Converse Avenue Improvement Plan
Final Report

City of Cheyenne

October 29, 2021

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The preparation of this report has been financed in part through grant[s] from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

Works Cited

Connect 2045 Long-Range Transportation Plan Update, December 2020, by Kimley Horn and Cheyenne MPO
Converse / Dell Range Intersection Traffic Safety Plan & Converse Avenue 35% Design Plan, November 2017, by HDR

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Acknowledgments

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Section 1

Introduction

In this section:

Introduction

In 2017, a study of Converse Avenue and Dell Range Boulevard was completed for the Cheyenne Metropolitan Planning Organization (MPO). Since that study, development in the City of Cheyenne has occurred faster than originally expected, which has impacted and will continue to impact Converse Avenue traffic volumes. The 2017 study did not address some issues and potential opportunities along Converse Avenue that the MPO has now identified. Recently, the MPO's Travel Demand Forecast Model was updated for the *Connect 2045 – PlanCheyenne Master Transportation Plan*, providing new traffic forecasts for determining future right-of-way and street network cross section needs. Private access drives and traffic control considerations needed additional study to address the anticipated increase in traffic volumes on the Converse Avenue corridor. In addition, analysis of the drainage swale on the west side of Converse Avenue north of the US Post Office was needed to support the reconstruction of the larger corridor. Because the previous study made recommendations for improvements to the larger Dell Range Boulevard and Converse Avenue intersection, this study does not include a review of that intersection, but is intended to accommodate those anticipated improvements.

OBJECTIVE

Develop a corridor improvement plan that enhances mobility and safety for all users to serve existing and future land use and traffic growth projections between Dell Range Boulevard and the new Carlson Street extension.

GOALS

- Identify the community's vision for the corridor
- Identify the corridor roadway cross-section
- Enhance pedestrian and bicycle mobility and safety, including crossings of Converse Avenue and connections to other facilities
- Improve intersection design and evaluate the need for traffic signal controls
- Minimize traffic conflicts through corridor access management

This project evaluates roadway improvements for the 3,200-foot-long segment of Converse Avenue north of Dell Range Boulevard to a new intersection with the planned construction of Carlson Street.

The City of Cheyenne reconstructed Converse Avenue from Storey Boulevard to a point south of Ogden Street in 2000. Converse Avenue was never fully completed and is in deteriorating condition. This project includes continuation of the Greenway on the west side of Converse Avenue from the existing terminus south of Ogden Street to Mason Way. Additional appropriate sidewalk improvements will be addressed along both sides of Converse Avenue in addition to considerations for all modes of travel. There is a bank of concrete box culverts (CBCs) at Dry Creek under Converse Avenue south of Mason Way which needs to be replaced as well due to their deteriorating condition which was documented in a 2020 WYDOT Structure Inspection Report.

The general objective of the Converse Avenue project is to develop corridor improvements that optimize and prioritize future safety and mobility for all users of the corridor. The project recommendations and design are not to be considered "final," and additional data, calibration, and validation will be required during final design to verify or modify the details of the recommended design reflected in this report. In addition, future developments and decisions may influence or alter the final design of the recommended improvements.

1.1 | Project Objective

The general objective of the Converse Avenue project is to design a corridor with improvements that optimize and prioritize future safety and mobility for all users of the corridor. The traffic study addresses the following corridor transportation topics:

- Current and year 2045 peak hour intersection operation
- Vehicle crash history
- Corridor cross-section improvement alternatives
- Potential future traffic signal warrants
- Potential residential street network connectivity options

1.2 | Project Goals

The following project goals were identified by the Project Steering Committee:

- Identify the community's vision for the corridor.
- Identify the corridor roadway cross-section.
- Enhance pedestrian and bicycle safety, including crossings of Converse Avenue and connections to other facilities.
- Improve intersection design and evaluate the need for traffic signal controls.
- Minimize traffic conflicts through corridor access management.

The corridor study evaluated the following intersections:

- Mason Way
- Point Bluff/United States Postal Service (USPS) Driveway
- Briarwood Lane
- Grandview Avenue
- Ogden Road
- Future Carlson Street

Figure 1: Converse Avenue study corridor.

Section 2

Project Coordination and Public Involvement

In this section:

The Converse Avenue Improvement Plan invited public and stakeholder participation, and developed a Public Involvement Plan (PIP) including small group (focus group) meetings with businesses and landowners, open house meetings with project area residents and stakeholders, project steering committee meetings, Cheyenne MPO committees, City of Cheyenne Planning Commissions, and City approvals.

2.1 | Project Steering Committee

Before any project activities were initiated, a small project team from Ayres and the MPO identified a larger group of local stakeholders to act as the Project Steering Committee. Participants included stakeholders from the MPO, the City, and the Laramie County School District 1. While initially envisioned as a large, formal group intended to guide and shape the project, it became evident that for such a short duration project, the intended purpose of stakeholder participation and acknowledgment could be fulfilled by the MPO and City Committees that the project was already scheduled and scoped to present to. Therefore, a smaller group from the same stakeholder groups was identified to act in a guidance role in more frequent progress-style Steering Committee meetings. The Steering Committee met bi-weekly and consisted of the following people:

- Tom Mason, MPO Director
- Jillian Harris, MPO Senior Transportation Planner
- Christopher Yaney, MPO Senior Planning Technician
- Tom Cobb, City of Cheyenne, City Engineer
- Anissa Gerard, City of Cheyenne, Traffic Engineer
- Charles Bloom, City of Cheyenne, Planning and Development Director
- Bryce Dorr, City of Cheyenne, Board of Public Utilities (BOPU)
- Jean Vetter, City of Cheyenne, Greenway and Parks Planner
- Vicki Nemecek, City of Cheyenne, Public Works Director
- Jeff Daugherty, Laramie County School District 1

The regular Project Steering Committee meetings provided a cooperative design effort which helped to identify opportunities and constraints in the corridor, as well as provided background and framework for key considerations that informed and shaped the plan recommendations.

The Steering Committee met 17 times during the project to guide the consultant team, review project progress and information, answer questions and provide insight, discuss public and stakeholder involvement, and collaborate to make decisions about the plan direction and recommendations. Agendas, meeting minutes, and presentations can be found in Appendix B.

