

# Dawson Trails Master Transportation Study



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**Dawson Trails Traffic Impact Study**  
**Updates from Previous Submittal – Change Log:**

Preface: This report represents version #5 of the Dawson Trails Master Traffic Study. The following is a log of updates that were incorporated into this report based on the comments received from the Town of Castle Rock:

1. Updated Crystal Valley Boulevard at Dawson Trails Boulevard/Prairie Hawk Drive (Intersection #7) with a signal in the 2025 background and 2030 background scenarios.
2. Fixed typos within the level of service tables for the NB ramp intersection on Plum Creek Parkway (Intersection #9).
3. Based on the listed changes, the volumes were volumes throughout the study intersections and the analysis, tables, figures, and report was updated accordingly.

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## Executive Summary

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The purpose of this traffic study is to evaluate potential traffic impacts and mobility connectivity within and around the proposed Dawson Trails development in Castle Rock, CO. The project site is generally bounded by Interstate 25 (I-25) to the east, Yucca Hills Road to the north, Twin Oaks neighborhood to the west, and approximately Colt Circle to the south.

It is anticipated that Dawson Trails will be developed over time and for the purpose of this traffic study, three phases were assumed to understand the roadway infrastructure needs and approximate timeline of need.

The first phase of the proposed development is anticipated to be completed in Year 2025 and includes approximately 500 residential dwelling units and 180,000 square feet of general commercial/retail space. The second phase of Dawson Trails is anticipated to be completed by Year 2030 and includes 3,100 residential dwelling units, 1,600,000 square feet of general commercial/retail/light industrial/flex space, and an elementary school with up to 450 students. The full build out is anticipated to be completed by Year 2040 and includes 2,250 residential dwelling units, 1,420,000 square feet of general commercial/retail/light industrial/flex space, an elementary school with up to 450 students, a high school with up to 2,000 students, a community facility (such as a recreation center or ice skating arena), and regional park. This totals to 5,850 dwelling units and approximately 3.2 million square feet of commercial space (mix of retail, flex, office, or light industrial).

Accounting for anticipated non-single occupancy vehicle (non-SOV) trips and internal capture trip reduction, and home-based trips internal to the property, the full build out of the project site is estimated to generate approximately 87,025 daily, 6,700 AM peak hour trips, 8,760 PM peak hour trips, and 8,385 Saturday midday peak hour trips. It was estimated that the external trips (those that begin or end outside of Dawson Trails) would be approximately 61,455 daily trips with about 4,250 trips occurring in the AM peak hour, 6,220 trips occurring in the PM peak hour, and 5,900 trips in the Saturday midday peak hour at full build-out (new and pass-by trips). The internal trips (those that remain within Dawson Trails, do not utilize the interchange or external roadways) were estimated to be approximately 25,570 daily trips, 2,450 trips in the AM peak hour, 2,540 trips in the PM peak hour, and 2,480 trips in the Saturday peak hour.

### **Current Study Area Traffic Conditions**

All of the study intersections currently operate overall at LOS D or better in the AM, PM, and Saturday midday peak hours, with two intersections on Plum Creek Parkway having one turning movement operating at LOS E/F in a peak period that could be improved with signal timing adjustments.

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## **Short-Term Improvements (Year 2025)**

To address the expected issues at the study intersections, the improvements listed below are recommended to accommodate the background traffic growth and project development trips anticipated to be completed by Year 2025.

- **Crystal Valley Interchange** – Extend Crystal Valley Parkway west over I-25 and the railroad tracks. Provide a full-movement interchange with I-25. \*\*
- **West Frontage Road** – Remove through Dawson Trails boundaries to accommodate the Crystal Valley interchange and tie back into existing alignment where appropriate.
- **Prairie Hawk Drive Extension (named Dawson Trails Boulevard south of Plum Creek Parkway)** – Construct through Dawson Trails and up to Plum Creek Parkway (one lane per direction in interim).
- **East Frontage Road** – Realign to accommodate the Crystal Valley interchange and tie back into existing alignment where appropriate. \*\*
- **West Frontage Road and Territorial Road (future Dawson Trails Boulevard at Crystal Valley Parkway)** – With the Crystal Valley Interchange, relocate this intersection to the ultimate location to the west. \*\*
  - Provide westbound, northbound, and southbound approaches with one left-turn lane, one through lane, and one right-turn lane; and the eastbound approach with one left-turn lane and one through/right-turn lane. The westbound and northbound right-turns are proposed to be channelized and free. \*\*
  - With Phase 1 of the development signalize this intersection.
  - It is understood that this intersection will be constructed to the ultimate width on all approaches. This study assumes that the unnecessary lanes will be striped out and not utilized until volumes warrant the need for use.
- **East Frontage Road and Crystal Valley Parkway** – With the Crystal Valley Interchange, relocate this intersection to the ultimate location and roundabout design with the I-25 northbound off-ramp. \*\*
- **Crystal Valley Parkway at Plum Creek Boulevard** – Roundabout being constructed by the Town of Castle Rock in Year 2023.
- **Territorial Road at Twin Oaks Road / Clarkes Circle** – Relocate intersections with the construction of the new internal Collector A. At Twin Oaks Road and Collector A, it is proposed that the northbound left-turn be restricted to reduce traffic through the rural community.

- **New Roadway Infrastructure** – Construct segments of the internal collector roadway network to serve the Phase 1 traffic.
  - **Collector Intersections along Dawson Trails Boulevard** – Proposed as multi-lane roundabouts. The proposed access north of Crystal Valley Parkway will be a  $\frac{3}{4}$  movement intersection with side-street stop-control.

*\*\* Indicates an improvement that was also recommended under Year 2025 background conditions (without the project).*

### **Mid-Term Improvements (Year 2030)**

To address the anticipated circulation needs at the study intersections, the improvements listed below are recommended to accommodate the background traffic growth and project development trips projected to be completed by Year 2030.

- **Crystal Valley Parkway at Dawson Trails Boulevard** – Provide the following additional lanes: second eastbound through lane, eastbound right-turn lane, second westbound left-turn lane, second northbound and southbound through lanes, second southbound left-turn lane.
- **Prairie Hawk Drive Extension (named Dawson Trails Boulevard south of Plum Creek Parkway)** – Widen roadway to ultimate cross-section with four-lanes (two per direction).
- **Collector Intersections along Dawson Trails Boulevard** – Proposed as multi-lane roundabouts.

### **Long-Term Improvements (Year 2040)**

The Town of Castle Rock's Transportation Master Plan recommends building more roadway capacity and complete streets citywide. The Dawson Trails project team recommends providing enhanced designs with acceptable operations for streets and intersections that provide safe and accessible facilities for all users, regardless of ability, age, or mode.

To accommodate the background growth and trips generated by the full buildout of the Dawson Trails development in Year 2040, the following capacity improvements are expected to be needed:

- **Crystal Valley Parkway at Dawson Trails Boulevard** – Add the third westbound left-turn lane and receiving lane and second westbound through lane.
- **Prairie Hawk Drive Extension (named Dawson Trails Boulevard south of Plum Creek Parkway)** – Widen roadway to six-lanes (three per direction) between Crystal Valley Boulevard and Intersection #105. Roundabouts will remain two circulating lanes with right-turn bypass lanes.
- **Collector Intersections along Dawson Trails Boulevard** – Proposed as multi-lane roundabouts.

A summary of the recommended improvements and estimated year the improvement is shown on **Figure 14A and Figure 14B**.



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## DAWSON TRAILS

## MASTER TRANSPORTATION STUDY

### 1.0 Introduction

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The Fox Tuttle Transportation Group has prepared this traffic impact study for the development of 2,063± acres located on the south end of Castle Rock, Colorado. The Dawson Trails project is located west of I-25 and the West Frontage Road and extends north and south of Territorial Road. The property will be developed over time with the first phase planned to be completed within the next five years and future phases occurring over 15+ years. Dawson Trails is proposed to have a mix of land uses including residential, commercial, office, light industrial, schools, and recreation. **Figure 1** provides a vicinity map for the proposed project.

The purpose of this study is to assist in identifying potential traffic impacts within the study area as a result of this project. The traffic study addresses existing, short-term (Year 2025), mid-term (Year 2030), and long-term (Year 2040) peak hour intersection conditions in the study area with and without the project-generated traffic. The information contained in this study is anticipated to be used by the Town of Castle Rock staff in identifying any intersection or roadway deficiencies and potential improvements for the build-out condition and future scenarios. This study focused on the weekday AM and PM, and Saturday midday peak hours which represents the periods of highest trip generation for the proposed uses and adjacent street traffic. The study is consistent with the requirements of the Town of Castle Rock's *Transportation Design Criteria Manual* (2018). The following supporting documents were reviewed and incorporated into this analysis as appropriate:

- *Town of Castle Rock Transportation Master Plan*. Felsburg Holt & Ullevig. October 2017.
- Westfield Trade Center Planned Development documentation from 1989 to the present.
- Right-of Way Plans and Conceptual Designs for the planned Crystal Valley Parkway Interchange.
- Conceptual alignment and plans for future extension of Prairie Hawk Drive.

## 2.0 Project Description

The Dawson Trails site is currently vacant land that is located on the west side of I-25 and adjacent to the Twin Oaks neighborhood. The proposed land use plan includes commercial, residential, and civic land uses. For the purpose of this traffic study it was assumed that the site plan will include up to:

- 5,850 residential dwelling units (DU)
- 900,000 sq. ft. of retail
- 800,000 sq. ft. of general office building
- 1,125,000 square feet (sq. ft.) of flex space (a mix of light industrial and office)
- 375,000 sq. ft. of light industrial
- Two Elementary Schools (up to 450 students each)
- One High School (up to 2,000 students)
- One Community Facility (such as Ice Arena or Recreation Center)
- One Regional Park and Several Neighborhood Parks

Note that these land uses represent one of many scenarios that could occur based on market dynamics and represent a reasonable baseline assumption for determining traffic impacts of the site at a master plan level. It is anticipated that this report evaluates the highest density of homes, commercial, office, and industrial spaces that could be built within Dawson Trails. In addition, the study assumes a similar development type in the Westfield parcel adjacent to northwest corner of the project property which is excluded from current total project acreage.

