance applications can be obtained by attending a pre-development meeting with our Development Review Committee (DRC) prior to submitting a complete application. Please call the phone number on the application to schedule an appointment. Submit the application and accompanying documents to the Permits Department at the address above Monday through Thursday between the hours of 7:30 a.m. and 5:30 p.m. and Friday between the hours of 7:30 a.m. and 11:30 a.m.

SUBDIVISION VARIANCE APPLICATION SUBMITTAL CHECKLIST ITEMS	REQUIRED (PLEASE CHECK)
Completed Subdivision Variance Application (with all signatures)	✓
One (1) paper copy of site/plot plan and/or site plan (including vicinity map), measuring 8 ½" x 11', 11" x 17" or 24" x 36" (scaled/dimensioned drawing showing location of proposed structures)	✓
Two (2) Copies of Recorded Plat (if platted)	N/A
Two (2) Copies of Legal Description (metes & bounds if not platted)	✓
Two (2) Copies of Proposed Plat - No subdividing of 2.48 Acrs.	N/A
Letter of Authorization (if applicable)	N/A
PDF format on disc containing all application documents rotated and formatted	✓
Paid Application Fee of $500.00 (non-refundable)	

APPLICANT CERTIFICATION

By signing below, I acknowledge that I have reviewed the Submittal Checklist and have included the required submittal items and reviewed them for completeness and accuracy. I also acknowledge that my application will be rejected if it is deemed incomplete.

Applicant Signature — Date: 4-6-24

DEVELOPMENT SERVICES DEPARTMENT
20025 HIGHWAY 6
MANVEL, TX 77578
PHONE: 281-489-0630
FAX: 281-489-0634

LETTER OF AUTHORIZATION

Have property owner complete and sign, if applicant differs from property owner.

Sweet Olive Homes
Owner Name

Owner Address

Owner City, State Zip

4-6-24
Date

Development Services Department
20025 Highway 6
Manvel, TX 77578

Dear City of Manvel Development Services,

I, Sweet Olive Homes, certify that I am the owner of the project property located at [redacted] and that the forgoing statements and answers made and all data, information, and evidence herewith submitted are in all respects to the best of my knowledge and belief, true, and correct. I appoint Brandon Seay with the company Sweet Olive Homes (if applicable) to act as my representative for this application. I agree to be responsible for payment of bills due to the City of Manvel related to this application. Furthermore, I understand that any material misrepresentation of this application, failure to comply with ordinances, and /or failure to remit payment for services can lead to delays in this variance request – up to and including rejecting the application and forfeiting any fees paid.

Please contact me directly at _____ if you have any questions.

Sincerely,

Owner Name Sweet Olive Homes

Owner Signature

DEVELOPMENT SERVICES DEPARTMENT
20025 HIGHWAY 6
MANVEL, TX 77578
PHONE: 281-489-0630
FAX: 281-489-0634

If a subdivision variance is granted, will it be detrimental to the public welfare or injurious to other property or property rights in the vicinity?

SEE Responses PG 3 - 4

DISCLAIMER & SIGNATURE

I certify that I am the owner or owner's representative of the property (with signed letter of authorization) and that the foregoing statements and answers herein made all data, information, and evidence herewith submitted are in all respects, to the best of my knowledge and belief, true and correct.

4-6-24
Date

PG 3 - (RESPONSES)

***Please see coordinated responses to the Sub-division Variance Application

Subdivision Variance Application – Filled Responses

Project Name: Ruby Gardens Estates

Site Address: 2043 County Road 206, Alvin, TX 77511

Total Acreage: 2.48 | Total Lots: 2

Parcel/Tax ID# (s) Description:

TRACT 1: A TRACT OF LAND CONTAINING 1.4848 ACRES (64,680 SQUARE FEET) SITUATED IN THE THOMAS SPRAGGINS SURVEY, ABSTRACT 366, BRAZORIA COUNTY, TEXAS. SAID TRACT BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS ATTACHED. TRACT 2: A TRACT OF LAND CONTAINING 1.0000 ACRES (43,560 SQUARE FEET) SITUATED IN THE THOMAS SPRAGGINS SURVEY, ABSTRACT 366, BRAZORIA COUNTY, TEXAS. SAID TRACT BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS ATTACHED.

Current Zoning: Un-zoned – Property is located within the City of Manvel Extraterritorial Jurisdiction (ETJ) and is subject to applicable subdivision regulations.

1. ***Subdivision Variance Requested:***

The applicant is requesting a variance from Chapter 62, Subdivisions, to allow development of a manufactured home lease community with flexibility in lot layout, dimensions, and infrastructure design. The request is to permit a unified, professionally managed rental community rather than a traditional platted subdivision with individually owned lots.

2. ***Special Circumstances:***

Yes. The property consists of approximately 2.48 acres within the Manvel ETJ and is uniquely suited for a cohesive lease community rather than a traditional subdivision. The tract size and configuration limit the efficiency of standard lot subdivision. Additionally, there is a growing demand for affordable housing options in the area. The proposed development provides a family-friendly environment with shared outdoor recreation areas.