2.2 | Public Involvement Strategy & Materials

The next component of the public involvement effort involved developing a public involvement strategy for the project.

The project team developed a Public Involvement Plan and advertisement material including a Project Fact Sheet and general project information for posting to the MPO website. The project also developed summary informational language for use on mailers and handouts and identified a geographic area around the project (to include residents and businesses within 1/8th of a mile along Converse Avenue and inside the project boundaries of Storey Boulevard and Dell Range Boulevard) to use for generating mailing lists for Public Involvement activities.

2.3 | Public Involvement Activities

The next component of the Public Involvement effort involved actively seeking public feedback through focus groups and public meetings. The project hosted focus groups with the US Post Office, local businesses, and a one-on-one meeting with Section 20 landowner and developer Frank Cole.

Converse Avenue Public Involvement Activities	
Event	**Date**
Small Group Events	
Focus Group #1 (Post Office)	Wednesday, February 10, 2021
Focus Group #2 (Local Businesses)	Thursday, February 11, 2021
Focus Group #3 (Frank Cole 1-on-1)	Wednesday, February 17, 2021
Public/Large Group Events	
Public Meeting #1	Wednesday, March 3, 2021
Public Meeting #2	Wednesday, May 26, 2021
Committee Presentations	
MPO Technical Committee Presentation	Wednesday, May 19, 2021
MPO Citizen Advisory Committee	Wednesday, June 9, 2021
*Special Technical Advisory Committee	Wednesday, September 15, 2021
*City Planning Commission	Monday, September 20, 2021
*City Governing Body (Final Plan Introduced)	Monday, October 11, 2021
*Public Service Committee	Monday, October 18, 2021
*City Governing Body (Final Plan Adoption)	Monday, October 25, 2021
*MPO Policy Committee Vote	Wednesday, December 15, 2021

**Scheduled future activities*

Focus Group #1 with the US Post Office was held on February 10 and was attended by 4 Postal Service staff, including:

- Cory Stibley (Plant Manager)
- Al Web (Network Specialist)
- Scott Boyd (Network Specialist)
- Kurt Kouba (Expediter)
- Jillian Harris (MPO) and Nathan Silberhorn and Darci Hendon (project team)

A summary of attendees and comments can be found in Appendix B, but primary concerns expressed included large freight truck accommodation and light vehicle safety during snowstorms and icy conditions.

Focus Group #2 was held on February 11 and was attended by 8 business owners, managers, and representatives, including:

- Rande Pouppirt (Owner of Black Market / AAA / Cold Stone Creamery building)
- Charlie Moore (Building Supervisor of Aspen Ridge)
- Steve Wehmeyer (Owner of Aspen Ridge)
- Sue Davidson (tenant in Aspen Ridge building)
- Justin Beckner (Civil Engineer for Ridge View Apartments)
- Tom Mason & Jillian Harris (MPO) and Nathan Silberhorn, Ken Voigt, and Darci Hendon (project team)

A summary of the meeting can be found in Appendix B, but primary concerns expressed included access issues, construction disruptions, and the addition and/or adjustment of traffic signals.

Focus Group #3, a 1-on-1 meeting with Mr. Frank Cole, was held on-site on February 17 with Darci Hendon of Summit Engineering. Darci and Mr. Cole drove around Section 20 with Mr. Cole providing general information about the Section 20 street network layout. A summary of the meeting can be found in Appendix B.

Public Meeting #1 was held virtually on March 3. The Public Meeting was advertised on the MPO Facebook page, on the MPO website, through 198 physical mailers sent to residences in the immediate vicinity of the corridor, and through Variable Message Boards placed in each direction of Converse Avenue for 3 days prior to the meeting. A 35-minute presentation was given, including Introduction of Team, Project Overview and Limits, Purpose and Goals, Overall Study Process, Identifying Existing Issues, Existing and Future Traffic, Conceptual Alternatives for addressing future traffic, and general Project Schedule. Active feedback was encouraged during the presentation via live polling questions, chat window, and live Question and Answer session following the presentation. One of the most successful engagement elements of the meeting was the live Polling questions, with around 90% to 95% of participants (by observation) responding. The polling questions asked are shown below, with the highest response to each question in bold text.

Polling questions

1. How did you hear about this meeting?
- Postcard mailer
- MPO Website
- Facebook
- **Message Board on Converse**
- Friend/Family/Neighbor

2. From Converse, which street do you most frequently use?
- Ogden Rd
- Grandview Ave
- Briarwood Ln
- **Point Bluff**
- Mason Way

3. What elements of this street are most important to you?
- **Capacity/vehicle throughput**
- Bike lane or shoulder
- Business access
- Speed
- Pedestrian access/safety
- Greenway
- Landscaping & aesthetics
- Intersection safety

4. How comfortable are you walking on a sidewalk immediately adjacent to the street?
- Completely uncomfortable
- **Uncomfortable**
- Mostly comfortable
- Completely comfortable

5. How comfortable are you riding a bicycle on a street with a shoulder?
- Completely uncomfortable
- **Uncomfortable**
- Mostly comfortable
- Completely comfortable

6. How comfortable are you riding a bicycle on a Greenway?
- Completely uncomfortable
- Uncomfortable
- Mostly comfortable
- **Completely comfortable**

*7. Do you like the idea of a raised center median? (***YES***/NO)*

8. In general, how do you feel about traffic signals?
- They make me feel safe
- **We need more to control speeds and cross-traffic**
- I could take them or leave them
- I don't like them, but they are necessary
- I hate them, and we have too many of them already

Unfortunately, due to technical issues with the features on the Zoom platform, the polling questions and responses were not captured in the meeting recording, and so the results are not available to print in this report. The project team was surprised to see that very few responses reflected a strong overall position on any question (i.e. results were, generally, fairly evenly distributed across the available options).

Summary

The presentation can be found in Appendix B.

