# PLANNING AND ZONING COMMISSION MEETING AGENDA 

December 06, 2023 at 7:00 PM
Town Hall - 1941 E. Jeter Road, Bartonville, TX 76226

## A. CALL MEETING TO ORDER

## B. PLEDGE OF ALLEGIANCE

C. PUBLIC PARTICIPATION

If you wish to address the Commission, please fill out a "Public Meeting Appearance Card" and present it to the Town Administrator, preferably before the meeting begins. Pursuant to Section 551.007 of the Texas Government Code, citizens wishing to address the Commission for items listed as public hearings will be recognized when the public hearing is opened. For citizens wishing to speak on a non-public hearing item, they may either address the Commission during the Public Participation portion of the meeting or when the item is considered by the Planning \& Zoning Commission.

## D. APPROVAL OF MINUTES

1. Discuss and consider the approval of the November 1, 2023, Regular Planning \& Zoning Commission Meeting Minutes.

## E. REGULAR ITEMS

1. Discuss and make a recommendation regarding a Preliminary Plat for a 99.744-acre tract of land situated in the A.R. Loving Survey, Abstract Number 0736A, Tracts 5, 5A, 6, and 7A in the Town of Bartonville, Denton County, Texas. The tract of land is located on the west side of FM 407, directly opposite the intersection of FM 407 and Rayzor Road, in Bartonville, Texas. The applicant is CCM Engineering, on behalf of the Education Leads to Success Foundation.
2. Discuss and make a recommendation regarding a Preliminary Plat for an 81.789-acre tract of land situated in the A.M. Feltus Survey, Abstract Number 1594, and the Daniel Cook Survey, Abstract No. 230, in the Town of Bartonville, Denton County, Texas. The tract of land is located on the north side of E Jeter Road, approximately 2,063 feet north of its intersection with Porter Road, in Bartonville, Texas. The applicant is Mycoskie Associates, Inc., on behalf of Rob Knight.

## F. FUTURE ITEMS

## G. ADJOURNMENT

The Planning and Zoning Commission reserves the right to adjourn into a closed meeting or executive session as authorized by Texas Government Code, Sections 551.001, et seq. (the Texas Open Meetings Act) on any item on its open meeting agenda in accordance with the Texas Open Meetings Act, including, without limitation Sections 551.071-551.088 of the Texas Open Meetings Act. Any final action, decision, or vote on a matter deliberated in a closed meeting will only be taken in an open meeting that is held in compliance with Texas Government Code, Chapter 551.

## CERTIFICATION

I hereby certify that this Notice of Meeting was posted on the Town Website, and on the bulletin board, at Town Hall of the Town of Bartonville, Texas, a place convenient and readily accessible to the public at all times. Said Notice was posted on the following date and time; and remained posted continuously prior to the scheduled time of said meeting and shall remain posted until meeting is adjourned.
/s/ Shannon Montgomery, Town Secretary
Posted: Wednesday, November 29, 2023 prior to 5:00 pm.

Agenda Removed from Town of Bartonville Bulletin Board on:
$B y:$ $\qquad$ , Title: $\qquad$

## PLANNING AND ZONING COMMUNICATION

DATE December 6, 2023
FROM: Shannon Montgomery, Town Secretary
AGENDA ITEM: Discuss and consider the approval of the November 1, 2023, Regular Planning \& Zoning Commission Meeting Minutes.

Summary: Minutes from the November 1, 2023, Regular Planning \& Zoning Commission Meeting.
Staff Recommendation: Approve as presented.
Exhibits:

- November 1, 2023, Regular Planning \& Zoning Commission Meeting Minutes.

THE PLANNING AND ZONING COMMISSION OF THE TOWN OF BARTONVILLE MET IN REGULAR SESSION ON THE 1ST DAY OF NOVEMBER 2023 AT THE TOWN OF BARTONVILLE TOWN HALL, LOCATED AT 1941 E JETER ROAD, BARTONVILLE, TEXAS WITH THE FOLLOWING COMMISSIONERS PRESENT, CONSTITUTING A QUORUM:

Gloria McDonald, Chair
Ralph Arment, Vice Chair
Brenda Hoyt-Stenovitch, Commissioner
Don Abernathy, Commissioner
Larry Hayes, Commissioner
Pat Adams, Alternate 1
Rick Lawrence, Alternate 2

## Town Staff Present:

Thad Chambers, Town Administrator
Shannon Montgomery, Town Secretary
Ed Voss, Town Attorney
Ryan Wells, Town Planning Consultant

## A. CALL MEETING TO ORDER

Chair McDonald called the meeting to order at 7:00 pm.

## B. PLEDGE OF ALLEGIANCE

Chair McDonald led the Pledge of Allegiance.

## C. PUBLIC PARTICIPATION

If you wish to address the Commission, please fill out a "Public Meeting Appearance Card" and present it to the Town Administrator, preferably before the meeting begins. Pursuant to Section 551.007 of the Texas Government Code, citizens wishing to address the Commission for items listed as public hearings will be recognized when the public hearing is opened. For citizens wishing to speak on a non-public hearing item, they may either address the Commission during the Public Participation portion of the meeting or when the item is considered by the Planning \& Zoning Commission.

There was no public participation.

## D. APPOINTMENT OF OFFICERS

## 1. Appointment of Chair

Motion made by Commissioner Arment, seconded by Commissioner Abernathy, to appoint Commissioner McDonald as Chair.

VOTE ON THE MOTION
AYES: McDonald, Arment, Hoyt-Stenovitch, Abernathy, and Hayes
NAYS: None
VOTE: 5/0

## 2. Appointment of Vice-Chair

Motion made by Commissioner Abernathy, seconded by Commissioner Hoyt-Stenovitch, to appoint Commissioner Arment as Vice Chair.

VOTE ON THE MOTION
AYES: McDonald, Arment, Hoyt-Stenovitch, Abernathy, and Hayes
NAYS: None
VOTE: 5/O

## E. APPROVAL OF MINUTES

1. Discuss and consider the approval of the September 6, 2023, Regular Planning \& Zoning Commission Meeting Minutes.

Motion made by Commissioner Hoyt-Stenovich, seconded by Commissioner Abernathy, to approve the September 6, 2023, Regular Planning \& Zoning Commission Meeting Minutes as presented.

## VOTE ON THE MOTION

AYES: McDonald, Arment, Hoyt-Stenovitch, Abernathy, and Hayes
NAYS: None
VOTE: 5/0

## F. PUBLIC HEARINGS AND ACTION ITEMS

1. Conduct a Public Hearing and consider an Ordinance amending the Town of Bartonville Code of Ordinances, Chapter 14, Exhibit "A," Article 14.02, Ordinance 361-05, Zoning Regulations for the Town of Bartonville, to change the zoning designation on four tracts of land, totaling 101.467 acres, situated in the Daniel Cook Survey, Abstract Number 230, and A.M. Feltus Survey, Abstract Number 1594, in the Town of Bartonville, Denton County, Texas, from Agricultural (AG) to Residential Estates 5 (RE-5). Town File \#ZC-2023-005.
Chair McDonald opened the Public Hearing at 7:03 pm.
Town Administrator Chambers introduced Ryan Wells, Town Planning Consultant, who presented the case to the Commission and recommended approval.

The following addressed the Commission:

- Laura Pittman, 1237 Post Oak Court, Bartonville, TX 76226 - IN FAVOR

Chair McDonald closed the Public Hearing at 7:12pm.
Motion made by Commissioner Hayes, seconded by Commissioner Arment, to recommend approval of an Ordinance amending the Town of Bartonville Code of Ordinances, Chapter 14, Exhibit "A," Article 14.02, Ordinance 361-05, Zoning Regulations for the Town of Bartonville, to change the zoning designation on four tracts of land, totaling 101.467 acres, situated in the Daniel Cook Survey, Abstract Number 230, and A.M. Feltus Survey, Abstract Number 1594, in the Town of Bartonville, Denton County, Texas, from Agricultural (AG) to Residential Estates 5 (RE-5) as presented.

## VOTE ON THE MOTION

AYES: McDonald, Arment, Hoyt-Stenovitch, Abernathy, and Hayes
NAYS: None
VOTE: 5/0
2. Conduct a Public Hearing and consider an Ordinance amending the Town of Bartonville Code of Ordinances, Chapter 14, Exhibit "A", the Zoning Ordinance, by deleting Chapter 20, "Fencing, Walls and Screening Requirements," and by amending Chapter 3, "Building Regulations" by adding Article 3.10, "Fences and Walls"; amending other Zoning Ordinance and Town Code Provisions accordingly.

Town Attorney Voss explained the proposed amendments to the Fence Ordinance and addressed questions from the Commissioners.

Chair McDonald opened the Public Hearing at 7:26 pm, and after recognizing there was no one wishing to speak on this item, Chair McDonald closed the Public Hearing at 7:26 pm.

Motion made by Commissioner Abernathy, seconded by Commissioner Arment, to recommend approval of an Ordinance amending the Town of Bartonville Code of Ordinance, Chapter 14, Exhibit "A", the Zoning Ordinance, by deleting Chapter 2, "Fencing, Walls and Screening Requirements," and by amending Chapter 3, "Building Regulations" by adding Article 3.10, "Fences and Walls"; amending other Zoning Ordinance and Town Code Provisions accordingly, as presented.

## VOTE ON THE MOTION

AYES: McDonald, Arment, Abernathy, and Hayes
NAYS: Hoyt-Stenovitch
VOTE: 4/1

## G. FUTURE ITEMS

Discussion only, no action taken.

## H. ADJOURNMENT

Chair McDonald adjourned the meeting at 7:47 pm.

APPROVED this the 6th day of December 2023.

## APPROVED:

Gloria McDonald, Chair

## ATTEST:

[^0]
# PLANNING AND ZONING COMMUNICATION 

DATE
FROM: Thad Chambers, Town Administrator
AGENDA ITEM: Discuss and make a recommendation regarding a Preliminary Plat for a 99.744-acre tract of land situated in the A.R. Loving Survey, Abstract Number 0736A, Tracts 5, 5A, 6 , and 7A in the Town of Bartonville, Denton County, Texas. The tract of land is located on the west side of FM 407, directly opposite the intersection of FM 407 and Rayzor Road, in Bartonville, Texas. The applicant is CCM Engineering, on behalf of the Education Leads to Success Foundation.

Land Use and Zoning: Current land use category is Residential Estates - 2 Acre Lots (RE-2). Current zoning is Agricultural (AG).

Summary: The applicant is the owner of four tracts of land, totaling 99.754 acres, located on the west side of FM 407, immediately opposite the intersection with Rayzor Road. The legal description of the property is A0736A A. R. Loving, TR 5, 4.325 Acres, Old DCAD TR \#4; TR 5A(1)(PT),6(PT), 82.6397 Acres; and TR 7A, 12.8526 Acres. The corresponding Denton CAD parcel numbers are 38038, 6236125, and 236126. The applicant has applied for a preliminary plat (see Exhibit A) in order to facilitate development of a new Universal Academy charter school campus.

The subject property is the current site for CJ's Legacy Ranch. There are multiple stables and outbuildings, residences, agricultural ponds, and cross-fencing on the property.

## Preliminary Plat

Bartonville Development Ordinance (BDO) Section 2.5.g lists the criteria of approval for a preliminary plat:

1. The plat substantially conforms with the approved land study or other studies and plans, as applicable;
2. The preliminary layouts of required public improvements and Town utilities have been approved by the Town Engineer; and
3. The plat conforms to applicable zoning and other regulations.
4. The plat has been approved by the Permitting Authority, as defined in Chapter 285 of the Texas Administrative Code, in accordance with Title 30, Texas Administrative Code, Chapter 285, Section 285.4(c) relating to the review of subdivision plans prior to the application for a permit for an on-site sewage facility.

The submitted preliminary plat is designed to create a single legal lot comprising 99.754 acres. The subject property is located on FM 407, which is identified on the Bartonville Thoroughfare Plan as a "Highway". All proposed driveway spacing for the site appears to meet TxDOT's driveway spacing standards for the roadway, based on information provided in the August 10, 2023, Traffic Impact Analysis prepared by

DeShazo Group. The preliminary plat does not identify any public improvements to be installed; however, the Traffic Impact Analysis does identify a left turn bay at Driveway \#2 (not reflected in the preliminary plat). This turn bay will require permitting from TxDOT, as it is in their right-of-way - see Conditions of Approval. The zoning district for the subject property is Agricultural (AG), which has a 10 -acre minimum lot size. The proposed resulting lot will meet the zoning district standards.

Staff Recommendation: Approve with Conditions.

## Staff's Recommended Conditions of Approval:

1. On the final plat, the fire lane easement shall be a minimum of 24 feet in width and all internal turn radii shall be a minimum of 30 feet.
2. The final plat shall show Driveway \#2 and the associated drive aisle, as indicated in the August 10, 2023 Traffic Impact Analysis. The drive aisle may be labeled as "Private Access Road." It is recommended that this also be identified as a fire lane since it will offer direct turning access from FM 407.
3. Driveway \#2 shall be served by a left turn bay cut in the median. Prior to construction of any public improvements in the TxDOT right-of-way, a TxDOT construction permit shall be obtained by the applicant.
4. Prior to submittal of a final plat, the proposed location and design of an on-site septic facility (OSSF) shall be approved by the Town of Bartonville, in accordance with Bartonville Development Ordinance Section 2.6.c.
5. Prior to any construction on the site within the Zone AE floodplain or floodway, a Conditional Letter of Map Revision (CLOMR) shall be submitted to and approved by FEMA.
6. The final plat shall contain an additional note under General Notes that reads, "The Zone AE floodplain and floodway shall be maintained and shall remain free of obstructive debris by the property owner, in accordance with the Bartonville Code of Ordinances.
7. A complete engineering/construction plan set shall accompany the final plat application, in accordance with Bartonville Development Ordinance Section 2.7.d.

Financial Information: Due to the property's ownership by a non-profit organization, the Town of Bartonville does not receive any ad valorem property taxes from the property. The Town can anticipate some minor expenses associated with serving the future school site with public safety and general governance services.

## Exhibits:

1. Preliminary Plat Application Packet
2. Traffic Impact Analysis, prepared by DeShazo Group and dated August 10, 2023
3. Flood Study, prepared by Cardinal Strategies and dated October 12, 2023

Exhibit 1

Application Type (check all applicable):
$\square$ Sketch Plat
$\square$ Land Study
-Preliminary
$\square$ Final
$\square$ Development
$\square$ Replat
$\square$ Amending Plat

Current Legal Description:
A0736A A. R. LOVING, TR 5A(1)(PT),6(PT), 82.6397 ACRES
Proposed Subdivision Name: ELTS ADDITION LOT 1, BLOCK A ロIn Town Limits $\square$ In Current Zoning:_AG Concurrent Zoning Change Req.? $\square$ Yes (zoning change request attached) ■No
Proposed Zoning (if applicable): ___ No. Proposed Lots: $\quad 1 \quad$ Total Acres: $\underline{99.744}$

Seeking Waiver/Suspension: $\square$ Yes $\square$ No If yes, please submit required information pursuant to Sec. 1.11 of Ordinance No. 336-03
Owner: Education Leads to Success Foundation

Address: 2104 Cavalier Way, Flower Mound, TX 75022
Phone: $\qquad$

Applicant: $\qquad$ CCM Engineering

Address: 2570 Justin Rd., Highland Village, TX 75077 Fax: $\qquad$

Please Note: If applicant is different from current owner a notarized statement, authorizing the applicant to act as owner's agent, must accompany this application along with submittal fees in accordance with the Town's adopted Fee Schedule.

I understand that it is unlawful for any person to knowingly or willfully misrepresent, or fail to include, any information required by the Development Ordinance on this application. I further understand that misrepresentation, or deliberate omission, of facts pertaining to the land study or plat shall constitute grounds for denial of the land study or plat.

| Applicant Signature |  |  | Date |
| :---: | :---: | :---: | :---: |
| Office Use Only: <br> Schedule: <br> Zoning Change? $\square \mathrm{Y} \quad \square \mathrm{N}$ Street Construction <br> Hearing Req? $\square$ <br> $\square \mathrm{Y}$ | Fee Pd: $\qquad$ <br> DRC: $\qquad$ <br> From $\qquad$ to $\qquad$ Public Improvements <br> Tax Certificate? $\square$ Y $\square$ | Check \# $\qquad$ <br> P\&Z: $\qquad$ <br> Publish Date: $\qquad$ Easements | Date: $\qquad$ <br> TC: $\qquad$ <br> Hearing Date: $\qquad$ Simultaneous Submit |
| Disbursement: Gas Co. Elec Co. | Town Engineer/Planner Cable Co. | $\square$ Town Attorney <br> $\square$ Fire Chief | DRC Members <br> Water Supply |


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Exhibit 2

## TRAFFIC IMPACT ANALYSIS UPDATE FOR

## BARTONVILLE ELTS SCHOOL

IN BARTONVILLE, TEXAS

DeShazo Project No. 23031

Prepared for:
Mr. Luke Spicer. P.E. CCM Engineering 2570 FM 407, Suite 209
Highland Village, TX 75077


08/10/2023
Texas Registered Engineering Firm F-3199
400 S Houston St, Suite 330, Dallas, TX-75202
Office: 214-748-6740| www.deshazogroup.com

REVISED

August 10, 2023

## DeShazo Group 42YEARS

## Traffic Impact Analysis Update for <br> Bartonville ELTS School in Bartonville, Texas

~ DeShazo Project No. 23031~

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Traffic Impact Analysis Update for

## Bartonville ELTS School in Bartonville, Texas

~ DeShazo Project No. 23031~
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Table 12. Intersection Sight Distance Summary

## LIST OF EXHIBITS: <br> Exhibit 1. Project Vicinity Map <br> Exhibit 2. Project Location \& Surroundings Map <br> Exhibit 3. Preliminary Site Plan <br> Exhibit 4. Existing Roadway Geometry and Traffic Control <br> Exhibit 5. Proposed Roadway Geometry and Traffic Control

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Traffic Impact Analysis Update for

## Bartonville ELTS School in Bartonville, Texas

~ DeShazo Project No. 23031~

| LIST OF ABBREVIATIONS: |  |  |  |
| :--- | :--- | :--- | :--- |
| DeShazo/DGI: | DeShazo Group, Inc. | Dr: | Drive |
| TIA: | Traffic Impact Analysis | St: | Street |
| LOS: | Level of Service | Pkwy: | Parkway |
| NB: | North Bound | Ave: | Avenue |
| SB: | South Bound | ITE: | Institute of Transportation |
| EB: | East Bound |  | Engineers |
| WB: | West Bound | TxDOT: | Texas Department of <br> L: |
| Left |  | Transportation |  |
| R: | Right | AASHTO: | American Association of State |
| T: | Through |  | Highway and Transportation |
| In: | Inbound/ Ingress |  | Officials |
| Out: | Outbound/ Egress | MUTCD: | Manual on Uniform Traffic |
| AM: | Ante Meridiem |  | Control Devices |
| PM: | Post Meridiem | HCM: | Highway Capacity Manual |
| PHF: | Peak Hour Factor | HCS: | Highway Capacity Software |
| VPH: | Vehicle Per Hour | NCTCOG: | North Central Texas Council |
| MPH: | Mile Per Hour |  | of Governments |
| V/C: | Volume/Capacity | AMM: | Access Management Manual |
| TWSC: | Two-Way Stop-Control | DU: | Dwelling Unit |
| AWSC: | All-Way Stop-Control | SF: | Square Feet |
| ISD: | Intersection Sight Distance | Ft: | Feet |
| TX: | Texas | MUD: | Mixed-Use Development |
| Blvd: | Boulevard | CBD: | Central Business District |
| Rd: | Road | PD: | Planned Development |
| City/Town: | Town of Bartonville |  |  |

## EXECUTIVE SUMMARY

The services of DeShazo Group, Inc. (DeShazo) were retained by CCM Engineering (Client), to conduct Traffic Engineering Services for the proposed Bartonville ELTS School in Bartonville, Texas. The proposed development will be located in the northwest quadrant of FM 407 and CJ's Legacy Ranch Drive intersection in Bartonville, Texas.

Two-access drives will connect to FM 407 at the site, which are expected to be constructed by the year 2024. While the school will have a capacity of about 391 students, it is expected that all the students will be transported by bus and have a projected 5 bus operation per day.

DeShazo performed the analysis based on two scenarios. Scenario 1 includes both the school bus and parent pick up and drop off together and Scenario $\mathbf{2}$ includes only 5 buses/10 bus trips a day. Scenario 1 was considered and traffic analysis was performed considering; during a time of emergency, some of the parents may want to pick up or drop off their kids. It is generally understood that this scenario will not occur on a regular basis.

The analysis of the traffic generated by the proposed development resulted in a minimal impact on the local roadway system. Below is a summary of findings and suggested recommendations from the following TIA report.

## INTERSECTION CAPACITY ANALYSIS

From the findings in our analysis, DeShazo has suggested improvements to the roadway geometry and traffic control devices to improve traffic operations for the local roadway network. These suggested recommendations are summarized below.

## SUMMARY OF FINDINGS

FINDING: Based upon the existing 2023 analysis, all study intersections are currently operating at LOS D or better during the peak hour periods, except the following:

## FM 407 and McMakin Rd:

The EB movement of this signalized intersection is operating at LOS F in 2023 Existing AM as well as $P M$ condition.

FM 407 and I T Neely Dr: The EBLR movement of this unsignalized intersection is operating at LOS $F$ in 2023 Existing $A M$ as well as PM condition.

FM 407 and Rayzor Rd: The WBL movement of this unsignalized intersection is operating at LOS E in 2023 Existing $A M$ and at $L O S F$ in the existing $P M$ condition.

FINDING: Based upon the 2024 Background and 2024 background-plus site buildout analysis, all study intersections are expected to operate at LOS D or better during the peak hour periods, except the following:

## FM 407 and McMakin Rd:

The $E B$ movement of this signalized intersection is expected to operate at LOS F during both the 2024 Background and Background Plus Site AM as well as PM conditions in both of the Scenarios.

## FM 407 and I T Neely Dr:

The EBLR movement of this unsignalized intersection is expected to operate at LOS F during both the 2024 Background and Background Plus Site $A M$ as well as $P M$ conditions in both of the Scenarios.

## FM 407 and Rayzor Rd:

The WBL movement of this unsignalized intersection is expected to operate at LOS F during both the Background Plus Site $A M$ as well as $P M$ conditions in Scenario 1. The intersection operates at LOS E during 2024 Background AM as well as Background Plus Site AM in Scenario 2.

## FM 407 and Driveway 2:

The EBLR movement of this unsignalized intersection is expected to operate at LOS F during both the 2024 Background Plus Site $A M$ as well as $P M$ conditions in Scenario 1. And the intersection operates at LOS E during 2024 Background Plus Site PM Scenario 2.

FINDING: Based upon the 2029 horizon and 2029 horizon-plus site buildout analysis all the intersections are expected to operate at LOS D, or better during the peak hour periods, with the exception of the following:

## FM 407 and McMakin Rd :

The signalized intersection is expected to operate (overall) at LOS C and LOS D during 2029 Horizon and 2029 Horizon Plus Site AM as well as PM conditions, respectively for both scenarios. The EB movement is expected to operate at LOS F during both the 2029 Horizon and 2029 Horizon Plus Site $A M$ and $P M$ conditions for both scenarios.

## FM 407 and I T Neely Dr:

The EBLR movement is expected to operate at LOS F during the 2029 Horizon and 2029 Horizon Plus Site $A M$ and $P M$ conditions for both scenarios.

## FM 407 and Rayzor Rd:

The WBL movement is expected to operate at LOS F during both the 2029 Horizon and 2029 Horizon Plus Site $A M$ and $P M$ conditions for both scenarios.

## FM 407 and Driveway 2:

The EBLR movement is expected to operate at LOS F during the 2029 Horizon Plus Site AM and PM conditions for scenario 1. And LOS E during 2029 Horizon Plus Site PM conditions for scenario 2.

## SUMMARY OF THE DESHAZO RECOMMENDATIONS FOR INTERSECTIONS:

## FM 407 and McMakin Rd:

Although, in general, this intersection is projected to function and remain at the overall LOS of LOS C and LOS D during the AM and PM horizon conditions. This signalized intersection's EB movement is already operating LOS F during both AM and PM conditions. Further, it is expected to worsen in the future scenarios. As the intersection is failing at current conditions and the proposed development is not contributing to any traffic at current conditions, DeShazo recommends that the Town should consider adding two exclusive left turns instead of one existing left turn, which will improve the level of service. This can be done by modifying the pavement markings, signage, and traffic signals.

This study has performed an intersection capacity analysis with these improvements (having two left turn lanes) and the results are attached to Appendix E.

## FM 407 at Rayzor Rd:

The WBL movement is expected to operate at LOS E and LOS F in 2023 Existing AM and Existing PM conditions respectively and is expected to operate at LOS F in future scenarios. The proposed site has no impact on this intersection as the majority of the traffic for the proposed development is expected to travel north-south and vice-versa. Additionally, during peak hours of analysis, the maximum $95^{\text {th }}$ percentile queue for Horizon and Horizon Plus Site is expected to be approximately 3 vehicles, which can be accommodated on the current turn lane of Razor Rd. Therefore no mitigation measure is recommended for this intersection by this development.

## FM 407 at IT Neely Dr:

The EBLR movement is currently operating at LOS F with a maximum $95^{\text {th }}$ percentile queue of 2 vehicles. The proposed site has no impact on this intersection as the majority of the traffic for the proposed development is expected to travel north-south and vice-versa. Therefore no mitigation measure is recommended for this intersection by this development.

## FM 407 and Driveway 2:

The EBLR movement is expected to operate at failing LOS from the buildout year 2025 and onwards for both hypothetical scenarios. For this outbound movement from the proposed drive, a maximum $95^{\text {th }}$ percentile queue of 20 vehicles is expected. Driveway 2 will have enough storage capacity to hold 20 projected vehicles. Therefore no mitigation measure is recommended for this intersection by this development.

The current and future expected queues at the failing intersection are represented in the following table.

| Intersection | Traffic Movement | 2023 <br> Existing |  | 2024 <br> Background |  | 2024 Background Plus <br> Site(Scenario 1) |  | 2024 <br> Background Plus Site(Scenario 2) |  | $\begin{gathered} 2029 \\ \text { Horizon } \end{gathered}$ |  | 2029 HorizonPlusSite(Scenario-1) |  | 2029 Horizon <br> Plus <br> Site(Scenario <br> 2) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM |
| Queue Length (Feet) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FM 407 | EB | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 17 | 17 | 17 | 17 | 17 |
| McMakin Rd | EBL | 253 | 499 | 258 | 512 | 271 | 514 | 258 | 512 | 288 | 580 | 301 | 582 | 288 | 580 |
| Queue (Vehicle) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FM 407 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| IT Neely Dr | EBLR | 2 | 1.8 | 2.2 | 2 | 2.7 | 2 | 2.2 | 2 | 3.4 | 3.2 | 4 | 3.3 | 3.4 | 3.2 |
| CJ's Legacy Ranch FM 407 | EBR | 0 | 0 | 0 | 0 | 0.6 | 0.1 | 0 | 0 | 0 | 0 | 0.7 | 0.1 | 0 | 0 |
| CJ's Legacy Ranch |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Dr | EBL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Proposed Driveway | SBLR | --- | --- | -- | -- | 0.2 | 0 | -- | 0 | -- | -- | 0.2 | 0 | -- | 0 |
| FM 407 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rayzor Rd | WBL | 1 | 1.6 | 1.1 | 1.6 | 1.5 | 1.6 | 1.1 | 1.6 | 1.6 | 2.4 | 2.2 | 2.5 | 1.6 | 2.4 |
| FM 407 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Driveway 2 | EBLR | 0 | 0 | 0 | 0 | 18.4 | 1.6 | 0 | 0.1 | 0 | 0 | 20.1 | 2.3 | 0 | 0.2 |

## ROADWAY LINK ANALYSIS

FINDING: Based upon the roadway link analysis, all roadway links are expected to operate at LOS $D$ or better for all different scenarios.

RECOMMENDATION: Based on the results of the study conducted on roadways links, it appears that the implementation of additional mitigation measures is not necessary.

## DRIVEWAY SPACING ANALYSIS

FINDING: Based on TxDOT's driveway spacing guidelines and measurements from the preliminary site plan and Google Earth program, all the proposed site driveways satisfy the spacing criteria requirements.

RECOMMENDATION: Based on the results of the study conducted on driveway spacing, it appears that the implementation of additional mitigation measures is not necessary.

## RIGHT - TURN DECELERATION ANALYSIS

FINDING: Based upon the projected volumes derived in this study and TxDOT's right-turn deceleration lane requirements, the installation of a right-turn deceleration lane is required at Driveway 2 at FM 407.

RECOMMENDATION: DeShazo recommends the maximum possible right-turn deceleration lane (within TxDOT recommended lengths) at this intersection's SBR movement to accommodate the expected right-turning vehicles.

## LEFT-TURN DECELERATION ANALYSIS

FINDING: Based upon the projected volumes derived in this study and TxDOT's left-turn deceleration lane requirements, the installation of a left-turn deceleration lane is required at Driveway 2 at FM 407.

RECOMMENDATION: DeShazo recommends the maximum possible left-turn deceleration lane (within TxDOT recommended lengths) at this intersection's NBR movement to accommodate the expected left-turning vehicles.

## INTERSECTION SIGHT DISTANCE ANALYSIS

FINDING: Based on the AASHTO and the Town of Bartonville's guidelines and measurements from the Google Earth program, all the proposed site driveway meets the intersection sight distance requirements.

RECOMMENDATION: Based on the results of the study conducted on intersection sight distance requirements, it appears that the implementation of additional mitigation measures is not necessary.

Disclaimer: However, if the site plans are developed further to include additional infrastructure such as fencing, walls, or landscaping in the vicinity of proposed driveways, intersection sight distances may need to be re-evaluated.

END OF SUMMARY

## INTRODUCTION

The services of DeShazo Group, Inc. (DeShazo) were retained by CCM Engineering (Client), to conduct Traffic Engineering Services for the proposed ELTS School in Bartonville, Texas. The proposed development is located in the Northwest quadrant of FM 407 and CJ's Legacy Ranch Drive intersection in Bartonville, Texas.

Two-access drives will connect to FM 407 at the site, which are expected to be constructed by the year 2024. While the school will have a capacity of about 391 students, it is expected that all the students will be transported by bus and have a projected 5 bus operation per day. Table 2. represents Development Program Summary.

Table 2. Development Program Summary

| Land Uses | Quantity | Unit | Buildout <br> Year | Daily Busing <br> Capacity |
| :---: | :---: | :---: | :---: | :---: |
| Charter Elementary <br> School | 391 | Students | 2024 | 5 Buses |

A project vicinity map and a project location \& surroundings map are provided in Exhibit 1 and Exhibit 2, respectively. A preliminary site plan is provided in Exhibit 3.