3. ***Deprivation of Property Right:***

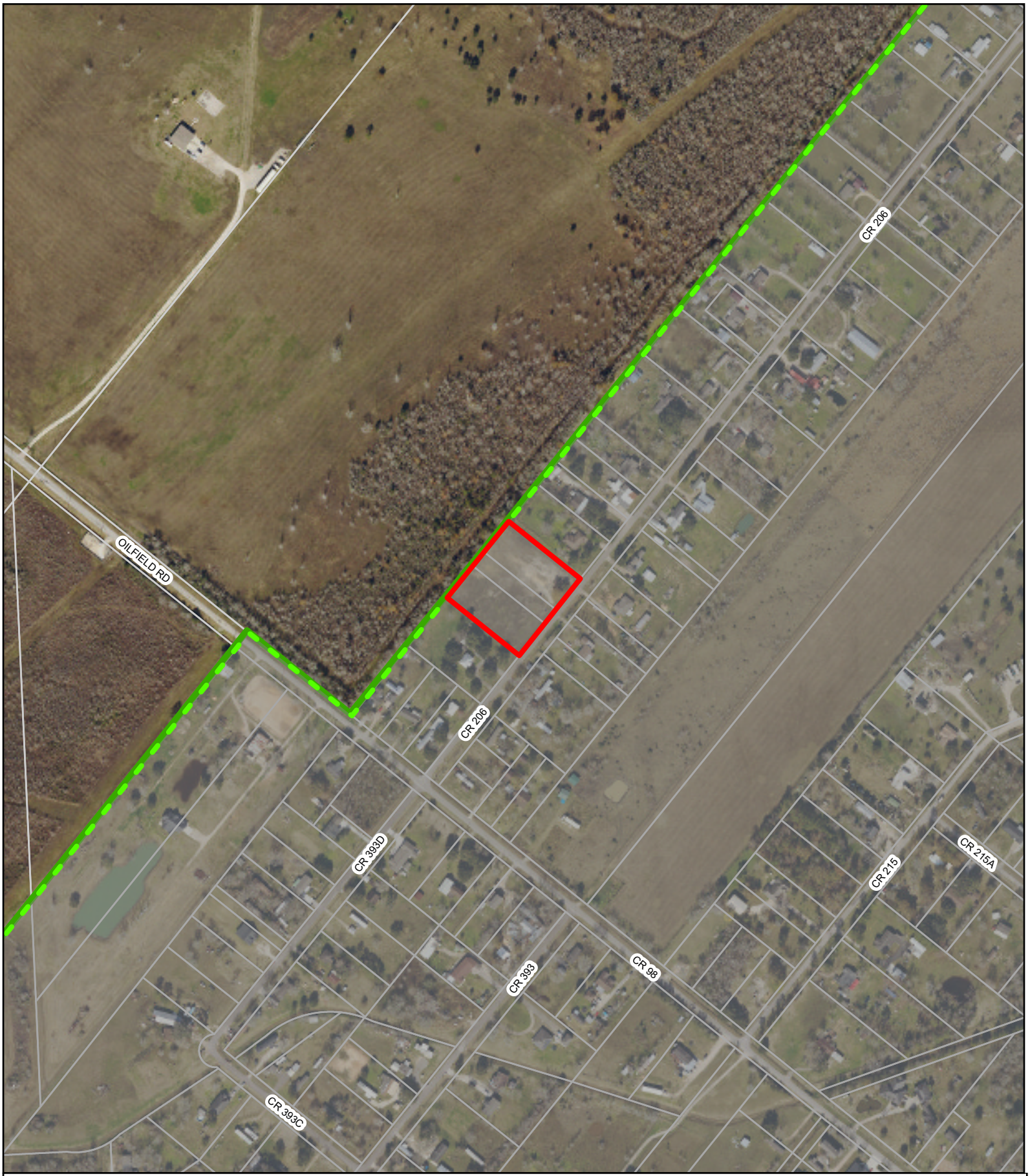
Yes. Strict enforcement of Chapter 62 would prevent development as a manufactured home lease community, which is a reasonable and economically viable use. Without the variance, the property would be limited to traditional subdivision, which is not practical given the site constraints. Public Welfare Impact: No. The requested variance will not be detrimental to public welfare nor injurious to surrounding properties. The development will be professionally

managed, compatible with surrounding land uses, and will not create adverse impacts related to traffic, drainage, or utilities. It will provide safe, affordable housing and improve the property.

4. ***If a subdivision variance is granted, will it be detrimental to the public welfare or injurious to other property or property rights in the vicinity?***

No. The requested variance will not be detrimental to the public welfare nor injurious to surrounding properties. The proposed development will be a professionally managed manufactured home lease community designed to provide safe, affordable housing in a family-friendly environment.

The project will maintain compatibility with surrounding land uses and will not create adverse impacts related to traffic, drainage, or utilities. The development will improve the property by introducing an organized and well-maintained residential use, while supporting the need for attainable housing in the area.