Public Meeting #2 was held in person at Anderson Elementary School on May 26 and streamed live on the MPO Facebook page. The Public Meeting was advertised on the MPO Facebook page, on the MPO website, through 198 physical mailers sent to residences in the immediate vicinity of the corridor, and through Variable Message Boards placed in each direction of Converse Avenue for 3 days prior to the meeting. 35 individuals signed in at the meeting, with 5 attendees on Facebook Live. Before the presentation, attendees were able to spend approximately 15 minutes visiting two duplicate workshop station areas to review exhibits, ask specific questions of project and City staff, and complete comment cards. Each station was comprised of the following exhibits:

- Explanation of intersection analysis elements (LOS, peak hour signal warrants, and graphs)
- Current and future traffic volumes
- Study recommendations (bullet list of nine recommendations presented in the presentation)
- Overall aerial strip map exhibit showing corridor recommendations
- Select recommendation images (blow-up aerials of Briarwood cul-de-sac and Carlson Street roundabout)
- Large format map for drawing/writing on (roll-out aerial image showing conceptual exhibit of overall corridor recommendations)
- Project schedules

A 40-minute presentation was given, including Introduction of Team, Project Overview and Limits, Purpose and Goals, Overall Study Process, Identifying Existing Issues, Existing and Future Traffic, Conceptual Alternatives Evaluated, Preliminary Plan Recommendations, and remaining Project Schedule. Active feedback was encouraged during the presentation via Facebook Live stream and live Question and Answer session following the presentation. The Q&A session occupied the entirety of the remaining time, though participants were invited to stay and ask additional questions while the meeting room was cleaned up.

Summary

The presentation slides and summary of comments can be found in Appendix B.

Committee Meetings

The project was concluded with presentations to a variety of committees leading up to and following Governing Body approval of the planning document. Committee presentations began in May with the MPO Technical Advisory Committee on May 19 and the MPO's Citizen Advisory Committee on June 9. Both presentations generated good discussion and insightful feedback which was incorporated into the final planning report and preliminary design submitted to the MPO.

Presentations of the final document were made in October and November 2021 and included the MPO Technical Advisory Committee, the City Planning Commission, the Public Service Committee, the City Governing Body, and the MPO Policy Committee.

Section 3

Improvement Alternatives Development and Analysis

In this section:

This report section summarizes the Converse Avenue Corridor Traffic Report, which was conducted as part of this study and is included as an Appendix to this report. The traffic report summary includes the following information:

- Existing Conditions
- Year 2045 Conditions
- Improvement Alternatives
- Access Management
- Dell Range Boulevard Eastbound Truck Turning Requirements
- Street Network Connectivity
- Evaluation
- Recommendations

3.1 | Existing Conditions

In order to design sound Converse Avenue corridor improvement alternatives, it is necessary to identify existing and future corridor conditions. The study segment of Converse Avenue extends from its intersection with Dell Range Boulevard to a proposed intersection with a new Carlson Street located approximately 1,500 feet north of Ogden Road. This segment of Converse Avenue is in need of reconstruction due to deteriorating pavement and Dry Creek bridge conditions. Since the Dell Range Boulevard intersection with Converse Avenue is planned to be reconstructed in a future project, it is not included in this traffic study.

At Dell Range Boulevard, Converse Avenue is signalized with a five-lane cross-section that provides separate southbound left- and right-turn lanes, two southbound through lanes, and a single 20-foot wide northbound traffic lane. The northbound traffic lane is separated from southbound traffic by double yellow paint lines. As Converse Avenue approaches Mason Way, the cross-section tapers to a three-lane continuous left-turn lane design with a separate southbound right-turn lane. The three-lane continuous left-turn lane design extends north through a future Carlson Street intersection to Storey Boulevard.

3.2 | Identification of Deficiencies

Existing traffic conditions can be defined by vehicle crash history, traffic volumes, and peak hour intersection operation.

Corridor Crash History

A summary of the most recent 5-year motor vehicle crash history from 2015 through 2019 for the study segment of Converse Avenue, obtained from the City of Cheyenne, is summarized in Table 1. As shown in Table 1, there were a total of 23 crashes reported on the study segment of Converse Avenue, with the highest number of crashes (11) reported on the segment of Converse Avenue just north of the Dell Range Boulevard intersection which averaged 2.2 crashes per year (11 total) followed by the Mason Way intersection which averaged 0.8 crashes per year (4 total).

Table 1: Converse Avenue Crash History (2015-2019)

Location	Crashes/Year					Crash Severity			Total	Annual Average
	2015	2016	2017	2018	2019	Property Damage Only	Injury	Fatal		
Converse Avenue north of Dell Range	0	2	2	5	2	9	2	0	**11**	**2.2**
Business Access Road	0	0	1	1	1	3	0	0	**3**	**0.6**
Dry Creek Segment	0	0	1	0	0	1	0	0	**1**	**0.2**
Mason Way	0	2	1	1	0	4	0	0	**4**	**0.8**
USPS Truck Driveway	0	0	0	1	0	1	0	0	**1**	**0.2**
Point Bluff/USPS Driveway	0	0	0	1	0	1	0	0	**1**	**0.2**
Briarwood Lane	0	0	0	0	0	0	0	0	**0**	**0.0**
Grandview Avenue	0	0	0	0	0	0	0	0	**0**	**0.0**
Ogden Road	0	0	1	0	0	1	0	0	**1**	**0.2**
Carlson Street	0	0	0	0	1	1	0	0	**1**	**0.2**
Total	**0**	**4**	**6**	**9**	**4**	**21**	**2**	**0**	**23**	**4.6**

Table 1 indicates only 2 of the total 23 crashes (9%) reported along the Converse Avenue Corridor involved injuries with both injury crashes occurring on the segment of Converse Avenue just north of Dell Range Boulevard.

Table 2 summarizes collision patterns reported at the Converse Avenue study intersections.