For the purpose of this traffic study, the first phase of Dawson Trails is assumed to be completed and occupied by Year 2025, the second phase is assumed to be completed by Year 2030, and the final phase is anticipated to be completed by Year 2040. The project proposes to have access on the future extension of Prairie Hawk Drive (named Dawson Trails Boulevard through the project) and construct several collector roadways for internal circulation and mobility for all road users. Other local streets will be constructed to provide the most beneficial access into and around each of the planning areas. The land uses, phasing, and access plan are provided on **Figure 2**.

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## 3.0 Study Considerations

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### 3.1 Data Collection

Intersection turning movement volumes were collected in April 2021 at seven (7) existing intersections and along five (5) roadway segments. The intersection turning movement counts were collected during the weekday AM and PM peak hours, as well as the Saturday midday peak hour, including pedestrians and bicyclists. Historic daily volumes were gathered from the Colorado Department of Transportation's (CDOT) Transportation Data Management System (TDMS) and forecasts were gathered from the Town of Castle Rock Transportation Master Plan (2017). The two intersections on Plum Creek Parkway at the I-25 interchange were counted as part of the Miller's Landing project in March 2019 and utilized in this project analysis.

The existing traffic volumes are illustrated on **Figure 3A** and **Figure 3B**. The existing intersection geometry and traffic control are also shown on this figure. Signal-related information for the existing signalized intersections along Plum Creek Parkway were provided by the Town of Castle Rock and utilized within the analysis. Count data sheets are provided in the **Appendix**.

### 3.2 Evaluation Methodology

The traffic operations analysis addressed the signalized and unsignalized intersection operations using the procedures and methodologies set forth by the Highway Capacity Manual (HCM)<sup>1</sup>. Existing Peak Hour Factors (PHF) were applied to the intersections for the existing, while PHFs were increased for future scenarios per HCM recommendations. Study intersections were evaluated using Synchro software (v10). The proposed roundabout intersections were evaluated with Sidra software.

### 3.3 Level of Service Capacity Analysis

A Level of Service analysis was conducted to determine the existing and future performance of the study area intersections and accesses to determine the most appropriate intersection traffic controls and auxiliary lanes for future conditions.

To measure and describe the operational status of the study intersections, transportation engineers and planners commonly use a grading system referred to as "Level of Service" (LOS) that is defined by the HCM. LOS characterizes the operational conditions of an intersections traffic flow, ranging from LOS A

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<sup>1</sup> Highway Capacity Manual, Highway Research Board Special Report 209, Transportation Research Board, National Research Council, 6<sup>th</sup> Edition (2016).

(indicating very good, free flow operations) and LOS F (indicating congested and sometimes oversaturated conditions). These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with traveling through the intersections. The intersection LOS is represented as a delay in seconds per vehicle for the intersection as a whole and for each turning movement.

Based on the Town's *Transportation Design Criteria Manual* (2018), the minimum acceptable level of service is LOS D. No through movement shall operate below LOS D and no left-turn movement shall operate below LOS E or have queues blocking the adjacent through lane. If a study intersection currently does not meet this Town's standard, then the project impact cannot degrade the intersection further without appropriate mitigation measures to keep the performance at the intersection similar to existing operations.

Criteria contained in the *HCM* was applied for these analyses in order to determine peak hour LOS for each scenario. A more detailed discussion of LOS methodology is contained in the **Appendix** for reference.

## 4.0 Existing Conditions

### 4.1 Roadways

The study area boundaries are based on the amount of traffic to be generated by the project and potential impact to the existing roadway network. The primary public roadways that serve the project are discussed in the following text and illustrated on **Figure 1**.

**Interstate 25 (I-25)** is a north-south freeway (CDOT classification of F-W) that travels the length of Colorado from Wyoming to New Mexico. I-25 provides regional and local access through the Front Range, including connecting the Town of Castle Rock to Denver to the north and Colorado Springs to the south. CDOT was recently widened I-25 between Castle Rock and Monument to include one managed, express toll lane to supplement the existing two travel lanes per direction and wider shoulders for safety purposes. The posted speed limit is 75 miles per hour (mph). I-25 services approximately 75,000 to 85,000 vehicles per day (vpd) in the project vicinity. Existing access to I-25 from the project site is as follows:

- Plum Creek Parkway (full-movement) interchange located 2.0 miles north of Territorial Road, accessed via the W. Frontage Road.
- Tomah Road (southbound I-25 only) interchange located 3.0 miles south of Territorial Road, accessed via the W. Frontage Road.

- Sky View Lane (full-movement) interchange located 5.1 miles south of Territorial Road, accessed via the W. Frontage Road

**West Frontage Road** is a north-south, two-lane roadway that parallels I-25 and provides local access to properties and businesses on the west side of the interstate. West Frontage Road extends from Plum Creek Parkway (north) to Sky View Lane (south). Recent counts taken north of Territorial Road indicate that this roadway services approximately 3,200 vpd to 6,300 vpd depending on the day of the week. The posted speed limit is 45 mph within the project vicinity. The West Frontage Road is proposed to be disconnected from the I-25 southbound on-ramp through the Dawson Trails project site. It is anticipated that the West Frontage Road will be utilized until Prairie Hawk Drive is extended south of Plum Creek Parkway (named Dawson Trails Boulevard). The portion of West Frontage Road between Plum Creek Parkway and the I-25 southbound on-ramp is anticipated to become one-way southbound and redesigned as an on-ramp. The extension of Prairie Hawk Drive (proposed to be named Dawson Trails Boulevard south of Crystal Valley Parkway) to the south will provide north-south connectivity and to be classified as a Major Arterial per the Town of Castle Rock's Transportation Master Plan (TMP). The new roadway will connect to West Frontage Road south of the project site. For the purpose of this study, it is anticipated that Dawson Trails Boulevard will be constructed with Phase 1 of the project and create a new intersection on Plum Creek Parkway.

**East Frontage Road / Wilcox Street** is a north-south, two-lane roadway that parallels I-25 and provides local access to downtown Castle Rock, several neighborhoods, and businesses on the east side of the interstate. Wilcox Street extends from Wolfensberger Road to Perry Street and continues as East Frontage Road to Sky View Lane (south). Historic traffic volumes indicate that East Frontage Road services approximately 7,500 vpd north of Perry Street. The posted speed limit is 45 mph. Per the Town of Castle Rock's Transportation Master Plan (TMP), East Frontage Road will remain a Minor Arterial into the future.

**Crystal Valley Parkway** is an east-west, major arterial with a four-lane cross section extending from East Frontage Road to Lake Gulch Road. The roadway provides access to several neighborhoods, a few small businesses, the Rhyolite Regional Park, and Fire Station #152. Crystal Valley Parkway services between 3,200 vpd and 8,300 vpd depending on the day of the week. The posted speed limit is 35 mph. The Town of Castle Rock is currently in the process of alternative evaluation and designing the planned Crystal Valley Parkway interchange (full-movement) to I-25. Based on the current information from the Town of Castle Rock, the I-25 interchange design is recommended to be a partial cloverleaf with a signal at the I-25 southbound ramp terminal, a

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free-flow ramp for I-25 on-ramp, and a roundabout at the I-25 northbound off-ramp that will include the East Frontage Road<sup>2</sup>.

**Plum Creek Parkway** is a major arterial east-west roadway that provides access through southern Castle Rock, extending from Wolfensberger Road (west) to Ridge Road (east). West of I-25, this arterial is currently two lanes and east of the interchange it widens to four lanes. The counts indicate that Plum Creek Parkway carries approximately 6,600 vpd west of I-25. The posted speed limit is 30 mph near the I-25 interchange and transitions to 45 mph to the west. Plum Creek Parkway provides direct access to I-25 with a full-movement interchange.

**Plum Creek Boulevard** is a north-south, two-lane Collector roadway that connects Plum Creek Parkway to Crystal Valley Parkway and provides local access to residential communities, the Plum Creek Golf and Country Club, Douglas County Fairgrounds, D.C. Oaks High School, and a few small businesses. South of Plum Creek Parkway this roadway services between 4,400 vpd to 6,500 vpd depending on the day of the week. South of Cherry Plum Way, this roadway services between 1,000 vpd and 1,650 vpd. The posted speed limit is 30 mph.

**Territorial Road** is gravel two-lane roadway that services primarily residential uses on the west side of I-25 and the future Dawson Trails development. An at-grade railroad crossing exists on Territorial Road just west of the West Frontage Road with stop-control and no gates. Currently, the roadway services an average of 370 vpd and has a posted speed limit of 25 mph. Territorial Road will be reconstructed and realigned as Dawson Trails develops. The future roadway is identified as a Major Arterial to Twin Oaks Road per the Town of Castle Rock's TMP.

## **4.2 Intersections**

The study area includes nine (9) existing intersections that are listed below with the current traffic control and were analyzed for existing and future background year traffic operations:

1. Plum Creek Parkway at Wilcox Street [signalized]
2. Plum Creek Parkway at Perry Street [signalized]
3. Plum Creek Parkway at Plum Creek Boulevard [signalized]
4. West Frontage Road at I-25 Southbound On-Ramp [free-flow, no side street approach]

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<sup>2</sup> Crystal Valley Interchange Traffic Analysis Technical Report. Apex Design, a Consor Company. February 2022.