2043 County Road 206 (PID: 170372)

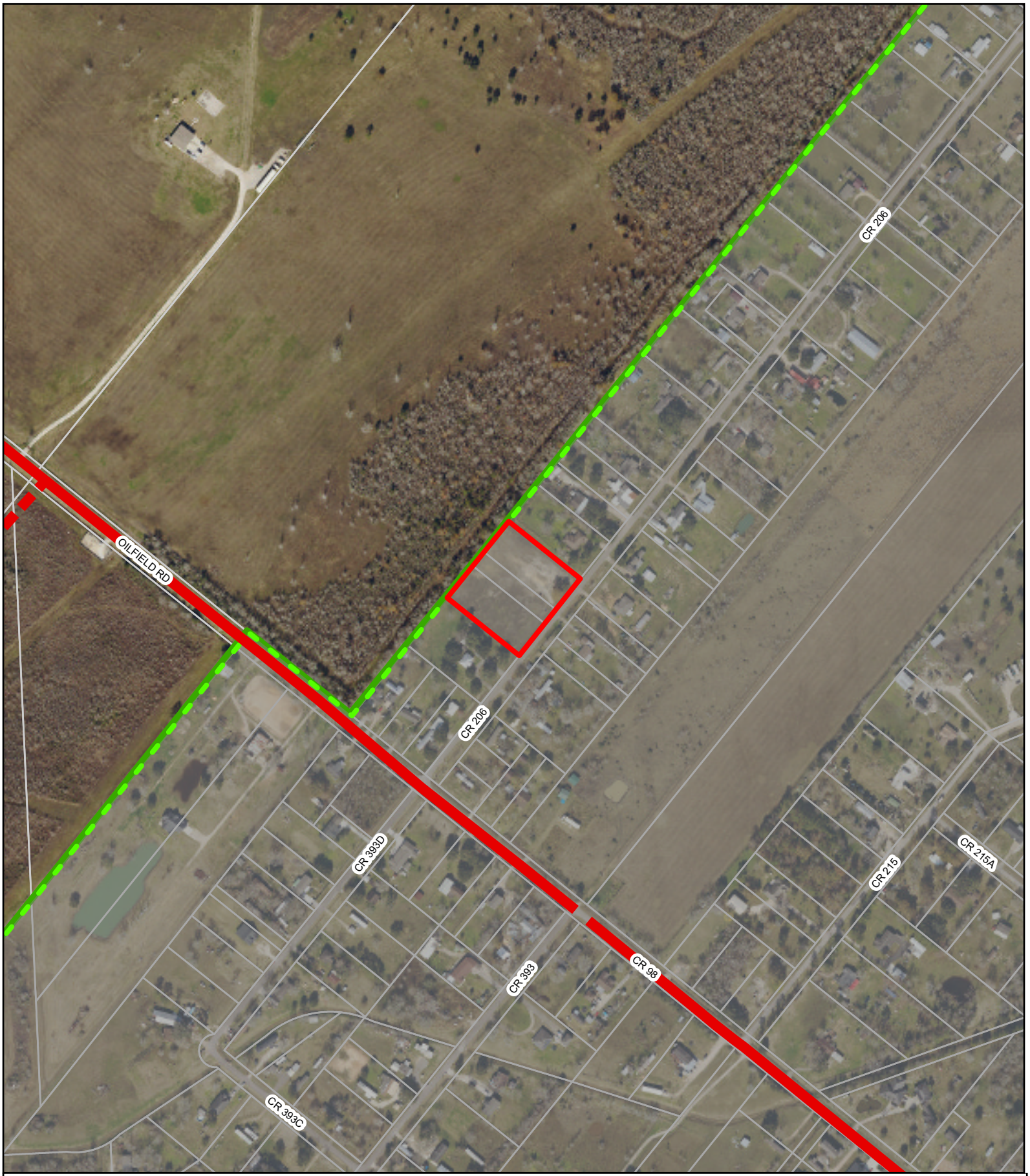
Parcels
City of Manvel City Limits
City of Manvel ETJ
2043 County Road 206

N
W E
S

US Feet
0 255 510 1,020 1,530 2,040

This map is made available for reference purposes only and should not be substituted for a survey product. The City of Manvel will not accept liability of any kind in conjunction with its use.

Date: April 2026
Reference: 2026026
Data Source: City of Manvel, Brazoria County Open Data



2043 County Road 206 (PID: 170372)

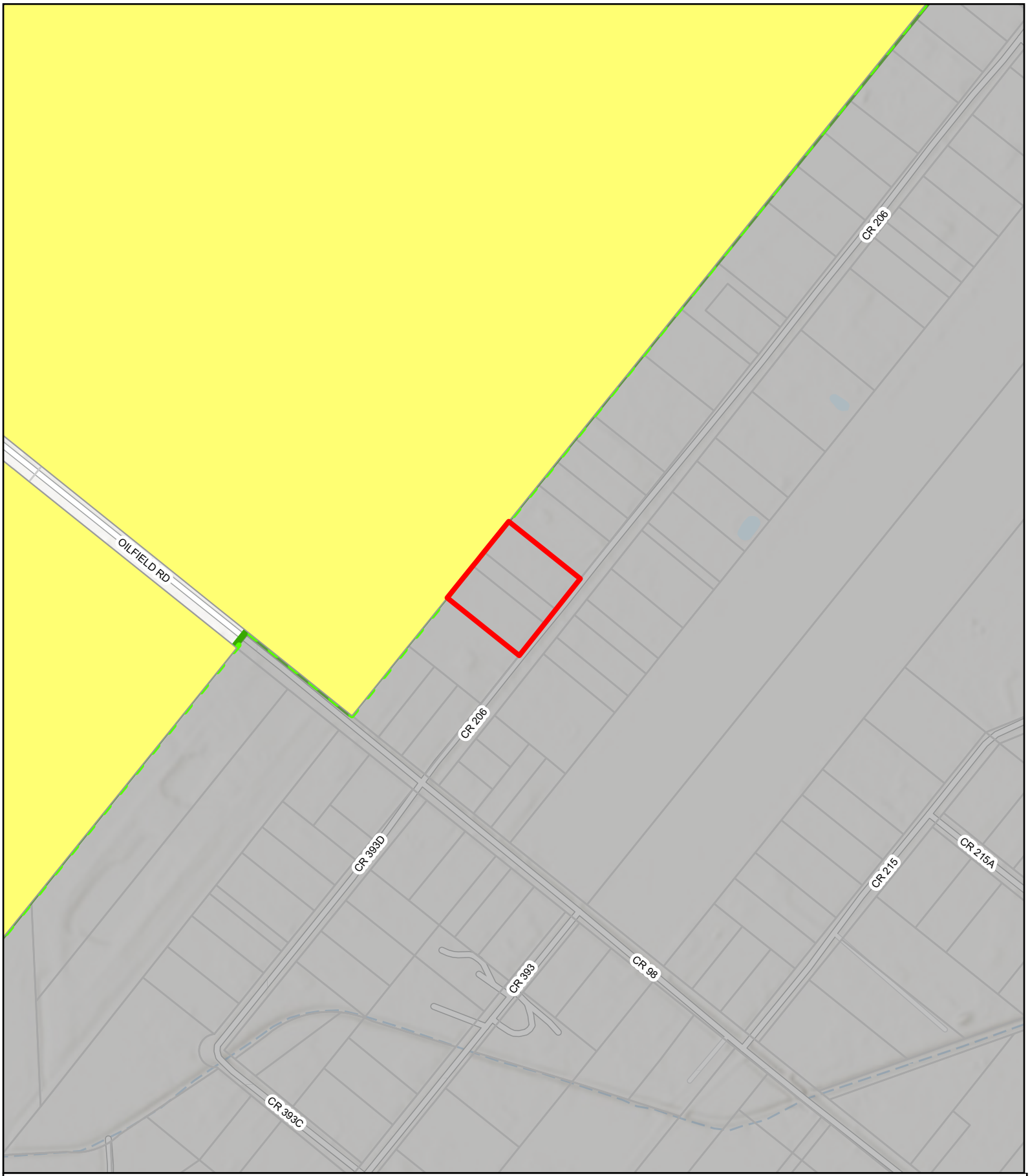
Arterial (100' ROW)
Proposed Arterial (100' ROW)
Parcels
City of Manvel ETJ
City of Manvel City Limits
2043 County Road 206