Table 2: Converse Avenue Collision Patterns

Location	Crash Types							Total
	Rear	Head	Same Direction	Front to Side	Right from Broadside	Sideswipe	Not a Collision with 2 Vehicles in Transport	
Converse Avenue north of Dell Range	5	1	1	1	1	2	0	**11**
Business Access Road	1	0	0	0	1	0	1	**3**
Dry Creek Segment	0	0	0	0	0	0	1	**1**
Mason Way	1	0	1	0	1	1	0	**4**
USPS Truck Driveway	0	0	0	0	0	0	1	**1**
Point Bluff/USPS Driveway	0	0	0	0	0	0	1	**1**
Briarwood Lane	0	0	0	0	0	0	0	**0**
Grandview Avenue	0	0	0	0	0	0	0	**0**
Ogden Road	0	0	0	0	0	0	1	**1**
Carlson Street	0	0	0	0	0	1	0	**1**
Total	**7**	**1**	**2**	**1**	**3**	**4**	**5**	**23**

As shown in Table 2, the primary collision patterns involving more than one vehicle were rear-end and sideswipe crashes. As also shown in Table 2, 5 rear-end crashes occurred on the segment of Converse Avenue north of Dell Range Boulevard. Of the 4 sideswipe crashes, half occurred on the segment of Converse Avenue north of Dell Range Boulevard. It is noted the crash terms "Same Direction," "Front to Side," and "Right from Broadside" involve an angle-type collision. When summed together, the number of angle crashes along the corridor totals 6.

Existing Traffic Volumes

Figure 2 illustrates the existing Year 2020 daily traffic volumes on Converse Avenue and the adjacent street network. As identified at right, daily traffic volumes steadily decrease along the study corridor north of Dell Range Boulevard.

Figure 2

24-hour intersection turning movement counts were collected at the following three study intersections by the City of Cheyenne from 12:00 p.m. Monday, June 1, 2020 to 12:00 p.m. on Tuesday, June 2, 2020 and from 12:00 p.m. on Monday, December 14, 2020 to 12:00 p.m. on Tuesday, December 15, 2020.

- Mason Way
- Point Bluff
- Ogden Road

Daily traffic volumes on Briarwood Lane and Grandview Avenue were estimated based on residential trip generation rates published in the Institute of Transportation Engineers Trip Generation Manual, 10th edition.

Figure 3 at right shows the hourly volume distribution of traffic on Converse Avenue between the Mason Way and Point Bluff intersections.

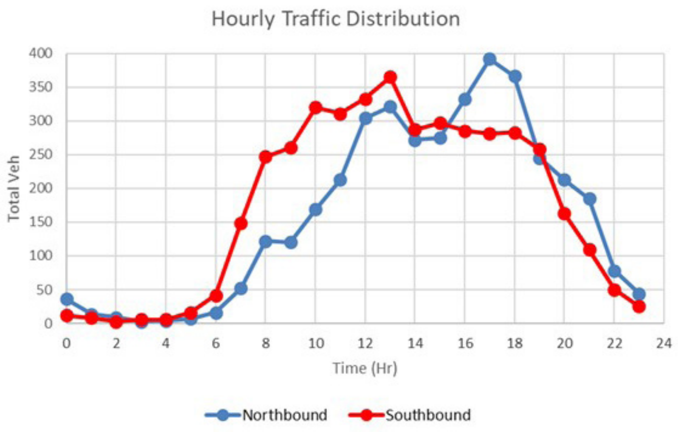


Figure 3

As an overall corridor, the mid-day peak hour occurs between 12:00 PM to 1:00 PM with the evening peak hour occurring between 3:30 PM to 4:30 PM. Heavy vehicles (trucks) comprise approximately 2% of the traffic stream along Converse Avenue during the peak hour time periods. This includes USPS trucks which use the corridor to access the USPS truck access driveway.

Corridor Traffic Operation

Existing Year 2020 and future Year 2045 peak hour traffic volumes are identified and analyzed in this study to identify any traffic operation corridor improvement needs.

Year 2020 Intersection Operation

For the purpose of this study, Level of Service (LOS) 'D' as defined in the Highway Capacity Manual (HCM), 6th Edition is used as the threshold for acceptable peak hour intersection operating conditions. Intersection operation is typically quantified based on its LOS during peak traffic volume periods. The LOS is determined based on the average amount of delay experienced by each vehicle entering an intersection during a 1-hour time period and is categorized by grades 'A' through 'F'. Table 3 provides a general LOS operation summary of the Converse Avenue study intersections highlighting only those traffic movements that are not operating at acceptable levels defined as LOS 'E' and 'F' during peak traffic volume time periods.

Table 3: Converse Avenue Intersection Traffic Movement Operation Summary
Year 2020 Existing Roadway Conditions

Intersection	Midday Peak Hour	Evening Peak Hour
Mason Way	All at LOS 'D' or better	EBLT at LOS 'F'
Point Bluff	All at LOS 'C' or better	All at LOS 'C' or better
Briarwood Lane	All at LOS 'B' or better	All at LOS 'B' or better
Grandview Avenue	All at LOS 'B' or better	All at LOS 'B' or better
Ogden Road	All at LOS 'B' or better	All at LOS 'B' or better

Based on the intersection capacity analysis summarized in Table 3, all existing study intersection traffic movements are operating at or better than LOS 'D' except for the eastbound left turn on Mason Way, which operates at LOS 'F' during the evening peak hour. The maximum queue length of the eastbound left turn on Mason Way is 125 feet.

Year 2045 Intersection Operation

According to PlanCheyenne year 2045 land use projections, residential and associated urban development is expected within the Section 20 area generally bounded by Powderhouse Road to the west, Converse Avenue to the east, Storey Boulevard to the north and the new Carlson Street on the south, as well as future development adjacent to the east side of the Converse Avenue Corridor. Based on a review of historic traffic patterns and PlanCheyenne transportation forecasts, development is expected to result in an annual growth rate of 2.64 percent in traffic on the study segment of Converse Avenue.