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5. Crystal Valley Parkway at Plum Creek Boulevard [side-street stop controlled]
  6. Crystal Valley Parkway at East Frontage Road [side-street stop controlled]
  7. West Frontage Road at Territorial Road [side-street stop-controlled]
  8. I-25 Southbound Ramps / West Frontage Road at Plum Creek Parkway [signalized]
  9. I-25 Northbound Ramps at Plum Creek Parkway [signalized]

The existing lane configuration at each of the study locations is illustrated on **Figure 3A** and **Figure 3B**.

#### **4.3 Pedestrian and Bicycle**

Currently, there are sidewalks and/or wide multi-use paths on both sides of Plum Creek Parkway and Crystal Valley Parkway. Plum Creek Boulevard has a wide detached sidewalk along one side of the roadway that switches as appropriate. There are no sidewalks or trails along the Frontage Roads. Along Plum Creek Parkway, there are small sections that lack sidewalks. The Colorado Front Range Trail travels along the Union Pacific Railroad on the east side of I-25 and provides connections to regional and local multi-modal infrastructure.

There are buffered bike lanes on Plum Creek Boulevard for majority of the length starting at Plum Creek Parkway. The rest of the study roadways do not provide designated bike facilities. Bicyclists are permitted to ride within the travel lanes or on the multi-use paths along the Frontage Roads, Crystal Valley Parkway, and Plum Creek Parkway.

#### **4.4 Transit**

Currently, the Town of Castle Rock does not participate in the Regional Transportation District for regional transit services and there is no local service available. The Town provides vouchers and funds for a taxi service and senior center transportation. In the recently published Castle Rock Transit Feasibility Study (October 2020) the Town evaluated the need for and implementation of transit to support their multimodal transportation goals. The study highlighted three preferred operating models that would support the different transit demands of the community and would be beneficial to Dawson Trails in the future.

#### **4.5 Year 2021 Existing Intersection Capacity Analysis**

The existing volumes, lane configuration, and traffic control are illustrated on **Figure 3A** and **Figure 3B**. The results of the LOS calculations for the intersections are summarized in **Table 1**. The details of LOS and delay for each movement are provided in **Table 2** (refer to **Appendix**). The intersection Level of Service

worksheets are attached in the **Appendix**. All of the intersections operate overall at LOS D or better in the three peak hours.

**Table 1: Existing Overall Level of Service Summary**

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
1	Plum Creek Pkwy at Wilcox St	Signal	C	D	C
2	Plum Creek Pkwy at Perry St	Signal	B	C	B
3	Plum Creek Pkwy at Plum Creek Blvd	Signal	B	A	B
4	West Frontage Road at I-25 SB On-Ramp	N/A	A (A)	A (A)	A (A)
5	Crystal Valley Pkwy at Plum Creek Blvd	Stop	A (C)	A (C)	A (B)
6	Crystal Valley Pkwy at East Frontage Rd	Stop	A (C)	A (D)	A (D)
7	West Frontage Rd at Territorial Rd	Stop	A (B)	A (B)	A (C)
8	Plum Creek Pkwy at I-25 SB Off-Ramp / W. Frontage Rd	Signal	C	C	C
9	Plum Creek Pkwy at I-25 NB Off-Ramp / On-Ramp	Signal	B	B	A

*Note: For unsignalized intersections, the worse approach/movement LOS is also listed in parenthesis*

All project intersections are shown to be operating overall at LOS D or better in the AM, PM, and Saturday midday peak hours. The following study intersections have movements that operate at LOS E or worse during one or more peak hours:

- **#1 – Plum Creek Parkway and Wilcox Street:** This signalized intersection operates overall at LOS C or LOS D in the evaluated peak hours; however, the eastbound left-turn movement currently operates at LOS E in the Saturday midday peak hour. The 95<sup>th</sup> percentile queue<sup>3</sup> for this movement was calculated to be approximately 146 feet (about 6 vehicles) in the same peak period, which is maintained within the existing 280 feet storage length.

**Recommendations:** Consider adding a couple seconds of green time to the eastbound left-turn protected phase during the Saturday midday peak period, as appropriate. It is typical for left-turn

<sup>3</sup> It should be noted that the 95<sup>th</sup> percentile queue length is a theoretical queue that is 1.65 standard deviations above the average queue length. In theory, the 95<sup>th</sup> percentile queue would be exceeded 5% of the time based on the average queue length, but it is also possible that a queue this long may not occur.



movements to experience delays during peak periods due to limited green time or minimum gaps in opposing traffic during the permitted phase.

- **#2 – Plum Creek Parkway and Perry Street:** This signalized intersection operates overall at LOS B or LOS C during the three peak hours; however, the northbound right-turn movement operates at LOS F in the PM peak hour and LOS E in the Saturday midday peak hour. The 95<sup>th</sup> percentile queues for this movement were estimated at approximately 65 feet or less, which is equal to the existing storage length.

**Recommendations:** Consider adding a couple seconds of green time to the northbound through phase during the PM and Saturday midday peak periods, as appropriate.

## 5.0 Future Conditions

### 5.1 Annual Growth Factor and Future Volume Methodology

In order to forecast the future peak hour traffic volumes, background traffic growth assumptions were estimated based on various resources: Town of Castle Rock's *Transportation Master Plan*, DRCOG regional model projections, CDOT data, and previous traffic impact studies within the area. Through the literature review, it was determined that the daily volumes forecasted for Year 2040 presented in the *Transportation Master Plan* were the most current predictions for the study area arterials and potential land development. The previous traffic model for the Town included the Dawson Trails and Westfield properties with forecasts of approximately 5,619 households and 5,738 employment jobs. This is similar to the proposed development to be constructed within the vacant properties. The traffic model assumed the majority of through north-south traffic would utilize I-25 and not travel on the Frontage Roads or future extension of Prairie Hawk Drive (named Dawson Trails Boulevard within project).

A comparison of the DRCOG base-year vs. 2040 projections shows annual growth of approximately 1.2% along Plum Creek Parkway on the east side of I-25. The Town TMP projects a full build 2040 volume of 24,900 vpd on Plum Creek Parkway just west of I-25. The Dawson Trails development area is included in these models. The forecasts for Crystal Valley Parkway, Plum Creek Boulevard, and the East and West Frontage Roads showed an annual growth rate of approximately 7% over the next 20 years, which includes development traffic from Dawson Trails, Westfield Trade Center, Crystal Valley Ranch, Lanterns, and Kings Ridge.

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To estimate the background volumes, the following methodology was applied:

**Year 2025**

- 0.5% annual growth on all roadways
- Plus, Miller's Landing Short-Term Trips
- Plus, 20% of Trips from Neighborhoods along Crystal Valley Parkway still under construction<sup>4</sup>

**Year 2030**

- 1.2% annual growth on Plum Creek Parkway
- 0.5% annual growth on other study roadways
- Plus, Miller's Landing Long-Term Trips
- Plus, 100% of Trips from Neighborhoods along Crystal Valley Parkway

**Year 2040**

- 1.2% annual growth on Plum Creek Parkway
- 0.5% annual growth on other study roadways
- Plus, Miller's Landing Long-Term Trips
- Plus, 100% of Trips from Neighborhoods along Crystal Valley Parkway
- Plus, Westfield Trade Center<sup>5</sup>

By the Year 2025, it is anticipated that the Crystal Valley interchange will be constructed and provide full-movement access to I-25, as well as provide east-west access over the interstate and along the south end of Town. Volumes were adjusted throughout the study area to account for the redirected traffic that will utilize the new Crystal Valley interchange instead of Plum Creek Parkway.

Using the above listed assumptions, the Year 2025 background traffic is summarized on **Figures 4A and 4B**; the Year 2030 background traffic is summarized on **Figures 5A and 5B**; and the Year 2040 background traffic is summarized on **Figures 6A and 6B**.

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<sup>4</sup> There are approximately 1,250 vacant lots within the Kings Ranch, Lanterns, and Crystal Valley Ranch communities. Trip generation was estimated by applying rates for single-family homes and then distributed throughout the study area.

<sup>5</sup> Westfield Trade Center is the land to the west of Dawson Trails and north of Territorial Road. It was estimated that 146 acres of the total 194 acres will be developable. For the purpose of this traffic study, it was assumed that there will be up to 154,200 sq. ft. of retail, 746,440 sq. ft. of "flex space" that will be either light industrial or office, and 500 multi-family units.

## 5.2 Year 2025 Anticipated Transportation Network

As shown in the Transportation Master Plan, it is planned that the following roadway and intersection improvements will be completed by Year 2025 background:

- **Crystal Valley Interchange** – Extend Crystal Valley Parkway west of East Frontage Road, over I-25 and the railroad tracks. The Town is currently working on evaluating and determining the most appropriate interchange design; therefore, this traffic study for Dawson Trails does not analyze the interchange intersections.
- **West Frontage Road and Territorial Road** – With the Crystal Valley Interchange, this existing intersection will be removed. A new intersection will be constructed with Crystal Valley Parkway/Territorial Road and the future Dawson Trails Boulevard, which is to the west over the railroad tracks.
  - It is understood that the intersection of Crystal Valley Parkway at Dawson Trails Boulevard will be constructed to the ultimate width on all approaches. This study assumes that the unnecessary lanes will be striped out and not utilized until volumes warrant the need for use.
  - The assumed lane configuration in the short-term scenario was based on the conceptual ultimate design of the intersection with the interchange and the forecasted background volumes. It was assumed that the westbound, northbound, and southbound approaches will provide one left-turn lane, one through lane, and one right-turn lane; and the eastbound approach will provide one left-turn lane and one through/right-turn lane.
  - In the short-term background scenario, this intersection can remain stop-controlled based on volumes.
- **Crystal Valley Parkway at Plum Creek Boulevard** – Town of Castle Rock plans to reconstruct the intersection as a roundabout. It was assumed that the eastbound and westbound approaches will include one left/through lane and one through/right lane, while the northbound approach will include one left-turn lane and one left/through/right lane and the southbound approach will include one shared left/through/right lane.
- **Crystal Valley Parkway at Dawson Trails Boulevard** – It is understood that this intersection will be constructed with the Crystal Valley Interchange as the ultimate configuration. This analysis just provides the timing of when lanes are warranted based on volumes or operations. The Town can decide to stripe out lanes that are not needed or provide all lanes which are anticipated to have improved levels of service than shown in this traffic study.