## PURPOSE

The purpose of this TIA is to determine if any improvements to the adjacent transportation system are needed to maintain a satisfactory level of service, an acceptable level of safety, and appropriate access for the proposed development. The Town of Bartonville is requiring that a TIA be completed for the subject site as part of the approval process. The study parameters used in this TIA are based upon the requirements of the TxDOT/ Town of Bartonville and are consistent with the standard industry practices used in similar studies.

## TRAFFIC IMPACT ANALYSIS - METHODOLOGY

To achieve this objective, this analysis summarizes the traffic operational characteristics of the background conditions within a designated study area and the projected incremental impact of the Project as determined through standardized engineering analyses. The standard methodology used to conduct the traffic impact analysis is described below.

1. Collect current traffic volume data on a typical day throughout the study area to represent existing traffic conditions.
2. Apply growth factors to the existing volumes to project future background traffic at the site buildout year conditions.
3. Project traffic is generated by the proposed development using trip generation, trip distribution, and traffic assignment as described below.
a. Trip generation is calculated in terms of "trip ends" - a trip end is a one-way vehicular trip entering or exiting a site driveway (i.e., a single vehicle entering and exiting a site represents two trip ends).
b. Trip distribution and assignment of site-generated trips to the surrounding roadway system are determined by proportionally estimating the orientation of travel via various travel routes. This is a subjective exercise based upon professional judgment considering such factors as directional characteristics of existing local traffic; trip attributes (e.g., trip purpose, trip length, travel time, etc.), roadway features (e.g., capacity, operational conditions, the character of the environment), regional demographics, etc.
4. Determine site-plus-background traffic by adding the projected site-generated traffic to the background traffic.
5. Analyze existing, background, and background-plus-site traffic volumes to evaluate the roadway conditions in the vicinity of the proposed development.
6. If needed, mitigation measures are recommended based on the analysis to improve roadway operational conditions.

## ANALYSIS SCENARIOS

This TIA analyzed the AM and PM peak hour periods that are considered the most critical conditions on the public roadway system related to the proposed project. The AM and PM peak hour periods were determined from the data collection of the study area.

Appendix B summarizes the peak hour volumes used in the study. The proposed project was analyzed as per the city of Bartonville standards for future scenarios. Those scenarios include 2023- the existing year, 2024 - the build year, and 2029 - the horizon year.

This TIA further analyzed these scenarios for the following peak hour periods that were considered the most critical conditions on the public roadway system related to the proposed project and land uses related to it.

## Roadway Intersections:

- Weekday: AM peak hour of adjacent street traffic (7:00 AM - 9:00 AM)
- Weekday: PM peak hour of adjacent street traffic (3:00 PM - 6:00 PM)


## Roadway Links:

- Weekday: 24-Hour bi-directional roadway tube counts were collected to verify the collected peak periods.

Development scenarios considered in this analysis are summarized in Table 3.

Table 3. Development Scenarios Analyzed

| Scenario | Development Program | Traffic Volumes |
| :--- | :---: | :--- |
| 2023 Existing | None Added | Existing 2023 Volumes |
| 2024 Background | None Added | Existing 2023 volumes have grown at <br> $2 \% \%^{[1]}$ per year for 2 years |
| 2024 Background + <br> Full Buildout | Full Build Traffic Added <br> Includes Scenario $1^{[2]}$ and <br> Scenario 2 ${ }^{[3])}$ | Existing 2023 volumes have grown at <br> $2 \% \%^{[1] ~ p e r ~ y e a r ~ f o r ~ 2 ~ y e a r s ~ p l u s ~}$ <br> proposed site traffic |
| 2029 Horizon | None Added | Existing 2023 volumes have grown at <br> $2 \% \%^{[1]}$ per year for 6 years |
| 2029 Horizon + Site | Full Build Traffic Added | Existing 2023 volumes have grown at <br> $2 \%$ <br> 2\% per year for 6 years plus <br> proposed site traffic |

## Notes:

${ }^{[1]}$ The 2\% growth rate is based on the Town of Bartonville's Population growth rate. The table representing the population growth rate is attached to Appendix E.
${ }^{[2]}$ Scenario 1: This scenario is a hypothetical scenario where all students are picked up/drop off even though the school bus is in service. As a conservative approach, DeShazo has taken this situation into consideration.
${ }^{[2]}$ Scenario 2: $100 \%$ of the students are bused is valid in case of an emergency where complete evacuation is mandatory. For e.g., severe weather conditions.




## SITE LOCATION AND STUDY AREA

## STUDY AREA

The study area for a TIA is typically defined to allow an assessment of the most relevant traffic impacts on the local area. The extent of the study area is discretionary but is generally commensurate with the scale of the proposed development. Special localized factors may also be considered. Table 4 below shows the existing and proposed roadway intersections analyzed in this study. All the existing intersections analyzed in this study were also shown in a project site location \& surroundings map in Exhibit 2.

Table 4. Existing and Proposed Roadway Intersections

| Intersection | Traffic control | Future Access Control Type |
| :---: | :---: | :---: |
| 1. FM 407 at IT Neely Dr | Two-way-stop-control Intersection | -- |
| 2. FM 407 at CJ Legacy Ranch Dr | Two-way-stop-control Intersection | -- |
| 3. FM 407 at Rayzor Rd | Two-way-stop-control Intersection | -- |
| 4. Driveway 1 at CJ's Legacy Ranch Dr | Two-way-stop-control Intersection | -- |
| 5. FM 407 at McMakin Rd | Signalized Intersection | -- |
| 6. Driveway 2 at FM 407 | Two-way-stop-control Intersection | Full Access |

## EXISTING ZONING AND DEVELOPMENT

The proposed site is currently zoned as AG: Agriculture (Min. 10 acre lots). The site is currently vacant land. A site location map with the surroundings of the project was shown in Exhibit 2.

## THOROUGHFARE SYSTEM

- FM 407 :
- Existing operation and cross-section: Four lanes, Two-way operation, median divided.
- Speed Limit: 50 MPH (posted)
- TxDOT Functional Classification: Minor Arterial
- Town of Bartonville Classification: Major Arterial 4 Lane Divided
- McMakin Rd:
- Existing operation and cross-section: Two lanes, undivided, two-way operation
- Speed Limit: 40 MPH (posted)
- TxDOT Functional Classification: Major Collector
- Town of Bartonville Classification: Principal Arterial 4 Lane Divided
- Rayzor Rd:
- Existing operation and cross-section: Four lanes, undivided, two-way operation
- Speed Limit: 20 MPH (posted)
- Denton County Functional Classification: Major Arterial 4 Lane Divided
- C J Legacy Ranch Dr
- Existing operation and cross-section: Two lanes, undivided, two-way operation
- Speed Limit: 25 MPH assumed (Not posted)
- IT Neely Dr:
- Existing operation and cross-section: Two lanes, Two-way operation
- Speed Limit: 30 MPH assumed (Not posted)
- TxDOT Functional Classification: Not Classified

A summary of the existing and proposed intersection/roadway geometry and traffic control devices is shown in Exhibit 4 and Exhibit 5.

## TRAFFIC VOLUMES

## EXISTING TRAFFIC VOLUMES

Traffic volumes were collected for the following intersections during the analysis periods at the study area intersections on Thursday, March $23^{\text {rd }}, 2023$. The traffic counts were collected from 7:00 AM to 9:00 AM for morning peak hours and 3:00 PM to 6:00 PM for evening/afternoon peak hours. The evening peak data collection was included from 3 PM to account for the adjacent school's peak dismissal timings.

Traffic volumes are graphically summarized in Appendix A and detailed 15-minute-count data sheets are provided in Appendix B.

## PROJECTED BACKGROUND TRAFFIC VOLUMES

Background traffic growth is defined as normal traffic growth that is not directly related to the subject development of this study. Based on the recent TIA performed by DeShazo in the vicinity of the proposed development and the city official's comments, a $2 \%$ annual growth rate in the vicinity of the proposed site is considered very conservative. DeShazo used an annual growth rate of $\mathbf{2 \%}$ from the collected (2023) for two years to 2024 background condition through the 2029 horizon year.

The $2 \%$ growth rate is based on the TxDOT Database System, city officials' comments, and previous TIA submitted in the vicinity of the proposed project. The approved TIA study scope from the city is attached in Appendix E of this report.

Future background traffic volumes estimated for the buildout years were calculated by applying the assumed growth rate to the study area intersections. These volumes are graphically summarized in Appendix A.

## SITE-TRAFFIC CHARACTERISTICS

Traffic generated by the development is projected by first determining the number of trips generated by the planned land use, then distributing and assigning projected site-related trips to the roadway system.

## TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual (11 ${ }^{\text {th }}$ Edition) is an accepted source for calculating trip generation for common land uses for which sufficient published data is available.

Trip generation is calculated in terms of "trip ends". A trip end is a one-way vehicular trip entering or exiting a site driveway (i.e., a single vehicle entering and exiting a site represents two trip ends). Trip generation for this Project was calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual ( $11^{\text {th }}$ Edition). ITE Trip Generation is a compilation of actual, vehicular traffic volume generation data and statistics by land use as collected over several decades by creditable sources across the country. This analysis evaluates typical weekday AM and PM peak hour conditions of the local street traffic. Table 5 and Table 6 provide a summary of the trip ends generated for the project.
According to the proposed school, all the students will be bused. This situation may not be accurate in reality. ITE Trip Generation Manual ( $11^{\text {th }}$ Edition) has trip generated based on students and employees only and states that 'the percentage of students at the sites who were transported to school via bus varied considerably. Some sites experienced higher than-average trip rates because many students did not utilize the available school bus service. Due to the varied transit and school bus usage at these sites, it is desirable that future studies report additional detail on the percentage of students who were bused to school and the percentage that were dropped off and picked up. Because of the uncertainty of the trips and their behavior. DeShazo performed the analysis based on two Scenarios.

Scenario 1: Bus + Passenger Car/Parent Pick up or Drop off.
Scenario 2: Bus Only
Scenario 1: This scenario is a hypothetical scenario where all students are picked up/drop off even though the school bus is in service. As a conservative approach, DeShazo has taken this situation into consideration.

Table 5. Full Buildout Projected Trip Generation for Scenario 1
(Bus + Passenger Cars Traffic)

| $\begin{aligned} & \text { ITE } \\ & \text { Code } \end{aligned}$ | $\begin{gathered} \text { ITE } \\ \text { Land Use } \end{gathered}$ | Quantity | ay Trips | AM Peak Hour |  |  | PM Peak Hour |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Total | In | Out | Total | In | Out |
| 536 | Charter Elementary School | 391 Students | 723 | 408 | 212 | 196 | 63 | 22 | 41 |
|  |  | Subtotals: | 723 | 408 | 212 | 196 | 63 | 22 | 41 |
|  |  | Totals: | 723 | 408 | 212 | 196 | 63 | 22 | 41 |

Scenario 2: i.e., 100\% of students are bused. is valid in case of an emergency where complete evacuation is mandatory. For e.g., severe weather conditions.

Table 6. Full Buildout Projected Trip Generation for Scenario 2
(Only Bus Traffic)

| Code | School Type | Quantity | Weekday Trips | AM Peak Hour |  |  | PM Peak Hour |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Total | In | Out | Total | In | Out |
|  | Charter Elementary School | 10 Buses | 10 | 5 | 5 | 0 | 5 | 0 | 5 |
|  |  | Subtotals: | 10 | 5 | 5 | 0 | 5 | 0 | 5 |
|  |  | Totals: | 10 | 5 | 5 | 0 | 5 | 0 | 5 |

## TRIP DISTRIBUTION AND ASSIGNMENT

Traffic for the proposed development was distributed and assigned to the study area roadway network based upon the roadway network and regional travel flow [or existing traffic patterns]. Detailed trip distribution and traffic assignment calculations and results are summarized in Appendix C.

## SITE-GENERATED TRAFFIC VOLUMES

Site-generated traffic is calculated by multiplying the trip generation value by the corresponding traffic assignments-both inbound and outbound (from Appendix C). The resulting cumulative (for all uses) peak period site-generated traffic volumes at the buildout of the Project are graphically summarized in Appendix A.

## ROADWAY INTERSECTION ANALYSIS

## INTERSECTION CAPACITY ANALYSIS - METHODOLOGY

The level of performance of infrastructure can often be measured through an analysis of volume and capacity that considers various physical and operational characteristics of the system. For vehicular traffic, an operational analysis of roadway intersection capacity is the most detailed type of analysis. An industry-standardized methodology for this type of analysis is presented in the Highway Capacity Manual (HCM). HCM uses the term "level of service" (LOS) to qualitatively describe the efficiency using a letter grade of $A$ through $F$. Generally, LOS is described as follows.

```
LOS \(A=\) free, unobstructed flow
LOS \(B=\) reasonably free flow
LOS C = stable flow
LOS \(D=\) approaching unstable flow
LOS \(E=\) unstable flow, operating at design capacity
LOS \(F=\) operating over design capacity
```

Traffic operational analysis is typically measured in one-hour periods during day-to-day peak conditions. In most urban settings, LOS C (or better) is desirable, although LOS D is considered to be acceptable. Nevertheless, periods of LOS $E$ or $F$ conditions are not uncommon for brief periods at major transportation facilities. In some cases, measures to add more capacity-either through operational changes and/or physical improvements-can be identified to increase efficiency and sometimes improve the level of service.

For traffic-signal-controlled ("signalized") intersections and STOP-controlled ("unsignalized") intersections, LOS is determined based upon the calculated average seconds of delay per vehicle. For signalized intersections, the average delay per vehicle can be effectively calculated for the entire intersection. However, the average delay per vehicle for unsignalized intersections is calculated by the separate approach or by individual traffic maneuvers that must stop or yield the right-of-way. For unsignalized intersections of a minor street or driveway and a major roadway, the analysis methodology often breaks down and yields low levels of service (often, LOS F) that cannot be mitigated unless a traffic signal is installed. However, for a traffic signal to be installed, the responsible agency that governs the right-of-way must issue its approval subject to very specific warrant criteria being met, and several other operational considerations being satisfied. Neither level of service nor delay is considered a criterion for traffic signal installation.

The following table summarizes the LOS criteria for signalized and unsignalized intersections as defined in the latest edition of the Highway Capacity Manual.

|  | Signalized Intersection <br> (Average Delay per Vehicle) | Unsignalized Intersection <br> (Average Delay per Vehicle) |
| :--- | :---: | :---: |
| LOS A | $\leq 10$ | $\leq 10$ |
| LOS B | $>10-\leq 20$ | $>10-\leq 15$ |
| LOS C | $>20-\leq 35$ | $>15-\leq 25$ |
| LOS D | $>35-\leq 55$ | $>25-\leq 35$ |
| LOS E | $>55-\leq 80$ | $>35-\leq 50$ |
| LOS F | $>80$ | $>50$ |

NOTE: Signalized intersection operational parameters and operational results in this TIA were obtained directly from the optimized software output and may differ slightly from actual traffic signal operations.

## 2023 EXISTING - INTERSECTION ANALYSIS

Existing traffic volumes were analyzed to determine current operational conditions. Intersection capacity analyses presented in this study were performed using the SYNCHRO software package. Table $\mathbf{7}$ provides a summary of peak period intersectional operational conditions (*). Detailed traffic volumes and software output for all intersection analyses are provided in Appendix A and Appendix D, respectively.

Table 7. 2023 Existing Intersection Analysis

| Intersections | Traffic Movement | 2023 Existing |  |
| :---: | :---: | :---: | :---: |
|  |  | AM | PM |
| Signalized Intersection |  |  |  |
| FM 407 |  |  |  |
| McMakin Blvd/Blanco Dr | Overall | C (25.9) | D (35.4) |
|  | EB | F (140.8) | F (119.7) |
|  | WB | C (25.1) | C (31.4) |
|  | NB | A (5.1) | A (9.9) |
|  | SB | A (6.2) | B (10.1) |
| Unsignalized Intersection (TWSC) |  |  |  |
| FM 407 |  |  |  |
| 1 T Neely Dr | NBL EBLR | $\begin{aligned} & \text { B (12.7) } \\ & \text { F (83.5) } \end{aligned}$ | $\begin{aligned} & \text { B (11.7) } \\ & \text { F (69.0) } \end{aligned}$ |
| CJ's Legacy Ranch Dr |  |  |  |
|  |  |  |  |  |
| FM 407 |  |  |  |
| Rayzor Rd | WBL | E (47.0) | F (121.4) |
|  | WBR | B (12.0) | B (14.9) |
|  | SBL | A (9.8) | C (15.2) |
| FM 407 |  |  |  |
| Driveway 2 | NBL | -- | -- |
|  | EBLR | -- | -- |

FINDING: Based upon the existing 2023 analysis, all study intersections are currently operating at LOS D or better during the peak hour periods, except the following:

## FM 407 and McMakin Rd:

The $E B$ movement of this signalized intersection is operating at LOS F in 2023 Existing AM as well as $P M$ condition.

FM 407 and IT Neely Dr: The EBLR movement of this unsignalized intersection is operating at LOS $F$ in 2023 Existing AM as well as PM condition.

FM 407 and Rayzor Rd: The WBL movement of this unsignalized intersection is operating at LOS E in 2023 Existing $A M$ and at LOS F in the existing PM condition.

KEY:
$A, B, C, D, E, F=$ Level-of-Service for each intersection approach
NB, SB, EB, WB = North-, South-, East-, Westbound approach

L, $T, R=$ Left, Through, Right Approach turning movement
AM = AM Peak Hour of Adjacent Street
PM = AM Peak Hour of Adjacent Street
NOTE: Signalized intersection operational parameters and operational results were obtained directly from the optimized software output and may differ slightly from actual traffic signal operations.

## 2024 BACKGROUND AND BACKGROUND PLUS SITE - INTERSECTION ANALYSIS

The proposed Bartonville ELTS school development is expected to be completed by the year 2024. Therefore, the year 2024 background (no build) and background-plus site traffic volumes were analyzed to determine the incremental change in operational conditions during peak periods without and with site-related traffic. The background plus site condition is analyzed in two scenarios. The LOS results are provided in Table 8.

Table 8. 2024 Scenario Intersection Analysis

| Intersections | Traffic Movement | 2024 Background |  | 2024 Background Plus |  | 2024 Background Plus Site(Scenario 2) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AM | PM | AM | PM | AM | PM |
| Signalized Intersection |  |  |  |  |  |  |  |
| FM 407 <br> McMakin Blvd/ Blanco Dr | Overall <br> $E B$ <br> WB <br> NB <br> $S B$ | $\begin{aligned} & \text { C (27.0) } \\ & \text { F }>100 \\ & \text { C (25.1) } \\ & \text { A (5.1) } \\ & \text { A (6.2) } \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { D (37.3) } \\ & \text { F }>100 \\ & \text { C }(31.4) \\ & \text { A (10.0) } \\ & \text { B (10.2) } \end{aligned}$ | $\begin{aligned} & \text { C (27.9) } \\ & \text { F }>100 \\ & \text { C (25.1) } \\ & \text { A (5.4) } \\ & \text { A }(6.6) \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { D (37.2) } \\ & \text { F }>100 \\ & \text { C }(31.4) \\ & \text { A }(10.0) \\ & \text { B }(10.3) \end{aligned}$ | $\begin{aligned} & \text { C (26.9) } \\ & \text { F }>100 \\ & \text { C (25.1) } \\ & \text { A (5.1) } \\ & \text { A (6.2) } \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { D (37.3) } \\ & \text { F }>100 \\ & \text { C }(31.4) \\ & \text { A (10.0) } \\ & \text { B (10.2) } \end{aligned}$ |
| Unsignalized Intersection (TWSC) |  |  |  |  |  |  |  |
| $\frac{\mathrm{FM} 407}{\text { IT Neely Dr }}$ | NBL EBLR | $\begin{aligned} & \mathrm{B}(13.0) \\ & \mathrm{F}(96.0) \end{aligned}$ | $\begin{aligned} & \text { B (11.9) } \\ & \text { F (74.8) } \end{aligned}$ | $\begin{aligned} & \text { B (13.7) } \\ & \text { F }>100 \end{aligned}$ | $\begin{aligned} & \mathrm{B}(12.0) \\ & \mathrm{F}(78.8) \end{aligned}$ | $\begin{aligned} & \text { B (13.0) } \\ & \text { F (96.0) } \end{aligned}$ | $\begin{aligned} & \text { B (11.9) } \\ & \text { F (74.8) } \end{aligned}$ |
| $\begin{aligned} & \hline \text { CJ's Legacy Ranch Dr } \\ & \hline \text { FM } 407 \end{aligned}$ | EBR | B (14.1) | B (12.4) | C (16.9) | B (12.7) | B (14.2) | B (12.4) |
| $\begin{array}{\|l} \hline \frac{\text { FM } 407}{\text { Rayzor Rd }} \end{array}$ | WBL WBR SBL | $\begin{aligned} & \text { E (49.0) } \\ & \text { B (12.1) } \\ & \text { A (9.5) } \end{aligned}$ | $\begin{aligned} & \text { F }>100 \\ & \text { C (15.2) } \\ & \text { B (12.9) } \end{aligned}$ | $\begin{aligned} & \text { F (70.9) } \\ & \text { B (13.1) } \\ & \text { B (10.1) } \end{aligned}$ | $\begin{aligned} & F>100 \\ & C(15.3) \\ & B(13.0) \end{aligned}$ | $\begin{aligned} & \text { E (49.0) } \\ & \text { B (12.1) } \\ & \text { A (9.5) } \end{aligned}$ | $\begin{aligned} & \mathrm{F}>100 \\ & \mathrm{C}(15.2) \\ & \mathrm{B}(12.9) \end{aligned}$ |
| $\frac{\mathrm{FM} 407}{\text { Driveway } 2}$ | NBL EBLR | -- |  | $\begin{aligned} & C(16.4) \\ & \text { F }>100 \end{aligned}$ | $\begin{aligned} & \text { B (11.1) } \\ & \text { F (67.2) } \end{aligned}$ | $\begin{aligned} & \text { B (12.3) } \\ & \text { A (0.0) } \end{aligned}$ | $\begin{aligned} & \text { A (0.0) } \\ & \text { E (37.5) } \end{aligned}$ |

FINDING: Based upon the 2024 Background and 2024 background-plus site buildout analysis, all study intersections are expected to operate at LOS D or better during the peak hour periods, except the following:

## FM 407 and McMakin Rd:

The $E B$ movement of this signalized intersection is expected to operate at $L O S F$ during both the 2024 Background and Background Plus Site $A M$ as well as PM conditions in both of the Scenarios.

## FM 407 and I T Neely Dr:

The $E B L R$ movement of this unsignalized intersection is expected to operate at $L O S F$ during both the 2024 Background and Background Plus Site $A M$ as well as $P M$ conditions in both of the Scenarios.

## FM 407 and Rayzor Rd:

The WBL movement of this unsignalized intersection is expected to operate at LOS F during both the Background Plus Site AM as well as PM conditions in Scenario 1. The intersection operates at LOS E during 2024 Background AM as well as Background Plus Site AM in Scenario 2.

## FM 407 and Driveway 2:

The $E B L R$ movement of this unsignalized intersection is expected to operate at LOS F during both the 2024 Background Plus Site $A M$ as well as $P M$ conditions in Scenario 1. And the intersection operates at LOS E during 2024 Background Plus Site PM Scenario 2.

## 2029 HORIZON AND HORIZON-PLUS-SITE - INTERSECTION ANALYSIS

A 5-year from full build year traffic analysis was performed. The 2029 horizon (no build), and horizon-plus-buildout traffic volumes were analyzed to determine the incremental change in operational conditions during peak periods without and with site-related traffic. The LOS results are provided in Table 9.

Table 9. 2029 Scenario Intersection Analysis

| Intersections | Traffic Movement | 2029 Horizon |  | $\frac{2029 \text { Horizon Plus }}{\text { Site(Scenario-1) }}$ |  | 2029 Horizon Plus <br> Site(Scenario-2) <br> AM |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AM | PM | AM | PM | AM | PM |
| Signalized Intersection |  |  |  |  |  |  |  |
| FM 407 <br> McMakin Blvd/ Blanco Dr | Overall <br> EB <br> WB <br> NB <br> SB | $\begin{aligned} & \text { C (32.8) } \\ & \text { F }>100 \\ & \text { C (24.7) } \\ & \text { A (5.3) } \\ & \text { A (6.6) } \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { D (48.1) } \\ & \text { F }>100 \\ & \text { A }(0.9) \\ & \text { B }(10.4) \\ & \text { B }(10.5) \\ & \hline \end{aligned}$ | $\begin{aligned} & C(34.0) \\ & \text { F >100 } \\ & C(24.7) \\ & \text { A (5.5) } \\ & \text { A }(7.0) \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { D }(47.9) \\ & \text { F }>100 \\ & \text { C }(30.9) \\ & \text { B }(10.5) \\ & \text { B }(10.6) \end{aligned}$ | $\begin{aligned} & \text { C (32.8) } \\ & \text { F }>100 \\ & \text { C (24.7) } \\ & \text { A (5.3) } \\ & \text { A (6.6) } \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { D (48.0) } \\ & \text { F }>100 \\ & \text { C }(30.9) \\ & \text { B (10.4) } \\ & \text { B (10.5) } \\ & \hline \end{aligned}$ |
| Unsignalized Intersection (TWSC) |  |  |  |  |  |  |  |
| $\frac{\mathrm{FM} 407}{\text { IT Neely Dr }}$ | NBL EBLR | $\begin{aligned} & \mathrm{B}(14.3) \\ & \mathrm{F}>100 \end{aligned}$ | $\begin{aligned} & \mathrm{B}(12.9) \\ & \mathrm{F}>100 \end{aligned}$ | $\begin{aligned} & C(15.2) \\ & F>100 \end{aligned}$ | $\begin{aligned} & \text { B (13.0) } \\ & \text { F >100 } \end{aligned}$ | $\begin{aligned} & \text { B (14.3) } \\ & \text { F >100 } \end{aligned}$ | $\begin{aligned} & \mathrm{B}(12.9) \\ & \mathrm{F}>100 \end{aligned}$ |
| $\begin{aligned} & \hline \text { CJ's Legacy Ranch Dr } \\ & \hline \text { FM } 407 \end{aligned}$ | EBR | C (15.2) | B (13.0) | C (18.6) | B (13.4) | C (15.2) | B (13.1) |
| $\frac{\mathrm{FM} 407}{\text { Rayzor Rd }}$ | WBL <br> WBR <br> SBL | $\begin{aligned} & \text { F (69.6) } \\ & \text { B (12.8) } \\ & \text { A }(9.8) \end{aligned}$ | $\begin{aligned} & \text { F }>100 \\ & \text { C }(16.7) \\ & \text { B (14.2) } \end{aligned}$ | $\begin{aligned} & \mathrm{F}>100 \\ & \mathrm{~B}(14.1) \\ & \mathrm{B}(10.5) \end{aligned}$ | $\begin{aligned} & \text { F }>100 \\ & \text { C (16.9) } \\ & \text { B (14.3) } \end{aligned}$ | $\begin{aligned} & \text { F (69.6) } \\ & \text { B (12.8) } \\ & \text { A (9.8) } \end{aligned}$ | $\begin{aligned} & \text { F }>100 \\ & \text { C (16.7) } \\ & \text { B (14.2) } \end{aligned}$ |
| $\frac{\text { FM } 407}{\text { Driveway } 2}$ | NBL EBLR | -- | - - | $\begin{aligned} & \text { C (18.7) } \\ & \text { F >100 } \end{aligned}$ | $\begin{aligned} & \text { B (11.8) } \\ & \text { F >100 } \end{aligned}$ | $\begin{aligned} & \text { B (13.3) } \\ & \text { A (0.0) } \end{aligned}$ | $\begin{aligned} & \text { A (0.0) } \\ & \text { E (48.0) } \end{aligned}$ |

FINDING: Based upon the 2029 horizon and 2029 horizon-plus site buildout analysis all the intersections are expected to operate at LOS D, or better during the peak hour periods, with the exception of the following:

## FM 407 and McMakin Rd :

- The signalized intersection is expected to operate (overall) at LOS C and LOS D during 2029 Horizon and 2029 Horizon Plus Site AM as well as PM conditions, respectively for both scenarios.
- The EB movement is expected to operate at LOS F during both the 2029 Horizon and 2029 Horizon Plus Site $A M$ and $P M$ conditions for both scenarios.


## FM 407 and I T Neely Dr:

- The EBLR movement is expected to operate at LOS F during the 2029 Horizon and 2029 Horizon Plus Site $A M$ and $P M$ conditions for both scenarios.


## FM 407 and Rayzor Rd:

- The WBL movement is expected to operate at LOS F during both the 2029 Horizon and 2029 Horizon Plus Site $A M$ and $P M$ conditions for both scenarios.


## FM 407 and Driveway 2:

- The EBLR movement is expected to operate at LOS F during the 2029 Horizon Plus Site AM and PM conditions for scenario 1. And LOS E during 2029 Horizon Plus Site PM conditions for scenario 2.


## ROADWAY LINK ANALYSIS - METHODOLOGY

A roadway link is a roadway segment between two intersections. Roadway link capacity analysis is a comparison of actual or forecasted traffic volumes to the theoretical roadway capacity. The capacity of the roadway link is a function of the roadway's cross-section (i.e., number of lanes, lane widths, type of center divider, etc.). However, other more theoretical factors also apply, such as the character of the environment and the functional classification of the roadway. Roadway link capacity is less critical than intersection capacity; however, it can provide a gauge of the utilization of a given roadway.

A specific industry standard for roadway link capacity does not exist, but the typical concept is derived from a base saturation flow rate (i.e., the maximum theoretical rate of continuous flow under ideal, unobstructed conditions). In the traffic engineering industry, this value is generally considered to range between 1,900-2,100 vehicles per lane per hour). A series of adjustment factors are then applied to the saturation flow rate to reflect the characteristics of a given location.