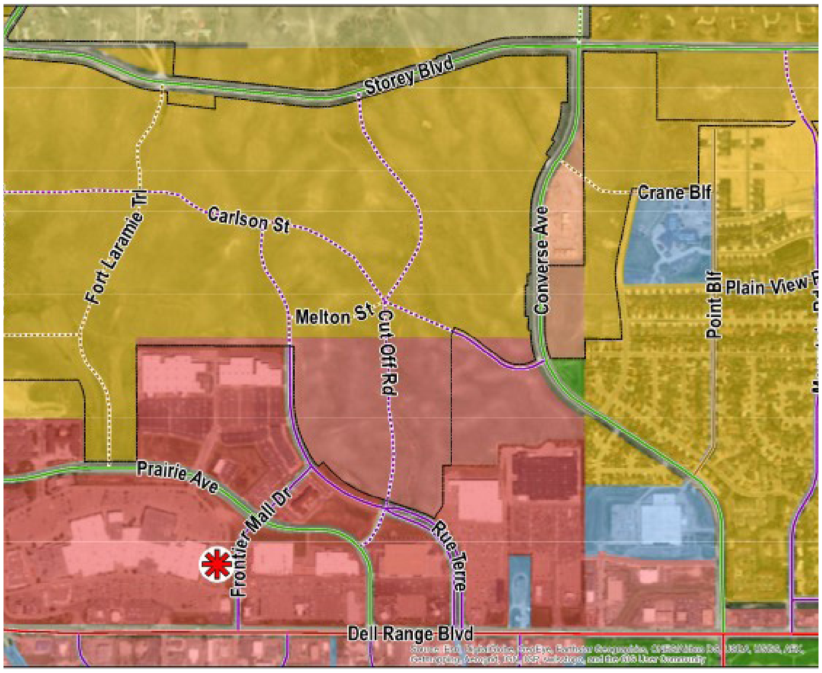


Figure 4: Section 20 Year 2045 Land Use Map (source: PlanCheyenne Connect 2045 LRTP)

Figure 4 at right illustrates the Section 20 Year 2045 land use development plan. As shown on this map, all of Section 20 is forecasted to be fully developed by the year 2045. The land area in the northern half of Section 20 is projected to contain new residential development along with the land area adjacent to the east side of Converse Avenue north of Carlson Street to Storey Boulevard.

Figure 5 illustrates the Year 2045 daily traffic volumes on Converse Avenue and the adjacent street network.

The forecasted 2045 peak hour volumes shown in Figure 5 are based on the trips forecast from the PlanCheyenne long-range land use/transportation model. These traffic volumes were used to identify the Year 2045 peak hour intersection turning movement projections.

Table 4 below provides a general LOS operation summary of the Converse Avenue study intersections, highlighting only those traffic movements that are not operating at acceptable levels defined as LOS 'E' and 'F' during peak traffic volume time periods.

Figure 5: Year 2045 Daily Traffic Volumes

Table 4: Converse Avenue Intersection Traffic Movement Operation Summary
Year 2045 Existing Roadway Conditions

Intersection	Midday Peak Hour	Evening Peak Hour
Mason Way	EBLT at LOS 'F'	EBLT at LOS 'F'
Point Bluff	EBLT at LOS 'F'	EBLT at LOS 'F'
		WBLT at LOS 'F'
Briarwood Lane	All at LOS 'C' or better	All at LOS 'C' or better
Grandview Avenue	All at LOS 'C' or better	All at LOS 'C' or better
Ogden Road	All at LOS 'C' or better	All at LOS 'D' or better
Future Carlson Street	EBLT at LOS 'E'	EBLT at LOS 'F'

The analysis of Year 2045 traffic indicates that all study intersection traffic movements in design year 2045 are expected to continue to operate at or better than LOS 'D' at the Briarwood Lane, Grandview Avenue, and Ogden Road intersections. At the Mason Way intersection, the eastbound left turn is expected to operate at LOS 'F' during both the mid-day and evening peak hours with maximum queue lengths increasing to 425 feet during both peak hours, as compared to current 125-foot queue. At the Point Bluff/USPS Driveway intersection, the westbound left turn is expected to operate at LOS 'F' during both the midday and evening peak hour with maximum queue lengths of 425 feet and 575 feet, respectively. The eastbound approach of the intersection is also expected to operate at LOS 'F' during the evening peak hour with a queue length of 25 feet. The analysis also indicates a future Carlson Street intersection would experience eastbound LOS 'E operation during the morning and LOS 'F' during the evening peak traffic period.

3.3 | Alternatives Development

An Enhanced 3-Lane Roadway and a 4-Lane Median Divided Roadway corridor improvement cross-section was developed to safely and efficiently accommodate projected Year 2045 traffic on Converse Avenue.

Enhanced 3-Lane Roadway Alternative

The first improvement cross-section involves an enhanced 3-lane roadway design illustrated in Figure 6 below.

Figure 6: Enhanced 3-Lane Roadway Alternative

Artist Rendering of Roadway Perspective

Roadway Cross-Section Dimensions

Under this design, the roadway includes a raised 16-foot median with channelized left-turn lanes at cross-street intersections. The median would be designed with a 'lipped' colored pavement and raised curbing at pedestrian crosswalk locations. This cross-section includes an 8-foot curbed tree lawn and 6-foot sidewalk on the east side of Converse Avenue and an 8-foot curbed tree lawn and 10-foot extension of the City's Greenway path. The total cross-section from outside of the east sidewalk to outside of the west Greenway path is 86 feet.

Year 2045 Intersection Operation Improvements

Due to poor Year 2045 intersection peak hour intersection operation at the Mason Way, Point Bluff, and a future Carlson Street intersection, each intersection was evaluated for the potential installation of traffic signals or roundabouts. Since the other study intersections were projected to operate at acceptable levels in 2045, they were not evaluated for traffic signal control.

Traffic Signal Analysis

An engineering study is required to determine if traffic signals are a viable intersection traffic control improvement option. The primary element of an Engineering Study involves a traffic signal warrant analysis documented in the national Manual on Uniform Traffic Control Devices (MUTCD). There are nine warrants that may justify the safe installation of traffic signals.

The three primary traffic signal warrants include:

1. Eight-Hour Volume;
2. Four-Hour Volume; and
3. Peak Hour Volume

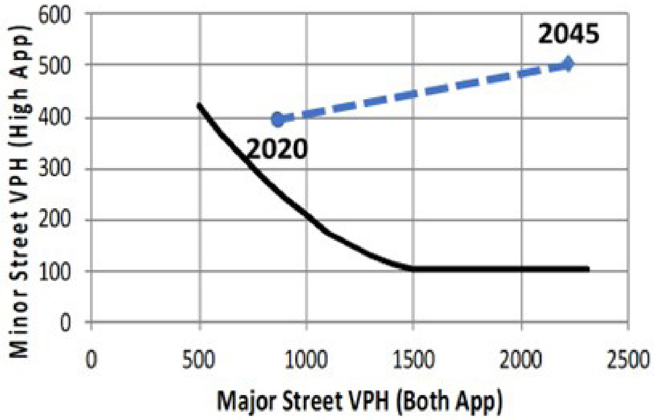
These are typically used to identify the potential criteria for future installation of traffic signals. Consistent with City of Cheyenne practice, Year 2045 peak hour traffic projections were evaluated to determine if the Mason Way, Point Bluff, and a future Carlson Street intersection satisfied Warrant Number 3 (Peak Hour Volume).