N
W E
S

US Feet
0 255 510 1,020 1,530 2,040

This map is made available for reference purposes only and should not be substituted for a survey product. The City of Manvel will not accept liability of any kind in conjunction with its use.

Date: April 2026
Reference: 2026028
Data Source: City of Manvel, Brazoria County Open Data



2043 County Road 206 (PID: 170372)

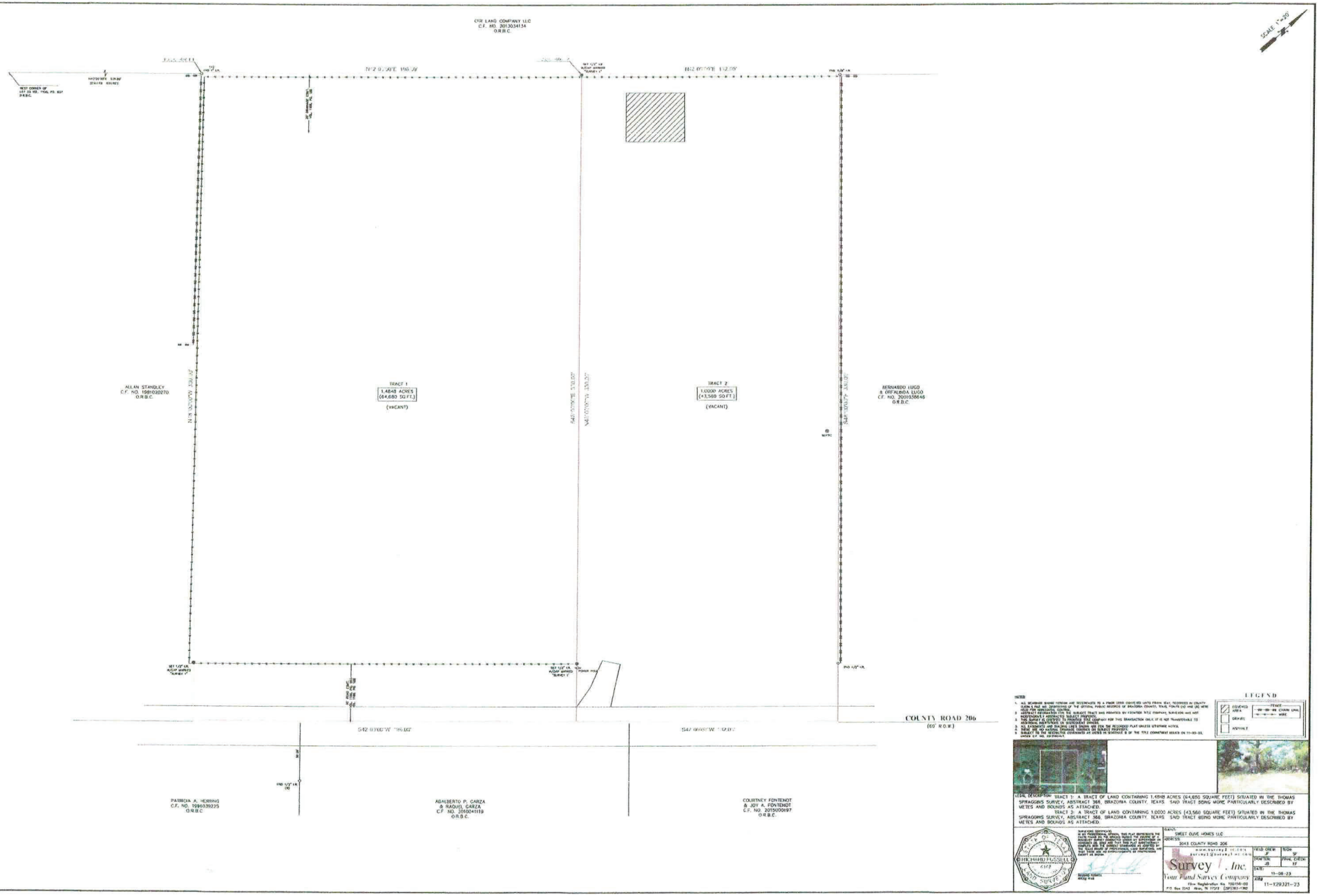
Parcels
City of Manvel ETJ
City of Manvel City Limits
Open Single-Family Residential District
2043 County Road 206

US Feet
0 255 510 1,020 1,530 2,040

N
W E
S

Date: April 2026
Reference: 2026028
Data Source: City of Manvel, Brazoria County Open Data

This map is made available for reference purposes only and should not be substituted for a survey product. The City of Manvel will not accept liability of any kind in conjunction with its use.