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- In 2025 background, the following lanes are anticipated to be needed: eastbound – one left-turn lane and one through/right-turn lane; and westbound, northbound, and southbound – one left-turn lane, one through lane, one right-turn lane. In the interim this intersection can be side-street stop-control (eastbound/westbound).
  - **East Frontage Road and Crystal Valley Parkway** – Based on the Crystal Valley Interchange Traffic Analysis Technical Report (February 2022), this existing intersection will be relocated to the east and be incorporated into the I-25 Northbound Ramp intersection on Crystal Valley Parkway. The Technical Report recommended that this intersection be designed as a five-legged, multi-lane roundabout to accommodate traffic exiting I-25 from the south and traffic on the East Frontage Road. Since this intersection was evaluated and designed as part of the interchange analysis, it is not included in the future scenarios of the Dawson Trails study.
  - **Crystal Valley Parkway at Dawson Trails Boulevard** – Signalize. Based on the signal warrant analysis, the signal is not warranted until 2030 background or with portions of Dawson Trails development generating traffic. However, with the interchange project it is likely the signal will be installed proactively; therefore, this analysis assumes the signal will be operations in 2025 background.
  - **Prairie Hawk Drive / Dawson Trails Boulevard** – For comparison purposes, it was assumed the planned arterial will be constructed west of the railroad tracks and create a new intersection on Plum Creek Parkway. The ultimate design is to provide four lanes (two per direction). It is understood that this roadway will be constructed with the first phase of Dawson Trails as a two-lane roadway (one lane per direction) and the construction, phasing, and funding of the new roadway will be coordinated with the Town of Castle Rock, Douglas County, CDOT, and Dawson Trails.
    - Note that through volumes on Dawson Trails Boulevard are not anticipated to need the second through lane without development traffic. Therefore, it is assumed the second through lane is a right-turn drop lane or striped out until needed.

These intersection improvements were assumed to be in place in the background condition for the short-term scenario and shown on **Figure 4A and Figure 4B**.

The MUTCD states that a traffic signal should not be installed unless one or more of the warrants are met and an engineering study finds that installing a traffic signal will improve the overall safety and operation of the intersection. The listed future signalized intersection should be monitored as development and growth occur within and near the study area to determine if and when other signal warrants are met.

Future signal timing phases and cycle lengths were based on the existing timing parameters along Plum Creek Parkway and optimized, as necessary.

### 5.3 Year 2025 Background Intersection Capacity Analysis

The study area intersections were evaluated to determine baseline conditions for the Year 2025 background scenario and to identify any capacity constraints associated with short-term background traffic (refer to **Section 5.1** for growth assumptions). It was assumed that the roadway and intersection improvements listed in **Section 5.2** will be implemented by Year 2025 background. The background volumes, lane configuration, and traffic control are illustrated on **Figure 4A** and **Figure 4B**.

The Level of Service criteria discussed previously was applied to the study area intersections to determine the impacts with the short-term background volumes. This analysis assumes the existing signal timing on Plum Creek Parkway will remain the same.

The results of the LOS calculations for the intersections are summarized in **Table 3**. The details of LOS and delays for each movement are provided in **Table 2** (refer to **Appendix**). The intersection Level of Service worksheets are attached in the **Appendix**.

**Table 3: Year 2025 Background Overall Level of Service Summary**

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
1	Plum Creek Pkwy at Wilcox St	Signal	C	D	D
2	Plum Creek Pkwy at Perry St	Signal	B	C	C
3	Plum Creek Pkwy at Plum Creek Blvd	Signal	B	A	B
4	West Frontage Road at I-25 SB On-Ramp	<i>Frontage Rd. removed and On-Ramp remains.</i>			
5	Crystal Valley Pkwy at Plum Creek Blvd	Rdabt	A	A	A
6	Crystal Valley Pkwy at East Frontage Rd	<i>This intersection will be included in Crystal Valley NB Off-Ramp Intersection (Rdabt)</i>			
7	Crystal Valley Parkway at Dawson Trails Blvd / Prairie Hawk Dr	Signal	C	C	C
8	Plum Creek Pkwy at I-25 SB Off-Ramp / W. Frontage Rd	Signal	C	C	C
9	Plum Creek Pkwy at I-25 NB Off-Ramp / On-Ramp	Signal	B	B	B
10	Plum Creek Pkwy at Prairie Hawk Dr/Dawson Trails Blvd	Signal	B	B	B

*Note: For unsignalized intersections, the worse approach/movement LOS is also listed in parenthesis*

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In summary, all the of the study intersections are estimated to operate at LOS D or better in the short-term background scenario. Movements that operated at LOS E/F in the existing scenario were estimated to continue to operate at these levels. The following movements were calculated to operate at LOS E/F in one or more of the peak hours in Year 2025 background as described below:

- **#1 – Plum Creek Parkway and Wilcox Street:** This signalized intersection operates overall at LOS C or LOS D in the evaluated peak hours; however, the eastbound left-turn movement was estimated to operate at LOS F in the Saturday peak hour. The 95<sup>th</sup> percentile queue for this movement was calculated to be approximately 186 feet (about 8 vehicles) in the same peak period, which is maintained within the existing 280 feet storage length.

**Recommendations:** Consider adding a couple seconds of green time to the eastbound left-turn protected phase during the Saturday peak period, as appropriate. It is typical for left-turn movements to operate below LOS D due to limited green time or minimum gaps in opposing traffic during the permitted phase.

- **#2 – Plum Creek Parkway and Perry Street:** This signalized intersection operates overall at LOS C or better during the three peak hours; however, the northbound right-turn movement was estimated to continue to operate at LOS F in the PM peak hour and LOS E in the Saturday midday peak hour. The 95<sup>th</sup> percentile queues for this movement were estimated at approximately 65 feet or less, which is equal to the existing storage length.

**Recommendations:** Consider adding a couple seconds of green time to the northbound through phase during the PM and Saturday midday peak periods, as appropriate.

#### 5.4 Year 2030 Planned Transportation Network

In addition to the listed transportation improvements in Year 2025 background, there are assumed roadway and intersection improvements in Year 2030 background based on the Town's upcoming projects, intersection movement volumes, and signal warrant analysis. It was assumed the following roadway and intersection improvements are constructed prior to Year 2030 background:

- **West Frontage Road** – Remove the portion of roadway between the I-25 Southbound On-Ramp and the south boundary of Dawson Trails. This is assumed to happen in background for analysis purposes of comparing similar scenarios. It is understood this roadway change will be coordinated with the Town of Castle Rock, Douglas County, CDOT, and Dawson Trails.

- It is assumed that the I-25 Southbound On-Ramp south of Plum Creek Parkway will remain but not have through traffic in the northbound or southbound directions unless needed for minimal local travel to existing homes and property.
- **Prairie Hawk Drive / Dawson Trails Boulevard** – Widen to the planned four-lane arterial. It is understood that this roadway will be a part of the Dawson Trails project, but is included in the background for comparison purposes.
  - Note that through volumes on Dawson Trails Boulevard are not anticipated to need the second through lane without development traffic. Therefore, it is assumed the second through lane is a right-turn drop lane or striped out until needed. It is understood that the intersection at Crystal Valley Parkway will be constructed as the ultimate design. This analysis just provides the timing of when lanes are warranted based on volumes or operations. The Town can decide to stripe out lanes that are not needed or provide all lanes which are anticipated to have improved levels of service than shown in this traffic study.

These roadway and intersection improvements were assumed to be in place in the mid-term background condition and are shown on **Figure 5A and Figure 5B**.

The Manual on Uniform Traffic Control Devices<sup>6</sup> (MUTCD) guidance states that a traffic signal should not be installed unless one or more of the warrants are met. Though, the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a signal. The MUTCD also states that a traffic signal should not be installed unless an engineering study finds that installing a traffic signal will improve the overall safety and operation of the intersection. The listed future signalized intersections should be monitored as development and growth occur within and near the study area to determine if and when other signal warrants are met. Future signal timing phases and cycle lengths were based on the existing timing parameters along Plum Creek Parkway and optimized, as necessary.

## 5.5 Year 2030 Background Intersection Capacity Analysis

The study area intersections were evaluated to determine baseline conditions for the Year 2030 background scenario and to identify any capacity constraints associated with background traffic in the mid-term scenario (refer to **Section 5.1** for growth assumptions). The mid-term background volumes, lane configuration, and traffic control are illustrated on **Figure 5A and Figure 5B**.

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<sup>6</sup> Manual on Uniform Traffic Control Devices. Federal Highway Administration. Washington, D.C. 2009.

The Level of Service criteria discussed previously was applied to the study area intersections to determine the impacts with the mid-term background volumes. The analysis assumed the signal timing at all signalized intersections would be adjusted to accommodate the additional lanes and change in traffic volumes. It should be noted that the peak hour factors were adjusted to the HCM suburban default of 0.92 (if the existing factor is less than 0.92) on the arterials and local streets since it is assumed that the peak periods will become longer with peak hour traffic spread more evenly over the hour as traffic increases than is experienced today.

The results of the LOS calculations for the intersections are summarized in **Table 4**. The details of LOS and delays for each movement are provided in **Table 2** (refer to **Appendix**). The intersection Level of Service worksheets are attached in the **Appendix**.