The North Central Texas Council of Governments (NCTCOG), the metropolitan planning agency for the DFW region, has derived internal "hourly service volume" guidelines used for transportation modeling purposes. The NCTCOG values were based upon the principles presented in the Highway Capacity Manual with "regional calibration" factors applied. Though these per-lane capacities, or "Service Volumes" (summarized in the table below), are intended for modeling purposes, they do provide a reasonable gauge of theoretical capacity.

| Area Type | Hourly Service Volumes Capacity per Lane by Area Type and Roadway Function |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Principal Arterial |  |  | $\begin{array}{c}\text { Minor Arterial \& } \\ \text { Frontage Road }\end{array}$ | $\begin{array}{c}\text { Collector \& } \\ \text { Local Street }\end{array}$ |  |
|  | $\begin{array}{c}\text { Median- } \\ \text { Divided or } \\ \text { One-Way }\end{array}$ |  | $\begin{array}{c}\text { Undivided } \\ \text { Two-Way }\end{array}$ | $\begin{array}{c}\text { Median- } \\ \text { Divided or } \\ \text { One-Way }\end{array}$ | $\begin{array}{c}\text { Undivided } \\ \text { Two-Way }\end{array}$ | $\begin{array}{c}\text { Median- } \\ \text { Divided or } \\ \text { One-Way }\end{array}$ |
| CBD | 725 | 650 | 725 | 650 | 475 | 425 |
| Two-Way |  |  |  |  |  |  |$]$

To determine the utilization of a roadway, the volume-to-capacity ratio is calculated - a $\mathrm{V} / \mathrm{C}$ ratio of less than 1.0 indicates that the roadway is operating under capacity. NCTCOG's level of service denominations is as follows.

```
Volume: Capacity Ratio \leq45% is LOS A/B
Volume: Capacity Ratio > 45% and \leq65% is LOS C
Volume: Capacity Ratio > 65% and < 80% is LOS D
Volume: Capacity Ratio > 80% and \leq 100% is LOS E
Volume: Capacity Ratio \geq100% is LOS F
```


## ROADWAY LINK ANALYSIS - RESULTS

For the purpose of the roadway link analysis, the area is considered Suburban Residential. Existing peak hour volumes, the growth rate factor, and peak hour projected site-generated trips were used to conduct the roadway link analysis which is summarized in Table 10.

Table 10. Roadway Link Capacity Analysis Results Summary

| Roadway |  | Classification for Analysis | *Hourly Volume | LANES | MEDIAN DIVIDED? | CAPACITY |  | V/C | LOS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Per Lane |  |  |  | Roadway |  |  |
| 2023 Existing: |  |  |  |  |  |  |  |  |  |
| FM 407 (Driveway 2 and CJ's Legacy Ranch Dr) | NB |  | Minor Arterial | 1,267 | 2 | Y | 975 | 1,950 | 0.65 | C |
|  | SB | 1,036 |  | 2 | 975 |  | 1,950 | 0.53 | C |
| 2024 Background: |  |  |  |  |  |  |  |  |  |
| FM 407 (Driveway 2 and CJ's Legacy Ranch Dr) | NB | Minor Arterial | 1,292 | 2 | Y | 975 | 1,950 | 0.66 | D |
|  | SB |  | 1,057 | 2 |  | 975 | 1,950 | 0.54 | C |
| 2024 Background+Site: Scenario 1 |  |  |  |  |  |  |  |  |  |
| FM 407 (Driveway 2 and CJ's Legacy Ranch Dr) | NB | Minor Arterial | 1,306 | 2 | Y | 975 | 1,950 | 0.67 | D |
|  | SB |  | 1,352 | 2 |  | 975 | 1,950 | 0.69 | D |
| 2024 Background+Site: Scenario 2 |  |  |  |  |  |  |  |  |  |
| FM 407 (Driveway 2 and CJ's Legacy Ranch Dr) | NB | Minor Arterial | 1,292 | 2 | Y | 975 | 1,950 | 0.66 | D |
|  | SB |  | 1,262 | 2 |  | 975 | 1,950 | 0.65 | C |
| 2029 Horizon: |  |  |  |  |  |  |  |  |  |
| FM 407 (Driveway 2 and CJ's Legacy Ranch Dr) | NB | Minor Arterial | 1,427 | 2 | Y | 975 | 1,950 | 0.73 | D |
|  | SB |  | 1,392 | 2 |  | 975 | 1,950 | 0.71 | D |
| 2029 Horizon+Site: Scenario 1 |  |  |  |  |  |  |  |  |  |
| FM 407 (Driveway 2 and CJ's Legacy Ranch Dr) | NB | Minor Arterial | 1,440 | 2 | Y | 975 | 1,950 | 0.74 | D |
|  | SB |  | 1,483 | 2 |  | 975 | 1,950 | 0.76 | D |
| 2029 Horizon+Site: Scenario 2 |  |  |  |  |  |  |  |  |  |
| FM 407 (Driveway 2 and CJ's Legacy Ranch Dr) | NB | Minor Arterial | 1,295 | 2 | Y | 975 | 1,950 | 0.66 | D |
|  | SB |  | 1,427 | 2 |  | 975 | 1,950 | 0.73 | D |

FINDING: Based upon the roadway link analysis, all roadway links are expected to operate at LOS $D$ or better for all different scenarios.

## SITE ACCESS REVIEW

The proposed development will have future access drives connection to the public/private roadway systems. As part of this TIA study, it has performed the proposed site access review based on appropriate agency requirements and guidelines. The Driveway Spacing, Deceleration Lane Requirements, and Intersection Sight Distance were evaluated as part of this site access review.

NOTE: The review of site access is reliant on the present state of the site and the preliminary site plan. In the event that any of these factors change, the site access review must be updated accordingly.

## DRIVEWAY SPACING REVIEW

## TXDOT DRIVEWAY SPACING CRITERIA:

The TxDOT Access Management Manual provides guidelines for new driveways along roadways based upon the posted speed limit. Based upon Tables 2-1, 2-2 (Appendix E) from TxDOT's Access Management Manual, the minimum driveway connection spacing is 425 feet for a speed limit equal to 50 mph , such as FM 407. TxDOT considers the spacing between access points as inside-edge- (of driveway pavement)-to inside-edge.

DRIVEWAY SPACING REVIEW FOR PROJECT:
A summary of the driveway spacing provided for each of the proposed site access points is presented in Table 11.

Table 11. Driveway Spacing Summary

| Spacing Between | Speed Limit <br> (MPH) | Required <br> (Ft) | Provided <br> (Ft) | Meets <br> Requirements |
| :--- | :---: | :---: | :---: | :---: |
| CJ Legacy Ranch Dr and <br> Driveway 2 | 50 | 425 | $\sim 425$ | Yes |
| Driveway 2 and 7-Eleven <br> Dr | 50 | 425 | $\sim 800$ | Yes |

FINDING: Based on TxDOT's driveway spacing guidelines and measurements from the preliminary site plan and Google Earth program, all the proposed site driveways satisfy the spacing criteria requirements.

## DECELERATION LANE ANALYSIS

## DECELERATION LANE REQUIREMENTS:

The TxDOT criteria for providing right-turn deceleration auxiliary lanes are outlined in Table 2-3 (Appendix E) of the Access Management Manual. The threshold for roadways with a posted speed limit greater than 45 MPH is 50 vehicles per hour (or, 60 vehicles per hour for a posted speed limit of 45 MPH or lower).

Table 12 summarizes the expected right-turn volumes at each driveway during peak hours. A summary of the projected peak hour driveway volumes is included in Appendix A for each scenario analyzed.

Table 12. Right-Turn Deceleration Lane Analysis
(full build at Scenario 1)

| Intersection | Traffic <br> Movement | Analysis Scenario | Turning <br> Vehicles <br> (VPH) | Exceeds <br> Requirements |
| :---: | :---: | :---: | :---: | :---: |
| CJ Legacy Ranch <br> Dr at FM 407 | SBR | 2024 Full Buildout + Site AM | 32 | No |
|  |  | 2024 Full Buildout + Site PM | 5 |  |
| Driveway 2 at FM <br> 407 | SBR | 2024 Full Buildout + Site AM | 55 | Ye |
|  | 2024 Full Buildout + Site PM | 6 |  |  |

FINDING: Based upon the projected volumes derived in this study and TxDOT's right-turn deceleration lane requirements, the installation of a right-turn deceleration lane is required at Driveway 2 at FM 407.

## LEFT TURN DECELERATION LANE REQUIREMENTS:

The TxDOT criteria for providing left-turn deceleration auxiliary lanes are outlined in Table 2-3 (Appendix E) of the Access Management Manual. The requirements state that;

1. For raised medians, left-turn deceleration lanes ("bays") are required for all left-turn opportunities.

FINDING: Based upon the projected volumes derived in this study and TxDOT's left-turn deceleration lane requirements, the installation of a left-turn deceleration lane is required at Driveway 2 at FM 407.

## INTERSECTION SIGHT DISTANCE REVIEW

## INTERSECTION SIGHT DISTANCE REVIEW FOR PROJECT

Table 13 provides the Intersection sight distance summary for this study.
Table 13. Intersection Sight Distance Summary

| Intersections | Speed <br> Limit <br> (MPH) | Line of Sight to the <br> Right ISD (Ft) |  | Line of Sight to the <br> Left ISD (Ft) | Meets <br> Requirements |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Required | Provided | Required | Provided |  |
| CJ Legacy Ranch Dr at <br> FM 407 | 50 | 480 | $>480$ | N/A | N/A | Yes |
| Driveway 2 at FM 407 | 50 | 480 | $>480$ | 555 | $>555$ | Yes |

FINDING: Based on the AASHTO and Town of Bartonville guidelines and measurements from the Google Earth program, the proposed site driveway meets the intersection sight distance requirements.

Disclaimer: However, if the site plans are developed further to include additional infrastructure such as fencing, walls, or landscaping in the vicinity of proposed driveways, intersection sight distances may need to be re-evaluated.

## END OF MEMO




## Appendix A. Traffic Volume Exhibits




Normn














## A11.1 $\mathbf{2 0 2 4}$ Horizon Plus Site Generated AM Peak Hour Traffic Volumes






## Appendix B. Existing Traffic Count Data

Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048589, Location: 33.085902, -97.131193
Provided by: C. J. Hensch \& Associates
Inc.
5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | Rayzor Road Westbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | R | T | U | App | Ped* | T | L | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 7:00AM | 4 | 71 | 0 | 75 | 0 | 184 | 16 | 0 | 200 | 0 | 5 | 4 | 0 | 9 | 0 | 284 |
| 7:15AM | 6 | 117 | 0 | 123 | 0 | 217 | 22 | 0 | 239 | 0 | 37 | 17 | 0 | 54 | 0 | 416 |
| 7:30AM | 1 | 143 | 0 | 144 | 0 | 280 | 22 | 1 | 303 | 0 | 73 | 18 | 0 | 91 | 0 | 538 |
| 7:45AM | 3 | 185 | 0 | 188 | 0 | 308 | 9 | 3 | 320 | 0 | 20 | 6 | 0 | 26 | 0 | 534 |
| Hourly Total | 14 | 516 | 0 | 530 | 0 | 989 | 69 | 4 | 1062 | 0 | 135 | 45 | 0 | 180 | 0 | 1772 |
| 8:00AM | 3 | 199 | 0 | 202 | 0 | 307 | 10 | 0 | 317 | 0 | 16 | 1 | 0 | 17 | 0 | 536 |
| 8:15AM | 3 | 162 | 0 | 165 | 0 | 292 | 9 | 0 | 301 | 0 | 11 | 5 | 0 | 16 | 0 | 482 |
| 8:30AM | 1 | 163 | 0 | 164 | 0 | 336 | 9 | 2 | 347 | 0 | 6 | 2 | 0 | 8 | 0 | 519 |
| 8:45AM | 4 | 145 | 0 | 149 | 0 | 264 | 5 | 1 | 270 | 0 | 15 | 3 | 0 | 18 | 1 | 437 |
| Hourly Total | 11 | 669 | 0 | 680 | 0 | 1199 | 33 | 3 | 1235 | 0 | 48 | 11 | 0 | 59 | 1 | 1974 |
| 3:00PM | 3 | 219 | 0 | 222 | 0 | 194 | 14 | 3 | 211 | 0 | 55 | 8 | 0 | 63 | 0 | 496 |
| 3:15PM | 3 | 240 | 0 | 243 | 0 | 239 | 10 | 2 | 251 | 0 | 9 | 5 | 0 | 14 | 0 | 508 |
| 3:30PM | 9 | 234 | 0 | 243 | 0 | 190 | 13 | 1 | 204 | 0 | 18 | 0 | 0 | 18 | 0 | 465 |
| 3:45PM | 9 | 247 | 0 | 256 | 0 | 212 | 5 | 3 | 220 | 0 | 11 | 4 | 0 | 15 | 0 | 491 |
| Hourly Total | 24 | 940 | 0 | 964 | 0 | 835 | 42 | 9 | 886 | 0 | 93 | 17 | 0 | 110 | 0 | 1960 |
| 4:00PM | 6 | 237 | 0 | 243 | 0 | 207 | 17 | 4 | 228 | 0 | 15 | 1 | 0 | 16 | 0 | 487 |
| 4:15PM | 9 | 249 | 0 | 258 | 0 | 242 | 9 | 3 | 254 | 0 | 12 | 5 | 0 | 17 | 0 | 529 |
| 4:30PM | 9 | 278 | 0 | 287 | 0 | 257 | 14 | 1 | 272 | 0 | 9 | 3 | 0 | 12 | 0 | 571 |
| 4:45PM | 10 | 313 | 0 | 323 | 0 | 254 | 13 | 2 | 269 | 0 | 14 | 5 | 0 | 19 | 0 | 611 |
| Hourly Total | 34 | 1077 | 0 | 1111 | 0 | 960 | 53 | 10 | 1023 | 0 | 50 | 14 | 0 | 64 | 0 | 2198 |
| 5:00PM | 8 | 289 | 0 | 297 | 0 | 239 | 8 | 2 | 249 | 0 | 17 | 6 | 0 | 23 | 0 | 569 |
| 5:15PM | 18 | 312 | 0 | 330 | 0 | 251 | 16 | 4 | 271 | 0 | 20 | 7 | 0 | 27 | 0 | 628 |
| 5:30PM | 12 | 259 | 0 | 271 | 0 | 239 | 15 | 1 | 255 | 0 | 21 | 5 | 0 | 26 | 0 | 552 |
| 5:45PM | 13 | 288 | 0 | 301 | 0 | 217 | 11 | 0 | 228 | 0 | 9 | 4 | 0 | 13 | 0 | 542 |
| Hourly Total | 51 | 1148 | 0 | 1199 | 0 | 946 | 50 | 7 | 1003 | 0 | 67 | 22 | 0 | 89 | 0 | 2291 |
| Total | 134 | 4350 | 0 | 4484 | 0 | 4929 | 247 | 33 | 5209 | 0 | 393 | 109 | 0 | 502 | 1 | 10195 |
| \% Approach | 3.0\% | 97.0\% | 0\% | - | - | 94.6\% | 4.7\% | 0.6\% | - | - | 78.3\% | 21.7\% | 0\% | - | - | - |
| \% Total | 1.3\% | 42.7\% | 0\% | 44.0\% | - | 48.3\% | 2.4\% | 0.3\% | 51.1\% | - | 3.9\% | 1.1\% | 0\% | 4.9\% | - | - |
| Lights | 132 | 4300 | 0 | 4432 | - | 4866 | 243 | 33 | 5142 | - | 392 | 105 | 0 | 497 | - | 10071 |
| \% Lights | 98.5\% | 98.9\% | 0\% | 98.8\% | - | 98.7\% | 98.4\% | 100\% | 98.7\% | - | 99.7\% | 96.3\% | 0\% | 99.0\% | - | 98.8\% |
| Articulated Trucks | 0 | 9 | 0 | 9 | - | 15 | 0 | 0 | 15 | - | 0 | 1 | 0 | 1 | - | 25 |
| \% Articulated Trucks | 0\% | 0.2\% | 0\% | 0.2\% | - | 0.3\% | 0\% | 0\% | 0.3\% | - | 0\% | 0.9\% | 0\% | 0.2\% | - | 0.2\% |
| Buses and Single-Unit Trucks | 2 | 41 | 0 | 43 | - | 48 | 4 | 0 | 52 | - | 1 | 3 | 0 | 4 | - | 99 |
| \% Buses and Single-Unit Trucks | 1.5\% | 0.9\% | 0\% | 1.0\% | - | 1.0\% | 1.6\% | 0\% | 1.0\% | - | 0.3\% | 2.8\% | 0\% | 0.8\% | - | 1.0\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 1 |  |
| \% Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 100\% | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0\% | - |

[^1]

Provided by: C. J. Hensch \& Associates

## Inc.

5215 Sycamore Ave., Pasadena, TX, 77503, US
[N] FM 407
Total: 9985
In: $5209 \quad$ Out: 4776
$\begin{array}{ll}\text { N} & \text { స̀ } \\ \underset{\sim}{\text { N m }}\end{array}$


Out: $5038 \quad$ In: 4484
Total: 9522
[S] FM 407

1. FM 407 at Rayzor Road - TMC

Thu Mar 23, 2023
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)

Provided by: C. J. Hensch \& Associates

## Inc.

5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | Rayzor Road Westbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | R | T | U | App | Ped* | T | L | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 7:30AM | 1 | 143 | 0 | 144 | 0 | 280 | 22 | 1 | 303 | 0 | 73 | 18 | 0 | 91 | 0 | 538 |
| 7:45AM | 3 | 185 | 0 | 188 | 0 | 308 | 9 | 3 | 320 | 0 | 20 | 6 | 0 | 26 | 0 | 534 |
| 8:00AM | 3 | 199 | 0 | 202 | 0 | 307 | 10 | 0 | 317 | 0 | 16 | 1 | 0 | 17 | 0 | 536 |
| 8:15AM | 3 | 162 | 0 | 165 | 0 | 292 | 9 | 0 | 301 | 0 | 11 | 5 | 0 | 16 | 0 | 482 |
| Total | 10 | 689 | 0 | 699 | 0 | 1187 | 50 | 4 | 1241 | 0 | 120 | 30 | 0 | 150 | 0 | 2090 |
| \% Approach | 1.4\% | 98.6\% | 0\% | - | - | 95.6\% | 4.0\% | 0.3\% | - | - | 80.0\% | 20.0\% | 0\% | - | - | - |
| \% Total | 0.5\% | 33.0\% | 0\% | 33.4\% | - | 56.8\% | 2.4\% | 0.2\% | 59.4\% | - | 5.7\% | 1.4\% | 0\% | 7.2\% | - | - |
| PHF | 0.833 | 0.866 | - | 0.865 | - | 0.963 | 0.568 | 0.333 | 0.970 | - | 0.411 | 0.417 | - | 0.412 | - | 0.971 |
| Lights | 10 | 670 | 0 | 680 | - | 1175 | 49 | 4 | 1228 | - | 120 | 30 | 0 | 150 | - | 2058 |
| \% Lights | 100\% | 97.2\% | 0\% | 97.3\% | - | 99.0\% | 98.0\% | 100\% | 99.0\% | - | 100\% | 100\% | 0\% | 100\% | - | 98.5\% |
| Articulated Trucks | 0 | 4 | 0 | 4 | - | 3 | 0 | 0 | 3 | - | 0 | 0 | 0 | 0 | - | 7 |
| \% Articulated Trucks | 0\% | 0.6\% | 0\% | 0.6\% | - | 0.3\% | 0\% | 0\% | 0.2\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.3\% |
| Buses and Single-Unit Trucks | 0 | 15 | 0 | 15 | - | 9 | 1 | 0 | 10 | - | 0 | 0 | 0 | 0 | - | 25 |
| \% Buses and Single-Unit Trucks | 0\% | 2.2\% | 0\% | 2.1\% | - | 0.8\% | 2.0\% | 0\% | 0.8\% | - | 0\% | 0\% | 0\% | 0\% | - | 1.2\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - | - - | - | - | - | - | - | - | - | - | - | - |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048589, Location: 33.085902, -97.131193
[N] FM 407
Total: 2054
In: 1241 Out: 813



Out: 1217 In: 699
Total: 1916
[S] FM 407

1. FM 407 at Rayzor Road - TMC

Thu Mar 23, 2023
PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048589, Location: 33.085902, -97.131193

|  | Item E1. |
| :--- | :--- |
| CJ Henscinc. |  |

Provided by: C. J. Hensch \& Associates
Inc.
5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | Rayzor Road Westbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | R | T | U | App | Ped* | T | L | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 4:30PM | 9 | 278 | 0 | 287 | 0 | 257 | 14 | 1 | 272 | 0 | 9 | 3 | 0 | 12 | 0 | 571 |
| 4:45PM | 10 | 313 | 0 | 323 | 0 | 254 | 13 | 2 | 269 | 0 | 14 | 5 | 0 | 19 | 0 | 611 |
| 5:00PM | 8 | 289 | 0 | 297 | 0 | 239 | 8 | 2 | 249 | 0 | 17 | 6 | 0 | 23 | 0 | 569 |
| 5:15PM | 18 | 312 | 0 | 330 | 0 | 251 | 16 | 4 | 271 | 0 | 20 | 7 | 0 | 27 | 0 | 628 |
| Total | 45 | 1192 | 0 | 1237 | 0 | 1001 | 51 | 9 | 1061 | 0 | 60 | 21 | 0 | 81 | 0 | 2379 |
| \% Approach | 3.6\% | 96.4\% | 0\% | - | - | 94.3\% | 4.8\% | 0.8\% | - | - | 74.1\% | 25.9\% | 0\% | - | - | - |
| \% Total | 1.9\% | 50.1\% | 0\% | 52.0\% | - | 42.1\% | 2.1\% | 0.4\% | 44.6\% | - | 2.5\% | 0.9\% | 0\% | 3.4\% | - | - |
| PHF | 0.625 | 0.952 | - | 0.937 | - | 0.974 | 0.797 | 0.563 | 0.975 | - | 0.750 | 0.750 | - | 0.750 | - | 0.947 |
| Lights | 45 | 1186 | 0 | 1231 | - | 990 | 51 | 9 | 1050 | - | 60 | 21 | 0 | 81 | - | 2362 |
| \% Lights | 100\% | 99.5\% | 0\% | 99.5\% | - | 98.9\% | 100\% | 100\% | 99.0\% | - | 100\% | 100\% | 0\% | 100\% | - | 99.3\% |
| Articulated Trucks | 0 | 3 | 0 | 3 | - | 4 | 0 | 0 | 4 | - | 0 | 0 | 0 | 0 | - | 7 |
| \% Articulated Trucks | 0\% | 0.3\% | 0\% | 0.2\% | - | 0.4\% | 0\% | 0\% | 0.4\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.3\% |
| Buses and Single-Unit Trucks | 0 | 3 | 0 | 3 | - | 7 | 0 | 0 | 7 | - | 0 | 0 | 0 | 0 | - | 10 |
| \% Buses and Single-Unit Trucks | 0\% | 0.3\% | 0\% | 0.2\% | - | 0.7\% | 0\% | 0\% | 0.7\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.4\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

PM Peak (4:30 PM - 5:30 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048589, Location: 33.085902, -97.131193

Provided by: C. J. Hensch \& Associates
5215 Sycamore Ave., Pasadena, TX, 77503, US
[N] FM 407
Total: 2322
In: 1061 Out: 1261
$\stackrel{7}{\circ}$ -


Out: 1022 In: 1237
Total: 2259
[S] FM 407

Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048590, Location: 33.086445, -97.131205

| Leg Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | CJ Legacy Ranch Drive Eastbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | T | L | U | App | Ped* | R | T | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 7:00AM | 90 | 0 | 0 | 90 | 0 | 0 | 183 | 0 | 183 | 0 | 0 | 0 | 0 | 0 | 0 | 273 |
| 7:15AM | 132 | 0 | 0 | 132 | 0 | 0 | 238 | 0 | 238 | 0 | 0 | 0 | 0 | 0 | 0 | 370 |
| 7:30AM | 244 | 0 | 0 | 244 | 0 | 0 | 309 | 0 | 309 | 0 | 0 | 0 | 0 | 0 | 0 | 553 |
| 7:45AM | 188 | 0 | 0 | 188 | 0 | 0 | 316 | 0 | 316 | 0 | 1 | 0 | 0 | 1 | 0 | 505 |
| Hourly Total | 654 | 0 | 0 | 654 | 0 | 0 | 1046 | 0 | 1046 | 0 | 1 | 0 | 0 | 1 | 0 | 1701 |
| 8:00AM | 215 | 0 | 0 | 215 | 0 | 0 | 316 | 0 | 316 | 0 | 0 | 0 | 0 | 0 | 0 | 531 |
| 8:15AM | 180 | 0 | 0 | 180 | 0 | 0 | 295 | 0 | 295 | 0 | 0 | 0 | 0 | 0 | 0 | 475 |
| 8:30AM | 171 | 0 | 0 | 171 | 0 | 0 | 331 | 0 | 331 | 0 | 0 | 0 | 0 | 0 | 0 | 502 |
| 8:45AM | 160 | 0 | 0 | 160 | 0 | 1 | 277 | 0 | 278 | 0 | 0 | 0 | 0 | 0 | 0 | 438 |
| Hourly Total | 726 | 0 | 0 | 726 | 0 | 1 | 1219 | 0 | 1220 | 0 | 0 | 0 | 0 | 0 | 0 | 1946 |
| 3:00PM | 262 | 0 | 0 | 262 | 0 | 0 | 201 | 0 | 201 | 0 | 1 | 0 | 0 | 1 | 0 | 464 |
| 3:15PM | 252 | 0 | 0 | 252 | 0 | 0 | 253 | 0 | 253 | 0 | 1 | 0 | 0 | 1 | 0 | 506 |
| 3:30PM | 259 | 0 | 0 | 259 | 0 | 0 | 190 | 0 | 190 | 0 | 0 | 0 | 0 | 0 | 0 | 449 |
| 3:45PM | 265 | 0 | 0 | 265 | 0 | 3 | 227 | 0 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | 495 |
| Hourly Total | 1038 | 0 | 0 | 1038 | 0 | 3 | 871 | 0 | 874 | 0 | 2 | 0 | 0 | 2 | 0 | 1914 |
| 4:00PM | 262 | 0 | 0 | 262 | 0 | 0 | 218 | 0 | 218 | 0 | 2 | 0 | 0 | 2 | 0 | 482 |
| 4:15PM | 255 | 0 | 0 | 255 | 0 | 1 | 250 | 0 | 251 | 0 | 0 | 0 | 0 | 0 | 0 | 506 |
| 4:30PM | 289 | 0 | 0 | 289 | 0 | 0 | 287 | 0 | 287 | 0 | 0 | 0 | 0 | 0 | 0 | 576 |
| 4:45PM | 331 | 0 | 0 | 331 | 0 | 2 | 244 | 0 | 246 | 0 | 1 | 0 | 0 | 1 | 0 | 578 |
| Hourly Total | 1137 | 0 | 0 | 1137 | 0 | 3 | 999 | 0 | 1002 | 0 | 3 | 0 | 0 | 3 | 0 | 2142 |
| 5:00PM | 309 | 0 | 0 | 309 | 0 | 0 | 255 | 0 | 255 | 0 | 1 | 0 | 0 | 1 | 0 | 565 |
| 5:15PM | 316 | 0 | 0 | 316 | 0 | 0 | 267 | 0 | 267 | 0 | 0 | 0 | 0 | 0 | 0 | 583 |
| 5:30PM | 311 | 0 | 0 | 311 | 0 | 0 | 268 | 0 | 268 | 0 | 0 | 0 | 0 | 0 | 0 | 579 |
| 5:45PM | 285 | 0 | 0 | 285 | 0 | 0 | 219 | 0 | 219 | 0 | 0 | 0 | 0 | 0 | 0 | 504 |
| Hourly Total | 1221 | 0 | 0 | 1221 | 0 | 0 | 1009 | 0 | 1009 | 0 | 1 | 0 | 0 | 1 | 0 | 2231 |
| Total | 4776 | 0 | 0 | 4776 | 0 | 7 | 5144 | 0 | 5151 | 0 | 7 | 0 | 0 | 7 | 0 | 9934 |
| \% Approach | 100\% | 0\% | 0\% | - |  | 0.1\% | 99.9\% | 0\% | - |  | 100\% | 0\% | 0\% | - |  |  |
| \% Total | 48.1\% | 0\% | 0\% | 48.1\% | - | 0.1\% | 51.8\% | 0\% | 51.9\% | - | 0.1\% | 0\% | 0\% | 0.1\% |  |  |
| Lights | 4718 | 0 | 0 | 4718 |  | 7 | 5095 | 0 | 5102 |  | 7 | 0 | 0 | 7 |  | 9827 |
| \% Lights | 98.8\% | 0\% | 0\% | 98.8\% |  | 100\% | 99.0\% | 0\% | 99.0\% |  | 100\% | 0\% | 0\% | 100\% |  | 98.9\% |
| Articulated Trucks | 9 | 0 | 0 | 9 | - | 0 | 13 | 0 | 13 | - | 0 | 0 | 0 | 0 |  | 22 |
| \% Articulated Trucks | 0.2\% | 0\% | 0\% | 0.2\% | - | 0\% | 0.3\% | 0\% | 0.3\% | - | 0\% | 0\% | 0\% | 0\% |  | 0.2\% |
| Buses and Single-Unit Trucks | 49 | 0 | 0 | 49 | - | 0 | 36 | 0 | 36 | - | 0 | 0 | 0 | 0 |  | 85 |
| \% Buses and Single-Unit Trucks | 1.0\% | 0\% | 0\% | 1.0\% | - | 0\% | 0.7\% | 0\% | 0.7\% | - | 0\% | 0\% | 0\% | 0\% |  | 0.9\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - |  | - | - | - | - |  | - | - | - | - |  |  |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - |  | - | - | - | - |  | - | - | - | - |  |  |

[^2]Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048590, Location: 33.086445, -97.131205


Provided by: C. J. Hensch \& Associates

## Inc.

5215 Sycamore Ave., Pasadena, TX, 77503, US
[N] FM 407
Total: 9927
In: 5151 Out: 4776
~ $\underset{\substack{\text { - } \\ \text { - } \\ \hline}}{ }$


Out: 5151 In: 4776
Total: 9927
[S] FM 407

Thu Mar 23, 2023
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048590, Location: 33.086445, -97.131205
CJ Hensuñ.
Associates.
Anc.
Provided by: C. J. Hensch \& Associates

## Inc.

5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Northboun |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | CJ Legacy Ranch Drive Eastbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | T | L | U | App | Ped* | R | T | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 7:30AM | 244 | 0 | 0 | 244 | 0 | 0 | 309 | 0 | 309 | 0 | 0 | 0 | 0 | 0 | 0 | 553 |
| 7:45AM | 188 | 0 | 0 | 188 | 0 | 0 | 316 | 0 | 316 | 0 | 1 | 0 | 0 | 1 | 0 | 505 |
| 8:00AM | 215 | 0 | 0 | 215 | 0 | 0 | 316 | 0 | 316 | 0 | 0 | 0 | 0 | 0 | 0 | 531 |
| 8:15AM | 180 | 0 | 0 | 180 | 0 | 0 | 295 | 0 | 295 | 0 | 0 | 0 | 0 | 0 | 0 | 475 |
| Total | 827 | 0 | 0 | 827 | 0 | 0 | 1236 | 0 | 1236 | 0 | 1 | 0 | 0 | 1 | 0 | 2064 |
| \% Approach | 100\% | 0\% | 0\% | - | - | 0\% | 100\% | 0\% | - | - | 100\% | 0\% | 0\% | - | - | - |
| \% Total | 40.1\% | 0\% | 0\% | 40.1\% | - | 0\% | 59.9\% | 0\% | 59.9\% | - | 0\% | 0\% | 0\% | 0\% | - | - |
| PHF | 0.847 | - | - | 0.847 | - | - | 0.978 | - | 0.978 | - | 0.250 | - | - | 0.250 | - | 0.933 |
| Lights | 807 | 0 | 0 | 807 | - | 0 | 1225 | 0 | 1225 | - | 1 | 0 | 0 | 1 | - | 2033 |
| \% Lights | 97.6\% | 0\% | 0\% | 97.6\% | - | 0\% | 99.1\% | 0\% | 99.1\% | - | 100\% | 0\% | 0\% | 100\% | - | 98.5\% |
| Articulated Trucks | 2 | 0 | 0 | 2 | - | 0 | 2 | 0 | 2 | - | 0 | 0 | 0 | 0 | - | 4 |
| \% Articulated Trucks | 0.2\% | 0\% | 0\% | 0.2\% | - | 0\% | 0.2\% | 0\% | 0.2\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.2\% |
| Buses and Single-Unit Trucks | 18 | 0 | 0 | 18 | - | 0 | 9 | 0 | 9 | - | 0 | 0 | 0 | 0 | - | 27 |
| \% Buses and Single-Unit Trucks | 2.2\% | 0\% | 0\% | 2.2\% | - | 0\% | 0.7\% | 0\% | 0.7\% | - | 0\% | 0\% | 0\% | 0\% | - | 1.3\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn
2. FM 407 at CJ Legacy Ranch Drive - TMC