CYR LAND COMPANY LLC
C.F. NO. 2013034134
O.R.B.C.
SCALE 1"=50'
N12°03'30"E 198.58'
N82°09'19"E 132.09'
ALLAN STANDLEY
C.F. NO. 1981030270
O.R.B.C.
TRACT 1
1.4848 ACRES
(64,680 SQ.FT.)
(VACANT)
TRACT 2
1.0000 ACRES
(43,560 SQ.FT.)
(VACANT)
BERNARDO LUGO
& ORFALINDA LUGO
C.F. NO. 2001038648
O.R.B.C.
N12°03'30"E 330.00'
S12°03'30"W 330.00'
S82°09'19"W 132.09'
S82°09'19"W 132.09'
COUNTY ROAD 206
(60' R.O.W.)
PATRICIA A. HERRING
C.F. NO. 1984039235
O.R.B.C.
AGALBERTO P. GARZA
& RAQUEL GARZA
C.F. NO. 2010041119
O.R.B.C.
COURTNEY FONTENOT
& JOY A. FONTENOT
C.F. NO. 2015000197
O.R.B.C.
LEGEND
FENCE
DRIVE
ASPHALT
LEGAL DESCRIPTION: TRACT 1: A TRACT OF LAND CONTAINING 1.4848 ACRES (64,650 SQUARE FEET) SITUATED IN THE THOMAS SPRAGGINS SURVEY, ABSTRACT 368, BRAZORIA COUNTY, TEXAS. SAID TRACT BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS ATTACHED.
TRACT 2: A TRACT OF LAND CONTAINING 1.0000 ACRES (43,560 SQUARE FEET) SITUATED IN THE THOMAS SPRAGGINS SURVEY, ABSTRACT 368, BRAZORIA COUNTY, TEXAS. SAID TRACT BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS ATTACHED.
SURVEYOR'S CERTIFICATE
RICHARD RUSSELL
4178
REGISTERED PROFESSIONAL LAND SURVEYOR
SURVEYED FOR: SWEET OLIVE HOMES LLC
ADDRESS: 3043 COUNTY ROAD 206
Survey 1, Inc.
Your Land Survey Company
FIELD CREW:
DRAWN BY: JB
DATE: 11-08-23
JOB #: 11-129321-23

TRACT 1
DESCRIPTION OF A TRACT OF LAND CONTAINING
1.4848 ACRES (64,680 SQUARE FEET) SITUATED
IN THE THOMAS SPRAGGINS SURVEY, ABSTRACT 366
BRAZORIA COUNTY, TEXAS

Being a tract of land containing 1.4848 acres (64,680 square feet), situated in the Thomas Spraggins Survey, Abstract 366, Brazoria County, Texas, being all of a tract of land conveyed unto Frank Seay by deed as recorded under County Clerk's File No. 2018051043 of the Official Records of Brazoria County, Texas, being out of the Northwest 1/2 of Farm Lot 33, as recorded in Volume 1100, Page 837 of the Deed records of Brazoria County, Texas. Said 1.4848-acre tract being more particularly described by metes and bounds as follows:

BEGINNING at a found 1-inch iron pipe for the west corner of said tract herein described, being located North 42°00'00" East, a distance of 535.60 feet (called 533.60 feet) from the west corner of said Lot 33;

THENCE North 42°00'00" East, a distance of 196.00 feet to a set 1/2-inch iron rod with cap marked "Survey 1" for the north corner of said tract herein described;

THENCE South 48°00'00" East, at 300.00 feet passing a set 1/2-inch iron rod with cap marked "Survey 1" in the northwest right-of-way line of County Road 206 (60.00 feet wide) and continue for a total distance of 330.00 feet to a point in the centerline of said County Road 206 for the east corner of said tract herein described;

THENCE South 42°00'00" West, along said centerline, a distance of 196.00 feet to the south corner of said tract herein described;

THENCE North 48°00'00" West, at 30.00 feet passing a set 1/2-inch iron rod with cap marked "Survey 1" in the northwest right-of-way line of said County Road 206, and continue for a total distance of 330.00 feet to the POINT OF BEGINNING and containing 1.4848 acres (64,680 square feet), more or less.

Note: This metes and bounds description is referenced to a survey drawing prepared by Survey 1, Inc. (Firm Registration No. 100758-00) dated Nov. 08, 2023, job number 11-129321-23.



TRACT 2
DESCRIPTION OF A TRACT OF LAND CONTAINING
1.0000 ACRES (43,560 SQUARE FEET) SITUATED
IN THE THOMAS SPRAGGINS SURVEY, ABSTRACT 366
BRAZORIA COUNTY, TEXAS

Being a tract of land containing 1.0000 acres (43,560 square feet), situated in the Thomas Spraggins Survey, Abstract 366, Brazoria County, Texas, being all of a tract of land conveyed unto Frank Seay by deed as recorded under County Clerk's File No. 2018051043 of the Official Records of Brazoria County, Texas, being out of the Northwest 1/2 of Farm Lot 33, as recorded in Volume 1100, Page 837 of the Deed records of Brazoria County, Texas. Said 1.0000-acre tract being more particularly described by metes and bounds as follows:

BEGINNING at a set 1/2-inch iron rod with cap marked "Survey 1" for the west corner of said tract herein described, being located North 42°00'00" East, a distance of 731.60 feet from the west corner of said Lot 33;

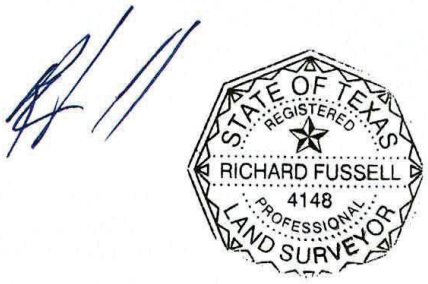
THENCE North 42°00'00" East, a distance of 132.00 feet to a found 5/8-inch iron rod for the north corner of said tract herein described;