**Table 4: Year 2030 Background Overall Level of Service Summary**

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
1	Plum Creek Pkwy at Wilcox St	Signal	C	D	C
2	Plum Creek Pkwy at Perry St	Signal	B	C	B
3	Plum Creek Pkwy at Plum Creek Blvd	Signal	B	A	B
4	West Frontage Road at I-25 SB On-Ramp	<i>Frontage Rd. removed and On-Ramp remains.</i>			
5	Crystal Valley Pkwy at Plum Creek Blvd	Rdabt	A	A	A
6	Crystal Valley Pkwy at East Frontage Rd	<i>This intersection will be included in Crystal Valley NB Off-Ramp Intersection (Roundabout)</i>			
7	Crystal Valley Pkwy at Dawson Trails Blvd / Prairie Hawk Dr	Signal	B	B	C
8	Plum Creek Pkwy at I-25 SB Off-Ramp / W. Frontage Rd	Signal	B	B	B
9	Plum Creek Pkwy at I-25 NB Off-Ramp / On-Ramp	Signal	B	B	B
10	Plum Creek Pkwy at Prairie Hawk Dr / Dawson Trails Blvd	Signal	C	C	C



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In summary, all the of the study intersections are estimated to operate at LOS D or better in the mid-term background scenario. Movements that operated at LOS E/F in the existing or Year 2025 background scenarios were estimated to improve as traffic spreads over the hour, cycle lengths are slightly increased, and signal timings are adjusted. The timing worksheets are included in the **Appendix**.

## 5.6 Year 2040 Planned Transportation Network

In addition to the listed transportation improvements in Year 2025 and Year 2030 background, there are assumed roadway and intersection improvements in Year 2040 background based on the Town's upcoming projects, intersection movement volumes, and signal warrant analysis. It was assumed the following roadway and intersection improvements are completed prior to Year 2040 background:

- **Prairie Hawk Drive / Dawson Trails Boulevard** – Allow all four through lanes to be available for use through and between intersections.
- **Crystal Valley Parkway at Dawson Trails Boulevard** –Provide second northbound and southbound through lanes and provide second southbound left-turn lane.

These roadway and intersection improvements were assumed to be in place in the background condition for the long-term scenario and shown in **Figure 6A and Figure 6B**. The details of the signal warrant analysis are provided in the **Appendix**.

## 5.7 Year 2040 Background Intersection Capacity Analysis

The study area intersections were evaluated to determine baseline operations for the Year 2040 background scenario and to identify any capacity constraints associated with background traffic in the long-term scenario (refer to **Section 5.1** for growth assumptions). The long-term background volumes, lane configuration, and traffic control are illustrated on **Figure 6A and Figure 6B**.

The Level of Service criteria discussed previously was applied to the study area intersections to determine the impacts with the long-term background volumes. The analysis assumed the signal timing at all signalized intersections would be adjusted to accommodate the additional lanes and change in traffic volumes. As previously discussed, the peak hour factors were adjusted, as necessary.

The results of the LOS calculations for the intersections are summarized in **Table 5**. The details of LOS and delays for each movement are provided in **Table 2** (refer to **Appendix**). The intersection Level of Service worksheets are attached in the **Appendix**.

**Table 5: Year 2040 Background Overall Level of Service Summary**

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
1	Plum Creek Pkwy at Wilcox St	Signal	C	D	C
2	Plum Creek Pkwy at Perry St	Signal	A	B	B
3	Plum Creek Pkwy at Plum Creek Blvd	Signal	B	C	B
4	West Frontage Road at I-25 SB On-Ramp	<i>Frontage Rd. removed and On-Ramp remains.</i>			
5	Crystal Valley Pkwy at Plum Creek Blvd	Rdabt	A	A	A
6	Crystal Valley Pkwy at East Frontage Rd	<i>This intersection will be included in Crystal Valley NB Off-Ramp Intersection (Roundabout)</i>			
7	Crystal Valley Pkwy at Dawson Trails Blvd / Prairie Hawk Dr	Signal	C	C	C
8	Plum Creek Pkwy at I-25 SB Off-Ramp / W. Frontage Rd	Signal	B	C	C
9	Plum Creek Pkwy at I-25 NB Off-Ramp / On-Ramp	Signal	B	B	B
10	Plum Creek Pkwy at Prairie Hawk Dr / Dawson Trails Blvd	Signal	C	C	C

In summary, all the of the study intersections are estimated to operate at LOS D or better overall in the long-term background scenario.

## 6.0 Future Conditions with the Dawson Trails Development

Dawson Trails is anticipated to include a mix of commercial, residential, office, flex space, light industrial, schools, and recreational uses. The site is planned to be developed over several phases. For the purpose of this traffic study, three phases were assumed to evaluate the short-term, mid-term, and long-term scenarios. The National Cooperative Highway Research Program (NCHRP)'s *Report 365: Travel Estimation Techniques for Urban Planning*<sup>7</sup> provides trip characteristics for and data to support household-based approaches for trip estimation and modeling.

<sup>7</sup> *NCHRP Report 365 – Travel Estimation Techniques for Urban Planning*. Transportation Research Board. Washington, D.C. 1998. And *NCHRP Report 684 – Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. Transportation Research Board. Washington, D.C. 2011.

These types of trips are contained within the Dawson Trails property to shop at or work at or recreate at land uses within the site without traveling on the external roadways. Data in NCHRP 365 shows that on average 20% of home-based trips are to/from work, 57% are “home-based other”, which would include trips to/from schools, to/from retail, etc., and the remaining 23% being “non-home based”, which could be deliveries, mail, and other services.

Assumptions for Dawson Trails trips were made using the NCHRP data as a basis. It was assumed that retail trips were 40% internal home-based trips, flex space trips were 30% internal home-based trips, and light industrial trips were 15% internal home-based trips. All of the internal, home-based trips between planning areas were assigned to the study roadways and through internal intersections and intersections along Dawson Trails Boulevard. The internal trips are accounted for in the trip assignment and analysis.

Since the school is anticipated to primarily serve the residences of Dawson Trails and adjacent neighborhoods, it was assumed that majority of the trips would be internal, diverted, or non-auto. Typically, school traffic does not create new traffic, instead redirects home-to-work and work-to-home trips. It is anticipated that 90% of the elementary school trips and 10% of the high school trips will be from the homes within Dawson Trails and the remaining trips will travel from the nearby neighborhoods. It should be noted that the internal school traffic was redirected from residential trips since those traveling to/from another school will redirect to the new school and then return to their route.

## 6.1 Trip Generation

A trip generation estimate was performed to determine the traffic characteristics of the proposed maximum density of the Dawson Trails development. The trip rates contained in the ITE [Trip Generation Manual](#) were applied to estimate the traffic for the proposed land uses as listed below:

- #110 “General Light Industrial”
- #210 “Single-Family Detached Housing”
- #220 “Multi-Family Housing (Low-Rise)”
- #520 “Elementary School”
- #530 “High School”
- #465 Ice Skating Rink
- #488 Soccer Complex (conservative land use assumption for the park)
- #710 “General Office Building”
- #820 “Shopping Center”
- #857 “Discount Club”

Specific uses and tenants for the majority of the commercial spaces are unknown at this time. It is anticipated that a small portion will be retail and the majority will be either office, flex space, or light industrial (“flex” space). For the flex commercial space it was assumed that 50% will be office/flex and

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50% will be light industrial. The square footage of the two potential land uses is listed in the trip generation table.

In the Saturday peak hour, the *Trip Generation Manual* provides the trip rates for the land use generator during its peak hour and not the peak hour of the day. The Trip generation Manual provides time of day tables that indicate when the peak hour has typically been documented for residential or commercial land uses. The data indicated that on Saturday the residential peak is 12.5% less during the commercial peak; therefore, the trip rates for the residential units were reduced by the listed percentage to represent the peak hour more accurately on Saturday.

**Table 6A** (external trips) and **Table 6B** (internal) provide the detailed trip generation estimates for the three phases of the future Dawson Trails community (refer to the **Appendix**). The proposed project is expected to experience new trips, also known as ‘primary trips’, pass-by trips, multi-use trips, and non-auto trips which are discussed below:

Primary Trips. These trips are made specifically to visit the site and are considered “new” trips. Primary trips would not have been made if the proposed project did not exist. Therefore, this is the only trip type that increases the total number of trips made on a regional basis.

Pass-By Trips. Pass-by trips do not create any increase in the traffic volumes within the primary impact area. In fact, the only impact of the pass-by trips is at the site driveways and adjacent intersections where through movements become turning movements into and out of the site. Therefore, pass-by trips have no additional impact on the road system beyond the site’s driveways or immediately adjacent intersections. With or without pass-by trips, the total trips to/from a project will remain the same. Pass-by was only applied to the retail portions of the Dawson Trails site and it was assumed some of the pass-by trips would be from I-25. Per ITE data, the pass-by percentages by land use and peak hour were applied as shown in the trip generation tables.

Multi-Use/ Multi-Purpose Trips. These trips occur from one land use or building to another within the planning area boundaries. Multi-use or multi-purpose trips typically do not affect the site access points, nor add any additional traffic volumes to the adjacent street network. Based on ITE *Trip Generation Manual*, the internal capture for the Dawson Trails project was calculated to be up to 16%. For conservative purposes, a 10% internal capture reduction was applied to the trip generation for commercial land uses and assumed to not travel on arterial or collector roadways.

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Non-Auto Trips. These trips are those that are completed by walking, biking, or transit or persons that telework. The future pedestrian and bicycle amenities will encourage residents, employees, customers, and visitors to make non-auto trips to/from and within the Dawson Trails community. The non-auto trips are assumed to be a 5% for commercial and residential land uses and 10% for the recreational land uses.

**Table 7** summarizes the land uses that were assumed for the Dawson Trails development for each phase. Phasing is illustrated on **Figure 2**.