As shown in Figure 7, the Peak Hour Warrant graphs for the Mason Way, Point Bluff, and a future Carlson Street intersection indicate that each intersection can be expected to satisfy the warrants for future traffic signals by the year 2045. It is noted that the Mason Way intersection currently satisfies the peak hour warrant. Additional evaluation of existing hourly traffic count data at the Mason Way intersection indicates the 8-Hour Warrant is also satisfied.

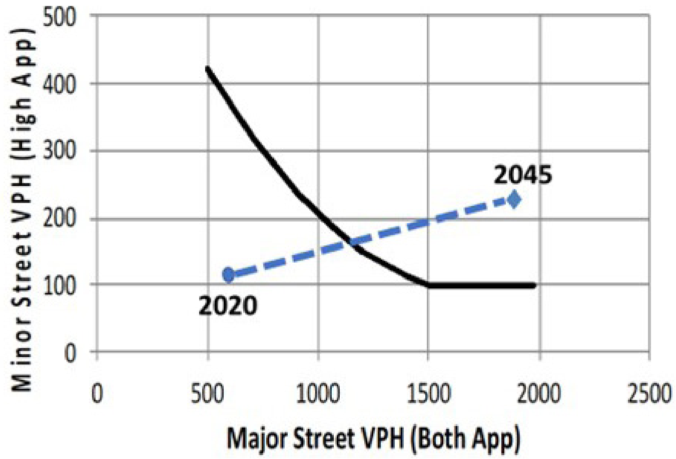
Table 5 on the following page provides a general LOS operation summary of the traffic signal operational improvements at the Mason Way, Point Bluff, and a future Carlson Street intersection with Converse Avenue.

Figure 7: Year 2045 Peak Hour Traffic Signal Warrant
Enhanced 3-Lane Roadway Alternative

Mason Way



Point Bluff



Future Carlson Street Intersection

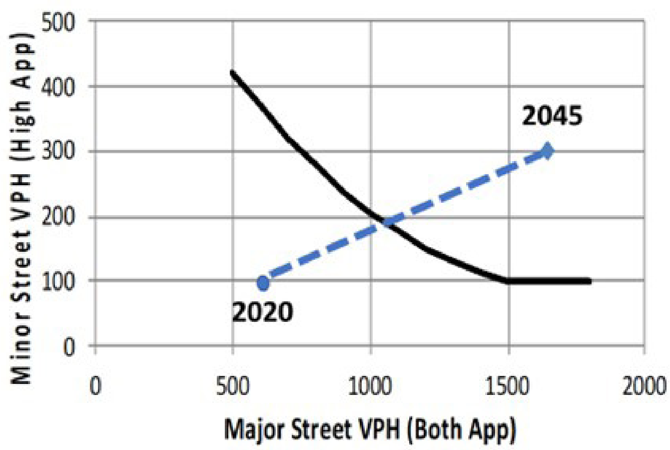


Table 5: Converse Avenue Enhanced 3-Lane Roadway Alternative Intersection Traffic Movement Summary - Year 2045 Traffic Signal Improvement Operation

Intersection	Midday Peak Hour	Evening Peak Hour
Mason Way	All at LOS 'C' or better	All at LOS 'C' or better
Point Bluff	All at LOS 'C' or better	All at LOS 'D' or better
Future Carlson Street	All at LOS 'D' or better	All at LOS 'C' or better

A peak hour intersection operation analysis indicates that the installation of future traffic signals will improve intersection operation to acceptable LOS 'D' or better at the Mason Way, Point Bluff, and the new Carlson Street intersection. With the installation of these 3 intersection traffic signal controls, all study intersection traffic movements are expected to operate at or better than LOS 'D' throughout the Converse Avenue Corridor through the design year 2045.

Additional detailed examination of the Point Bluff intersection operation indicates extensive northbound queuing of 875 feet during the evening peak. In order to reduce queuing, a separate northbound right-turn lane was analyzed.

Table 6 provides a general LOS operation summary of the traffic signal operational and construction of a separate northbound right-turn lane improvement at the Point Bluff intersection with Converse Avenue.

Table 6: Converse Avenue Enhanced 3-Lane Roadway Alternative Intersection Traffic Movement Year 2045 Traffic Signal with Northbound Right Turn Lane Improvement Operation Summary

Intersection	Midday Peak Hour	Evening Peak Hour
Point Bluff	All at LOS 'C' or better	All at LOS 'C' or better

With a separate northbound right-turn lane, evening peak hour operation is at LOS 'B' with queue reduction to 625 feet.

Roundabout Analysis

Based on comments received at the March 3, 2021, public information meeting, an analysis was conducted for a potential roundabout traffic control improvement in the Year 2045 at a future Carlson Street intersection with Converse Avenue.

Figure 8 illustrates a primary single-lane roundabout design for a future Carlson Street intersection with Converse Avenue.

Table 7 on the following page provides a general LOS operation summary of a single lane roundabout at a future Carlson Street intersection with Converse Avenue.