THENCE South 48°00'00" East, at 300.00 feet passing a found 1/2-inch iron rod in the northwest right-of-way line of County Road 206 (60.00 feet wide) and continue for a total distance of 330.00 feet to a point in the centerline of said County Road 206 for the east corner of said tract herein described;

THENCE South 42°00'00" West, along said centerline, a distance of 132.00 feet to the south corner of said tract herein described;

THENCE North 48°00'00" West, at 30.00 feet passing a set 1/2-inch iron rod with cap marked "Survey 1" in the northwest right-of-way line of said County Road 206, and continue for a total distance of 330.00 feet to the POINT OF BEGINNING and containing 1.0000 acres (43,560 square feet), more or less.

Note: This metes and bounds description is referenced to a survey drawing prepared by Survey 1, Inc. (Firm Registration No. 100758-00) dated Nov. 08, 2023, job number 11-129321-23.

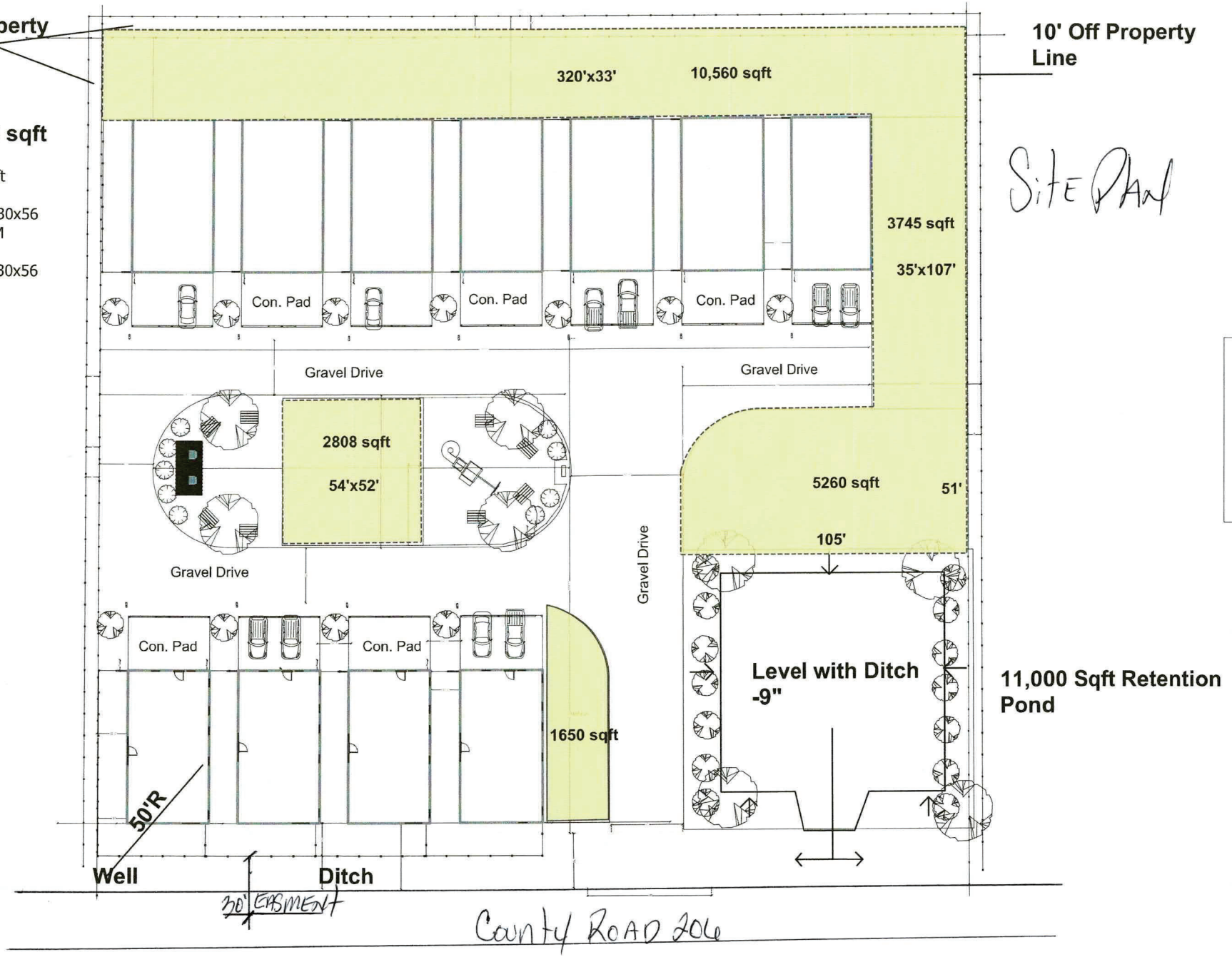


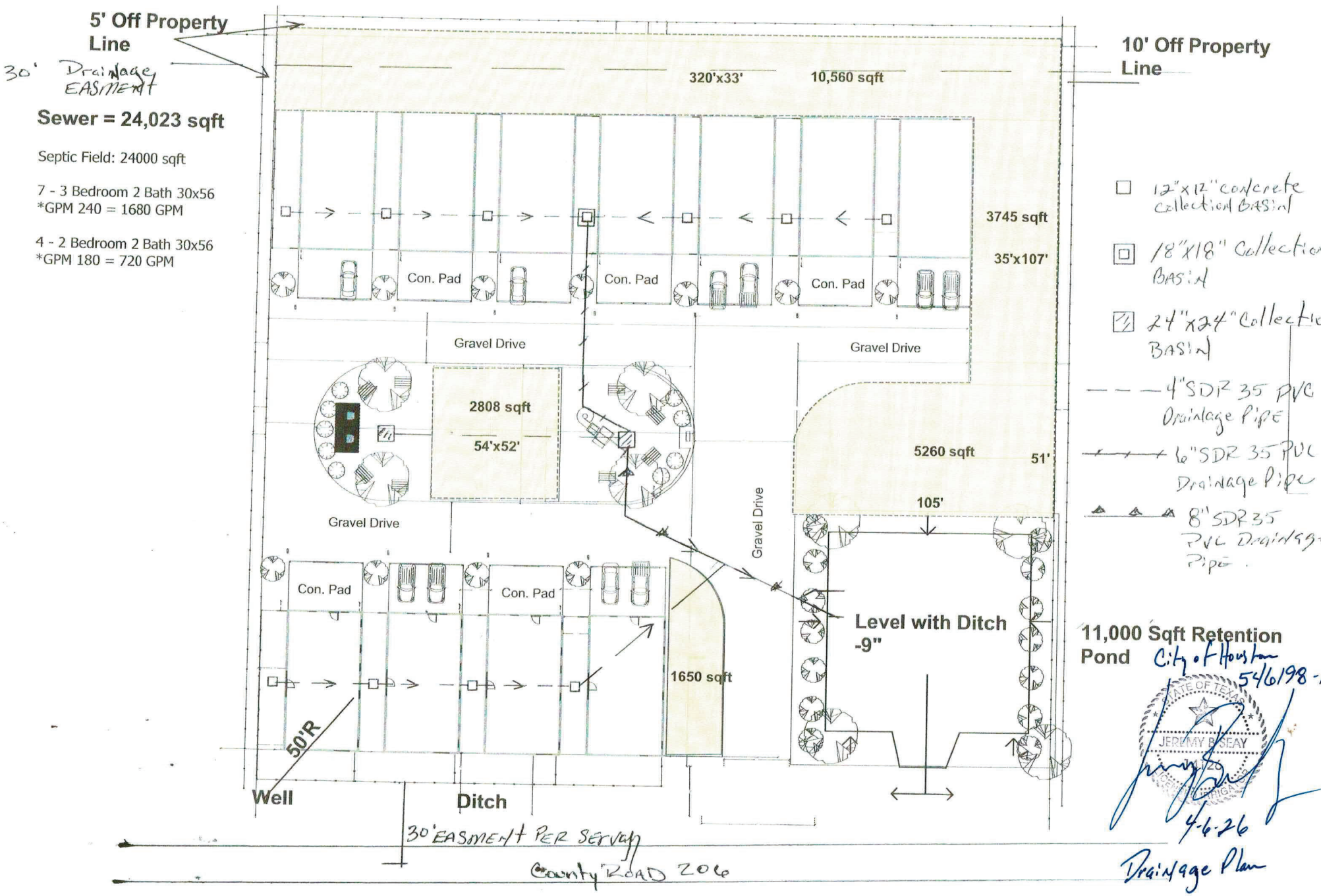
Sewer = 24,023 sqft

Septic Field: 24000 sqft

7 - 3 Bedroom 2 Bath 30x56
*GPM 240 = 1680 GPM

4 - 2 Bedroom 2 Bath 30x56
*GPM 180 = 720 GPM




5' Off Property Line
30' Drainage EASEMENT
Sewer = 24,023 sqft
Septic Field: 24000 sqft
7 - 3 Bedroom 2 Bath 30x56
*GPM 240 = 1680 GPM
4 - 2 Bedroom 2 Bath 30x56
*GPM 180 = 720 GPM
10' Off Property Line
320'x33'
10,560 sqft
3745 sqft
35'x107'
Con. Pad
Con. Pad
Con. Pad
Gravel Drive
Gravel Drive
2808 sqft
54'x52'
5260 sqft
51'
105'
Gravel Drive
Gravel Drive
Con. Pad
Con. Pad
1650 sqft
Level with Ditch
-9"
50'R
Well
Ditch
30' EASEMENT PER SERVAY
County ROAD 206