Thu Mar 23, 2023
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048590, Location: 33.086445, -97.131205


Provided by: C. J. Hensch \& Associates

## Inc.

5215 Sycamore Ave., Pasadena, TX, 77503, US
[N] FM 407
Total: 2063
In: 1236 Out: 827
$\underset{\underset{\sim}{\sim}}{\underset{\sim}{N}}$


Out: 1237 In: 827
Total: 2064
[S] FM 407

Thu Mar 23, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048590, Location: 33.086445, -97.131205

CJ Hensuñ.
Associates.
Anc.
Provided by: C. J. Hensch \& Associates

## Inc.

5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | CJ Legacy Ranch Drive Eastbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | T | L | U | App | Ped* | R | T | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 4:45PM | 331 | 0 | 0 | 331 | 0 | 2 | 244 | 0 | 246 | 0 | 1 | 0 | 0 | 1 | 0 | 578 |
| 5:00PM | 309 | 0 | 0 | 309 | 0 | 0 | 255 | 0 | 255 | 0 | 1 | 0 | 0 | 1 | 0 | 565 |
| 5:15PM | 316 | 0 | 0 | 316 | 0 | 0 | 267 | 0 | 267 | 0 | 0 | 0 | 0 | 0 | 0 | 583 |
| 5:30PM | 311 | 0 | 0 | 311 | 0 | 0 | 268 | 0 | 268 | 0 | 0 | 0 | 0 | 0 | 0 | 579 |
| Total | 1267 | 0 | 0 | 1267 | 0 | 2 | 1034 | 0 | 1036 | 0 | 2 | 0 | 0 | 2 | 0 | 2305 |
| \% Approach | 100\% | 0\% | 0\% | - | - | 0.2\% | 99.8\% | 0\% | - | - | 100\% | 0\% | 0\% | - | - | - |
| \% Total | 55.0\% | 0\% | 0\% | 55.0\% | - | 0.1\% | 44.9\% | 0\% | 44.9\% | - | 0.1\% | 0\% | 0\% | 0.1\% | - | - |
| PHF | 0.957 | - | - | 0.957 | - | 0.250 | 0.965 | - | 0.966 | - | 0.500 | - | - | 0.500 | - | 0.988 |
| Lights | 1262 | 0 | 0 | 1262 | - | 2 | 1025 | 0 | 1027 | - | 2 | 0 | 0 | 2 | - | 2291 |
| \% Lights | 99.6\% | 0\% | 0\% | 99.6\% | - | 100\% | 99.1\% | 0\% | 99.1\% | - | 100\% | 0\% | 0\% | 100\% | - | 99.4\% |
| Articulated Trucks | 1 | 0 | 0 | 1 | - | 0 | 3 | 0 | 3 | - | 0 | 0 | 0 | 0 | - | 4 |
| \% Articulated Trucks | 0.1\% | 0\% | 0\% | 0.1\% | - | 0\% | 0.3\% | 0\% | 0.3\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.2\% |
| Buses and Single-Unit Trucks | 4 | 0 | 0 | 4 | - | 0 | 6 | 0 | 6 | - | 0 | 0 | 0 | 0 | - | 10 |
| \% Buses and Single-Unit Trucks | 0.3\% | 0\% | 0\% | 0.3\% | - | 0\% | 0.6\% | 0\% | 0.6\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.4\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048590, Location: 33.086445, -97.131205

Provided by: C. J. Hensch \& Associates
[N] FM 407
Total: 2303
In: 1036 Out: 1267
$\cdots \quad \begin{gathered}\stackrel{\rightharpoonup}{\mathrm{M}} \\ \underset{\sim}{\mathrm{H}}\end{gathered}$


Out: 1036
In: 1267
Total: 2303
[S] FM 407

## 3. FM 407 at IT Neely Drive - TMC

Thu Mar 23, 2023
Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048591, Location: 33.090544, -97.131222


Provided by: C. J. Hensch \& Associates Pasadena, TX, 77503, US

| Leg Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | IT Neely Drive Eastbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | T | L | U | App | Ped* | R | T | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 7:00AM | 85 | 3 | 0 | 88 | 0 | 5 | 196 | 0 | 201 | 0 | 0 | 3 | 0 | 3 | 0 | 292 |
| 7:15AM | 133 | 6 | 0 | 139 | 0 | 12 | 226 | 0 | 238 | 0 | 2 | 2 | 0 | 4 | 0 | 381 |
| 7:30AM | 229 | 10 | 0 | 239 | 0 | 11 | 304 | 0 | 315 | 0 | 0 | 6 | 0 | 6 | 0 | 560 |
| 7:45AM | 191 | 12 | 0 | 203 | 0 | 10 | 307 | 0 | 317 | 0 | 3 | 6 | 0 | 9 | 0 | 529 |
| Hourly Total | 638 | 31 | 0 | 669 | 0 | 38 | 1033 | 0 | 1071 | 0 | 5 | 17 | 0 | 22 | 0 | 1762 |
| 8:00AM | 194 | 14 | 0 | 208 | 0 | 7 | 312 | 0 | 319 | 0 | 2 | 12 | 0 | 14 | 0 | 541 |
| 8:15AM | 168 | 11 | 0 | 179 | 0 | 11 | 292 | 0 | 303 | 0 | 4 | 4 | 0 | 8 | 0 | 490 |
| 8:30AM | 169 | 8 | 0 | 177 | 0 | 9 | 329 | 0 | 338 | 0 | 2 | 7 | 0 | 9 | 0 | 524 |
| 8:45AM | 146 | 8 | 0 | 154 | 0 | 6 | 265 | 1 | 272 | 0 | 1 | 5 | 0 | 6 | 0 | 432 |
| Hourly Total | 677 | 41 | 0 | 718 | 0 | 33 | 1198 | 1 | 1232 | 0 | 9 | 28 | 0 | 37 | 0 | 1987 |
| 3:00PM | 252 | 12 | 0 | 264 | 0 | 13 | 198 | 1 | 212 | 0 | 9 | 2 | 0 | 11 | 0 | 487 |
| 3:15PM | 241 | 12 | 0 | 253 | 0 | 18 | 227 | 1 | 246 | 0 | 7 | 5 | 0 | 12 | 0 | 511 |
| 3:30PM | 255 | 17 | 1 | 273 | 0 | 11 | 182 | 0 | 193 | 0 | 6 | 4 | 0 | 10 | 0 | 476 |
| 3:45PM | 246 | 17 | 1 | 264 | 0 | 8 | 223 | 0 | 231 | 0 | 4 | 7 | 0 | 11 | 0 | 506 |
| Hourly Total | 994 | 58 | 2 | 1054 | 0 | 50 | 830 | 2 | 882 | 0 | 26 | 18 | 0 | 44 | 0 | 1980 |
| 4:00PM | 234 | 12 | 0 | 246 | 0 | 9 | 210 | 1 | 220 | 0 | 3 | 6 | 0 | 9 | 0 | 475 |
| 4:15PM | 250 | 11 | 0 | 261 | 0 | 13 | 233 | 3 | 249 | 0 | 8 | 2 | 0 | 10 | 0 | 520 |
| 4:30PM | 261 | 14 | 0 | 275 | 0 | 16 | 251 | 2 | 269 | 0 | 11 | 8 | 0 | 19 | 0 | 563 |
| 4:45PM | 324 | 14 | 1 | 339 | 0 | 15 | 249 | 0 | 264 | 0 | 5 | 4 | 0 | 9 | 0 | 612 |
| Hourly Total | 1069 | 51 | 1 | 1121 | 0 | 53 | 943 | 6 | 1002 | 0 | 27 | 20 | 0 | 47 | 0 | 2170 |
| 5:00PM | 293 | 11 | 0 | 304 | 0 | 17 | 234 | 0 | 251 | 0 | 6 | 6 | 0 | 12 | 0 | 567 |
| 5:15PM | 311 | 10 | 0 | 321 | 0 | 20 | 266 | 1 | 287 | 0 | 4 | 8 | 0 | 12 | 0 | 620 |
| 5:30PM | 265 | 30 | 0 | 295 | 0 | 10 | 253 | 0 | 263 | 0 | 2 | 5 | 0 | 7 | 0 | 565 |
| 5:45PM | 267 | 16 | 0 | 283 | 0 | 9 | 209 | 3 | 221 | 0 | 8 | 11 | 0 | 19 | 0 | 523 |
| Hourly Total | 1136 | 67 | 0 | 1203 | 0 | 56 | 962 | 4 | 1022 | 0 | 20 | 30 | 0 | 50 | 0 | 2275 |
| Total | 4514 | 248 | 3 | 4765 | 0 | 230 | 4966 | 13 | 5209 | - | 87 | 113 | 0 | 200 | 0 | 10174 |
| \% Approach | 94.7\% | 5.2\% | 0.1\% | - |  | 4.4\% | 95.3\% | 0.2\% | - |  | 43.5\% | 56.5\% | 0\% | - |  |  |
| \% Total | 44.4\% | 2.4\% | 0\% | 46.8\% |  | 2.3\% | 48.8\% | 0.1\% | 51.2\% |  | 0.9\% | 1.1\% | 0\% | 2.0\% |  |  |
| Lights | 4466 | 246 | 3 | 4715 |  | 227 | 4901 | 11 | 5139 |  | 86 | 111 | 0 | 197 |  | 10051 |
| \% Lights | 98.9\% | 99.2\% | 100\% | 99.0\% |  | 98.7\% | 98.7\% | 84.6\% | 98.7\% |  | 98.9\% | 98.2\% | 0\% | 98.5\% |  | 98.8\% |
| Articulated Trucks | 13 | 1 | 0 | 14 |  | 1 | 15 | 0 | 16 |  | 0 | 1 | 0 | 1 |  | 31 |
| \% Articulated Trucks | 0.3\% | 0.4\% | 0\% | 0.3\% |  | 0.4\% | 0.3\% | 0\% | 0.3\% |  | 0\% | 0.9\% | 0\% | 0.5\% |  | 0.3\% |
| Buses and Single-Unit Trucks | 35 | 1 | 0 | 36 |  | 2 | 50 | 2 | 54 |  | 1 | 1 | 0 | 2 |  | 92 |
| \% Buses and Single-Unit Trucks | 0.8\% | 0.4\% | 0\% | 0.8\% |  | 0.9\% | 1.0\% | 15.4\% | 1.0\% |  | 1.1\% | 0.9\% | 0\% | 1.0\% |  | 0.9\% |
| Pedestrians |  | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians |  | - | - | - |  | - | - | - | - |  | - | - | - | - |  |  |
| Bicycles on Crosswalk |  | - | - | - |  | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - |  | - | - | - | - |  | - | - | - | - |  |  |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048591, Location: 33.090544, -97.131222

Provided by: C. J. Hensch \& Associates
[N] FM 407
Total: 9849
In: 5209 Out: 4640


Out: 5056 In: 4765
Total: 9821
[S] FM 407

Thu Mar 23, 2023
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)

CJ Hensuñ.
Associates.
Anc.
Provided by: C. J. Hensch \& Associates

## Inc.

All Movements
ID: 1048591, Location: 33.090544, -97.131222
5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | IT Neely Drive Eastbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | T | L |  | App | Ped* | R | T | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 7:30AM | 229 | 10 | 0 | 239 | 0 | 11 | 304 | 0 | 315 | 0 | 0 | 6 | 0 | 6 | 0 | 560 |
| 7:45AM | 191 | 12 | 0 | 203 | 0 | 10 | 307 | 0 | 317 | 0 | 3 | 6 | 0 | 9 | 0 | 529 |
| 8:00AM | 194 | 14 | 0 | 208 | 0 | 7 | 312 | 0 | 319 | 0 | 2 | 12 | 0 | 14 | 0 | 541 |
| 8:15AM | 168 | 11 | 0 | 179 | 0 | 11 | 292 | 0 | 303 | 0 | 4 | 4 | 0 | 8 | 0 | 490 |
| Total | 782 | 47 | 0 | 829 | 0 | 39 | 1215 | 0 | 1254 | 0 | 9 | 28 | 0 | 37 | 0 | 2120 |
| \% Approach | 94.3\% | 5.7\% | 0\% | - | - | 3.1\% | 96.9\% | 0\% | - | - | 24.3\% | 75.7\% | 0\% | - | - | - |
| \% Total | 36.9\% | 2.2\% | 0\% | 39.1\% | - | 1.8\% | 57.3\% | 0\% | 59.2\% | - | 0.4\% | 1.3\% | 0\% | 1.7\% | - | - |
| PHF | 0.854 | 0.839 | - | 0.867 | - | 0.886 | 0.974 | - | 0.983 | - | 0.563 | 0.583 | - | 0.661 | - | 0.946 |
| Lights | 766 | 46 | 0 | 812 | - | 39 | 1203 | 0 | 1242 | - | 9 | 27 | 0 | 36 | - | 2090 |
| \% Lights | 98.0\% | 97.9\% | 0\% | 97.9\% | - | 100\% | 99.0\% | 0\% | 99.0\% | - | 100\% | 96.4\% | 0\% | 97.3\% | - | 98.6\% |
| Articulated Trucks | 2 | 1 | 0 | 3 | - | 0 | 3 | 0 | 3 | - | 0 | 1 | 0 | 1 | - | 7 |
| \% Articulated Trucks | 0.3\% | 2.1\% | 0\% | 0.4\% | - | 0\% | 0.2\% | 0\% | 0.2\% | - | 0\% | 3.6\% | 0\% | 2.7\% | - | 0.3\% |
| Buses and Single-Unit Trucks | 14 | 0 | 0 | 14 | - | 0 | 9 | 0 | 9 | - | 0 | 0 | 0 | 0 | - | 23 |
| \% Buses and Single-Unit Trucks | 1.8\% | 0\% | 0\% | 1.7\% | - | 0\% | 0.7\% | 0\% | 0.7\% | - | 0\% | 0\% | 0\% | 0\% | - | 1.1\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

Provided by: C. J. Hensch \& Associates
[N] FM 407
Total: 2064
In: $1254 \quad$ Out: 810
m $\stackrel{\text { n }}{\text { n }}$


Out: $1224 \quad$ In: 829
Total: 2053
[S] FM 407

Thu Mar 23, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048591, Location: 33.090544, -97.131222

CJ Hens Item E1.
Associates. Mac.
Provided by: C. J. Hensch \& Associates

## Inc.

5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Northbound |  |  |  |  | FM 407 <br> Southbound |  |  |  |  | IT Neely Drive Eastbound |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | T | L | U | App | Ped* | R | T | U | App | Ped* | R | L | U | App | Ped* | Int |
| 2023-03-23 4:45PM | 324 | 14 | 1 | 339 | 0 | 15 | 249 | 0 | 264 | 0 | 5 | 4 | 0 | 9 | 0 | 612 |
| 5:00PM | 293 | 11 | 0 | 304 | 0 | 17 | 234 | 0 | 251 | 0 | 6 | 6 | 0 | 12 | 0 | 567 |
| 5:15PM | 311 | 10 | 0 | 321 | 0 | 20 | 266 | 1 | 287 | 0 | 4 | 8 | 0 | 12 | 0 | 620 |
| 5:30PM | 265 | 30 | 0 | 295 | 0 | 10 | 253 | 0 | 263 | 0 | 2 | 5 | 0 | 7 | 0 | 565 |
| Total | 1193 | 65 | 1 | 1259 | 0 | 62 | 1002 | 1 | 1065 | 0 | 17 | 23 | 0 | 40 | 0 | 2364 |
| \% Approach | 94.8\% | 5.2\% | 0.1\% | - | - | 5.8\% | 94.1\% | 0.1\% | - | - | 42.5\% | 57.5\% | 0\% | - | - | - |
| \% Total | 50.5\% | 2.7\% | 0\% | 53.3\% | - | 2.6\% | 42.4\% | 0\% | 45.1\% | - | 0.7\% | 1.0\% | 0\% | 1.7\% | - | - |
| PHF | 0.921 | 0.542 | 0.250 | 0.928 | - | 0.775 | 0.942 | 0.250 | 0.928 | - | 0.708 | 0.719 | - | 0.833 | - | 0.953 |
| Lights | 1188 | 65 | 1 | 1254 | - | 62 | 992 | 1 | 1055 | - | 17 | 23 | 0 | 40 | - | 2349 |
| \% Lights | 99.6\% | 100\% | 100\% | 99.6\% | - | 100\% | 99.0\% | 100\% | 99.1\% | - | 100\% | 100\% | 0\% | 100\% | - | 99.4\% |
| Articulated Trucks | 1 | 0 | 0 | 1 | - | 0 | 3 | 0 | 3 | - | 0 | 0 | 0 | 0 | - | 4 |
| \% Articulated Trucks | 0.1\% | 0\% | 0\% | 0.1\% | - | 0\% | 0.3\% | 0\% | 0.3\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.2\% |
| Buses and Single-Unit Trucks | 4 | 0 | 0 | 4 | - | 0 | 7 | 0 | 7 | - | 0 | 0 | 0 | 0 | - | 11 |
| \% Buses and Single-Unit Trucks | 0.3\% | 0\% | 0\% | 0.3\% | - | 0\% | 0.7\% | 0\% | 0.7\% | - | 0\% | 0\% | 0\% | 0\% | - | 0.5\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048591, Location: 33.090544, -97.131222

Provided by: C. J. Hensch \& Associates
[N] FM 407
Total: 2282
In: $1065 \quad$ Out: 1217


Out: $1020 \quad$ In: 1259
Total: 2279
[S] FM 407

## 4. FM 407 at McMakin Road - TMC

Tue Mar 28, 2023
Full Length (7 AM-9 AM, 3 PM-6 PM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on
Crosswalk)
All Movements
ID: 1048592, Location: 33.077608, -97.130532

CJ Hens Item E1.
Associates. Mac
Provided by: C. J. Hensch \& Associates Inc. 5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Southbound |  |  |  |  |  | McMakin Road/Blanco Drive Westbound |  |  |  |  |  | FM 407 <br> Northbound |  |  |  |  |  | McMakin Road Eastbound |  |  |  |  |  | Int |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | R | T | L | U | App |  | R | T | L | U | App |  | R | T | L | U | App | Ped* | R | T | L | U |  |  |  |
| 2023-03-28 7:00AM | 300 | 725 | 1 | 1 | 1027 | 0 | 5 | 10 | 12 | 0 | 27 | 0 | 2 | 343 | 31 | 0 | 376 | 0 | 26 | 4 | 173 | 0 | 203 | 0 | 1633 |
| 8:00AM | 254 | 803 | 2 | 0 | 1059 | 0 | 5 | 14 | 18 | 0 | 37 | 0 | 7 | 424 | 31 | 0 | 462 | 0 | 37 | 10 | 238 | 0 | 285 | 0 | 1843 |
| 3:00PM | 197 | 605 | 4 | 0 | 806 | 0 | 2 | 3 | 16 | 0 | 21 | 0 | 16 | 629 | 33 | 0 | 678 | 0 | 24 | 12 | 326 | 0 | 362 | 0 | 1867 |
| 4:00PM | 210 | 668 | 2 | 0 | 880 | 0 | 2 | 8 | 12 | 0 | 22 | 0 | 14 | 725 | 52 | 1 | 792 | 0 | 29 | 9 | 371 | 0 | 409 | 0 | 2103 |
| 5:00PM | 198 | 703 | 1 | 1 | 903 | 0 | 4 | 7 | 9 | 0 | 20 | 0 | 8 | 816 | 45 | 1 | 870 | 2 | 43 | 11 | 491 | 0 | 545 | 0 | 2338 |
| Total | 1159 | 3504 | 10 | 2 | 4675 | 0 | 18 | 42 | 67 | 0 | 127 | 0 | 47 | 2937 | 192 | 2 | 3178 | 2 | 159 | 46 | 1599 | 0 | 1804 | 0 | 9784 |
| \% Approach | 24.8\% | 75.0\% | 0.2\% | 0\% | - | - | 14.2\% | 33.1\% | 52.8\% 0\% |  | - |  | 1.5\% | 92.4\% | 6.0\% | 0.1\% | - | - | 8.8\% | 2.5\% | 88.6\% 0\% |  |  |  | - |
| \% Total | 11.8\% | 35.8\% | 0.1\% | 0\% | 47.8\% |  | 0.2\% | 0.4\% | 0.7\% 0\% |  | 1.3\% |  | 0.5\% | 30.0\% | 2.0\% | 0\% | 32.5\% | - | 1.6\% | 0.5\% | 16.3\% 0\% | \% 1 | 8.4\% |  |  |
| Lights | 1139 | 3456 | 10 | 2 | 4607 | - | 18 | 40 | 65 | 0 | 123 | - | 45 | 2904 | 192 | 2 | 3143 | - | 157 | 45 | 1589 | 0 | 1791 |  | 9664 |
| \% Lights | 98.3\% | 98.6\% | 100\% | 100\% 9 | 98.5\% | - | 100\% 9 | 95.2\% | 97.0\% 0\% | \% | 96.9\% |  | 95.7\% | 98.9\% | 100\% | 00\% | 98.9\% |  | 98.7\% | 97.8\% | 99.4\% 0\% | \% | 99.3\% |  | 98.8\% |
| Articulated Trucks | 3 | 13 | 0 | 0 | 16 |  | 0 | 0 | 0 | 0 | 0 |  | 0 | 7 | 0 | 0 | 7 | - | 0 | 0 | 2 | 0 | 2 |  | 25 |
| \% Articulated Trucks | 0.3\% | 0.4\% | 0\% | 0\% | 0.3\% | - | 0\% | 0\% | 0\% 0\% |  | 0\% | - | 0\% | 0.2\% | 0\% | 0\% | 0.2\% | - | 0\% | 0\% | 0.1\% 0\% |  | 0.1\% |  | 0.3\% |
| Buses and Single-Unit Trucks | 17 | 35 | 0 | 0 | 52 | - | 0 | 2 | 2 | 0 | 4 | - | 2 | 26 | 0 | 0 | 28 | - | 2 | 1 | 8 | 0 | 11 | - | 95 |
| \% Buses and Single-Unit Trucks | 1.5\% | 1.0\% | 0\% | 0\% | 1.1\% | - | 0\% | 4.8\% | 3.0\% 0\% |  | 3.1\% | - | 4.3\% | 0.9\% | 0\% | 0\% | 0.9\% | - | 1.3\% | 2.2\% | 0.5\% 0\% |  | 0.6\% |  | 1.0\% |
| Pedestrians | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - |  | - | - | - | - | - |  | - | - | - | - | - | 0\% | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 2 | - | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - |  | - | - | - | - | - | - | - | - | - | - | - | 100\% | - | - | - | - | - |  | - |

[^3]All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048592, Location: 33.077608, -97.130532

CJ Hens Item E1.
Associat Unc
Provided by: C. J. Hensch \& Associates
5215 Sycamore Ave., Pasadena, TX, 77503, US
[N] FM 407
Total: 9231
In: 4675 Out: 4556


Out: 3732
In: 3178
Total: 6910
[S] FM 407

## 4. FM 407 at McMakin Road - TMC

Tue Mar 28, 2023
AM Peak (7:30 AM - 8:30 AM)
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048592, Location: 33.077608, -97.130532
Item E1.
CJ Hensyns
Associates.ma.
Provided by: C. J. Hensch \& Associates
Inc.
5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Southbound |  |  |  |  | McMakin Road/Blanco Drive Westbound |  |  |  |  |  | FM 407 <br> Northbound |  |  |  |  |  | McMakin Road Eastbound |  |  |  |  |  | Int |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | R | T | L U | App |  | R | T | L | U | App |  | R | T | L | U | App |  | R | T | L | U | App |  |  |
| 2023-03-28 7:30AM | 90 | 171 | 10 | 262 | 0 | 2 | 3 | 11 | 0 | 16 | 0 | 0 | 99 | 11 | 0 | 110 | 0 | 8 | 2 | 54 | 0 | 64 | 0 | 452 |
| 7:45AM | 83 | 237 | 0 0 | 320 | 0 | 2 | 2 | 0 | 0 | 4 | 0 | 2 | 103 | 12 | 0 | 117 | 0 | 8 | 1 | 55 | 0 | 64 | 0 | 505 |
| 8:00AM | 84 | 189 | 20 | 275 | 0 | 2 | 3 | 4 | 0 | 9 | 0 | 2 | 106 | 8 | 0 | 116 | 0 | 7 | 4 | 76 | 0 | 87 | 0 | 487 |
| 8:15AM | 58 | 203 | 0 0 | 261 | 0 | 1 | 4 | 3 | 0 | 8 | 0 | 3 | 119 | 11 | 0 | 133 | 0 | 7 | 4 | 52 | 0 | 63 | 0 | 465 |
| Total | 315 | 800 | 30 | 1118 | 0 | 7 | 12 | 18 | 0 | 37 | 0 | 7 | 427 | 42 | 0 | 476 | 0 | 30 | 11 | 237 | 0 | 278 | 0 | 1909 |
| \% Approach | 28.2\% 7 | 71.6\% | 0.3\% 0\% | - | - | 18.9\% | 32.4\% | 48.6\% 0\% |  | - |  | 1.5\% | 89.7\% | 8.8\% 0\% |  | - |  | 10.8\% | 4.0\% | 85.3\% 0\% |  | - | - | - |
| \% Total | 16.5\% | 41.9\% | 0.2\% 0\% | 58.6\% | - | 0.4\% | 0.6\% | 0.9\% 0 | \% | 1.9\% | - | 0.4\% | 22.4\% | 2.2\% 0\% | \% 2 | 24.9\% |  | 1.6\% | 0.6\% | 12.4\% 0\% | \% 1 | 14.6\% |  |  |
| PHF | 0.875 | 0.844 | 0.375 | 0.873 | - | 0.875 | 0.750 | 0.409 | - | 0.578 |  | 0.583 | 0.897 | 0.875 | - 0 | 0.895 |  | 0.9380 | 0.688 | 0.780 | - | 0.799 |  | 0.945 |
| Lights | 313 | 789 | 30 | 1105 | - | 7 | 11 | 18 | 0 | 36 | - | 7 | 415 | 42 | 0 | 464 |  | 29 | 11 | 235 | 0 | 275 |  | 1880 |
| \% Lights | 99.4\% | 98.6\% | 100\% 0\% | 98.8\% | - | 100\% 9 | 91.7\% | 100\% 0\% | \% 9 | 97.3\% |  | 100\% | 97.2\% | 100\% 0\% | \% 9 | 97.5\% |  | 96.7\% 1 | 100\% | 99.2\% 0\% | \% 9 | 98.9\% |  | 98.5\% |
| Articulated Trucks | 1 | 3 | $0 \quad 0$ | 4 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 3 | 0 | 0 | 3 | - | 0 | 0 | 0 | 0 | 0 |  | 7 |
| \% Articulated Trucks | 0.3\% | 0.4\% | 0\% 0\% | 0.4\% | - | 0\% | 0\% | 0\% 0\% |  | 0\% | - | 0\% | 0.7\% | 0\% 0\% | 0\% | 0.6\% | - | 0\% | 0\% | 0\% 0\% |  | 0\% |  | 0.4\% |
| Buses and Single-Unit Trucks | 1 | 8 | $0 \quad 0$ | 9 | - | 0 | 1 | 0 | 0 | 1 | - | 0 | 9 | 0 | 0 | 9 | - | 1 | 0 | 2 | 0 | 3 | - | 22 |
| \% Buses and Single-Unit Trucks | 0.3\% | 1.0\% | 0\% 0\% | 0.8\% | - | 0\% | 8.3\% | 0\% 0\% |  | 2.7\% | - | 0\% | 2.1\% | 0\% 0\% |  | 1.9\% | - | 3.3\% | 0\% | 0.8\% 0\% |  | 1.1\% | - | 1.2\% |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |  |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - - | - | - | - | - | - | - | - | - | - | - | - | - | - |  | - | - | - | - | - |  | - |

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048592, Location: 33.077608, -97.130532

CJ Hensy Hem E1.
Associat Mac
Provided by: C. J. Hensch \& Associates
5215 Sycamore Ave., Pasadena, TX, 77503, US
[N] FM 407
Total: 1789
In: 1118
Out: 671


Out: 848 In: 476
Total: 1324
[S] FM 407

## 4. FM 407 at McMakin Road - TMC

Tue Mar 28, 2023
PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on
Crosswalk)
All Movements
ID: 1048592, Location: 33.077608, -97.130532