**Table 7: Land Use Assumptions per Phase**

Land Use Type		Size (rounded)
<b>Phase 1 (Year 2025)</b>		
Single-Family Homes /Townhomes		500 dwelling units
Commercial (Retail and Service)		180,000 sq. ft.
<b>Phase 2 (Year 2030)</b>		
Single-Family Homes		1,935 dwelling units
Multi-Family Homes		1,165 dwelling units
Elementary School		450 Students
Commercial (Retail and Service)		483,000 sq. ft.
Office Space		217,000 sq. ft.
Flex Space (Office)		450,000 sq. ft.
Flex Space (Light Industrial)		450,000 sq. ft.
<b>Phase 3 (Year 2040)</b>		
Single-Family Homes		1,092 dwelling units
Multi-Family Homes		1,158 dwelling units
Elementary School		450 Students
High School		2,000 Students
Commercial (Retail and Service)		237,000 sq. ft.
Office Space		583,000 sq. ft.
Light Industrial		375,000 sq. ft.
Flex Space (Office)		112,500 sq. ft.
Flex Space (Light Industrial)		112,500 sq. ft.
Recreation Center / Ice Arena		60,000 sq. ft.
Regional Park		12 fields/courts
<b>Total Dawson Trails Development</b>		
Residential Homes		5,850 dwelling units
Commercial (Retail and Service)		900,000 sq. ft.
Office		800,000 sq. ft.
Light Industrial		375,000 sq. ft.
Flex Space (Office or Light Industrial)		1,125,000 sq. ft.
Elementary School		900 Students
High School		2,000 Students

## Estimated Trips

Dawson Trails was estimated to generate approximately 87,025 daily trips with about 6,700 trips occurring in the AM peak hour, 8,760 trips occurring in the PM peak hour, and 8,385 trips in the Saturday midday peak hour at full build-out (new and pass-by trips). The total trips listed include all external and internal trips. It was estimated that the external trips would be approximately 61,455 daily trips with about 4,250 trips occurring in the AM peak hour, 6,220 trips occurring in the PM peak hour, and 5,900 trips in the Saturday midday peak hour at full build-out (new and pass-by trips). The internal trips were estimated to be approximately 25,570 daily trips, 2,450 trips in the AM peak hour, 2,540 trips in the PM peak hour, and 2,480 trips in the Saturday peak hour. **Table 6A** summarizes the external trips that begin or end outside of Dawson Trails. **Table 6B** summarizes the internal trips that remain within Dawson Trails, do not utilize the interchange or external roadways, and were assigned to the local roadway network within Dawson Trails.

## 6.2 Trip Distribution and Assignment

The estimated trip volumes were distributed onto the study area street network based on existing traffic characteristics and available capacity, and anticipated destinations, as well as regional growth and future roadway infrastructure. The assumed distributions by land use type are listed below in **Table 8** and presented on **Figure 7**:

**Table 8: Trip Distribution Summary**

To/From	Percentage
North I-25 via Crystal Valley Interchange	35%
North I-25 via Plum Creek Parkway	5%
North Prairie Hawk Drive / Dawson Trails Blvd.	15%
North Wilcox Street via Frontage Roads	5%
North Perry Street via E. Frontage Road	3%
South I-25 via Crystal Valley Interchange	20%
South W. Frontage Road (Dawson Trails Blvd.)	5%
East Crystal Valley Parkway	4%
East Plum Creek Parkway	2%
West Plum Creek Parkway via. Prairie Hawk Drive / Dawson Trails Blvd.	2%
West via Twin Oaks Neighborhood	<1%
Existing Businesses/Neighborhoods East of I-25	4%

Using these distribution assumptions, the projected site traffic for each planning area was assigned to the study area roadway network for the weekday AM and PM peak hours and the Saturday midday peak hour during each of the three phases based on the most convenient route and available access.

The Phase 1 site-generated volumes for Year 2025 are shown on **Figures 8A and 8B** (existing intersections) and **Figure 8C** (proposed access). The site-generated volumes for the completion of Phases 1 and 2 are shown on **Figures 9A and 9B** (existing intersections) and **Figure 9C** (proposed access). The site-generated volumes for the full buildout of Dawson Trails are shown on **Figures 10A and 10B** (existing intersections) and **Figure 10C** (proposed access).

### 6.3 Proposed Roadway Network and Access

The future extension of Prairie Hawk Drive and realignment of West Frontage Road will be the primary arterial for the project. It is anticipated that two lanes of the arterial will be constructed with Phase 1 and widened in the future as volumes and operations warrant. South of Plum Creek Parkway, this proposed four-lane roadway will be named Dawson Trails Boulevard. The Dawson Trails project plans to construct several collector roadways internally to the site that will provide access between Dawson Trails Boulevard and the planning areas. Each phase will include segments of the proposed roadways to serve the planned development with anticipated completion with the final phase. In addition to the anticipated background roadway and intersection improvements, the following proposed roadway and intersection improvements are recommended to accommodate the proposed trip volume<sup>8</sup>:

#### Phase 1 (Year 2025):

- **Prairie Hawk Drive / Dawson Trails Boulevard** – Construct as a two-lane roadway (one lane per direction) between Plum Creek Parkway and the south boundary of the Dawson Trails property.
- **Crystal Valley Parkway at Plum Creek Boulevard** – Roundabout (per Town plans and design).
- **Crystal Valley Parkway at Dawson Trails Boulevard** – Signalize (based on signal warrant analysis).
  - It is understood that this intersection will be constructed to the ultimate width on all approaches. This study assumes that the unnecessary lanes will be striped out and not utilized until volumes warrant the need for use.

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<sup>8</sup> The traffic study provides technical information and evaluates the need for transportation mitigation as traffic grows, but it does not address infrastructure commitments or obligations of Dawson Trails. That needs to be discussed and negotiated in the development agreements for the project.



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- **Territorial Road at Twin Oaks Road / Clarkes Circle** – Relocate intersections with the construction of the new internal Collector A. It is proposed that Twin Oaks Road be realigned to the south to create an intersection on Collector A. It is anticipated that Clarkes Circle connect to Collector A as an emergency access.
    - **Twin Oaks Road at Collector A** – Provide a left-turn lane on Collector A southbound. Do not permit a left-turn movement for the northbound approach. Add stop signs on the side-street approaches.
  - **New Roadway Infrastructure** – Construct collector roadways from Dawson Trails Boulevard into and through the Dawson Trails property. Internal roadways and intersections will be aligned, designed, and analyzed at the filing level.
  - **Intersections along Dawson Trails Boulevard** – It is proposed that the full movement intersections be constructed as roundabouts, except for Collector Road A that will be signalized since it is the west leg of the Dawson Trails Boulevard at Crystal Valley Parkway intersection. Additional restricted movement accesses along Dawson Trails Boulevard will be identified and evaluated at the filing level of the project, as well as internal intersections along the collector roadways.
    - **#102 Collector H:** Construct roundabout with one approach lane on the northbound and southbound approaches, one left-turn/right-turn lane on the westbound approach, and one westbound right-turn bypass lane.
    - **#104 Access E-2/F-1.3:** Construct roundabout with one approach lane on the northbound and southbound approaches and one left-turn/right-turn lane on the eastbound approach
    - **#105 Collector Road B:** Construct roundabout with one approach lane on the northbound and southbound approaches and one left-turn/right-turn lane on the eastbound approach.
    - **#106 Collector Road C:** Construct roundabout with one approach lane on the northbound and southbound approaches and one left-turn/right-turn lane on the eastbound approach.
    - It is understood that roundabouts will be constructed to the ultimate configuration to reduce reconstruction in the future. Interim roundabout geometry can be incorporated to build the ultimate diameter but only use necessary lanes for each phase. The traffic study lists the lanes needed per the volumes, but the Town can decide to stripe out or provide interim curbing/raised pavement to restrict use of certain lanes.

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**Phase 2 (Year 2030):**

- **Prairie Hawk Drive / Dawson Trails Boulevard** – Widen to a four-lane roadway (two lanes per direction) between Plum Creek Parkway and the south boundary of the Dawson Trails property. The roundabout intersections will be constructed to the ultimate design to accommodate the widening in the future.
- **Crystal Valley Parkway at Dawson Trails Boulevard** – With the Phase 2 development volume, this intersection will need to provide the following additional lanes from the previous scenarios/phases: second eastbound through lane, one eastbound right-turn lane, second westbound left-turn lane, and second northbound and southbound through lanes. Protected only phasing for dual left-turn phase.
- **Twin Oaks Road at Collector A** – Signalize and provide one westbound left-turn lane.
- **New Roadway Infrastructure** – Construct collector roadways from Dawson Trails Boulevard into and through the Dawson Trails property. Internal roadways and intersections will be aligned, designed, and analyzed at the filing level.
- **Intersections along Dawson Trails Boulevard** – It is proposed that the full-movement intersections be constructed as roundabouts. Additional accesses will be identified and evaluated at the filing level of the project.
  - **#101 Access F-1:** Construct roundabout with two approach lanes on the northbound and southbound approaches, and one approach lane on the westbound approach.
  - **#102 Collector:** Construct eastbound approach with one inbound lane and one outbound lane.
  - **#104 Access E-2/F-1.3:** Construct westbound approach with one left-turn lane, one through/right-turn lane, and one right bypass lane. Upgrade the eastbound approach to include one left-turn lane, one left-turn/through/right-turn lane, and one right bypass lane. Add right-turn bypass lanes on the northbound and southbound approaches.
  - **#105 Collector Road B:** Construct westbound approach with one left-turn lane, one through/right-turn lane, and one right bypass lane. Upgrade the eastbound approach to include one left-turn lane, one left-turn/through/right-turn lane, and one right bypass lane. Add right-turn bypass lanes on the northbound and southbound approaches.
  - **#106 Collector Road C:** Construct westbound approach with one left-turn lane, one through/right-turn lane, and one right bypass lane. Upgrade the eastbound approach to include one left-turn lane and one left-turn/through/right-turn lane.