12"x12" concrete collection BASIN
18"x18" Collection BASIN
24"x24" Collection BASIN
4" SDR 35 PVC Drainage Pipe
6" SDR 35 PVC Drainage Pipe
8" SDR 35 PVC Drainage Pipe
11,000 Sqft Retention Pond
City of Houston
546198
STATE OF TEXAS
JEREMY R SEAY
4-6-26
Drainage Plan

MANVEL PD&Z DATA SHEET

MEETING DATE: May 26, 2026

TOPIC: Subdivision variance request for an approximate 2.4848-acre tract of land located at 2043 County Road 206 (PID 170372), Manvel, Texas, within the City of Manvel Extraterritorial Jurisdiction (ETJ), requesting a variance from Chapter 62, Section 62-113 – *Sidewalks*, to allow development of the subject site without constructing sidewalks along the abutting street.

BACKGROUND: The subject site is an approximately 2.4848-acre tract located within the City of Manvel's ETJ on the north side of County Road 206 (PID 170372). The property is subject to the City's Subdivision Ordinance requirements. The applicant, Brandon Seay, representing the property owner Sweet Olive Homes, is proposing development of the subject site as a manufactured home lease community with flexibility in internal lot layout and site design. The applicant states that the requested variance is intended to support a unified development pattern consistent with a rental community concept rather than a traditional individually platted subdivision layout.

The applicant has coordinated with City staff regarding applicable subdivision requirements, including platting, potential right-of-way dedication based on the Major Thoroughfare Plan, and required infrastructure improvements such as sidewalks along applicable frontage.