CJ Hens ItemE1.
Associates. lna
Provided by: C. J. Hensch \& Associates Inc. 5215 Sycamore Ave., Pasadena, TX, 77503, US

| Leg <br> Direction | FM 407 <br> Southbound |  |  |  |  |  | McMakin Road/Blanco Drive Westbound |  |  |  |  |  | FM 407 <br> Northbound |  |  |  |  |  | McMakin Road Eastbound |  |  |  |  |  | Int |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time | R | T | L | U | App |  | R | T | L | U | App |  | R | T | L | U | App | Ped* | R | T | L | U |  |  |  |
| 2023-03-28 4:45PM | 53 | 185 | 1 | 0 | 239 | 0 | 1 | 1 | 2 | 0 | 4 | 0 | 3 | 208 | 15 |  | 226 | 0 | 10 | 2 | 106 | 0 | 118 | 0 | 587 |
| 5:00PM | 56 | 171 | 1 | 0 | 228 | 0 | 0 | 2 | 5 | 0 | 7 | 0 | 2 | 182 | 13 |  | 198 | 0 | 15 | 4 | 124 | 0 | 143 | 0 | 576 |
| 5:15PM | 49 | 179 | 0 | 0 | 228 | 0 | 2 | 3 | 0 | 0 | 5 | 0 | 2 | 219 | 10 | 0 | 231 | 1 | 4 | 4 | 136 | 0 | 144 | 0 | 608 |
| 5:30PM | 51 | 183 | 0 | 1 | 235 | 0 | 2 | 2 | 2 | 0 | 6 | 0 | 4 | 208 | 10 | 0 | 222 | 1 | 12 | 1 | 127 | 0 | 140 | 0 | 603 |
| Total | 209 | 718 | 2 | 1 | 930 | 0 | 5 | 8 | 9 | 0 | 22 | 0 | 11 | 817 | 48 |  | 877 | 2 | 41 | 11 | 493 | 0 | 545 | 0 | 2374 |
| \% Approach | 22.5\% | 77.2\% | 0.2\% | 0.1\% | - |  | 22.7\% | 36.4\% | 40.9\% 0\% |  | - |  | 1.3\% | 93.2\% | 5.5\% | 0.1\% | - |  | 7.5\% | 2.0\% | 90.5\% 0\% |  |  |  | - |
| \% Total | 8.8\% | 30.2\% | 0.1\% | 0\% | 39.2\% |  | 0.2\% | 0.3\% | 0.4\% 0\% | \% | 0.9\% |  | 0.5\% | 34.4\% | 2.0\% |  | 36.9\% |  | 1.7\% | 0.5\% | 20.8\% 0\% | \% | 3.0\% |  |  |
| PHF | 0.933 | 0.970 | 0.500 | 0.250 | 0.973 |  | 0.625 | 0.667 | 0.450 |  | 0.786 | - | 0.688 | 0.933 | 0.800 | 0.250 | 0.949 |  | 0.683 | 0.688 | 0.906 | - | 0.946 |  | 0.976 |
| Lights | 207 | 709 | 2 | 1 | 919 |  | 5 | 8 | 8 | 0 | 21 |  | 10 | 814 | 48 | 1 | 873 |  | 41 | 10 | 492 | 0 | 543 |  | 2356 |
| \% Lights | 99.0\% | 98.7\% | 100\% | 100\% | 98.8\% |  | 100\% | 100\% | 88.9\% 0\% | \% | 95.5\% |  | 90.9\% | 99.6\% | 100\% | 100\% | 99.5\% |  | 100\% | 90.9\% | 99.8\% 0\% | \% 9 | 9.6\% |  | 99.2\% |
| Articulated Trucks | 0 | 1 | 0 | 0 | 1 |  | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 |  | 1 |
| \% Articulated Trucks | 0\% | 0.1\% | 0\% | 0\% | 0.1\% |  | 0\% | 0\% | 0\% 0\% |  | 0\% | - | 0\% | 0\% | 0\% | 0\% | 0\% |  | 0\% | 0\% | 0\% 0\% |  | 0\% |  | 0\% |
| Buses and Single-Unit Trucks | 2 | 8 | 0 | 0 | 10 |  | 0 | 0 | 1 | 0 | 1 | - | 1 | 3 | 0 | 0 | 4 |  | 0 | 1 | 1 | 0 | 2 |  | 17 |
| \% Buses and Single-Unit Trucks | 1.0\% | 1.1\% | 0\% | 0\% | 1.1\% | - | 0\% |  | 11.1\% 0\% |  | 4.5\% | - | 9.1\% | 0.4\% | 0\% | 0\% | 0.5\% | - | 0\% | 9.1\% | 0.2\% 0\% |  | 0.4\% |  | 0.7\% |
| Pedestrians | - | - | - | - | - - | 0 | - | - | - | - | - | 0 | - | - | - |  | - | 0 | - | - | - | - | - | 0 |  |
| \% Pedestrians | - | - | - | - | - - |  | - | - | - | - | - | - | - | - | - |  | - | 0\% | - | - | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | - - | 0 | - | - | - | - | - | 0 | - | - | - |  | - | 2 | - | - | - | - | - | 0 |  |
| \% Bicycles on Crosswalk | - | - | - | - | - - |  | - - | - - | - | - | - |  | - | - | - |  | - | 100\% | - | - | - | - | - |  | - |

[^4]PM Peak (4:45 PM - 5:45 PM) - Overall Peak Hour
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks, Pedestrians, Bicycles on Crosswalk)
All Movements
ID: 1048592, Location: 33.077608, -97.130532

Provided by: C. J. Hensch \& Associates
5215 Sycamore Ave., Pasadena, TX, 77503, US
[N] FM 407
Total: 2246
In: $930 \quad$ Out: 1316


Out: 769
In: 877
Total: 1646
[S] FM 407

## Appendix C. Site-Generated Traffic Supplement





## Appendix D. Detailed Intersection Capacity Analysis Results

Timings
5：FM 407 \＆McMakin Rd／Blanco Dr
2023 Existing
Timing Plan：AM

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | \％ | $\uparrow$ | 「 |  | ¢ $\uparrow$ |  | \％ | 个 $\uparrow$ | 「 | \％ | 个 $\uparrow$ | \％ |
| Traffic Volume（vph） | 237 | 11 | 30 | 18 | 12 | 7 | 42 | 427 | 7 | 3 | 800 | 315 |
| Future Volume（vph） | 237 | 11 | 30 | 18 | 12 | 7 | 42 | 427 | 7 | 3 | 800 | 315 |
| Ideal Flow（vphpl） | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length（t） | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 | 175 |  | 175 |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 | 1 |  |  |
| Taper Length（t） | 25 |  |  | 25 |  |  | 170 |  |  | 100 |  |  |
| Lane Util．Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Fit |  |  | 0.850 |  | 0.973 |  |  |  | 0.850 |  |  | ． 850 |
| Flt Protected | 0.950 |  |  |  | 0.976 |  | 0.950 |  |  | 0.950 |  |  |
| Satd．Flow（prot） | 1770 | 1863 | 1583 | 0 | 3361 | 0 | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 |
| Flt Permitted | 0.488 |  |  |  | 0.928 |  | 0.287 |  |  | 0.490 |  |  |
| Satd．Flow（perm） | 909 | 1863 | 1583 | 0 | 3196 | 0 | 535 | 3539 | 1583 | 913 | 3539 | 583 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  | Yes |
| Satd．Flow（RTOR） |  |  | 73 |  | 7 |  |  |  | 127 |  |  | 335 |
| Link Speed（mph） |  | 30 |  |  | 25 |  |  | 50 |  |  | 50 |  |
| Link Distance（t） |  | 180 |  |  | 124 |  |  | 512 |  |  | 2145 |  |
| Travel Time（s） |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  | 29.3 |  |
| Lane Group Flow（vph） | 252 | 12 | 32 | 0 | 39 | 0 | 45 | 454 | 7 | 3 | 851 | 335 |
| Turn Type | pm＋pt | NA | Perm | Perm | NA |  | pm＋pt | NA | Perm | pm＋pt | NA | Perm |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 6 |  |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 6 |  |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial（s） | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split（s） | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 45.0 | 45.0 |
| Total Split（s） | 7.5 | 40.5 | 40.5 | 33. | 33. |  | 7.5 | 42.0 | 42. | 7.5 | 42 | 42.0 |
| Total Split（\％） | 8．3\％ | 45．0\％ | 45．0\％ | 36．7\％ | 36．7\％ |  | 8．3\％ | 46．7\％ | 46．7\％ | 8．3\％ | 46．7\％ | 46．7\％ |
| Yellow Time（s） | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 5 | 3.5 |
| All－Red Time（s） | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust（s） | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time（s） | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Lead／Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead－Lag Optimize？ | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | Max | Ma |
| Act Effct Green（s） | 10.4 | 10.4 | 10.4 |  | 6.2 |  | 43.0 | 42.4 | 42.4 | 41.3 | 39.6 | 39.6 |
| Actuated g／C Ratio | 0.16 | 0.16 | 0.16 |  | 0.10 |  | 0.68 | 0.67 | 0.67 | 0.65 | 0.63 | 0.63 |
| V／c Ratio | 1.22 | 0.04 | 0.10 |  | 0.12 |  | 0.11 | 0.19 | 0.01 | 0.00 | 0.38 | 0.30 |
| Control Delay | 164.1 | 21.9 | 1.9 |  | 25.1 |  | 4.6 | 5.2 | 0.0 | 4.3 | 7.9 | 1.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 164.1 | 21.9 | 1.9 |  | 25.1 |  | 4.6 | 5.2 | 0.0 | 4.3 | 7.9 | 1.8 |
| LOS | F | C | A |  | C |  | A | A | A | A | A |  |
| Approach Delay |  | 140.8 |  |  | 25.1 |  |  | 5.1 |  |  | 6.2 |  |
| Approach LOS |  | F |  |  | C |  |  | A |  |  | A |  |
| Queue Length 50th（tt） | $\sim 113$ | 4 | 0 |  | 6 |  | 5 | 31 | 0 | 0 | 98 |  |
| Queue Length 95th（tt） | \＃253 | 16 | 5 |  | 20 |  | 15 | 72 | 0 | 3 | 143 | 32 |
| Internal Link Dist（ft） |  | 100 |  |  | 44 |  |  | 432 |  |  | 2065 |  |
| Turn Bay Length（tt） |  |  |  |  |  |  | 175 |  | 200 | 175 |  | 175 |
| Base Capacity（vph） | 206 | 1071 | 941 |  | 1459 |  | 422 | 2372 | 1103 | 636 | 2215 | 1116 |

TIA Study for Bartonville ELTS School in Bartonville，Texas
PMA

Timings
5：FM 407 \＆McMakin Rd／Blanco Dr

| Lane Group |  | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Starvation C | ap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap | Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap | Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v／c | Ratio | 1.22 | 0.01 | 0.03 |  | 0.03 |  | 0.11 | 0.19 | 0.01 | 0.00 | 0.38 | 0.30 |
| Intersection Summary |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Area Type：Other |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length： 90 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length： 63.3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle： 100 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type：Actuated－Uncoordinated |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v／c Ratio： 1.22 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay： 25.9 |  |  |  |  |  | Intersection LOS：C |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 57．3\％ |  |  |  |  |  | ICU Level of Service B |  |  |  |  |  |  |  |
| Analysis Period（min） 15 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ～Volume exceeds capacity，queue is theoretically infinite． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| \＃95th percentile volume exceeds capacity，queue may be longer． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Splits and Phases：5：FM 407 \＆McMakin Rd／Blanco Dr |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ${ }_{01}$ | 402 |  |  |  |  |  | $\rightarrow 84$ |  |  |  |  |  |  |
| ${ }_{\text {7 }}$ | 42 s |  |  |  |  |  | 40.5 s |  |  |  |  |  |  |
|  | $\downarrow 06$ |  |  |  |  |  | $\rangle_{07}$ |  |  |  |  |  |  |
| 7.5 | 42 s |  |  |  |  |  |  | 33 s |  |  |  |  |  |

[^5]Synchro 11 Report

1: FM 407 \& I T Neely Dr


[^6]Synchro 11 Report
Synro Page 1

HCM 6th TWSC


PMA



[^7]Synchro 11 Report
Page 4

HCM 6th TWSC
6: FM 407 \& Driveway 2


TIA Study for Bartonville ELTS School in Bartonville, Texas Synchro 11 Report
PMA

Timings
5: FM 407 \& McMakin Rd/Blanco Dr
2023 Existing
Timing Plan: PM

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBU | SBL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | \% | $\uparrow$ | $\overline{7}$ |  | AT |  |  | \% | 个4 | F' |  | 7 |
| Traffic Volume (vph) | 493 | 11 | 41 | 9 | 8 | 5 | 1 | 48 | 817 | 11 | 1 | 2 |
| Future Volume (vph) | 493 | 11 | 41 | 9 | 8 | 5 | 1 | 48 | 817 | 11 | 1 | 2 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 |  | 175 |  | 200 |  | 175 |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 |  | 1 |  | 1 |  | 1 |
| Taper Length (ft) | 25 |  |  | 25 |  |  |  | 170 |  |  |  | 100 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 |
| Frt |  |  | 0.850 |  | 0.966 |  |  |  |  | 0.850 |  |  |
| Flt Protected | 0.950 |  |  |  | 0.980 |  |  | 0.950 |  |  |  | 0.950 |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3351 | 0 | 0 | 1770 | 3539 | 1583 | 0 | 1770 |
| Flt Permitted | 0.588 |  |  |  | 0.955 |  |  | 0.306 |  |  |  | 0.295 |
| Satd. Flow (perm) | 1095 | 1863 | 1583 | 0 | 3265 | 0 | 0 | 570 | 3539 | 1583 | 0 | 550 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  |  | Yes |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 5 |  |  |  |  | 127 |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  |  | 50 |  |  |  |
| Link Distance (t) |  | 180 |  |  | 124 |  |  |  | 512 |  |  |  |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  |  | 7.0 |  |  |  |
| Lane Group Flow (vph) | 503 | 11 | 42 | 0 | 22 | 0 | 0 | 50 | 834 | 11 | 0 |  |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | custom | pm+pt | NA | Perm | custom | pm+pt |
| Protected Phases | 7 | 4 |  |  | 8 |  |  | 5 | 2 |  |  |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 5 | 2 |  | 2 | 1 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 5 | 2 | 2 | 1 |  |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 |
| Total Split (s) | 20.0 | 35.0 | 35.0 | 15.0 | 15.0 |  | 10.0 | 10.0 | 45.0 | 45.0 | 10.0 | 10.0 |
| Total Split (\%) | 22.2\% | 38.9\% | 38.9\% | 16.7\% | 16.7\% |  | 11.1\% | 11.1\% | 50.0\% | 50.0\% | 11.1\% | 11.1\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  |  | 0.0 | 0.0 | 0.0 |  | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  |  | 4.5 | 4.5 | 4.5 |  | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lead | Lag | Lag | Lead | Lead |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | None | Max | Max | None | None |
| Act Effict Green (s) | 19.7 | 19.7 | 19.7 |  | 6.1 |  |  | 45.9 | 44.9 | 44.9 |  | 44.2 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 |  | 0.08 |  |  | 0.61 | 0.59 | 0.59 |  | 0.59 |
| v/c Ratio | 1.18 | 0.02 | 0.09 |  | 0.08 |  |  | 0.11 | 0.40 | 0.01 |  | 0.01 |
| Control Delay | 131.6 | 21.4 | 2.6 |  | 31.4 |  |  | 7.4 | 10.2 | 0.0 |  | 7.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  |  | 0.0 | 0.0 | 0.0 |  | 0.0 |
| Total Delay | 131.6 | 21.4 | 2.6 |  | 31.4 |  |  | 7.4 | 10.2 | 0.0 |  | 7.3 |
| LOS | F | C | A |  | C |  |  | A | B | A |  | A |
| Approach Delay |  | 119.7 |  |  | 31.4 |  |  |  | 9.9 |  |  |  |
| Approach LOS |  | F |  |  | C |  |  |  | A |  |  |  |
| Queue Length 50th (tt) | ~316 | 4 | 0 |  | 4 |  |  | 7 | 73 | 0 |  | 1 |
| Queue Length 95th (tt) | \#499 | 16 | 10 |  | 16 |  |  | 25 | 211 | 0 |  | 4 |
| Internal Link Dist (ft) |  | 100 |  |  | 44 |  |  |  | 432 |  |  |  |
| Turn Bay Length (tt) |  |  |  |  |  |  |  | 175 |  | 200 |  | 175 |
| Base Capacity (vph) | 426 | 764 | 693 |  | 465 |  |  | 435 | 2106 | 993 |  | 412 |

TIA Study for Bartonville ELTS School in Bartonville, Texas
RD

5: FM 407 \& McMakin Rd/Blanco Dr

[^8] RD

Synchro 11 Report


[^9]| 5: FM 407 \& McMakin Rd/Blanco Dr | Timing Plan: PM |  |  |  |
| :--- | ---: | ---: | ---: | ---: |
|  | $\downarrow$ |  |  |  |
|  | SBT | SBR |  |  |
| Lane Group | 0 | 0 |  |  |
| Starvation Cap Reductn | 0 | 0 | 0 |  |
| Spillback Cap Reductn | 0 | 0 |  |  |
| Storage Cap Reductn | 0.38 | 0.22 |  |  |
| Reduced vic Ratio |  |  |  |  |
| Intersection Summary |  |  |  |  |

HCM 6th TWSC
2023 Existing
1: FM 407 \& I T Neely Dr


[^10]

[^11]Synchro 11 Report


[^12]Synchro 11 Report


[^13]Synchro 11 Report

## HCM 6th TWSC

6: FM 407

|  |  |
| :--- | :--- |
| Intersection |  |
| Int Delay, s/veh $\quad 0$ |  |

## Movement $\quad$ EBL EBR NBL NBT SBT SBR


$\begin{array}{lrrrrrr}\text { Conflicting Peds, \#hr } & 0 & 0 & 0 & 0 & 0 & 0 \\ \text { Sign Control } & \text { Stop } & \text { Stop } & \text { Free } & \text { Free } & \text { Free } & \text { Free }\end{array}$
RT Channelized - None - None - None
$\begin{array}{llllll}\text { Storage Length } & 0 & - & - & - & - \\ \text { Veh in Median Storage, \# } & 0 & - & - & 0 & 0 \\ \text { Grade, } \% & 0 & - & - & 0 & 0\end{array}$
$\begin{array}{lrrrrrr}\text { Grade, \% } & 0 & - & - & 0 & 0 & - \\ \text { Peak Hour Factor } & 92 & 92 & 92 & 92 & 92 & 92 \\ \text { Heavy Vehicles, \% } & 2 & 2 & 2 & 2 & 2 & 2\end{array}$
$\begin{array}{lllrrrr}\text { Heavy Vehicles, } \% & 2 & 2 & 2 & 2 & 2 & 2\end{array}$
Mumt Flow


| Critical Hdwy Stg 2 | 5.84 |  | - |  |
| :--- | :--- | :--- | :--- | :--- |
| Follow-up Hdwy | 3.52 | 3.32 | 2. | - |

$\begin{array}{lrrr}\text { Follow-up Hdwy } & 3.52 & 3.32 & 2.22 \\ \text { Pot Cap-1 Maneuver } & 70 & 470 & 617\end{array}$


Stage 2 460
$\begin{array}{llll}\text { Mov Cap-1 Maneuver } & 70 & 470 & 617\end{array}$
Mov Cap-2 Maneuver


| Stage | 272 |
| :--- | :--- |
| Stage 2 | 460 |



Capacity (veh/h)
HCM Lane V/C Ra
HCM Lane V/C Ratio
HCM Control Delay (s)
HCM Lane LOS
HCM 95th \%tile Q(veh)

TIA Study for Bartonville ELTS School in Bartonville, Texas
Synchro 11 Report
RD

Timings
5：FM 407 \＆McMakin Rd／Blanco Dr
2024 Background
Timing Plan：AM

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | ${ }^{*}$ | $\uparrow$ | F |  | ¢ $\uparrow$ |  | ＊ | 个个 | 「 | ${ }^{*}$ | $\uparrow \uparrow$ |  |
| Traffic Volume（vph） | 242 | 11 | 31 | 18 | 12 | 7 | 43 | 436 | 7 | 3 | 816 | 321 |
| Future Volume（vph） | 242 | 11 | 31 | 18 | 12 | 7 | 43 | 436 | 7 | 3 | 816 | 321 |
| Ideal Flow（vphpl） | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length（tt） | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 | 175 |  | 175 |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 | 1 |  | 1 |
| Taper Length（t） | 25 |  |  | 25 |  |  | 170 |  |  | 100 |  |  |
| Lane Util．Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Fit |  |  | 0.850 |  | 0.973 |  |  |  | 0.850 |  |  | 0.850 |
| Flt Protected | 0.950 |  |  |  | 0.976 |  | 0.950 |  |  | 0.950 |  |  |
| Satd．Flow（prot） | 1770 | 1863 | 1583 | 0 | 3361 | 0 | 1770 | 3539 | 1583 | 1770 | 3539 | 158 |
| Flt Permitted | 0.488 |  |  |  | 0.928 |  | 0.280 |  |  | 0.485 |  |  |
| Satd．Flow（perm） | 909 | 1863 | 1583 | 0 | 3196 | 0 | 522 | 3539 | 1583 | 903 | 3539 | 1583 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  | Yes |
| Satd．Flow（RTOR） |  |  | 73 |  | 7 |  |  |  | 127 |  |  | 341 |
| Link Speed（mph） |  | 30 |  |  | 25 |  |  | 50 |  |  | 50 |  |
| Link Distance（t） |  | 180 |  |  | 124 |  |  | 512 |  |  | 2145 |  |
| Travel Time（s） |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  | 29.3 |  |
| Lane Group Flow（vph） | 257 | 12 | 33 | 0 | 39 | 0 | 46 | 464 | 7 | 3 | 868 | 341 |
| Turn Type | pm＋pt | NA | Perm | Perm | NA |  | pm＋pt | NA | Perm | pm＋pt | NA | Perm |
| rotected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 6 |  | 6 |
| etector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 6 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial（s） | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split（s） | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 45.0 | 45.0 |
| Total Split（s） | 7.5 | 40.5 | 40.5 | 33.0 | 33.0 |  | 7.5 | 42.0 | 42.0 | 7.5 | 42.0 | 42.0 |
| Total Split（\％） | 8．3\％ | 45．0\％ | 45．0\％ | 36．7\％ | 36．7\％ |  | 8．3\％ | 46．7\％ | 46．7\％ | 8．3\％ | 46．7\％ | 46．7\％ |
| Yellow Time（s） | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All－Red Time（s） | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust（s） | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time（s） | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Lead／Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead－Lag Optimize？ | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | Max | Max |
| Act Effict Green（s） | 10.4 | 10.4 | 10.4 |  | 6.2 |  | 42.9 | 42.3 | 42.3 | 41.2 | 39.5 | 39.5 |
| Actuated g／C Ratio | 0.16 | 0.16 | 0.16 |  | 0.10 |  | 0.68 | 0.67 | 0.67 | 0.65 | 0.62 | 0.62 |
| v／c Ratio | 1.25 | 0.04 | 0.10 |  | 0.12 |  | 0.11 | 0.20 | 0.01 | 0.00 | 0.39 | 0.31 |
| Control Delay | 172.2 | 21.9 | 2.2 |  | 25.1 |  | 4.7 | 5.3 | 0.0 | 4.3 | 8.0 | 1.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 172.2 | 21.9 | 2.2 |  | 25.1 |  | 4.7 | 5.3 | 0.0 | 4.3 | 8.0 | 1.8 |
| LOS | F | C | A |  | C |  | A | A | A | A | A | A |
| Approach Delay |  | 147.6 |  |  | 25.1 |  |  | 5.1 |  |  | 6.2 |  |
| Approach LOS |  | F |  |  | C |  |  | A |  |  | A |  |
| Queue Length 50th（tt） | ～118 | 4 | 0 |  | 6 |  | 5 | 32 | 0 | 0 | 101 | 0 |
| Queue Length 95th（tt） | \＃258 | 16 | 6 |  | 20 |  | 15 | 73 | 0 | 3 | 147 | 32 |
| Internal Link Dist（ft） |  | 100 |  |  | 44 |  |  | 432 |  |  | 2065 |  |
| Turn Bay Length（tt） |  |  |  |  |  |  | 175 |  | 200 | 175 |  | 175 |
| Base Capacity（vph） | 206 | 1073 | 943 |  | 1462 |  | 413 | 2370 | 1102 | 630 | 2213 | 1117 |

TIA Study for Bartonville ELTS School in Bartonville，Texas
PMA

Timings
2024 Background
5：FM 407 \＆McMakin Rd／Blanco Dr

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Reduced v／c Ratio | 1.25 | 0.01 | 0.03 | 0.03 | 0.11 | 0.20 | 0.01 | 0.00 | 0.39 | 0.31 |  |  |

Storage Cap Reduct
$\frac{\text { Intersection Summary }}{}$ Area Type：Other Other
Actuated Cycle Length： 63.2
Natural Cycle： 100
Control Type：Actuated－Uncoordinated
Maximum v／c Ratio： 1.25
$\begin{array}{ll}\text { Intersection Signal Delay：} 27.0 & \text { Intersection LOS：} \mathrm{C} \\ \text { Intersection Capacity Utilization 58．0\％} & \end{array}$
Intersection Capacity Utilization 58．0\％ICU Level of Service B
nalysis Period（min） 15
Volume exceeds capacity，queue is theoretically infinite．
Q5th serown is maximum after two cycles．
ue may be longer．


[^14]PMA

Synchro 11 Report

1: FM 407 \& I T Neely Dr


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HCM 6th TWSC


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Pyntion


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HCM 6th TWSC 2024 Background

6: FM 407 \& Driveway 2

|  |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: |
|  |  |  |  |  |  |  |

TIA Study for Bartonville ELTS School in Bartonville, Texas
Synchro 11 Report
PMA

| Timings <br> 5: FM 407 \& McMakin Rd/Blanco Dr |  |  |  |  |  |  |  |  |  | $\qquad$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\rangle$ | $\rightarrow$ |  | 7 |  |  | 4 | $\uparrow$ | $p$ | 4 |  | $\downarrow$ |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Lane Configurations | * | $\uparrow$ | F |  | ¢ $\uparrow$ |  | \% | 个4 | \% |  | \% | $\uparrow \uparrow$ |
| Traffic Volume (vph) | 503 | 11 | 42 | 9 | - | 5 | 49 | 833 | 11 | 1 | , | 732 |
| Future Volume (vph) | 503 | 11 | 42 | 9 | 8 | 5 | 49 | 833 | 11 | 1 | 2 | 732 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length (tt) | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Fit |  |  | 0.850 |  | 0.966 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.980 |  | 0.950 |  |  |  | 0.950 |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3351 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.588 |  |  |  | 0.955 |  | 0.299 |  |  |  | 0.288 |  |
| Satd. Flow (perm) | 1095 | 1863 | 1583 | 0 | 3265 | 0 | 557 | 3539 | 1583 | 0 | 536 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 5 |  |  |  | 127 |  |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance (t) |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow (vph) | 513 | 11 | 43 | 0 | 22 | 0 | 50 | 850 | 11 | 0 | 3 | 747 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | custom | pm+pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 | 6 |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 1 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split (s) | 20.0 | 35.0 | 35.0 | 15.0 | 15.0 |  | 10.0 | 45.0 | 45.0 | 10.0 | 10.0 | 45.0 |
| Total Split (\%) | 22.2\% | 38.9\% | 38.9\% | 16.7\% | 16.7\% |  | 11.1\% | 50.0\% | 50.0\% | 11.1\% | 11.1\% | 50.0\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Effct Green (s) | 19.7 | 19.7 | 19.7 |  | 6.1 |  | 45.9 | 44.9 | 44.9 |  | 44.2 | 41.2 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 |  | 0.08 |  | 0.61 | 0.59 | 0.59 |  | 0.59 | 0.55 |
| V/c Ratio | 1.20 | 0.02 | 0.09 |  | 0.08 |  | 0.12 | 0.40 | 0.01 |  | 0.01 | 0.39 |
| Control Delay | 140.5 | 21.4 | 2.6 |  | 31.4 |  | 7.4 | 10.3 | 0.0 |  | 7.3 | 12.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 140.5 | 21.4 | 2.6 |  | 31.4 |  | 7.4 | 10.3 | 0.0 |  | 7.3 | 12.3 |
| LOS | F | C | A |  | C |  | A | B | A |  | A | B |
| Approach Delay |  | 127.8 |  |  | 31.4 |  |  | 10.0 |  |  |  | 10.2 |
| Approach LOS |  | F |  |  | C |  |  | A |  |  |  | B |
| Queue Length 50th (tt) | ~326 | 4 | 0 |  | 4 |  | 7 | 75 | 0 |  | 1 | 98 |
| Queue Length 95th (t) | \#512 | 16 | 11 |  | 16 |  | 25 | 216 | 0 |  | 4 | 185 |
| Internal Link Dist (ft) |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length (tt) |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity (vph) | 426 | 764 | 693 |  | 465 |  | 428 | 2106 | 993 |  | 405 | 1929 |

[^19]RD


[^20]Synchro 11 Report


Timings
5: FM 407 \& McMakin Rd/Blanco Dr

## Lane Group

Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

TIA Study for Bartonville ELTS School in Bartonville, Texas
RD

1: FM 407 \& I T Neely Dr
$\longrightarrow$


[^21]—


[^22]Synchro 11 Report
Page 2

## HCM 6th TWSC

3: CJ Legacy Ranch Dr \& Driveway
$\longrightarrow$

| Intersection |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh | 0 |  |  |  |  |  |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations |  | $\uparrow$ | $\dagger$ |  | \% |  |
| Traffic Vol, veh/h | 0 | 2 | 0 | 0 | 0 |  |
| Future Vol, veh/h | 0 | 2 | 0 | 0 | 0 | 0 |
| 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 | 2 | 0 | 0 | 0 |  |



Synchro 11 Report

## TIA Study for Bartonville ELTS School in Bartonville, Texas

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[^23]Synchro 11 Report
Page 4

## HCM 6th TWSC

6: FM 407
$\xrightarrow{ }$

| Intersection |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh | 0 |  |  |  |  |  |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations | $\mathbf{Y}$ |  |  | $\uparrow \uparrow$ | $\uparrow \uparrow$ |  |
| Traffic Vol, veh/h | 0 | 0 | 0 | 1292 | 1055 | 0 |


$\begin{array}{lllll}\text { Critical Hdwy Stg 2 } & 5.84 & \text { - } & & - \\ \text { Follow-up Hdwy } & 3.52 & 3.32 & 2.22\end{array}$

$\begin{array}{llll}\text { Mov Cap-1 Maneuver } & 66 & 462 & 605\end{array}$
Mov Cap-2 Maneuver

| Stage 1 | 265 |
| :--- | :--- |
| Stage 2 | 453 |



Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR
Capacity (veh/h)
HCM Lane V/C Ratio
HCM Control Delay (s)
HCM Lane LOS $\begin{array}{lll}- & - & 0 \\ 0 & - & 0\end{array}$
HCM 95th \%tile Q(veh)

[^24]Synchro 11 Report
RD

5: FM 407 \& McMakin Rd/Blanco Dr

|  | $\stackrel{ }{*}$ |  |  |  |  |  | 4 | $\uparrow$ |  | 4 |  | $\downarrow$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Lane Configurations | * | $\uparrow$ | F |  | ${ }_{4}{ }^{1}$ |  | ${ }^{7}$ | ¢ $\uparrow$ | F |  | ${ }^{7}$ | ¢ ${ }^{\text {¢ }}$ |
| Traffic Volume (vph) | 252 | 11 | 31 | 18 | 12 | 7 | 43 | 545 | 7 | 10 | 3 | 914 |
| Future Volume (vph) | 252 | 11 | 31 | 18 | 12 | 7 | 43 | 545 | 7 | 10 | 3 | 914 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length (t) | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Frt |  |  | 0.850 |  | 0.973 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.976 |  | 0.950 |  |  |  | 0.950 |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3361 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.488 |  |  |  | 0.928 |  | 0.241 |  |  |  | 0.434 |  |
| Satd. Flow (perm) | 909 | 1863 | 1583 | 0 | 3196 | 0 | 449 | 3539 | 1583 | 0 | 808 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 7 |  |  |  | 127 |  |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance (tt) |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow (vph) | 268 | 12 | 33 | 0 | 39 | 0 | 46 | 580 | 7 | 0 | 14 | 972 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | custom | pm+pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 | 6 |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 1 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split (s) | 7.5 | 40.5 | 40.5 | 33.0 | 33.0 |  | 7.5 | 42.0 | 42.0 | 7.5 | 7.5 | 42.0 |
| Total Split (\%) | 8.3\% | 45.0\% | 45.0\% | 36.7\% | 36.7\% |  | 8.3\% | 46.7\% | 46.7\% | 8.3\% | 8.3\% | 46.7\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Effict Green (s) | 10.4 | 10.4 | 10.4 |  | 6.2 |  | 42.7 | 42.1 | 42.1 |  | 41.0 | 39.4 |
| Actuated g/C Ratio | 0.17 | 0.17 | 0.17 |  | 0.10 |  | 0.68 | 0.67 | 0.67 |  | 0.65 | 0.63 |
| v/c Ratio | 1.29 | 0.04 | 0.10 |  | 0.12 |  | 0.13 | 0.25 | 0.01 |  | 0.02 | 0.44 |
| Control Delay | 191.3 | 21.9 | 2.2 |  | 25.1 |  | 4.8 | 5.5 | 0.0 |  | 4.3 | 8.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 191.3 | 21.9 | 2.2 |  | 25.1 |  | 4.8 | 5.5 | 0.0 |  | 4.3 | 8.4 |
| LOS | F | C | A |  | C |  | A | A | A |  | A | A |
| Approach Delay |  | 164.8 |  |  | 25.1 |  |  | 5.4 |  |  |  | 6.6 |
| Approach LOS |  | F |  |  | C |  |  | A |  |  |  | A |
| Queue Length 50th (tt) | $\sim 128$ | 4 | 0 |  | 6 |  | 5 | 42 | 0 |  | 2 | 117 |
| Queue Length 95th (tt) | \#271 | 16 | 6 |  | 20 |  | 15 | 92 | 0 |  | 7 | 170 |
| Internal Link Dist (tt) |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length (t) |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity (vph) | 207 | 1077 | 946 |  | 1467 |  | 367 | 2367 | 1101 |  | 572 | 2210 |

[^25]RD

Timings
2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 5: FM 407 \& McMakin Rd/Blanco Dr


[^26]Synchro 11 Report

## Timings

 5: FM 407 \& McMakin Rd/Blanco Dr| 5: FM 407 \& McMakin Rd/Blanco Dr |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |

## Intersection Summary $\quad$ Other <br> Cycle Length: 90

Actuated Cycle Length: 63
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.29
ntersection Signal Delay: 27.9
Intersection Capacity Utilization 61 .3\%
Analysis Period (min) 15
Analysis Period (min) 15
Volume exceeds capacity, queue is theoretically infin
Queue shown is maximum after two cycles.
\# Queue shown is maximum atter two cycles.
Queue shown is maximum after two cycles.