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- **#107 Collector Road D:** Construct roundabout with two approach lanes on the northbound and southbound approaches, and one approach lane on the eastbound approach.
  - **All roundabout intersections:** change to two-lane circulation to accommodate widening of Dawson Trails Boulevard/Prairie Hawk Drive. It is understood that roundabouts will be constructed to the ultimate configuration to reduce rebuilding in the future. Interim roundabout geometry can be incorporated to build the ultimate diameter but only use necessary lanes for each phase. The traffic study lists the lanes needed per the volumes, but the Town can decide to stripe out or provide interim curbing/raised pavement to restrict use of certain lanes.

**Phase 3 – Full Buildout (Year 2040):**

- **Prairie Hawk Drive / Dawson Trails Boulevard** – Widen to a six-lane roadway (three lanes per direction) between Crystal Valley Boulevard and Intersection #105. The third lane will be dropped at the appropriate downstream intersection as a right-turn lane and roundabout will not have three circulating lanes.
- **Crystal Valley Parkway at Dawson Trails Boulevard** – Provide the following lanes: third westbound left-turn lane and receiving lane and second westbound through lane.
- **New Roadway Infrastructure** – Construct collector roadways from Dawson Trails Boulevard into and through the Dawson Trails property. Internal roadways and intersections will be aligned, designed, and analyzed at the filing level.
- **Intersections along Dawson Trails Boulevard** – It is proposed that the full-movement intersections be constructed as roundabouts. Additional accesses will be identified and evaluated at the filing level of the project.
  - **#101 Access F-1:** Construct eastbound approach with one inbound lane and one outbound lane.
  - **#108 Access G-2/High School:** Construct roundabout with two approach lanes on the northbound and southbound approaches, and one approach lane on the eastbound and westbound approaches.

Refer to **Figures 8C** and **9C** and **10C** for an illustration of the proposed access locations.

It should be noted that the internal accesses will be identified and vetted in more detail during the design stages of specific parcels and adjustments to access will be made as necessary based on discussions with

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Town staff, land use types, and traffic flow. This master traffic study will be updated if changes to access significantly impact the trip generation, traffic flow, or infrastructure needs.

#### **6.4 Proposed Pedestrian and Bicyclist Facilities**

Dawson Trails plans to provide sidewalks and trails throughout the project site that will connect the residential areas to the commercial land uses, neighborhood parks, the recreation center, the regional park, the schools and to a wide multi-use path along Dawson Trails Boulevard. Refer to the site plan for details on sidewalks, trails, and bike lanes within the Dawson Trails community. As the design details of the project are developed and specific areas are planned, the pedestrian and bicyclist facilities, connections, and crossings will be determined and included in the design submittals. The internal multi-modal accommodations are anticipated to link to external facilities as proposed in the Town's TMP. It is understood that some of the pedestrian and bicyclist infrastructure may include signal crossing, grade separated crossing, or other enhancements to provide a safe environment for people walking or biking and to encourage non-auto travel.

The Town of Castle Rock's TMP proposes that there will be an on-street bike lane/shoulder along Dawson Trails Boulevard (Prairie Hawk Drive Extension), Plum Creek Parkway, Crystal Valley Parkway, and East Frontage Road.

#### **6.5 Proposed Mobility Hub**

Per discussions with the Town of Castle Rock and CDOT, a portion of land will be reserved for a mobility hub for future transit services. Currently, the location is planned to be in Planning Area F-1 (PL 1.08) (north of Crystal Valley Parkway and east of Dawson Trails Boulevard). The potential mobility hub will provide a park-n-ride for future local or regional transit services that are being planned for the area. This will connect to the future pedestrian and bicyclist facilities to complete the "first and final" mile of a transit commute. The exact design and amenities of the mobility hub have not been determined at this time and will continue to be defined as the Dawson Trails project is developed.

Planning Area F-1 (PL 1.08) is planned to be a mix of commercial uses within this traffic study. The trip generation assumed that the entire parcel will be commercial space since this is the highest traffic generator between the two land use types (commercial vs. park-n-ride). If the mobility hub is constructed, then the trip generation is anticipated to be significantly lower than commercial businesses and services.

#### **6.6 Year 2025 Background + Project (Phase 1) Intersection Capacity Analysis**

This section discusses impacts associated with the addition of the Phase 1 of Dawson Trails development trips in the short-term scenario. The site-generated volumes for Phase 1 were added to the Year 2025

background volumes and are illustrated on **Figures 11A and 11B** (existing intersections) and **Figure 11C** (proposed intersections). These figures also illustrate the necessary traffic control and lane configurations for all of the study intersections and proposed accesses. The recommended improvements in the Year 2025 background scenario were assumed to be implemented. The analysis assumed the existing signal timing is held at the existing signalized intersections. Future signalized intersections had optimized timing with parameters similar to the existing timing plans for those on Plum Creek Parkway.

The results of the LOS calculations for the intersections are summarized in **Table 9**. The details of the LOS and delays for each movement are listed in **Table 2** (existing intersections) and **Table 10** (proposed intersections). The intersection Level of Service worksheets are attached in the **Appendix**.

**Table 9: Year 2025 Background + Project (Phase 1) Overall Level of Service Summary**

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
1	Plum Creek Pkwy at Wilcox St	Signal	C	D	C
2	Plum Creek Pkwy at Perry St	Signal	B	C	C
3	Plum Creek Pkwy at Plum Creek Blvd	Signal	B	A	B
4	West Frontage Road at I-25 SB On-Ramp	<i>Frontage Rd. removed and On-Ramp remains.</i>			
5	Crystal Valley Pkwy at Plum Creek Blvd	Rdabt	A	A	A
6	Crystal Valley Pkwy at East Frontage Rd	<i>This intersection will be included in Crystal Valley NB Off-Ramp Intersection (Roundabout)</i>			
7	Crystal Valley Pkwy at Dawson Trails Blvd	Signal	C	C	D
8	Plum Creek Pkwy at I-25 SB Off-Ramp	Signal	B	C	B
9	Plum Creek Pkwy at I-25 NB Off-Ramp / On-Ramp	Signal	B	B	B
10	Plum Creek Pkwy at Prairie Hawk Dr / Dawson Trails Blvd	Signal	C	C	C
102	Dawson Trails Blvd at Collector Road H	Rdabt	A	A	A
103	Dawson Trails Blvd & E-1/F-2 Access	Stop	A (B)	A (B)	A (B)
104	Dawson Trails Blvd & E-2/F-3 Access	Rdabt	A	C	B
105	Dawson Trails Blvd & Collector Road B	Rdabt	A	A	A
106	Dawson Trails Blvd & Collector Road C	Rdabt	A	A	A
109	Collector Road A at Twin Oaks Road	Stop	A (B)	A (B)	A (B)

*Note: For unsignalized intersections, the worse approach/movement LOS is also listed in parenthesis*

The study intersections will operate acceptably in the short-term scenario with the addition of Phase 1 trips with the recommended mitigation measures (listed in Section 6.3). All movements and overall LOS were calculated to be LOS D or better in all peak periods. The proposed accesses intersections for Phase 1 are anticipated to operate overall at LOS A in the three peak hours with all movements at LOS D or better.

## 6.7 Year 2030 Background + Project (Phase 1 & 2) Intersection Capacity Analysis

This section discusses impacts associated with the completion of the second phase of the Dawson Trails development with the proposed mid-term scenario. The site-generated volumes for the first two phases were added to the Year 2030 background volumes and are illustrated on **Figures 12A and 12B** (existing intersections) and **Figure 12C** (proposed accesses). These figures also illustrate the necessary traffic control and lane configurations for all of the study intersections and proposed intersections. The recommended improvements in the previous scenarios were assumed to be implemented and signal timings were optimized as appropriate.

The results of the LOS calculations for the intersections are summarized in **Table 11**. The details of the LOS and delay for each movement are summarized in **Table 2** (existing intersections) and **Table 13** (proposed intersections). The intersection Level of Service worksheets are attached in the **Appendix**.

**Table 11: Year 2030 Background + Project (Phase 1 & 2) Overall Level of Service Summary**

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
1	Plum Creek Pkwy at Wilcox St	Signal	C	D	D
2	Plum Creek Pkwy at Perry St	Signal	B	B	B
3	Plum Creek Pkwy at Plum Creek Blvd	Signal	B	A	B
5	Crystal Valley Pkwy at Plum Creek Blvd	Rdabt	A	B	A
6	Crystal Valley Pkwy at East Frontage Rd	<i>This intersection will be included in Crystal Valley NB Off-Ramp Intersection (Roundabout)</i>			
7	Crystal Valley Pkwy at Dawson Trails Blvd	Signal	D	D	D
8	Plum Creek Pkwy at I-25 SB Off-Ramp	Signal	B	B	B
9	Plum Creek Pkwy at I-25 NB Off-Ramp / On-Ramp	Signal	C	B	B
10	Plum Creek Pkwy at Prairie Hawk Dr / Dawson Trails Blvd	Signal	C	C	C
101	Dawson Trails Blvd at F-1 Access	Rdabt	A	A	A

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
102	Dawson Trails Blvd at Collector Road H	Rdabt	A	A	A
103	Dawson Trails Blvd & E-1/F-2 Access	Stop	A (B)	A (B)	A (C)
104	Dawson Trails Blvd & E-2/F-3 Access	Rdabt	A	C	B
105	Dawson Trails Blvd & Collector Road B	Rdabt	A	A	B
106	Dawson Trails Blvd & Collector Road C	Rdabt	A	A	A
107	Dawson Trails Blvd & Collector Road D	Rdabt	A	A	A
109	Collector Road A at Twin Oaks Road	Signal	A	A	A

*Note: For unsignalized intersections, the worse approach/movement LOS is also listed in parenthesis*

All of the study intersections will operate acceptably in the mid-term scenario with the completion of Phases 1 & 2 of Dawson Trails project with the recommended mitigation measures (listed in Section 6.3). The intersection of Collector A and Twin Oaks Road was evaluated with a signal and roundabout. Both traffic control options were calculated to operate at LOS A in the three peak hours. The 95<sup>th</sup> percentile queues with the signal were estimated to extend to 110 feet or less and with a roundabout the queues were estimated to extend 50 feet or less.