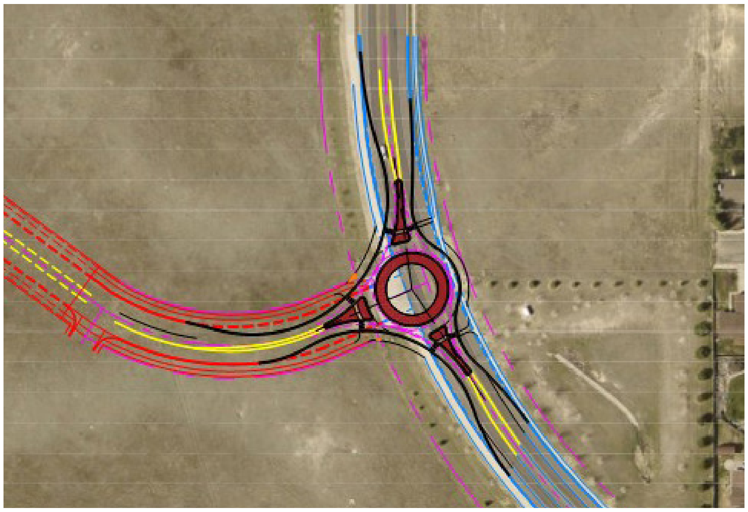


Figure 8: 3-Leg Roundabout Design for a Future Carlson Street Intersection with Converse Avenue

Table 7: Converse Avenue Enhanced 3-Lane Roadway Alternative Intersection Traffic Movement Year 2045 Traffic Roundabout Improvement Operation Summary

Intersection	Midday Peak Hour	Evening Peak Hour
Future Carlson Street	All at LOS 'B' or better	All at LOS 'C' or better

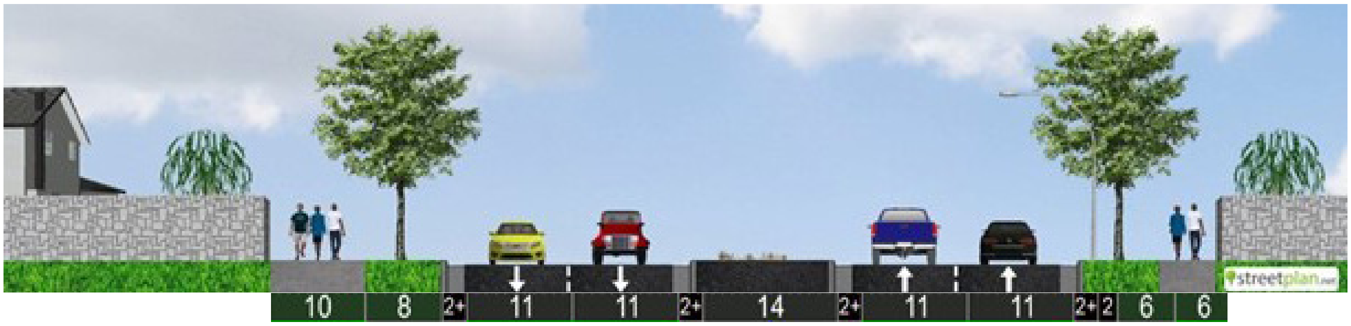
Under roundabout control, all intersection traffic movements are expected to operate at LOS 'B' during the midday peak hour and at LOS 'C' or better during the evening peak hour. Maximum queue lengths are expected to reach 125 feet during the midday and 250 feet during the evening peak hour for the northbound and southbound approaches, respectively. All other movements are expected to have a maximum queue length of 125 feet or less. Roundabout consideration at the Mason Way and Point Bluff intersections were not evaluated due to their close proximity and traffic platooning impacts generated by the signalized Converse Avenue intersection with Dell Range Boulevard and a future traffic signal at Mason Way.

Year 2045 Intersection Operation Improvements

The second improvement cross-section involves a 4-lane median divided roadway, shown in Figure 9.

Figure 9: 4-Lane Median Divided Roadway Alternative Artist Rendering of Roadway Perspective

Roadway Cross-Section Dimensions



Under this design, the roadway includes two travel lanes in the north and southbound directions with a 16-foot median with channelized left-turn lanes. The median would be designed with a 'lipped' colored pavement and raised curbing at pedestrian crosswalk locations. This cross-section includes an 8-foot curbed tree lawn and 6-foot sidewalk on the east side of Converse Avenue and an 8-foot curbed tree lawn and 10-foot extension of the City's Greenway path. The total cross-section width from outside of the east sidewalk to outside of the west Greenway path is 100 feet wide.

Table 8 provides as general LOS operation summary of the Converse Avenue study intersections highlighting only those traffic movements that are not operating at acceptable levels defined as LOS 'E' and 'F' during peak traffic volume time periods.

Table 8: Converse Avenue 4-Lane Median Divided Roadway Alternative Intersection Traffic Movement Operation Summary - Year 2045 Existing Traffic Control Conditions

Intersection	Midday Peak Hour	Evening Peak Hour
Mason Way	EBLT at LOS 'F'	EBLT at LOS 'F'
Point Bluff	WBLT at LOS 'F'	WBLT at LOS 'F'
		EBLT at LOS 'E'
Briarwood Lane	All at LOS 'B' or better	All at LOS 'B' or better
Grandview Avenue	All at LOS 'B' or better	All at LOS 'C' or better
Ogden Road	All at LOS 'C' or better	All at LOS 'D' or better
Future Carlson Street	EBLT at LOS 'F'	EBLT at LOS 'F'

With the 4-lane Median Divided Roadway alternative and existing cross-street stop sign control, the left-turn movements on the eastbound approach of Mason Way and the westbound approach of Point Bluff are expected to operate at LOS 'F' during both the morning and evening peak hours with the eastbound approach at Point Bluff operating at LOS 'E' during the evening peak hour. The future Carlson Street intersection eastbound left turn is expected to operate at LOS 'E' during the morning and LOS 'F' during the evening peak hour.

Due to the poor intersection peak hour traffic operation at the Mason Way, Point Bluff, and future Carlson Street intersections, each intersection was evaluated for the potential installation of traffic signals or roundabouts.

Traffic Signal Analysis

A similar engineering study was conducted for the 4-Lane Median Divided Roadway alternative as was conducted for the Enhanced 3-Lane Roadway alternative. The peak hour warrant curves for a 4-lane roadway, shown on Figure 10, are slightly different than those used in 3-lane roadway analysis. As shown in Figure 10 at right and on the following page, the Mason Way, Point Bluff, and a future Carlson Street intersections will satisfy the 4-lane warrants to consider the installation of traffic signals.