[^27]RD

## Lane Group

Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

## TIA Study for Bartonville ELTS School in Bartonville, Texas <br> RD

HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 1: FM 407 \& I T Neely Dr Timing Plan: AM


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Page 1

HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 2: CJ Legacy Ranch Dr \& FM 407


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Page 2

HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 3: CJ Legacy Ranch Dr \& Driveway


Synchro 11 Report

## TIA Study for Bartonville ELTS School in Bartonville, Texas

Page 3

HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 4: FM 407 \& Rayzor Rd


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Page 4

HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 6: FM 407 \& Driveway 2

|  |  |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | :--- | :--- | :--- |

TIA Study for Bartonville ELTS School in Bartonville, Texas
Synchro 11 Report
RD

5: FM 407 \& McMakin Rd/Blanco Dr
Timing Plan PM

|  | $\rangle$ | $\rightarrow$ |  | 7 |  |  | 4 | 4 | $p$ | 4 |  | $\downarrow$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Lane Configurations | \% | $\uparrow$ | $\bar{\square}$ |  | * $\uparrow$ |  | $\dagger$ | ¢ 4 | F |  | \% | ¢ ${ }^{\text {c }}$ |
| Traffic Volume (vph) | 504 | 11 | 42 | 9 | 8 | 5 | 49 | 844 | 11 | 3 | 2 | 756 |
| Future Volume (vph) | 504 | 11 | 42 | 9 | 8 | 5 | 49 | 844 | 11 | 3 | 2 | 756 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length (t) | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Fit |  |  | 0.850 |  | 0.966 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.980 |  | 0.950 |  |  |  | 0.950 |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3351 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.588 |  |  |  | 0.955 |  | 0.289 |  |  |  | 0.283 |  |
| Satd. Flow (perm) | 1095 | 1863 | 1583 | 0 | 3265 | 0 | 538 | 3539 | 1583 | 0 | 527 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 5 |  |  |  | 127 |  |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance ( t ) |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow (vph) | 514 | 11 | 43 | 0 | 22 | 0 | 50 | 861 | 11 | 0 | 5 | 771 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | custom | pm+pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 | 6 |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 1 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split (s) | 20.0 | 35.0 | 35.0 | 15.0 | 15.0 |  | 10.0 | 45.0 | 45.0 | 10.0 | 10.0 | 45.0 |
| Total Split (\%) | 22.2\% | 38.9\% | 38.9\% | 16.7\% | 16.7\% |  | 11.1\% | 50.0\% | 50.0\% | 11.1\% | 11.1\% | 50.0\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Effict Green (s) | 19.7 | 19.7 | 19.7 |  | 6.1 |  | 45.9 | 44.9 | 44.9 |  | 44.2 | 41.2 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 |  | 0.08 |  | 0.61 | 0.59 | 0.59 |  | 0.59 | 0.55 |
| v/c Ratio | 1.21 | 0.02 | 0.09 |  | 0.08 |  | 0.12 | 0.41 | 0.01 |  | 0.01 | 0.40 |
| Control Delay | 141.5 | 21.4 | 2.6 |  | 31.4 |  | 7.5 | 10.3 | 0.0 |  | 7.2 | 12.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 141.5 | 21.4 | 2.6 |  | 31.4 |  | 7.5 | 10.3 | 0.0 |  | 7.2 | 12.5 |
| LOS | F | C | A |  | C |  | A | B | A |  | A | B |
| Approach Delay |  | 128.6 |  |  | 31.4 |  |  | 10.0 |  |  |  | 10.3 |
| Approach LOS |  | F |  |  | c |  |  | B |  |  |  | B |
| Queue Length 50th (tt) | ~327 | 4 | 0 |  | 4 |  | 7 | 76 | 0 |  | 1 | 102 |
| Queue Length 95th (tt) | \#514 | 16 | 11 |  | 16 |  | 25 | 220 | 0 |  | 6 | 192 |
| Internal Link Dist (tt) |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length (t) |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity (vph) | 426 | 764 | 693 |  | 465 |  | 418 | 2106 | 993 |  | 400 | 1929 |

TIA Study for Bartonville ELTS School in Bartonville, Texas
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Timings
2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 5: FM 407 \& McMakin Rd/Blanco Dr

Timing Plan: PN


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## Timings

 5: FM 407 \& McMakin Rd/Blanco Dr| 5: FM 407 \& McMakin Rd/Blanco Dr |  |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |

## $\begin{array}{ll}\text { Intersection Summary } & \\ \text { Area Type: Other }\end{array}$ <br> Cycle Length: 90

Actuated Cycle Length: 75.
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.21
Itersection Signal Dela 37,2
Intersection Signal Delay: 37.2
Intersection Capacity Utilization 73 3\%
Intersection Capacity Utiliza
Analysis Period (min) 15
Queue shown is maximum atter two cor
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.


## Lane Group

Starvation Cap Reductn
spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

## TIA Study for Bartonville ELTS School in Bartonville, Texas

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HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 1: FM 407 \& I T Neely Dr


Synchro 11 Report

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HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 2: CJ Legacy Ranch Dr \& FM 407


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HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 3: CJ Legacy Ranch Dr \& Driveway


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HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 4: FM 407 \& Rayzor Rd Timing Plan: PM


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HCM 6th TWSC 2024 Background Plus Site (Scenario 1-For Buses + Passenger Car) 6: FM 407


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2024 Background Plus Site (Scenario 2 - For Buses only) 5: FM 407 \& McMakin Rd/Blanco Dr Timing Plan: AM

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | * | $\uparrow$ | 「 |  | $\uparrow \uparrow$ |  | \% | $\uparrow \uparrow$ | F | \% | ¢ $\uparrow$ | F |
| Traffic Volume (vph) | 242 | 11 | 31 | 18 | 12 | 7 | 43 | 439 | 7 | 3 | 816 | 321 |
| Future Volume (vph) | 242 | 11 | 31 | 18 | 12 | 7 | 43 | 439 | 7 | 3 | 816 | 321 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 | 175 |  | 175 |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 | 1 |  |  |
| Taper Length (t) | 25 |  |  | 25 |  |  | 170 |  |  | 100 |  |  |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Fit |  |  | 0.850 |  | 0.973 |  |  |  | 0.850 |  |  | 0.850 |
| Flt Protected | 0.950 |  |  |  | 0.976 |  | 0.950 |  |  | 0.950 |  |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3361 | 0 | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 |
| Flt Permitted | 0.488 |  |  |  | 0.928 |  | 0.280 |  |  | 0.484 |  |  |
| Satd. Flow (perm) | 909 | 1863 | 1583 | 0 | 3196 | 0 | 522 | 3539 | 1583 | 902 | 3539 | 1583 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  | Yes |
| Satd. Flow (RTOR) |  |  | 73 |  | 7 |  |  |  | 127 |  |  | 341 |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  | 50 |  |
| Link Distance (t) |  | 180 |  |  | 124 |  |  | 512 |  |  | 2145 |  |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  | 29.3 |  |
| Lane Group Flow (vph) | 257 | 12 | 33 | 0 | 39 | 0 | 46 | 467 | 7 | 3 | 868 | 341 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 6 |  |  |
| tector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 6 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 45.0 | 45.0 |
| Total Split (s) | 7.5 | 40.5 | 40.5 | 33.0 | 33. |  | 7.5 | 42.0 | 42.0 | 7.5 | 42.0 | 42.0 |
| Total Split (\%) | 8.3\% | 45.0\% | 45.0\% | 36.7\% | 36.7\% |  | 8.3\% | 46.7\% | 46.7\% | 8.3\% | 46.7\% | 46.7\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | Max | Max |
| Act Efft Green (s) | 10.4 | 10.4 | 10.4 |  | 6.2 |  | 42.9 | 42.3 | 42.3 | 41.2 | 39.5 | 39.5 |
| Actuated g/C Ratio | 0.16 | 0.16 | 0.16 |  | 0.10 |  | 0.68 | 0.67 | 0.67 | 0.65 | 0.62 | 0.62 |
| v/c Ratio | 1.25 | 0.04 | 0.10 |  | 0.12 |  | 0.11 | 0.20 | 0.01 | 0.00 | 0.39 | 0.31 |
| Control Delay | 172.2 | 21.9 | 2.2 |  | 25.1 |  | 4.7 | 5.3 | 0.0 | 4.3 | 8.0 | 1.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 172.2 | 21.9 | 2.2 |  | 25.1 |  | 4.7 | 5.3 | 0.0 | 4.3 | 8.0 | 1.8 |
| LOS | F | C | A |  | C |  | A | A | A | A | A |  |
| Approach Delay |  | 147.6 |  |  | 25.1 |  |  | 5.1 |  |  | 6.2 |  |
| Approach LOS |  | F |  |  | C |  |  | A |  |  | A |  |
| Queue Length 50th (tt) | $\sim 118$ | 4 | 0 |  | 6 |  | 5 | 32 | 0 | 0 | 101 | 0 |
| Queue Length 95th (tt) | \#258 | 16 | 6 |  | 20 |  | 15 | 74 | 0 | 3 | 147 | 32 |
| Internal Link Dist (ft) |  | 100 |  |  | 44 |  |  | 432 |  |  | 2065 |  |
| Turn Bay Length (ti) |  |  |  |  |  |  | 175 |  | 200 | 175 |  | 175 |
| Base Capacity (vph) | 206 | 1073 | 943 |  | 1462 |  | 413 | 2370 | 1102 | 629 | 2213 | 1117 |

TIA Study for Bartonville ELTS School in Bartonville, Texas
Synchro 11 Report

Timings
2024 Background Plus Site (Scenario 2 - For Buses only)
5: FM 407 \& McMakin Rd/Blanco Dr
-

TIA Study for Bartonville ELTS School in Bartonville, Texas


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HCM 6th TWSC
6: FM 407 \& Driveway 2
2024 Background Plus Site (Scenario 2 - For Buses only)


TIA Study for Bartonville ELTS School in Bartonville, Texas
RD

Timings 5: FM 407 \& McMakin Rd/Blanco Dr Timing Plan: PM

2024 Background Plus Site (Scenario 2 -For Buses only)

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | \% | $\uparrow$ | F |  | ¢ $\uparrow$ |  | * | $\uparrow \uparrow$ | ${ }^{7}$ |  | ${ }^{7}$ | ¢ $\uparrow$ |
| Traffic Volume (vph) | 503 | 11 | 42 | 9 | 8 | 5 | 49 | 833 | 11 | 1 | 2 | 735 |
| Future Volume (vph) | 503 | 11 | 42 | 9 | 8 | 5 | 49 | 833 | 11 | 1 | 2 | 735 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length (ft) | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Frt |  |  | 0.850 |  | 0.966 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.980 |  | 0.950 |  |  |  | 0.950 |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3351 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.588 |  |  |  | 0.955 |  | 0.298 |  |  |  | 0.288 |  |
| Satd. Flow (perm) | 1095 | 1863 | 1583 | 0 | 3265 | , | 555 | 3539 | 1583 | 0 | 536 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 5 |  |  |  | 127 |  |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance (t) |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow (vph) | 513 | 11 | 43 | 0 | 22 | 0 | 50 | 850 | 11 | 0 | 3 | 750 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | custom | pm+pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 1 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split (s) | 20.0 | 35.0 | 35.0 | 15.0 | 15.0 |  | 10.0 | 45.0 | 45.0 | 10.0 | 10.0 | 45.0 |
| Total Split (\%) | 22.2\% | 38.9\% | 38.9\% | 16.7\% | 16.7\% |  | 11.1\% | 50.0\% | 50.0\% | 11.1\% | 11.1\% | 50.0\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Effct Green (s) | 19.7 | 19.7 | 19.7 |  | 6.1 |  | 45.9 | 44.9 | 44.9 |  | 44.2 | 41.2 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 |  | 0.08 |  | 0.61 | 0.59 | 0.59 |  | 0.59 | 0.55 |
| V/c Ratio | 1.20 | 0.02 | 0.09 |  | 0.08 |  | 0.12 | 0.40 | 0.01 |  | 0.01 | 0.39 |
| Control Delay | 140.5 | 21.4 | 2.6 |  | 31.4 |  | 7.4 | 10.3 | 0.0 |  | 7.3 | 12.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 140.5 | 21.4 | 2.6 |  | 31.4 |  | 7.4 | 10.3 | 0.0 |  | 7.3 | 12.3 |
| LOS | F | C | A |  | C |  | A | B | A |  | A | B |
| Approach Delay |  | 127.8 |  |  | 31.4 |  |  | 10.0 |  |  |  | 10.2 |
| Approach LOS |  | F |  |  | C |  |  | A |  |  |  | B |
| Queue Length 50th (tt) | ~326 | 4 | 0 |  | 4 |  | 7 | 75 | 0 |  | 1 | 98 |
| Queue Length 95th (t) | \#512 | 16 | 11 |  | 16 |  | 25 | 216 | 0 |  | 4 | 186 |
| Internal Link Dist (tt) |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length (tt) |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity (vph) | 426 | 764 | 693 |  | 465 |  | 427 | 2106 | 993 |  | 405 | 1929 |

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Timings
5: FM 407 \& McMakin Rd/Blanco Dr


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5: FM 407 \& McMakin Rd/Blanco Dr
2024 Background Plus Site (Scenario 2 -For Buses only)

|  | $\rangle$ | $\rightarrow$ | 7 | $\checkmark$ | $\leftarrow$ | 4 | 4 | $\dagger$ | $p$ | 14 | $\checkmark$ | $\downarrow$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Starvation Cap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 | 0 |
| Reduced v/c Ratio | 1.20 | 0.01 | 0.06 |  | 0.05 |  | 0.12 | 0.40 | 0.01 |  | 0.01 | 0.39 |

$$
\begin{aligned}
& \text { Reduaged v/c Reation } \\
& \text { Redu }
\end{aligned}
$$

$\frac{\text { Intersection Summary }}{}$ Area Type:
Cycle Length: Other
Actuated
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/C Ratio: 1.20
Intersection Signal Delay: 37.3
Intersection Capacity Utilization $73.0 \%$
Analysis Period (min) 15
Analysis Period (min) 15
Queue shown is maximum after two cycles.
\# Queue shown is maximum atter two cycles.
Queue shown is maximum after two cycles.



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2024 Background Plus Site (Scenario 2 -For Buses only)

## 3: CJ Legacy Ranch Dr \& Driveway



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HCM 6th TWSC
2024 Background Plus Site (Scenario 2 -For Buses only)
6: FM 407


TIA Study for Bartonville ELTS School in Bartonville, Texas
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Synchro 11 Report

5：FM 407 \＆McMakin Rd／Blanco Dr

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | \％ | $\uparrow$ | 「 |  | 4t |  | \％ | 个个 | 「 | \％ | ¢ $\uparrow$ | 7 |
| Traffic Volume（vph） | 267 | 12 | 34 | 20 | 14 | 8 | 47 | 481 | 8 | 3 | 901 | 355 |
| Future Volume（vph） | 267 | 12 | 34 | 20 | 14 | 8 | 47 | 481 | 8 | 3 | 901 | 355 |
| Ideal Flow（vphpl） | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length（tt） | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 | 175 |  | 175 |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 | 1 |  |  |
| Taper Length（t） | 25 |  |  | 25 |  |  | 170 |  |  | 100 |  |  |
| Lane Util．Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Fit |  |  | 0.850 |  | 0.970 |  |  |  | 0.850 |  |  | 0.850 |
| Flt Protected | 0.950 |  |  |  | 0.977 |  | 0.950 |  |  | 0.950 |  |  |
| Satd．Flow（prot） | 1770 | 1863 | 1583 | 0 | 3354 | 0 | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 |
| Flt Permitted | 0.488 |  |  |  | 0.919 |  | 0.245 |  |  | 0.463 |  |  |
| Satd．Flow（perm） | 909 | 1863 | 1583 | 0 | 3155 | 0 | 456 | 3539 | 1583 | 862 | 3539 | 1583 |
| Right Turn on Red |  |  | Ye |  |  | Yes |  |  | Ye |  |  | S |
| Satd．Flow（RTOR） |  |  | 73 |  | 9 |  |  |  | 127 |  |  | 378 |
| Link Speed（mph） |  | 30 |  |  | 25 |  |  | 50 |  |  | 50 |  |
| Link Distance（t） |  | 180 |  |  | 124 |  |  | 512 |  |  | 2145 |  |
| Travel Time（s） |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  | 29.3 |  |
| Lane Group Flow（vph） | 284 | 13 | 36 | 0 | 45 | 0 | 50 | 512 | 9 | 3 | 959 | 378 |
| Turn Type | pm＋pt | NA | Perm | Perm | NA |  | pm＋pt | NA | Perm | pm＋pt | NA | Perm |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 6 |  |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 6 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial（s） | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split（s） | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 45.0 | 45.0 |
| Total Split（s） | 7.5 | 40.5 | 40.5 | 33.0 | 33.0 |  | 7.5 | 42.0 | 42.0 | 7.5 | 42.0 | 42.0 |
| Total Split（\％） | 8．3\％ | 45．0\％ | 45．0\％ | 36．7\％ | 36．7\％ |  | 8．3\％ | 46．7\％ | 46．7\％ | 8．3\％ | 46．7\％ | 46．7\％ |
| Yellow Time（s） | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All－Red Time（s） | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust（s） | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time（s） | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Lead／Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead－Lag Optimize？ | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | Max | Max |
| Act Effct Green（s） | 10.4 | 10.4 | 10.4 |  | 6.3 |  | 42.4 | 41.8 | 41.8 | 40.7 | 39.0 | 39.0 |
| Actuated g／C Ratio | 0.17 | 0.17 | 0.17 |  | 0.10 |  | 0.68 | 0.67 | 0.67 | 0.65 | 0.62 | 0.62 |
| V／c Ratio | 1.37 | 0.04 | 0.11 |  | 0.14 |  | 0.13 | 0.22 | 0.01 | 0.00 | 0.44 | 0.34 |
| Control Delay | 217.6 | 21.9 | 2.8 |  | 24.7 |  | 4.9 | 5.4 | 0.0 | 4.3 | 8.4 | 1.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 217.6 | 21.9 | 2.8 |  | 24.7 |  | 4.9 | 5.4 | 0.0 | 4.3 | 8.4 | 1.9 |
| LOS | F | C | A |  | C |  | A | A | A | A | A | A |
| Approach Delay |  | 186.8 |  |  | 24.7 |  |  | 5.3 |  |  | 6.6 |  |
| Approach LOS |  | F |  |  | C |  |  | A |  |  | A |  |
| Queue Length 50th（tt） | $\sim 144$ | 4 | 0 |  | 7 |  | 6 | 36 | 0 | 0 | 116 | 0 |
| Queue Length 95th（t） | \＃288 | 17 | 8 |  | 22 |  | 16 | 81 | 0 | 3 | 167 | 34 |
| Internal Link Dist（ft） |  | 100 |  |  | 44 |  |  | 432 |  |  | 2065 |  |
| Turn Bay Length（tt） |  |  |  |  |  |  | 175 |  | 200 | 175 |  | 175 |
| Base Capacity（vph） | 208 | 1083 | 951 |  | 1457 |  | 371 | 2360 | 1098 | 603 | 2204 | 1128 |

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Timings
5：FM 407 \＆McMakin Rd／Blanco Dr

| Lane Group |  | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Starvation | ap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 | 0 | 0 |  |
| Spillback | p Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 | 0 | 0 |  |
| Storage Ca | Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 | 0 | 0 |  |
| Reduced vid | Ratio | 1.37 | 0.01 | 0.04 |  | 0.03 |  | 0.13 | 0.22 | 0.01 | 0.00 | 0.44 | 0.34 |
| Intersection Summary |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Area Type：Other |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length： 90 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length： 62.7 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle： 100 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type：Actuated－Uncoordinated |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v／c Ratio： 1.37 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay： 32.8 |  |  |  |  |  | Intersection LOS：C |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 61．8\％Analysis Period（min）15 |  |  |  |  |  | ICU Level of Service B |  |  |  |  |  |  |  |
|  |  |  |  |  |  | Analysis Period（min） 15 |  |  |  |  |  |  |  |  |
| ～Volume exceeds capacity，queue is theoretically infinite． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| \＃95th percentile volume exceeds capacity，queue may be longer． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles． |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Splits and Phases：5：FM 407 \＆McMakin Rd／Blanco Dr |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\downarrow_{\oslash_{1}}$ | 402 |  |  |  |  |  | 484 |  |  |  |  |  |  |
| 7．5\％ | 42 s |  |  |  |  |  | 40.5 s |  |  |  |  |  |  |
| 405 | － 0 |  |  |  |  |  | $\%_{67}$ | $\leftarrow_{\square 8}$ |  |  |  |  |  |
| $7.5{ }^{7}{ }^{\text {\％}}$－ 42 s |  |  |  |  |  |  | 7．5！ | 33 s |  |  |  |  |  |

[^44]1: FM 407 \& I T Neely Dr


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## HCM 6th TWSC



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| 5: FM 407 \& McMakin Rd/Blanco Dr |  |  |  |  |  |  |  |  |  |  | Timing Plan: PM |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\rangle$ |  |  | 7 |  |  |  | $\uparrow$ | $p$ | 4 |  | $\downarrow$ |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Lane Configurations | \% | $\uparrow$ | $\bar{\square}$ |  | ¢ $\uparrow$ |  | \% | 个 $\uparrow$ | F |  | ${ }_{1}$ | $\uparrow \uparrow$ |
| Traffic Volume (vph) | 555 | 12 | 46 | 10 | 9 | 6 | 54 | 920 | 12 | 1 | 2 | 809 |
| Future Volume (vph) | 555 | 12 | 46 | 10 | 9 | 6 | 54 | 920 | 12 | 1 | 2 | 809 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length (t) | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Utill. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Fit |  |  | 0.850 |  | 0.964 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.980 |  | 0.950 |  |  |  | 0.950 |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3344 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.580 |  |  |  | 0.955 |  | 0.265 |  |  |  | 0.251 |  |
| Satd. Flow (perm) | 1080 | 1863 | 1583 | 0 | 3258 | 0 | 494 | 3539 | 1583 | 0 | 468 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 6 |  |  |  | 127 |  |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance ( t ) |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow (vph) | 566 | 12 | 47 | 0 | 25 | 0 | 55 | 939 | 12 | 0 | 3 | 826 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | custom | pm+pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 1 |  |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split (s) | 20.0 | 35.0 | 35.0 | 15.0 | 15.0 |  | 10.0 | 45.0 | 45.0 | 10.0 | 10.0 | 45.0 |
| Total Split (\%) | 22.2\% | 38.9\% | 38.9\% | 16.7\% | 16.7\% |  | 11.1\% | 50.0\% | 50.0\% | 11.1\% | 11.1\% | 50.0\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Effct Green (s) | 19.7 | 19.7 | 19.7 |  | 6.1 |  | 45.9 | 44.9 | 44.9 |  | 44.2 | 41.1 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 |  | 0.08 |  | 0.61 | 0.59 | 0.59 |  | 0.59 | 0.54 |
| v/c Ratio | 1.33 | 0.02 | 0.10 |  | 0.09 |  | 0.14 | 0.45 | 0.01 |  | 0.01 | 0.43 |
| Control Delay | 191.0 | 21.4 | 3.1 |  | 30.9 |  | 7.6 | 10.7 | 0.0 |  | 7.3 | 12.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 191.0 | 21.4 | 3.1 |  | 30.9 |  | 7.6 | 10.7 | 0.0 |  | 7.3 | 12.8 |
| LOS | F | C | A |  | C |  | A | B | A |  | A | B |
| Approach Delay |  | 173.7 |  |  | 30.9 |  |  | 10.4 |  |  |  | 10.5 |
| Approach LOS |  | F |  |  | C |  |  | B |  |  |  | B |
| Queue Length 50th (tt) | $\sim 378$ | 4 | 0 |  | 4 |  | 7 | 86 | 0 |  | 1 | 112 |
| Queue Length 95th (tt) | \#580 | 17 | 13 |  | 17 |  | 27 | 245 | 0 |  | 4 | 209 |
| Internal Link Dist (tt) |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length (t) |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity (vph) | 425 | 764 | 692 |  | 465 |  | 394 | 2105 | 993 |  | 370 | 1928 |

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Timings
5: FM 407 \& McMakin Rd/Blanco Dr

|  | $\downarrow$ |
| :---: | :---: |
| Lane Group | SBR |
| Larktconfigurations | $\overline{7}$ |
| Traffic Volume (vph) | 235 |
| Future Volume (vph) | 235 |
| Ideal Flow (vphpl) | 1900 |
| Storage Length (tt) | 175 |
| Storage Lanes | 1 |
| Taper Length (t) |  |
| Lane Util. Factor | 1.00 |
| Frt | 0.850 |
| Flt Protected |  |
| Satd. Flow (prot) | 1583 |
| Flt Permitted |  |
| Satd. Flow (perm) | 1583 |
| Right Turn on Red | Yes |
| Satd. Flow (RTOR) | 240 |
| Link Speed (mph) |  |
| Link Distance (t) |  |
| Travel Time (s) |  |
| Lane Group Flow (vph) | 240 |
| Turn Type | Perm |
| Protected Phases |  |
| Permitted Phases | 6 |
| Detector Phase | 6 |
| Switch Phase |  |
| Minimum Initial (s) | 5.0 |
| Minimum Split (s) | 45.0 |
| Total Split (s) | 45.0 |
| Total Split (\%) | 50.0\% |
| Yellow Time (s) | 3.5 |
| All-Red Time (s) | 1.0 |
| Lost Time Adjust (s) | 0.0 |
| Total Lost Time (s) | 4.5 |
| Lead/Lag | Lag |
| Lead-Lag Optimize? | Yes |
| Recall Mode | Max |
| Act Effict Green (s) | 41.1 |
| Actuated g/C Ratio | 0.54 |
| V/c Ratio | 0.25 |
| Control Delay | 2.7 |
| Queue Delay | 0.0 |
| Total Delay | 2.7 |
| LOS | A |
| Approach Delay |  |
| Approach LOS |  |
| Queue Length 50th (tt) | 0 |
| Queue Length 95th (tt) | 38 |
| Internal Link Dist (tt) |  |
| Turn Bay Length (tt) | 175 |
| Base Capacity (vph) | 971 |

TIA Study for Bartonville ELTS School in Bartonville, Texas
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## Lane Group

Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

TIA Study for Bartonville ELTS School in Bartonville, Texas
RD

## HCM 6th TWSC

1: FM 407 \& I T Neely Dr

| Intersection |
| :--- |
| Int Delay, S/veh $\quad 2.7$ |

$\begin{array}{lcllllll}\text { Int Delay, s/veh } & 2.7 & & & \\ \text { Movement } & \text { EBL } & \text { EBR } & \text { NBU } & \text { NBL } & \text { NBT } & \text { SBT } & \text { SBR }\end{array}$

$\begin{array}{ll}\text { Critical Hdwy Stg } 1 & 5.84 \\ \text { Critical Hdwy Stg } 2 & 5.84\end{array}$
$\begin{array}{lrrrrr}\text { Cnitical Hdwy Stg } 2 & 5.84 & & 0 & -\dot{3} \\ \text { Follow-up Hdwy } & 3.52 & 3.32 & 2.52 & 2.23 \\ \text { Pot Cap-1 Maneuver } & 48 & 448 & 252 & 542\end{array}$
$\left.\begin{array}{lrrrrrrl}\text { oot Cap-1 Maneuver } & 48 & 448 & 252 & 542 & - & - & - \\ \text { Stage 1 } & 252 & - & - & - & - & - & -\end{array}\right]$

| Stage 1 | 252 | - | - | - | - | - |
| :---: | :--- | :--- | :--- | :--- | :--- | :--- |
| Stage 2 | 373 | - | - | - | - | - |
| Platoon blocked, $\%$ |  |  |  |  | - | - |