## 6.8 Year 2040 Background + Project (Phases 1 & 2 & 3) Intersection Capacity Analysis

This section discusses impacts associated with the full buildout of the Dawson Trails development with the proposed long-term scenario. The site-generated volumes for the entire development were added to the Year 2040 background volumes and are illustrated on **Figures 13A and 13B** (existing intersections) and **Figure 13C** (proposed intersections). These figures also illustrate the necessary traffic control and lane configurations for all of the study intersections and proposed accesses. The recommended improvements in the previous scenarios were assumed to be implemented and signal timing was optimized.

The results of the LOS calculations for the intersections are summarized in **Table 12**. The details of the LOS and delays for each movement are summarized in **Table 2** (existing intersections) and **Table 13** (proposed intersections). The intersection Level of Service worksheets are attached in the **Appendix**.

**Table 12: Year 2040 Background + Project (Full Buildout) Overall Level of Service Summary**

No.	Intersection	Traffic Control	AM Peak Hour	PM Peak Hour	Sat Peak Hour
1	Plum Creek Pkwy at Wilcox St	Signal	C	D	D
2	Plum Creek Pkwy at Perry St	Signal	A	C	B
3	Plum Creek Pkwy at Plum Creek Blvd	Signal	B	C	C
5	Crystal Valley Pkwy at Plum Creek Blvd	Rdabt	B	B	A
6	Crystal Valley Pkwy at East Frontage Rd	<i>This intersection will be included in Crystal Valley NB Off-Ramp Intersection (Roundabout)</i>			
7	Crystal Valley Pkwy at Dawson Trails Blvd	Signal	D	E	E
8	Plum Creek Pkwy at I-25 SB Off-Ramp	Signal	B	C	C
9	Plum Creek Pkwy at I-25 NB Off-Ramp / On-Ramp	Signal	C	C	C
10	Plum Creek Pkwy at Prairie Hawk Dr / Dawson Trails Blvd	Signal	C	C	C
101	Dawson Trails Blvd at F-1 Access	Rdabt	A	B	B
102	Dawson Trails Blvd at Collector Road H	Rdabt	A	B	C
103	Dawson Trails Blvd & E-1/F-2 Access	Stop	A (B)	A (C)	A (C)
104	Dawson Trails Blvd & E-2/F-3 Access	Rdabt	B	C	D
105	Dawson Trails Blvd & Collector Road B	Rdabt	B	B	C
106	Dawson Trails Blvd & Collector Road C	Rdabt	B	B	C
107	Dawson Trails Blvd & Collector Road D	Rdabt	A	A	A
108	Dawson Trails Blvd at PA15/Park Access	Rdabt	A	A	A
109	Collector Road A at Twin Oaks Road	Signal	A	B	B

*Note: For unsignalized intersections, the worse approach/movement LOS is also listed in parenthesis*

All of the study intersections are predicted to operate acceptably in the long-term scenario with the full buildout of Dawson Trails with the recommended mitigation measures (listed in Section 6.3). One intersection has movements that are anticipated to operate below LOS D with the additional project trips:

- **#7 – Dawson Trails Boulevard and Crystal Valley Parkway:** This future signalized intersection was calculated to operate overall at LOS D in the AM peak hour, LOS E in the PM peak hour, and LOS E in the Saturday peak hour due to the high volumes on all movements, especially the turning



movements, and limited green time. During the morning peak hour the eastbound and southbound left-turn movements were estimated to operate at LOS E which is typical for left-turns at an arterial/arterial intersection at full buildout and protected only phasing. During the PM peak hour, the eastbound left-turn, eastbound through and the westbound left-turn were estimated to operate at LOS E. During the Saturday peak hour, all four left-turn movements and the eastbound and westbound through movements were estimated to operate at LOS E.

The 95<sup>th</sup> percentile queues for the eastbound left-turn movement were calculated to extend up to 308 feet and the queues for the westbound left-turn movement were calculated to be 451 feet or less. The 95<sup>th</sup> percentile queues for the northbound left-turn movement were estimated to be up to 47 feet. The 95<sup>th</sup> percentile queues for the southbound left-turn movement were estimated to be 543 feet or less.

**Recommendations:** No mitigation measures are recommended, except to ensure the storage length is adequate to accommodate the queue lengths and that signal timing is adjusted once volumes are generated. The ultimate design of this intersection already is expected to provide multiple left-turn and free right-turn lanes to accommodate the high volumes to/from the future Crystal Valley Interchange. The cycle length is assumed to be maxed out at 150 seconds. No other mitigation measures are available for consideration.

The intersection of Collector A and Twin Oaks Road was evaluated with a signal and roundabout. Both traffic control options were calculated to operate at LOS A in the three peak hours. The 95<sup>th</sup> percentile queues with the signal were estimated to extend to 320 feet or less and with a roundabout the queues were estimated to extend 50 feet or less.

**Table 13** lists the estimated queues for all the study intersections. **Figure 14A** illustrates the recommended intersection design with mitigation measures as either background (non-project related) or project-implemented (by phase). **Figure 14B** illustrates the anticipated phasing of roadway construction, widening, and intersection connections. **Figure 15** summarizes the daily volume on the internal roadways with the full buildout.

## 7.0 Queuing Analysis

A queuing analysis was performed to determine if the average and 95<sup>th</sup> percentile queues would be accommodated by the existing or future storage length and if any of the queues impact an upstream intersection/access. **Table 13** provides the storage lengths and the 95<sup>th</sup> percentile queues for each existing

and future scenario as calculated by Synchro or Sidra (assuming each vehicle utilizes 25 feet of space). It should be noted that the 95<sup>th</sup> percentile queue length is a theoretical queue that is 1.65 standard deviations above the average queue length. In theory, the 95<sup>th</sup> percentile queue would be exceeded 5% of the time based on the average queue length, but it is also possible that a queue this long may not occur.

As shown in **Table 13**, majority of the queues are shorter than the provided storage length in all scenarios. Queues that exceed existing or future storage lengths are highlighted in blue text. The maximum queue length is highlighted in purple text. The study intersections that will be at or near capacity are anticipated to experience longer queues with any additional traffic. There are several intersections that will need long storage lengths to maintain the calculated queues. There are a couple existing auxiliary lanes that will not be able to be lengthened to accommodate a future queue since they are limited by adjacent accesses/intersections.

## 8.0 Dawson Trails Boulevard Access Plan

A high-level access management plan has been developed for Dawson Trails Boulevard through the project site. The purpose of the plan is to provide approximate locations of full movement access and provide the estimated distances between these intersections. Majority of the full movement intersections on Dawson Trails Boulevard are proposed to be multi-lane roundabouts with a signal at Crystal Valley Parkway/Collector A. **Figure 16** illustrates the access management plan for Dawson Trails Boulevard for full movement intersections.

The *Town of Castle Rock Transportation Design Criteria Manual (2018)* states that “full access to major arterials shall be limited to one-half (1/2) mile intervals or more, plus or minus 200-feet, in order to achieve good speed, capacity and optimal signal progression” in Section 3.2.3.4.B. As shown on **Figure 16**, the intersection spacing is less than ½ mile between all of the intersections. This criterion is unnecessary on a corridor that has roundabouts instead of signals since the required ½ mile spacing is to optimize progression of the signal timing along the main thoroughfare to maintain a speed of 45 mph. With roundabouts, progression is not needed and closer intersection spacing can be achieved with high efficiency. For those intersections identified as signal or potential signal, it is anticipated that progression can be achieved. A variance request has been submitted to the Town.

At this level of analysis, accesses between the full movement intersections have not been identified and will be decided and evaluated at the SDP/filing stage of this project. It is anticipated that any additional

access intersections will be restricted to  $\frac{3}{4}$  movement or right-in, right-out to reduce congestion and improve safety along Dawson Trails Boulevard.

## 9.0 Conclusions

The Dawson Trails project proposes to develop up to 5,850 single-family or multi-family dwelling units and 3.2 million square feet (sq. ft.) of commercial space, including retail, office, light industrial, and flex space. The site plans to provide land for two elementary schools and one high school, as well as a large regional park with a recreational center. The Dawson Trails property is on the west side of I-25 on the south end of Castle Rock and in the vicinity of the future Crystal Valley Interchange. The development will be phased over time and this traffic study assumes the first phase will be completed by Year 2025, the second phase will be completed by Year 2030, and the final phase will be completed by Year 2040.

The project includes multiple access locations along the future extension of Prairie Hawk Drive, named Dawson Trails Boulevard south of Plum Creek Parkway and through the project. Internally other collector and local streets will be constructed to provide the most beneficial access into and around the site, which will be evaluated at the filing level. Several trails are planned to provide mobility and accessibility for people walking and biking.

The project is estimated to generate approximately 87,025 daily trips with about 6,700 trips occurring in the AM peak hour, 8,760 trips occurring in the PM peak hour, and 8,385 trips in the Saturday midday peak hour at full build-out. Nearly 35% of the total project trips will be home-based trips and internal to the Dawson Trails site between residential planning areas to/from the commercial space, schools, and recreational areas. **It was determined that the proposed roadway system can accommodate the projected traffic volumes for buildout conditions.** The phasing of the roadways and lane configurations are shown on **Figure 14**.

**Figure 14** illustrates the recommended mitigation measures as either background (non-project related) or project-implemented. **Figure 15** summarizes the daily volume on the internal roadways with the full buildout. The responsibility and cost contribution of the anticipated roadway and intersection improvements are not a part of the traffic impact study but are anticipated be negotiated within future development agreements.