According to Section 62-113 of the Subdivision Ordinance:

> *"Sidewalks shall be constructed at a minimum of five feet wide or as determined by the city's thoroughfare plan and in accordance with the city's design criteria profile. Sidewalks shall be installed in accordance with the city's design criteria manual. For non-residential development with frontage on rights-of-way owned and maintained by the County or State, a sidewalk shall be made part of the site development, if controlling authority does not permit construction of sidewalk within the right-of-way."*

The subject site has frontage along County Road 206. Therefore, sidewalk construction is required as part of site development, even if the controlling authority does not permit construction within the right-of-way. The applicant, on behalf of the property owner, is requesting a subdivision variance to allow platting and developing the subject site without constructing sidewalks along the abutting streets.

STAFF FINDINGS: Pursuant to Section 62-5, Variance, staff reviewed the request and found the following:

- Special Circumstances: There are special circumstances affecting the subject site due to its location within the City's Extraterritorial Jurisdiction (ETJ) along County Road 206, a Brazoria County-maintained roadway. The roadway is an asphalt street with open drainage ditches and an approximate 60-foot right-of-way width. County Road 206 currently provides access to several existing developed residential properties and currently terminates at the Briscoe Canal, functioning as a dead-end local roadway. There are no existing sidewalks along either side of the roadway within the vicinity of the subject site. Additionally, Brazoria County does not permit sidewalk construction within its right-of-way under its current standards, limiting the feasibility of sidewalk installation.
- Strict Enforcement: Strict application of the ordinance would not deprive the applicant of

reasonable property rights; however, it would increase project costs due to required sidewalk construction. It would also ensure compliance with the City's Subdivision Ordinance and Design Criteria Manual. However, adjacent properties along this corridor were developed primarily as residential uses without corresponding right-of-way or sidewalk improvements, and requiring sidewalks at this time may result in isolated segments that are not connected to a continuous pedestrian network. Future development along County Road 206, particularly if adjacent properties are developed for non-residential uses in the future, may provide opportunities for improved pedestrian connectivity and continuity over time. Full compliance would increase the overall scope and cost of the project, and based on existing development patterns, immediate pedestrian connectivity benefits along the subject frontage would be limited.

- Impact on Public Welfare: Based on existing conditions and the lack of a continuous pedestrian network in the immediate area, the variance is not expected to result in a material adverse impact on the public welfare or injurious to surrounding property or property rights in the vicinity.

RECOMMENDATION: Staff is not recommending approval of this variance to sidewalk requirement based on the principle that sidewalks are a critical part of City's mobility-related infrastructure. However, if based on the special circumstances discussed above, if the Commission recommends approval to City Council, following conditions should be considered:

1. The subdivision variance shall expire upon a change of use from a manufactured home lease community*;* or
2. The subdivision variance shall expire upon further subdivision or replatting of the property into multiple lots or reserves.

ATTACHMENTS: Application Form, Vicinity Aerial Map, Major Thoroughfare Plan Map, Zoning Map, Survey, M&B Descriptions, and Proposed Site Plan for Manufactured Home Lease Community.

FUNDING ISSUES

_X_ Not applicable
___ Not budgeted
___ Full amount already budgeted
___ Funds to be transferred from Acct.#

SUBMITTING STAFF MEMBER Ellie Roohbakhsh Senior Planner	**FINANCE DIRECTOR APPROVAL _____** **CITY MANAGER APPROVAL _____**

DEVELOPMENT SERVICES DEPARTMENT
20025 Highway 6, Manvel, TX 77578 | Ph: 281-489-0630

DEVELOPMENT UPDATES TO THE PLANNING AND ZONING COMMISSION

April 13, 2026 – May 26, 2026

The following table provides an overview of Development Services Department activities from *April 13, 2026, through May 26, 2026*.

PRE-DEVELOPMENT MEETINGS		
LOCATION	LAND USE	DESCRIPTION
Uzzell Road - East of the Public Works Department (Open-Single Family Residential District)	Single Family Residential	• *The applicant is doing their due diligence of the requirements for future development of a 50 Acre Tract.* • *The applicant would like to develop ½ lots with a private water system.*
6410 Old Chocolate Bayou Road (Open-Single Family Residential District)	Single Family Residential	• *The applicant is doing their due diligence of the requirements for future development.* • *The applicant is inquiring about the utilities, thoroughfares, and the permitting process.*
Lewis Lane, East of FM 1128 (PID: 228273) - Next to the Alvin ISD Lewis Lane Center *(Open-Single Family Residential District)*	112 Acre Single Family Residential	• *The applicant is doing their due diligence of the requirements for future development of a 112 Acre Tract.* • *The applicant development via a PUD Process that will include multiple parks and green space.* • *The applicant would like to schedule a workshop to discuss their development*
7342 Rogers Road (Light Commercial District)	Art Exhibit	• *The applicant is doing their due diligence of the requirements for the final stages of the Art Exhibit.*
McCoy Road & Wilson Road *(Open-Single Family Residential District)*	Wedding & Event Venue	• *The applicant is doing their due diligence of the requirements for a Wedding & Event Venue* • *The applicant would like to know the requirements needed for their project to move forward.*
3401 CR 56 (Pomona)	8 Medical Offices and potential Carwash	• *The applicant is doing their due diligence of the requirements for the 8 Medical Offices* and potential Carwash. • *The applicant would like to know the requirements needed for their project to move forward.*

DEVELOPMENT SERVICES DEPARTMENT

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CERTIFICATE OF OCCUPANCY APPROVALS
None

COMMERCIAL CONSTRUCTION APPROVALS		
LOCATION	**DATE ISSUED**	**DESCRIPTION**
17110 Highway 6	04/13/2026	Manvel Retail Building – 5,100 Sq FT
19500 Highway 6	04/23/2026	Market at Meridiana Building A – 11,124 Sq FT
19510 Highway 6	04/23/2026	Market at Meridiana Building B – 15,571 Sq FT