$\begin{array}{llllllll}\text { Mov Cap-1 Maneuver } & 41 & 448 & 533 & 533 & - & - & - \\ \text { Mov Cap-2 Maneuver } & 41 & - & - & - & - & - & -\end{array}$ $\begin{array}{llllllll}\text { Stage } 1 & 215 & - & - & - & - & - & - \\ \text { Stage } 2 & 373 & - & - & - & - & - & -\end{array}$

|  |  |  |  |
| :--- | ---: | :--- | ---: |
| Approach | EB | NB | SB |
| HCM Control Delay, s | 139.2 | 0.7 | 0 |
| HCM LOS | F |  |  |


| HCM LOS | F |  |
| :--- | :--- | :--- | :--- | :--- |
| Minor Lane/Maior Mvmt | NBL |  |
| NBT EBLI 1 | SBT | SBR |

Minor Lane/Major Mvmt $\quad$ NBL NBT EBLn1 SBT SBR
Capacity (veh/h)
$0.146-0707$
HCM Control Delay (s) $12.9 \quad-1392$
HCM Lane LOS
$\begin{array}{lrrrll}\text { HCM Lane LOS } & \text { B } & - & F & - & - \\ \text { HCM 95th \%tile Q(veh) } & 0.5 & - & 3.2 & - & -\end{array}$

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HCM 6th TWSC
2: CJ Legacy Ranch Dr \& FM 407
$\qquad$


[^52]Synchro 11 Report
Sy

## HCM 6th TWSC

3: CJ Legacy Ranch Dr \& Driveway
Intersection

| Intersection |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Int Delay, s/veh | 0 |  |  |  |  |  |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations |  | $\uparrow$ | $\stackrel{\text { F }}{ }$ |  | M |  |
| Traffic Vol, veh/h | 0 | 2 | 0 | 0 | 0 | 0 |
| Future Vol, veh/h | 0 | 2 | 0 | 0 | 0 | 0 |
| 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 | $\cdot$ | 0 |  |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, \% | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 2 | 0 | 0 | 0 |  |



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HCM 6th TWSC
4: FM 407 \& Rayzor Rd
$\qquad$


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Page 4

## HCM 6th TWSC

6: FM 407

| Intersection |
| :--- |
| Int Delay, s/veh $\quad 0$ |


\section*{| Int Delay, s/veh | 0 |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |}



$\begin{array}{lrrrrrr}\text { Conflicting Peds, \#hr } & 0 & 0 & 0 & 0 & 0 & 0 \\ \text { Sign Control } & \text { Stop } & \text { Stop } & \text { Free } & \text { Free } & \text { Free } & \text { Free }\end{array}$
$\begin{array}{lrl}\text { Sign Control } & \text { Stop Stop Free Free Free Fee } \\ \text { RT Channelized } & \text { - None } & \text { - None }\end{array}$
$\begin{array}{llllll}\text { Storage Length } & 0 & - & - & - & - \\ \text { Veh in Median Storage, \# } & 0 & - & - & 0 & 0 \\ \text { Grade, } \% & 0 & - & - & 0 & 0\end{array}$
$\begin{array}{lrrrrrr}\text { Grade, \% } & 0 & - & - & 0 & 0 & - \\ \text { Peak Hour Factor } & 92 & 92 & 92 & 92 & 92 & 92 \\ \text { Heavy Vehicles, } \% & 2 & 2 & 2 & 2 & 2 & 2\end{array}$
$\begin{array}{lrrrrrr}\text { Heavy Vehicles, \% } & 2 & 2 & 2 & 2 & 2 & 2 \\ \text { Mumt Flow } & 0 & 0 & 0 & 1551 & 1265 & 0\end{array}$
Mumt Flow

$\begin{array}{llll}\text { Platoon blocked, \% } & & & \\ \text { Mov Cap-1 Maneuver } & 49 & 422 & 545\end{array}$
Mov Cap-2 Maneuver

| Stage 1 | 229 |
| :--- | ---: |
| Stage 2 | 414 |



Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR
Capacity (veh/h)
HCM Lane V/C Ratio
HCM Control Delay (s)
HCM Lane LOS
HCM 95th \%tile Q(veh)

TIA Study for Bartonville ELTS School in Bartonville, Texas
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Timings 5：FM 407 \＆McMakin Rd／Blanco Dr

Timing Plan：A 5：FM 407 \＆McMakin Rd／Blanco Dr Timing Plan：AM

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | \％ | $\uparrow$ | $\overline{7}$ |  | ＊ 1 |  | \％ | ¢个 | $\overline{7}$ |  | ${ }^{*}$ | 个 ${ }^{\text {¢ }}$ |
| Traffic Volume（vph） | 278 | 12 | 34 | 20 | 14 | 8 | 47 | 590 | 8 | 10 | 3 | 999 |
| Future Volume（vph） | 278 | 12 | 34 | 20 | 14 | 8 | 47 | 590 | 8 | 10 | 3 | 999 |
| Ideal Flow（vphpl） | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length（t） | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length（t） | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Util．Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Frt |  |  | 0.850 |  | 0.970 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.977 |  | 0.950 |  |  |  | 0.950 |  |
| Satd．Flow（prot） | 1770 | 1863 | 1583 | 0 | 3354 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.488 |  |  |  | 0.919 |  | 0.211 |  |  |  | 0.410 |  |
| Satd．Flow（perm） | 909 | 1863 | 1583 | 0 | 3155 | 0 | 393 | 3539 | 1583 | 0 | 764 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd．Flow（RTOR） |  |  | 73 |  | 9 |  |  |  | 127 |  |  |  |
| Link Speed（mph） |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance（t） |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time（s） |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow（vph） | 296 | 13 | 36 | 0 | 45 | 0 | 50 | 628 | 9 | 0 | 14 | 1063 |
| Turn Type | pm＋pt | NA | Perm | Perm | NA |  | pm＋pt | NA | Perm | custom | pm＋pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 1 |  |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial（s） | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split（s） | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split（s） | 7.5 | 40.5 | 40.5 | 33.0 | 33.0 |  | 7.5 | 42.0 | 42.0 | 7.5 | 7.5 | 42.0 |
| Total Split（\％） | 8．3\％ | 45．0\％ | 45．0\％ | 36．7\％ | 36．7\％ |  | 8．3\％ | 46．7\％ | 46．7\％ | 8．3\％ | 8．3\％ | 46．7\％ |
| Yellow Time（s） | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All－Red Time（s） | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust（s） | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time（s） | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead／Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead－Lag Optimize？ | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Effict Green（s） | 10.4 | 10.4 | 10.4 |  | 6.3 |  | 42.2 | 41.6 | 41.6 |  | 40.5 | 38.9 |
| Actuated g／C Ratio | 0.17 | 0.17 | 0.17 |  | 0.10 |  | 0.68 | 0.67 | 0.67 |  | 0.65 | 0.62 |
| v／c Ratio | 1.42 | 0.04 | 0.11 |  | 0.14 |  | 0.15 | 0.27 | 0.01 |  | 0.03 | 0.48 |
| Control Delay | 239.3 | 21.9 | 2.8 |  | 24.7 |  | 5.1 | 5.6 | 0.0 |  | 4.4 | 8.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 239.3 | 21.9 | 2.8 |  | 24.7 |  | 5.1 | 5.6 | 0.0 |  | 4.4 | 8.9 |
| LOS | F | C | A |  | C |  | A | A | A |  | A |  |
| Approach Delay |  | 206.5 |  |  | 24.7 |  |  | 5.5 |  |  |  | 7.0 |
| Approach LOS |  | F |  |  | C |  |  | A |  |  |  |  |
| Queue Length 50th（tt） | $\sim 156$ | 4 | 0 |  | 7 |  | 6 | 46 | 0 |  | 2 | 134 |
| Queue Length 95th（tt） | \＃301 | 17 | 8 |  | 22 |  | 16 | 101 | 0 |  | 7 | 192 |
| Internal Link Dist（tt） |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length（tt） |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity（vph） | 209 | 1087 | 954 |  | 1463 |  | 331 | 2357 | 1096 |  | 544 | 2200 |

[^55]5：FM 407 \＆McMakin Rd／Blanco Dr Timing Plan：AM

| Lane Group | SBR |
| :---: | :---: |
| Lanteontigurations | 「 |
| Traffic Volume（vph） | 365 |
| Future Volume（vph） | 365 |
| Ideal Flow（vphpl） | 1900 |
| Storage Length（t） | 175 |
| Storage Lanes | 1 |
| Taper Length（t） |  |
| Lane Util．Factor | 1.00 |
| Frt | 0.850 |
| Flt Protected |  |
| Satd．Flow（prot） | 1583 |
| Flt Permitted |  |
| Satd．Flow（perm） | 1583 |
| Right Turn on Red | Yes |
| Satd．Flow（RTOR） | 381 |
| Link Speed（mph） |  |
| Link Distance（ t ） |  |
| Travel Time（s） |  |
| Lane Group Flow（vph） | 388 |
| Turn Type | Perm |
| Protected Phases |  |
| Permitted Phases | 6 |
| Detector Phase | 6 |
| Switch Phase |  |
| Minimum Initial（ s ） | 5.0 |
| Minimum Split（s） | 45.0 |
| Total Split（s） | 42.0 |
| Total Split（\％） | 46．7\％ |
| Yellow Time（s） | 3.5 |
| All－Red Time（s） | 1.0 |
| Lost Time Adjust（s） | 0.0 |
| Total Lost Time（s） | 4.5 |
| Lead／Lag | Lag |
| Lead－Lag Optimize？ | Yes |
| Recall Mode | Max |
| Act Effict Green（s） | 38.9 |
| Actuated g／C Ratio | 0.62 |
| v／c Ratio | 0.34 |
| Control Delay | 2.0 |
| Queue Delay | 0.0 |
| Total Delay | 2.0 |
| LOS | A |
| Approach Delay |  |
| Approach LOS |  |
| Queue Length 50th（tt） | 1 |
| Queue Length 95th（t） | 36 |
| Internal Link Dist（t） |  |
| Turn Bay Length（ti） | 175 |
| Base Capacity（vph） | 1128 |

[^56]Synchro 11 Report

2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 5: FM 407 \& McMakin Rd/Blanco Dr Timing Plan: AM

|  |  | $\rightarrow$ |  |  |  |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
|  | EBL | EBT | EBR |  | WBT | WBR | NBL | NBT | NBR | SBU | SBL |
| SBT |  |  |  |  |  |  |  |  |  |  |  |
| Lane Group | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 |


\section*{| Intersection Summary |  |
| :--- | :--- |
| Area Type: Other |  |}

Cycle Length: 90
Actuated Cycle Length: 62.5
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.42
Intersection Signal Delay: 34.0
Intersection Capacity Utilization 65 1\%
Analysis Period (min) 15
Analysis Period (min) 15
$\sim$ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum atter two cycles.


[^57]RD

## Lane Group

Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

## TIA Study for Bartonville ELTS School in Bartonville, Texas

RD


[^58]HCM 6th TWSC 2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 2: CJ Legacy Ranch Dr \& FM 407


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HCM 6th TWSC
2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car)
6: FM 407 \& Driveway 2

|  |  |  |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | :--- | :--- | :--- |

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RD

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Timings 5: FM 407 \& McMakin Rd/Blanco Dr

Timing Plan: PM 5: FM 407 \& McMakin Rd/Blanco Dr Timing Plan: PM

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | \% | $\uparrow$ | $\stackrel{7}{ }$ |  | А $\hat{\text { t }}$ |  | \% | ¢ $\uparrow$ | 7 |  | \% | 个 ${ }^{\text {¢ }}$ |
| Traffic Volume (vph) | 556 | 12 | 46 | 10 | 9 | 6 | 54 | 931 | 12 | 3 | 2 | 832 |
| Future Volume (vph) | 556 | 12 | 46 | 10 | 9 | 6 | 54 | 931 | 12 | 3 | 2 | 832 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length (t) | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Fit |  |  | 0.850 |  | 0.964 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.980 |  | 0.950 |  |  |  | 0.950 |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3344 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.580 |  |  |  | 0.955 |  | 0.255 |  |  |  | 0.246 |  |
| Satd. Flow (perm) | 1080 | 1863 | 1583 | 0 | 3258 | 0 | 475 | 3539 | 1583 | 0 | 458 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 6 |  |  |  | 127 |  |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance (f) |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow (vph) | 567 | 12 | 47 | 0 | 25 | 0 | 55 | 950 | 12 | 0 | 5 | 849 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | custom | pm+pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 | 6 |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | , | 1 | 1 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split (s) | 20.0 | 35.0 | 35.0 | 15.0 | 15.0 |  | 10.0 | 45.0 | 45.0 | 10.0 | 10.0 | 45.0 |
| Total Split (\%) | 22.2\% | 38.9\% | 38.9\% | 16.7\% | 16.7\% |  | 11.1\% | 50.0\% | 50.0\% | 11.1\% | 11.1\% | 50.0\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Efft Green (s) | 19.7 | 19.7 | 19.7 |  | 6.1 |  | 45.9 | 44.9 | 44.9 |  | 44.2 | 41.1 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 |  | 0.08 |  | 0.61 | 0.59 | 0.59 |  | 0.59 | 0.54 |
| v/c Ratio | 1.33 | 0.02 | 0.10 |  | 0.09 |  | 0.14 | 0.45 | 0.01 |  | 0.01 | 0.44 |
| Control Delay | 192.0 | 21.4 | 3.1 |  | 30.9 |  | 7.7 | 10.8 | 0.0 |  | 7.2 | 12.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 192.0 | 21.4 | 3.1 |  | 30.9 |  | 7.7 | 10.8 | 0.0 |  | 7.2 | 12.9 |
| LOS | F | C | A |  | C |  | A | B | A |  | A | B |
| Approach Delay |  | 174.6 |  |  | 30.9 |  |  | 10.5 |  |  |  | 10.6 |
| Approach LOS |  | F |  |  | C |  |  | B |  |  |  | B |
| Queue Length 50th (tt) | $\sim 379$ | 4 | 0 |  | 4 |  | 7 | 87 | 0 |  | 1 | 116 |
| Queue Length 95th (tt) | \#582 | 17 | 13 |  | 17 |  | 27 | 249 | 0 |  | 6 | 216 |
| Internal Link Dist (tt) |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length (tt) |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity (vph) | 425 | 764 | 692 |  | 465 |  | 384 | 2105 | 993 |  | 365 | 1928 |

[^62]Timings 5: FM 407 \& McMakin Rd/Blanco Dr

| Lane Group | SBR |
| :---: | :---: |
| Larteonfigurations | F |
| Traffic Volume (vph) | 237 |
| Future Volume (vph) | 237 |
| Ideal Flow (vphpl) | 1900 |
| Storage Length (tt) | 175 |
| Storage Lanes | 1 |
| Taper Length (t) |  |
| Lane Util. Factor | 1.00 |
| Frt | 0.850 |
| Flt Protected |  |
| Satd. Flow (prot) | 1583 |
| Flt Permitted |  |
| Satd. Flow (perm) | 1583 |
| Right Turn on Red | Yes |
| Satd. Flow (RTOR) | 242 |
| Link Speed (mph) |  |
| Link Distance (t) |  |
| Travel Time (s) |  |
| Lane Group Flow (vph) | 242 |
| Turn Type | Perm |
| Protected Phases |  |
| Permitted Phases | 6 |
| Detector Phase | 6 |
| Switch Phase |  |
| Minimum Initial (s) | 5.0 |
| Minimum Split (s) | 45.0 |
| Total Split (s) | 45.0 |
| Total Split (\%) | 50.0\% |
| Yellow Time (s) | 3.5 |
| All-Red Time (s) | 1.0 |
| Lost Time Adjust (s) | 0.0 |
| Total Lost Time (s) | 4.5 |
| Lead/Lag | Lag |
| Lead-Lag Optimize? | Yes |
| Recall Mode | Max |
| Act Efft Green (s) | 41.1 |
| Actuated g/C Ratio | 0.54 |
| v/c Ratio | 0.25 |
| Control Delay | 2.7 |
| Queue Delay | 0.0 |
| Total Delay | 2.7 |
| LOS | A |
| Approach Delay |  |
| Approach LOS |  |
| Queue Length 50th (tt) | 0 |
| Queue Length 95th (tt) | 38 |
| Internal Link Dist (tt) |  |
| Turn Bay Length (t) | 175 |
| Base Capacity (vph) | 972 |

[^63]Synchro 11 Report

2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 5: FM 407 \& McMakin Rd/Blanco Dr Timing Plan: PM

|  | $\rangle$ | $\rightarrow$ | $\geqslant$ | 7 | 4 | 4 | 4 | $\dagger$ | $p$ | 4 | $\checkmark$ | $\downarrow$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Starvation Cap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 | 0 |
| Reduced v/c Ratio | 1.33 | 0.02 | 0.07 |  | 0.05 |  | 0.14 | 0.45 | 0.01 |  | 0.01 | 0.44 |

## $\begin{array}{ll}\text { Intersection Summary } & \\ \text { Area Type: Other }\end{array}$ <br> ycle Length: Other

## Actuated Cycle Len

Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.33
Intersection Signal Delay: 47.9
Intersection Capacity Utilization $78.6 \%$
Analysis Period (min) 15
Analysis Period (min) 15
$\sim \quad$ Volume exceeds capacity, queue is theoretically infil
Queue shown is maximum after two cycles.
\# Queue shown is maximum atter two cycles.
Queue shown is maximum after two cycles.


## Lane Group

Starvation Cap Reductn
spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

## TIA Study for Bartonville ELTS School in Bartonville, Texas

RD


[^64]HCM 6th TWSC 2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 2: CJ Legacy Ranch Dr \& FM 407


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HCM 6th TWSC
2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 3: CJ Legacy Ranch Dr \& Driveway Timing Plan: PM


[^66]Synchro 11 Report
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HCM 6th TWSC
2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 4: FM 407 \& Rayzor Rd Timing Plan: PM


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Synchro 11 Report
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TIA Study for Bartonville ELTS School in Bartonville, Texas
Synchro 11 Report
RD

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Configurations | ${ }^{*}$ | $\uparrow$ | F |  | 4 1 |  | \％ | 个个 | 「 | ${ }^{*}$ | ¢ $\uparrow$ |  |
| Traffic Volume（vph） | 267 | 12 | 34 | 20 | 14 | 8 | 47 | 484 | 8 | 3 | 901 | 355 |
| Future Volume（vph） | 267 | 12 | 34 | 20 | 14 | 8 | 47 | 484 | 8 | 3 | 901 | 355 |
| Ideal Flow（vphpl） | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length（t） | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 | 175 |  | 175 |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 | 1 |  | 1 |
| Taper Length（t） | 25 |  |  | 25 |  |  | 170 |  |  | 100 |  |  |
| Lane Util．Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Fit |  |  | 0.850 |  | 0.970 |  |  |  | 0.850 |  |  | 0.850 |
| Flt Protected | 0.950 |  |  |  | 0.977 |  | 0.950 |  |  | 0.950 |  |  |
| Satd．Flow（prot） | 1770 | 1863 | 1583 | 0 | 3354 | 0 | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 |
| Flt Permitted | 0.488 |  |  |  | 0.919 |  | 0.245 |  |  | 0.462 |  |  |
| Satd．Flow（perm） | 909 | 1863 | 1583 | 0 | 3155 | 0 | 456 | 3539 | 1583 | 861 | 3539 | 1583 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  | Yes |
| Satd．Flow（RTOR） |  |  | 73 |  | 9 |  |  |  | 127 |  |  | 378 |
| Link Speed（mph） |  | 30 |  |  | 25 |  |  | 50 |  |  | 50 |  |
| Link Distance（t） |  | 180 |  |  | 124 |  |  | 512 |  |  | 2145 |  |
| Travel Time（s） |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  | 29.3 |  |
| Lane Group Flow（vph） | 284 | 13 | 36 | 0 | 45 | 0 | 50 | 515 | 9 | 3 | 959 | 378 |
| Turn Type | pm＋pt | NA | Perm | Perm | NA |  | pm＋pt | NA | Perm | pm＋pt | NA | Perm |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  | 1 | 6 |  |
| Permitted Phases | 4 |  | 4 | 8 |  |  | 2 |  | 2 | 6 |  | 6 |
| etector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 6 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial（s） | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split（s） | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 45.0 | 45.0 |
| Total Split（s） | 7.5 | 40.5 | 40.5 | 33.0 | 33.0 |  | 7.5 | 42.0 | 42.0 | 7.5 | 42.0 | 42.0 |
| Total Split（\％） | 8．3\％ | 45．0\％ | 45．0\％ | 36．7\％ | 36．7\％ |  | 8．3\％ | 46．7\％ | 46．7\％ | 8．3\％ | 46．7\％ | 46．7\％ |
| Yellow Time（s） | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All－Red Time（s） | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust（s） | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lost Time（s） | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| Lead／Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lag | Lag |
| Lead－Lag Optimize？ | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | Max | Max |
| Act Effict Green（s） | 10.4 | 10.4 | 10.4 |  | 6.3 |  | 42.4 | 41.8 | 41.8 | 40.7 | 39.0 | 39.0 |
| Actuated g／C Ratio | 0.17 | 0.17 | 0.17 |  | 0.10 |  | 0.68 | 0.67 | 0.67 | 0.65 | 0.62 | 0.62 |
| v／c Ratio | 1.37 | 0.04 | 0.11 |  | 0.14 |  | 0.13 | 0.22 | 0.01 | 0.00 | 0.44 | 0.34 |
| Control Delay | 217.6 | 21.9 | 2.8 |  | 24.7 |  | 4.9 | 5.4 | 0.0 | 4.3 | 8.4 | 1.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 217.6 | 21.9 | 2.8 |  | 24.7 |  | 4.9 | 5.4 | 0.0 | 4.3 | 8.4 | 1.9 |
| LOS | F | C | A |  | C |  | A | A | A | A | A |  |
| Approach Delay |  | 186.8 |  |  | 24.7 |  |  | 5.3 |  |  | 6.6 |  |
| Approach LOS |  | F |  |  | C |  |  | A |  |  | A |  |
| Queue Length 50th（tt） | $\sim 144$ | 4 | 0 |  | 7 |  | 6 | 36 | 0 | 0 | 116 | 0 |
| Queue Length 95th（tt） | \＃288 | 17 | 8 |  | 22 |  | 16 | 82 | 0 | 3 | 167 | 34 |
| Internal Link Dist（ft） |  | 100 |  |  | 44 |  |  | 432 |  |  | 2065 |  |
| Turn Bay Length（ft） |  |  |  |  |  |  | 175 |  | 200 | 175 |  | 175 |
| Base Capacity（vph） | 208 | 1083 | 951 |  | 1457 |  | 371 | 2360 | 1098 | 603 | 2204 | 1128 |

[^68]RD

Timings 5：FM 407 \＆McMakin Rd／Blanco Dr


[^69]Synchro 11 Report


[^70]HCM 6th TWSC 2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 2: CJ Legacy Ranch Dr \& FM 407


[^71]Synchro 11 Report
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HCM 6th TWSC
2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car) 3: CJ Legacy Ranch Dr \& Driveway


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Synror 3


[^73]Synchro 11 Report
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HCM 6th TWSC
2029 Horizon Plus Site(Scenario 1-For Buses + Passenger Car)
6: FM 407 \& Driveway 2


TIA Study for Bartonville ELTS School in Bartonville, Texas
Synchro 11 Report
RD

Timings 5: FM 407 \& McMakin Rd/Blanco Dr

2029 Horizon Plus Site(Scenario 2 - For Buses only)

|  | $\rangle$ |  |  | $\checkmark$ |  |  | 4 | $\uparrow$ | $>$ | 4 | - | $\downarrow$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Lane Configurations | * | $\uparrow$ | F' |  | $4{ }^{4}$ |  | \% | 个4 | \% |  | * | ¢ $\uparrow$ |
| Traffic Volume (vph) | 555 | 12 | 46 | 10 | 9 | 6 | 54 | 920 | 12 | 1 | , | 812 |
| Future Volume (vph) | 555 | 12 | 46 | 10 | 9 | 6 | 54 | 920 | 12 | 1 | 2 | 812 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (t) | 0 |  | 0 | 0 |  | 0 | 175 |  | 200 |  | 175 |  |
| Storage Lanes | 1 |  | 1 | 0 |  | 0 | 1 |  | 1 |  | 1 |  |
| Taper Length (t) | 25 |  |  | 25 |  |  | 170 |  |  |  | 100 |  |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 | 1.00 | 0.95 |
| Frt |  |  | 0.850 |  | 0.964 |  |  |  | 0.850 |  |  |  |
| Flt Protected | 0.950 |  |  |  | 0.980 |  | 0.950 |  |  |  | 0.950 |  |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 0 | 3344 | 0 | 1770 | 3539 | 1583 | 0 | 1770 | 3539 |
| Flt Permitted | 0.580 |  |  |  | 0.955 |  | 0.264 |  |  |  | 0.251 |  |
| Satd. Flow (perm) | 1080 | 1863 | 1583 | 0 | 3258 | 0 | 492 | 3539 | 1583 | 0 | 468 | 3539 |
| Right Turn on Red |  |  | Yes |  |  | Yes |  |  | Yes |  |  |  |
| Satd. Flow (RTOR) |  |  | 73 |  | 6 |  |  |  | 127 |  |  |  |
| Link Speed (mph) |  | 30 |  |  | 25 |  |  | 50 |  |  |  | 50 |
| Link Distance (t) |  | 180 |  |  | 124 |  |  | 512 |  |  |  | 2145 |
| Travel Time (s) |  | 4.1 |  |  | 3.4 |  |  | 7.0 |  |  |  | 29.3 |
| Lane Group Flow (vph) | 566 | 12 | 47 | 0 | 25 | 0 | 55 | 939 | 12 | 0 | 3 | 829 |
| Turn Type | pm+pt | NA | Perm | Perm | NA |  | pm+pt | NA | Perm | custom | pm+pt | NA |
| Protected Phases | 7 | 4 |  |  | 8 |  | 5 | 2 |  |  | 1 | 6 |
| Permitted Phases | 4 |  | 4 | 8 |  |  | , |  | 2 | 1 | 6 |  |
| Detector Phase | 7 | 4 | 4 | 8 | 8 |  | 5 | 2 | 2 | 1 | 1 | 6 |
| Switch Phase |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |  | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 9.5 | 35.0 | 35.0 | 35.0 | 35.0 |  | 9.5 | 45.0 | 45.0 | 9.5 | 9.5 | 45.0 |
| Total Split (s) | 20.0 | 35.0 | 35.0 | 15.0 | 15.0 |  | 10.0 | 45.0 | 45.0 | 10.0 | 10.0 | 45.0 |
| Total Split (\%) | 22.2\% | 38.9\% | 38.9\% | 16.7\% | 16.7\% |  | 11.1\% | 50.0\% | 50.0\% | 11.1\% | 11.1\% | 50.0\% |
| Yellow Time (s) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| All-Red Time (s) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Lost Time (s) | 4.5 | 4.5 | 4.5 |  | 4.5 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 |
| Lead/Lag | Lead |  |  | Lag | Lag |  | Lead | Lag | Lag | Lead | Lead | Lag |
| Lead-Lag Optimize? | Yes |  |  | Yes | Yes |  | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None |  | None | Max | Max | None | None | Max |
| Act Effict Green (s) | 19.7 | 19.7 | 19.7 |  | 6.1 |  | 45.9 | 44.9 | 44.9 |  | 44.2 | 41.1 |
| Actuated g/C Ratio | 0.26 | 0.26 | 0.26 |  | 0.08 |  | 0.61 | 0.59 | 0.59 |  | 0.59 | 0.54 |
| v/c Ratio | 1.33 | 0.02 | 0.10 |  | 0.09 |  | 0.14 | 0.45 | 0.01 |  | 0.01 | 0.43 |
| Control Delay | 191.0 | 21.4 | 3.1 |  | 30.9 |  | 7.6 | 10.7 | 0.0 |  | 7.3 | 12.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 |  | 0.0 |  | 0.0 | 0.0 | 0.0 |  | 0.0 | 0.0 |
| Total Delay | 191.0 | 21.4 | 3.1 |  | 30.9 |  | 7.6 | 10.7 | 0.0 |  | 7.3 | 12.8 |
| LOS | F | C | A |  | C |  | A | B | A |  | A | B |
| Approach Delay |  | 173.7 |  |  | 30.9 |  |  | 10.4 |  |  |  | 10.5 |
| Approach LOS |  | F |  |  | C |  |  | B |  |  |  | B |
| Queue Length 50th (tt) | ~378 | 4 | 0 |  | 4 |  | 7 | 86 | 0 |  | 1 | 112 |
| Queue Length 95th (tt) | \#580 | 17 | 13 |  | 17 |  | 27 | 245 | 0 |  | 4 | 210 |
| Internal Link Dist (ft) |  | 100 |  |  | 44 |  |  | 432 |  |  |  | 2065 |
| Turn Bay Length (ti) |  |  |  |  |  |  | 175 |  | 200 |  | 175 |  |
| Base Capacity (vph) | 425 | 764 | 692 |  | 465 |  | 393 | 2105 | 993 |  | 370 | 1928 |

[^74]Timings 5: FM 407 \& McMakin Rd/Blanco Dr

| Lane Group | SBR |
| :---: | :---: |
| Larteoonfigurations | F |
| Traffic Volume (vph) | 235 |
| Future Volume (vph) | 235 |
| Ideal Flow (vphpl) | 1900 |
| Storage Length (t) | 175 |
| Storage Lanes | 1 |
| Taper Length (t) |  |
| Lane Utill. Factor | 1.00 |
| Frt | 0.850 |
| Flt Protected |  |
| Satd. Flow (prot) | 1583 |
| Flt Permitted |  |
| Satd. Flow (perm) | 1583 |
| Right Turn on Red | Yes |
| Satd. Flow (RTOR) | 240 |
| Link Speed (mph) |  |
| Link Distance (t) |  |
| Travel Time (s) |  |
| Lane Group Flow (vph) | 240 |
| Turn Type | Perm |
| Protected Phases |  |
| Permitted Phases | 6 |
| Detector Phase | 6 |
| Switch Phase |  |
| Minimum Initial (s) | 5.0 |
| Minimum Split (s) | 45.0 |
| Total Split (s) | 45.0 |
| Total Split (\%) | 50.0\% |
| Yellow Time (s) | 3.5 |
| All-Red Time (s) | 1.0 |
| Lost Time Adjust (s) | 0.0 |
| Total Lost Time (s) | 4.5 |
| Lead/Lag | Lag |
| Lead-Lag Optimize? | Yes |
| Recall Mode | Max |
| Act Effict Green (s) | 41.1 |
| Actuated g/C Ratio | 0.54 |
| v/c Ratio | 0.25 |
| Control Delay | 2.7 |
| Queue Delay | 0.0 |
| Total Delay | 2.7 |
| LOS | A |
| Approach Delay |  |
| Approach LOS |  |
| Queue Length 50th (tt) | 0 |
| Queue Length 95th (tt) | 38 |
| Internal Link Dist (tt) |  |
| Turn Bay Length (tt) | 175 |
| Base Capacity (vph) | 971 |

[^75]Synchro 11 Report
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## Timings

 5: FM 407 \& McMakin Rd/Blanco Dr|  | $\dagger$ |  |  |  |  | $\pm$ |  | $\uparrow$ | P | 4 | $\checkmark$ | $\downarrow$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBU | SBL | SBT |
| Staration Cap Reductn | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 |  |
| Spillback Cap Reductm | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 |  |
| Storage Cap Reductm | 0 | 0 | 0 |  | 0 |  | 0 | 0 | 0 |  | 0 |  |
| Reduced V/c Ratio | 1.33 | 0.02 | 0.07 |  | 0.05 |  | 0.14 | 0.45 | 0.01 |  | 0.01 | 0.43 |

## $\frac{\text { Intersection Summary }}{\text { Area Type: }}$ Other <br> Cycle Length: Other <br> Cycle Length: 90

Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum V/C Ratio: 1.33
Intersection Signal Delay: 18.0
Analysis Period (min) 15
Analysis Period (min) 15
Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum ater two cycles.
\# Queue shown is maximum atter two cycles.
Queue shown is maximum atter two cycles.


Starvation Cap Reductn
Spillback Cap Reductn
Storage Cap Reductn
Reduced v/c Ratio
Intersection Summary

TIA Study for Bartonville ELTS School in Bartonville, Texas
RD


[^76]RD
2: CJ Legacy Ranch Dr \& FM $407 \quad$ Timing Plan: PM


[^77]Synchro 11 Report
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HCM 6th TWSC
2029 Horizon Plus Site(Scenario 2 - For Buses only)

## 3: CJ Legacy Ranch Dr \& Driveway



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[^79]Synchro 11 Report
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HCM 6th TWSC
6: FM 407
2029 Horizon Plus Site(Scenario 2 - For Buses only)


TIA Study for Bartonville ELTS School in Bartonville, Texas
RD

## Appendix E. Supplemental Information

population growth indicates that growth is moving northward out of Tarrant County. Cities within close proximity to Bartonville have experienced increased rates of population growth over the past ten years. Table 1-1 shows population growth for Bartonville, Denton County, and selected area cities from 1990 to 2016.

Table 1-1
Population Growth 1980 to 2016

| Place | Population Estimate |  |  |  | Growth 1990-2016 |  | Compound Growth Rate |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1990 | 2000 | 2010 | 2016 | Change | \% Change | 1990-2010 | 2010-2016 |
| Bartonville | 849 | 1,093 | 1,469 | 1,650 | 801 | 94.3\% | 1.8\% | 1.2\% |
| Denton County | 273,525 | 432,976 | 662,614 | 784,840 | 511,315 | 186.9\% | 3.0\% | 1.7\% |
| Argyle | 1,575 | 2,365 | 3,282 | 3,820 | 2,245 | 142.5\% | 2.5\% | 1.5\% |
| Copper Canyon | 978 | 1,216 | 1,334 | 1,380 | 402 | 41.1\% | 1.0\% | 0.3\% |
| Corinth | 3,944 | 11,325 | 19,935 | 20,740 | 16,796 | 425.9\% | 5.5\% | 0.4\% |
| Denton | 66,270 | 80,537 | 113,383 | 125,980 | 59,710 | 90.1\% | 1.8\% | 1.1\% |
| Double Oak | 1,664 | 2,179 | 2,867 | 2,950 | 1,286 | 77.3\% | 1.8\% | 0.3\% |
| Flower Mound | 15,527 | 50,702 | 64,669 | 69,080 | 53,553 | 344.9\% | 4.9\% | 0.7\% |
| Hickory Creek | 1,893 | 2,078 | 3,247 | 3,730 | 1,837 | 97.0\% | 1.8\% | 1.4\% |
| Highland Village | 7,027 | 12,173 | 15,056 | 15,370 | 8,343 | 118.7\% | 2.6\% | 0.2\% |

SOURCE: U.S. Census, 1990, 2000, 2010, 2016

The data shows that Bartonville and its neighboring cities have experienced a moderate rate of growth over the past ten years. From 2000 to 2016, Bartonville has grown at a rate that is similar to Denton County as a whole. It is anticipated that the county population growth pattern will continue and that Bartonville will continue to experience a healthy rate of growth. Due to the limited opportunities for additional residential development within the Bartonville Planning Area, it is also expected that Bartonville's residential areas will build-out relatively quickly.

## Elementary School

## Description

An elementary school is a public school that typically serves students attending kindergarten through the fifth or sixth grade. An elementary school is usually centrally located in a residential community to facilitate student access. Bus service is commonly provided to students living beyond a specified distance from the school. Middle school/junior high school (Land Use 522), private school (K-8) (Land Use 530), private school (K-12) (Land Use 532), charter elementary school (Land Use 536), and charter school (K-12) (Land Use 538) are related uses.

## Additional Data

Elementary school students generally used school buses more than regular transit and were dropped off and picked up more than high school students, who were apt to walk longer distances, ride bicycles, or, in some cases, drive to school. The percentage of students at the sites who were transported to school via bus varied considerably. Some sites experienced higher than (average trip rates because many students did not utilize the available school bus service. Due) to the varied transit and school bus usage at these sites, it is desirable that future studies report additional detail on the percentage of students who were bused to school and the percentage that were dropped off and picked up.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alabama, Arizona, British Columbia (CAN), California, Connecticut, Florida, Hawaii, Minnesota, Montana, Nevada, New York, Oregon, Texas, Utah, Washinton, and West Virginia.

## Source Numbers

$186,383,390,395,533,536,572,579,583,609,611,612,613,632,707,852,856,858,866,877$, 878, 896, 940, 1039, 1048, 1067, 1083

| Metric |  |  |  | US Customary |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Design | Stopping sight distance (m) | Intersection sight distance for passenger cars |  | Design speed (mph) | Stopping sight distance (ft) | Intersection sight distance for passenger cars |  |
| speed <br> (km/h) |  | Calculated (m) | Design (m) |  |  | Calculated <br> (ft) | Design (ft) |
| 20 | 20 | 36.1 | 40 | 15 | 80 | 143.3 | 145 |
| 30 | 35 | 54.2 | 55 | 20 | 115 | 191.1 | 195 |
| 40 | 50 | 72.3 | 75 | 25 | 155 | 238.9 | 240 |
| 50 | 65 | 90.4 | 95 | 30 | 200 | 286.7 | 290 |
| 60 | 85 | 108.4 | 110 | 35 | 250 | 334.4 | 335 |
| 70 | 105 | 126.5 | 130 | 40 | 305 | 382.2 | 385 |
| 80 | 130 | 144.6 | 145 | 45 | 360 | 430.0 | 430 |
| 90 | 160 | 162.6 | 165 | 50 | 425 | 477.8 | 480 |
| 100 | 185 | 180.7 | 185 | 55 | 495 | 525.5 | 530 |
| 110 | 220 | 198.8 | 200 | 60 | 570 | 573.3 | 575 |
| 120 | 250 | 216.8 | 220 | 65 | 645 | 621.1 | 625 |
| 130 | 285 | 234.9 | 235 | 70 | 730 | 668.9 | 670 |
|  |  |  |  | 75 | 820 | 716.6 | 720 |
|  |  |  |  | 80 | 910 | 764.4 | 765 |

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or cross a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap must be adjusted and required sight distance recalculated.

Exhibit 9-58. Design Intersection Sight Distance-Case B2——Right Turn from Stop and Case B3-Crossing Maneuver

| Metric |  |  |  | US Customary |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Design speed (km/h) | Stopping sight distance (m) | Intersection sight distance for passenger cars |  | Design speed (mph) | Stopping sight distance (ft) | Intersection sight distance for passenger cars |  |
|  |  | Calculated (m) | Design (m) |  |  | Calculated (ft) | Design (ft) |
| 20 | 20 | 41.7 | 45 | 15 | 80 | 165.4 | 170 |
| 30 | 35 | 62.6 | 65 | 20 | 115 | 220.5 | 225 |
| 40 | 50 | 83.4 | 85 | 25 | 155 | 275.6 | 280 |
| 50 | 65 | 104.3 | 105 | 30 | 200 | 330.8 | 335 |
| 60 | 85 | 125.1 | 130 | 35 | 250 | 385.9 | 390 |
| 70 | 105 | 146.0 | 150 | 40 | 305 | 441.0 | 445 |
| 80 | 130 | 166.8 | 170 | 45 | 360 | 496.1 | 500 |
| 90 | 160 | 187.7 | 190 | 50 | 425 | 551.3 | 555 |
| 100 | 185 | 208.5 | 210 | 55 | 495 | 606.4 | 610 |
| 110 | 220 | 229.4 | 230 | 60 | 570 | 661.5 | 665 |
| 120 | 250 | 250.2 | 255 | 65 | 645 | 716.6 | 720 |
| 130 | 285 | 271.1 | 275 | 70 | 730 | 771.8 | 775 |
|  |  |  |  | 75 | 820 | 826.9 | 830 |
|  |  |  |  | 80 | 910 | 882.0 | 885 |

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap must be adjusted and required sight distance recalculated.

Exhibit 9-55. Design Intersection Sight Distance—Case B1—Left Turn from Stop

Existing Zoning Map
Please confirm accuracy / currency of data with contact on cover


Future Land Use Plan
Please confirm accuracy / currency of data with contact on cover



Denton County Thoroughfare Plan Approved: April 18, 2017

## LEGEND

Road Types
Freeway/Highway
Toll Road
$\Longrightarrow \begin{aligned} & \text { Principal Arterial } 6 \text { Lane } \\ & \text { Divided (120' to 160' ROW) }\end{aligned}$
Principal Arterial 4 Lane
Divided (100' to 120' ROW
Major Arterial 6 Lane Divided
(120' to $140^{\prime}$ ROW)
$=\left[\begin{array}{c}\text { Major Arterial 4 Lane Divided } \\ \left(100^{\prime} \text { to 120' ROW) }\right.\end{array}\right.$
Minor Arterial 4 Lane Undivided
One-way Couplet (Lanes and
$\ldots$ Minor Arterial 2 Lane ( $70^{\prime}$
$\stackrel{\square}{\square \square}$
County Line
Airport
Rail Line
$\sum$ Lake
1-Percent Flood Risk Zones
(FEMA)


## ©



Exhibit 3

## ELTSF ADDITION <br> FLOOD STUDY

Loving Branch
Bartonville, TX


Prepared by:
CARDINAL
Strategies
TBPE Firm No. F-11976
Prepared for:

October 12, 2023


# (た) <br> CARDINAL Strategies 

CCM Engineering<br>Attn: Cody Crannell, P.E.<br>2570 Justin Road<br>Highland Village, TX 75077

## October 12, 2023

Re: Flood Study - Loving Branch
Project Name - ELTSF Addition, Bartonville, TX

## Dear Mr. Crannell:

Enclosed is the Flood Study Report for Loving Branch to support the proposed improvements in Bartonville, Texas. This report includes hydrologic and hydraulic modeling and results for the Pre-Project and Post-Project conditions for FEMA effective and fully-developed flows.

Should you have any questions or concerns, please do not hesitate to contact me at (214) 986-2283 to discuss any items related to this report.

Sincerely,


John Foose, P.E, CFM
Cardinal Strategies Engineering Services, LLC
TBPE Firm Registration No. F-11976
CARDINALSTRATEGIES

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### 1.0 Project Description

1.1 Purpose

The purpose of this flood study is to evaluate the 100-year fully-developed peak discharges for Loving Branch in the vicinity of the ELTSF Addition development. The improvement includes the expansion of existing private drive and proposed construction of a secondary drive from FM-407 E. A hydrologic and hydraulic evaluation was performed for the watershed and stream. This study will establish the existing and ultimate 100-year channel velocities and water surface elevations of the floodplain for Loving Branch.

### 1.2 Site Location and Proposed Improvements

A new school building is proposed on the 95-acre site for the Education Leads to Success Foundation. The site is located on FM-407 East, Loving Branch flows from south to north through the site. The site location can be seen in Figure 1.

### 1.3 FEMA Flood Insurance Rate Map

Loving Branch is currently mapped as a FEMA Zone AE with floodway on the Flood Insurance Rate Map (FIRM) 48121C0510G dated April 18, 2011, as shown in Figure 2.

### 1.4 Data Collection

Data obtained in support of the ELTSF Addition flood study includes:

- Texas Natural Resources Information System (TNRIS) 1m Lidar dated 2020.
- Soils provided by USDA Natural Resources Conservation Service (NRCS).
- Future Land Use Map of the Town of Bartonville effective by 2037.
- Engineering Plans and Survey by CCM Engineering dated June 2023

The horizontal datum utilized for the project is the NAD83 Texas State Plane North Central Zone FIPS 4202. The vertical datum is NAVD88.



### 2.0 Hydrologic Analysis

A hydrologic analysis was performed for Loving Branch to calculate fully-developed peak discharges in the stream for the hydraulic analysis. The intersection of Loving Branch and FM-407 East crossing is the downstream extent of the hydrologic analysis.

A fully-developed SCS Unit Hydrograph model was created for the analysis using HECHMS version 4.10.

The drainage areas for Loving Branch were delineated using 1-foot contours from 2020 TNRIS lidar data. Figures 3 provides the fully-developed hydrologic map.

The watershed is comprised of type A, B, C and D soils provided by the NRCS. The SCS Curve Number and SCS time of concentration methods were used to estimate losses and lag times. The curve number values from from iSWM are shown below in Table 1.

Table 7 - Land Use Curve Numbers

| HMS Element | Curve Number by Soil Group |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | A | B | C | D |
| Open Space - Good | 39 | 61 | 74 | 80 |
| Commercial/Business | 89 | 92 | 94 | 95 |
| Industrial | 81 | 88 | 91 | 93 |
| Residential - 2 acre | 46 | 65 | 77 | 82 |
| Paved - Roads | 98 | 98 | 98 | 98 |

The times of concentration were calculated for the longest flow paths using TNRIS 1-foot contours and the equations used for calculating sheet, shallow, and channel flow. The calculations for the longest flow paths can be found in Appendix B. The time of concentration for each basin were converted to lag times by multiplying each value by 0.6. Lag times are provided in Table 2.

The fully-developed land use was developed based on the Town of Bartonville 2037 Comprehensive Plan. The composite curve number for each basin is shown below in Table 2. Muskingum-Cunge was used for all the routing reaches. The shapefile used for the routing can be found in Appendix D. The calculations can be found in Appendix B.

The rainfall depth used in this hydrologic analysis was obtained from the Denton Rainfall Table of iSWM Technical Manual, April 2020.

Table 2 - Fully-Developed Hydrologic Parameters

| HMS <br> Element | Area <br> $\left(\mathbf{m}^{2}\right)$ | Area <br> (acres) | Curve <br> Number | Lag Time <br> $(\mathbf{m i n})$ |
| :---: | :---: | :---: | :---: | :---: |
| DA_01 | 0.1918 | 122.75 | 74.2 | 12.0 |
| DA_02 | 0.5795 | 370.89 | 76.7 | 19.6 |
| DA_03 | 0.7645 | 489.25 | 76.6 | 13.3 |
| DA_04 | 0.0593 | 37.95 | 90.3 | 7.2 |
| DA_05 | 0.2633 | 168.54 | 69.5 | 11.9 |



### 2.1 Results

The results of 100-yr fully-developed peak discharges are shown below in Table 3. The following flow will be used in the hydraulic analysis to study the impacts of proposed driveway expansion. Section 4.0 describes hydraulic modeling.

Table 3 -Fully-Developed Hydrologic Results

| HMS Element | Peak Discharge <br> (cfs) |
| :---: | :---: |
| J-01 | 650 |
| J-02 | 2225 |
| J-03 | 3185 |
| J-04 | 3925 |

### 3.0 Hydraulic Analysis

A hydraulic model was built for Loving Branch to evaluate the impacts of the proposed construction of the private drive in the stream. A hydraulic model was created using HEC-RAS version 6.3.1. The following sections will provide more detail for both the PreProject and Post-Project analysis.

### 3.1 Flows Data

The FEMA Effective multiple profiles utilized effective WSELs at existing cross section letter "G" provided in the LOMR 11-06-3364P.The existing multiple profiles use the revised effective water surface elevation from LOMR study for the downstream boundary condition, while the fully-developed flows utilized the normal depth of 0.00314 $\mathrm{ft} / \mathrm{ft}$. Table 4 shows the peak discharges used in the hydraulic analysis.

Table 4 - Peak Discharges

| Cross- <br> Section | $10 \%$ <br> (cfs) | $2 \%$ <br> $($ cfs $)$ | $1 \%$ <br> $($ cfs $)$ | $0.2 \%$ <br> $(c f s)$ | $1 \%$ FD <br> (cfs) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 4455 | 1280 | 1730 | 1930 | 2340 | 2225 |
| 1984 | 1770 | 2440 | 2740 | 3340 | 3185 |
| 733 | 1900 | 2730 | 3070 | 3740 | 3925 |

### 3.2 Pre-Project

Cross sections were cut approximately every 200 feet starting from FEMA cross-section letter "J" to cross-section letter "G". Cross sections were made from the 2020 TNRIS points and on-site survey to develop an existing conditions geometry for the stream. Aerial imagery was used to determine the roughness coefficients for the channel and overbanks of the model. The Manning's roughness values range from 0.045 to 0.05 .

Table 5 shows the difference of 100YR WSELs under the existing and fully-developed conditions. The two profiles use the same geometry but different flow data and downstream boundary conditions.

Table 5 - 100 YR Comparison - Existing vs Fully-Developed Conditions.

| CrossSection | Existing WSEL (ft) | Fully-Developed WSEL (ft) | Difference <br> (ft) |
| :---: | :---: | :---: | :---: |
| 4450 | 628.69 | 628.84 | 0.15 |
| 4195 | 627.63 | 627.78 | 0.15 |
| 3932 | 626.04 | 626.16 | 0.12 |
| 3652 | 624.2 | 624.34 | 0.14 |
| 317 | 621.8 | 627.97 | 0.17 |
| 2848 | 620.1 | 620.19 | 0.09 |
| 2659 | 618.66 | 618.88 | 0.22 |
| 2024 | 618.14 | 618.32 | 0.18 |
| 1984 | 618.08 | 618.25 | 0.17 |
| 1912 | Private Drive |  |  |
| 1857 | 616.52 | 616.86 | 0.34 |
| 1577 | 616.24 | 616.62 | 0.38 |
| 1414 | 616.12 | 616.5 | 0.38 |
| 1383 | 616.1 | 616.49 | 0.39 |
| 1272 | 615.85 | 616.27 | 0.42 |
| 1237 | 615.49 | 615.85 | 0.36 |
| 938 | 612.82 | 613.29 | 0.47 |
| 890 | 612.42 | 612.93 | 0.51 |
| 759 | FM-407 E |  |  |
| 733 | 612.53 | 612.96 | 0.43 |
| 622 | 612.02 | 612.45 | 0.43 |
| 237 | 617.1 | 611.75 | 0.65 |

### 3.3 Post-Project

The Pre-Project model was used as the starting point for the Post-Project hydraulic analysis. The existing drive across Loving Branch is widened by 10 ft and the upstream deck elevation is updated. The Post-Project model incorporates the second proposed drive from the grading plan provided by CCM Engineering. A $7^{\prime} \times 4^{\prime}$ box culvert is proposed underneath the proposed drive as it crosses through the main channel at the entrance with FM-407 E. Grading is proposed to mitigate the rises in water surface elevation. The engineering plan can be found in Appendix A. The results of hydraulic analysis are shown below.

### 3.4 Results

The comparisons provided in Tables 6-9 demonstrate that the ELTSF Addition development does not cause any adverse changes to 100-YR existing and fullydeveloped water surface elevation and channel velocity in Loving Branch. Figure 4 shows the fully-developed hydraulic workmap.

Table 6 - Existing 100-YR Water Surface Elevations Comparison.

| Cross- <br> Section | Pre-Project WSEL (ft) | Post-Project WSEL (ft) | Difference <br> (ft) |
| :---: | :---: | :---: | :---: |
| 4450 | 628.69 | 628.69 | 0.00 |
| 4195 | 627.63 | 627.63 | 0.00 |
| 3932 | 626.04 | 626.04 | 0.00 |
| 3652 | 624.2 | 624.2 | 0.00 |
| 3117 | 621.8 | 621.8 | 0.00 |
| 2848 | 620.1 | 620.1 | 0.00 |
| 2659 | 618.66 | 618.66 | 0.00 |
| 2024 | 618.14 | 618.12 | -0.02 |
| 1984 | 618.08 | 618.06 | -0.02 |
| 1912 | Private Drive |  |  |
| 1857 | 616.52 | 616.45 | -0.07 |
| 1577 | 616.24 | 616.19 | -0.05 |
| 1414 | 616.12 | 616.08 | -0.04 |
| 1383 | 616.1 | 616.06 | -0.04 |
| 1300 | Proposed Drive |  |  |
| 1272 | 615.85 | 615.84 | -0.01 |
| 1237 | 615.49 | 615.48 | -0.01 |
| 938 | 612.82 | 612.82 | 0.00 |
| 890 | 612.42 | 612.42 | 0.00 |
| 759 | FM-407 E |  |  |
| 733 | 612.53 | 612.53 | 0.00 |
| 622 | 612.02 | 612.02 | 0.00 |
| 237 | 611.1 | 611.1 | 0.00 |

Table 7 - Fully Developed 100-YR Water Surface Elevations Comparison.

| CrossSection | Pre-Project WSEL (ft) | Post-Project WSEL (ft) | Difference <br> (ft) |
| :---: | :---: | :---: | :---: |
| 4450 | 628.84 | 628.84 | 0.00 |
| 4195 | 627.78 | 627.78 | 0.00 |
| 3932 | 626.16 | 626.16 | 0.00 |
| 3652 | 624.34 | 624.34 | 0.00 |
| 3171 | 621.97 | 621.97 | 0.00 |
| 2848 | 620.19 | 620.19 | 0.00 |
| 2659 | 618.87 | 618.86 | -0.01 |
| 2024 | 618.32 | 618.29 | -0.03 |
| 1984 | 618.25 | 618.22 | -0.03 |
| 1912 | Private Drive |  |  |
| 1857 | 616.86 | 616.81 | -0.05 |
| 1577 | 616.62 | 616.58 | -0.04 |
| 1414 | 616.50 | 616.48 | -0.02 |
| 1383 | 616.49 | 616.46 | -0.03 |
| 1300 | Proposed Drive |  |  |
| 1272 | 616.27 | 616.25 | -0.02 |
| 1237 | 615.85 | 615.86 | 0.01 |
| 938 | 613.29 | 613.29 | 0.00 |
| 890 | 612.94 | 612.94 | 0.00 |
| 759 | FM-407 E |  |  |
| 733 | 612.96 | 612.96 | 0.00 |
| 622 | 612.45 | 612.45 | 0.00 |
| 237 | 611.75 | 611.75 | 0.00 |

Table 8 - Existing 100-YR Channel Velocity Comparison.

| CrossSection | Pre-Project Velocity (fps) | Post-Project Velocity (fps) | Difference (ft) |
| :---: | :---: | :---: | :---: |
| 4450 | 5.27 | 5.27 | 0.00 |
| 4195 | 5.14 | 5.14 | 0.00 |
| 3932 | 5.59 | 5.59 | 0.00 |
| 3652 | 4.22 | 4.21 | -0.01 |
| 3111 | 3.20 | 3.20 | 0.00 |
| 2848 | 4.77 | 4.76 | -0.01 |
| 2659 | 2.97 | 2.97 | 0.00 |
| 2024 | 1.98 | 1.99 | 0.01 |
| 1984 | 2.64 | 2.65 | 0.01 |
| 1912 | Private Drive |  |  |
| 1857 | 3.18 | 3.29 | 0.11 |
| 1577 | 2.77 | 2.62 | -0.15 |
| 1414 | 2.86 | 2.70 | -0.16 |
| 1383 | 2.15 | 2.04 | -0.11 |
| 1300 | Proposed Drive |  |  |
| 1272 | 3.89 | 3.45 | -0.44 |
| 1237 | 5.56 | 5.19 | -0.37 |
| 938 | 7.88 | 7.87 | -0.01 |
| 890 | 6.00 | 6.00 | 0.00 |
| 759 | FM-407 E |  |  |
| 733 | 4.88 | 4.88 | 0.00 |
| 622 | 3.48 | 3.48 | 0.00 |
| 237 | 3.71 | 3.71 | 0.00 |

Table 9 - Fully Developed 100-YR Channel Velocity Comparison.

| CrossSection | Pre-Project Velocity (fps) | Post-Project Velocity (fps) | Difference (ft) |
| :---: | :---: | :---: | :---: |
| 4450 | 5.57 | 5.57 | 0.00 |
| 4195 | 5.23 | 5.23 | 0.00 |
| 3932 | 5.87 | 5.88 | 0.01 |
| 3652 | 4.34 | 4.34 | 0.00 |
| 3111 | 3.37 | 3.38 | 0.01 |
| 2848 | 5.13 | 5.12 | -0.01 |
| 2659 | 3.05 | 3.06 | 0.01 |
| 2024 | 2.15 | 2.16 | 0.01 |
| 1984 | 2.89 | 2.91 | 0.02 |
| 1912 | Private Drive |  |  |
| 1857 | 3.20 | 3.28 | 0.08 |
| 1577 | 2.77 | 2.62 | -0.15 |
| 1414 | 2.9 | 2.78 | -0.12 |
| 1383 | 2.22 | 2.1 | -0.12 |
| 1300 | Proposed Drive |  |  |
| 1272 | 3.83 | 3.42 | -0.41 |
| 1237 | 5.84 | 5.41 | -0.43 |
| 938 | 7.79 | 7.79 | 0.00 |
| 890 | 6.19 | 6.19 | 0.00 |
| 759 | FM-407 E |  |  |
| 733 | 5.58 | 5.58 | 0.00 |
| 622 | 3.69 | 3.69 | 0.00 |
| 237 | 3.35 | 3.35 | 0.00 |



### 4.0 Conclusion

The proposed plan includes widening the existing private drive while proposing another drive from FM-407 E. The hydraulic results show that the improvement results in no adverse impacts to the existing and fully-developed 100-year flood risk. There is a minimal rise in channel velocity, but this should be negligible as the velocity is relatively small and not considered corrosive.

All collected data is provided in Appendix A, hydrologic output and calculations in Appendix B, and hydraulic output in Appendix C. Appendix D contains the digital models, GIS data.

# PLANNING AND ZONING COMMUNICATION 

December 6, 2023

## FROM: Thad Chambers, Town Administrator

AGENDA ITEM: Discuss and make a recommendation regarding a Preliminary Plat for an 81.789-acre tract of land situated in the A.M. Feltus Survey, Abstract Number 1594, and the Daniel Cook Survey, Abstract No. 230, in the Town of Bartonville, Denton County, Texas. The tract of land is located on the north side of E Jeter Road, approximately 2,063 feet north of its intersection with Porter Road, in Bartonville, Texas. The applicant is Mycoskie Associates, Inc., on behalf of Rob Knight.

Land Use and Zoning: Current land use category is Residential Estates - 5 Acre Lots (RE-5). Current zoning is Agricultural (AG).

Summary: The applicant is the owner of one tract of land, totaling 81.789 acres, located on the north side of E Jeter Road, approximately 2,063 feet north of its intersection with Porter Road. The legal description of the property is A1594A, A.M. Feltus, TR 1, 78.763 Acres, Old DCAD TR \#2. The corresponding Denton CAD parcel number is 65110. The applicant has applied for a preliminary plat (see Exhibit A) in order to facilitate large lot residential development.

The subject property is part of a former agricultural tract. There are multiple agricultural buildings and outbuildings, residences, and cross-fencing on the property.

## Preliminary Plat

Bartonville Development Ordinance (BDO) Section 2.5.g lists the criteria of approval for a preliminary plat:

1. The plat substantially conforms with the approved land study or other studies and plans, as applicable;
2. The preliminary layouts of required public improvements and Town utilities have been approved by the Town Engineer; and
3. The plat conforms to applicable zoning and other regulations.
4. The plat has been approved by the Permitting Authority, as defined in Chapter 285 of the Texas Administrative Code, in accordance with Title 30, Texas Administrative Code, Chapter 285, Section 285.4(c) relating to the review of subdivision plans prior to the application for a permit for an on-site sewage facility.

The submitted preliminary plat is designed to create four legal lots totaling 81.789 acres. The resulting lots will range from 11.180 to 38.476 acres. The subject property is located on East Jeter Road, which is
designated as a "Minor Collector" on the Town of Bartonville's Thoroughfare Plan. The applicant shows a proposed private road serving all four lots from East Jeter Road. There will also be a public water line easement that will be used to serve all four lots with a 6 -inch public water line. The Town Engineer will review construction plans for all proposed improvements concurrent with the final plat submittal; see the proposed conditions of approval. The zoning district for the subject property is Agricultural (AG), which has a 10-acre minimum lot size. The proposed resulting lots will meet the zoning district standards.

Staff Recommendation: Approve with Conditions.

## Staff's Recommended Conditions of Approval:

1. Prior to recordation of the final plat, the two "Offsite Drainage Easements" depicted on the Preliminary Utility Plan shall be recorded as separate instruments.
2. Prior to recordation of the final plat, all easements to be established via the plat shall be labeled "by this plat."
3. Prior to recordation of the final plat, the front, side, and rear yard setbacks (building lines) shall be set at 50 feet, as established by Chart 4.2 of the Bartonville Zoning Ordinance. These setbacks shall apply to all property lines of each lot, including both portions of Lot 3.
4. Prior to recordation of the final plat, any existing buildings located within a regulatory setback shall be removed or relocated such that no existing buildings are located within any new yard setbacks to be established by the plat.
5. The final plat shall include an approval block as depicted in Section 2.7.c. of the Bartonville Development Ordinance.
6. Prior to submittal of a final plat, the proposed location and design of the on-site septic facilities (OSSF) for each proposed lot shall be approved by the Town of Bartonville, in accordance with Bartonville Development Ordinance Section 2.6.c.
7. A complete engineering/construction plan set shall accompany the final plat application, in accordance with Bartonville Development Ordinance Section 2.7.d.
8. The final plat shall depict a 10 -foot-wide utility easement along one side and along the entire length of the private road.

Financial Information: The establishment of four new estate residences will generate additional ad valorem property taxes for the Town of Bartonville, based on the future assessed value of the homes and properties and the Town's property tax rate. The Town can anticipate some minor expenses associated with serving the future residences with public safety and general governance services. Given that the future road will be privately owned and maintained, the Town will not be responsible for the costs to maintain the road.

## Exhibits:

1. Preliminary Plat Application Packet

Exhibit 1


## GENERAL NOTES









6. THE HONE OMNER'SASSOCAATON SHALL BE RESPONSBLLE FOR MANTANNG THE DRANAGE

STATE OF TEXAS \&
COUNTY OF DENTON $\&$








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PRELIMINARY


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COUNTY OFTARRANT

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MY ComMISIION EXPREES: $\qquad$
Novenber 2023




[^0]:    Shannon Montgomery, TRMC, Town Secretary

[^1]:    *Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

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