Figure 10: Year 2045 Peak Hour Traffic Signal Warrant 4-Lane Median Roadway Alternative Mason Way

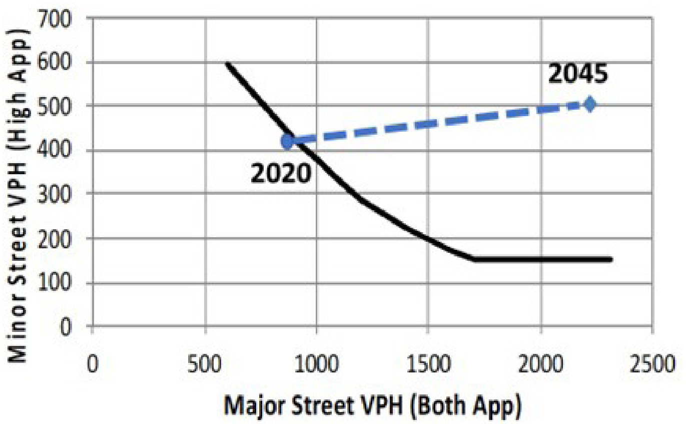


Table 9 below provides a general LOS operation summary of the traffic signal operational improvements at the Mason Way, Point Bluff and a future Carlson Street intersection with Converse Avenue.

With traffic signals, all traffic movements at the Mason Way, Point Bluff and at a future Carlson Street intersection are expected to operate at LOS 'C' or better during both the morning and evening peak hours except for the eastbound left turn at a future Carlson Street intersection which is expected to operate at LOS 'D' during the morning peak hour.

Roundabout Analysis

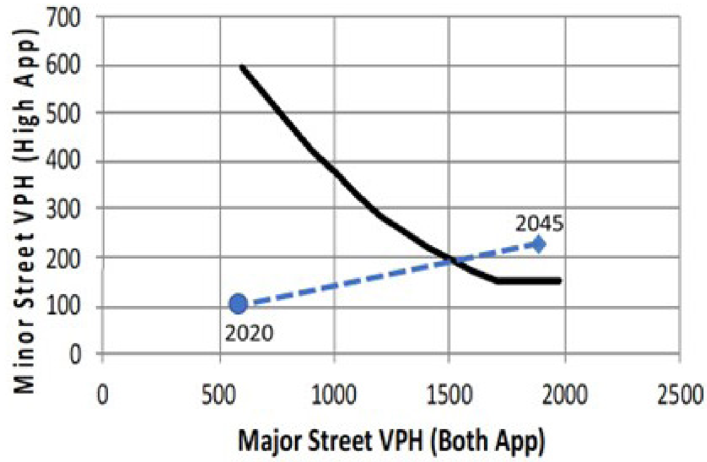
It is noted that the 4-lane cross-section alternative was not analyzed with a dual lane roundabout due to local traffic safety concerns experienced at a dual lane roundabout on Pershing Boulevard at its intersection with Converse Avenue.

Access Management

Access management on arterial streets has been shown to improve safety by reducing traffic conflict points along a roadway. Two principle areas identified in this study for access management involved left turns that currently occur at the commercial developments located along Converse Avenue north of its intersection with Dell Range Boulevard and south of the Dry Creek bridge (Commercial Back Access Roads) with the second access management location involved traffic conflicts at the Briarwood Lane intersection with Converse Avenue.

Figure 10: Year 2045 Peak Hour Traffic Signal Warrant 4-Lane Median Roadway Alternative (cont.)

Point Bluff



Future Carlson Street Intersection

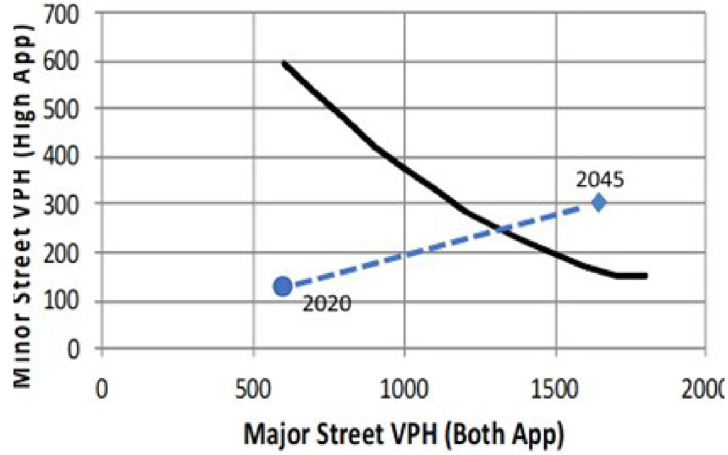


Table 9: Converse Avenue 4-Lane Median Divided Roadway Alternative Intersection Traffic Movement Operation Summary - Year 2045 Traffic Signal Improvements

Intersection	Midday Peak Hour	Evening Peak Hour
Mason Way	All at LOS 'C' or better	All at LOS 'C' or better
Point Bluff	All at LOS 'C' or better	All at LOS 'C' or better
Future Carlson Street	All at LOS 'D' or better	All at LOS 'C' or better

Commercial Access Business Roads

The commercial business access road on the east side of Converse Avenue provides secondary access to Cold Stone Creamery and adjacent businesses and accommodates entering and exiting traffic flow. The commercial business access road on the west side of Converse Avenue operates as a one-way eastbound roadway exiting the Cheyenne State Bank property and adjacent development. In addition to the left-turn conflict concerns with traffic on Converse Avenue, it has also been reported that motorists will travel in the wrong direction on the western back access road to avoid southbound right-turn traffic delays at the Dell Range intersection. Both of these access roads are located approximately 175 feet north of Dell Range Boulevard.

Traffic conflict concerns at both these access road intersections involve left-turn conflicts in close proximity to the Dell Range Boulevard intersection; the fact that left turns attempting to across Converse Avenue are periodically blocked by traffic queues on Converse Avenue and traffic driving in the wrong direction creates a problem on the eastbound one-way road on the west side of Converse Avenue.

It is therefore recommended to construct a raised 4-foot-wide median separating northbound and southbound traffic on Converse Avenue between Dell Range Boulevard and Mason Way under both the 3-lane enhanced and 4-lane divided roadway alternatives. In the event that right-of-way constraints don't allow for a raised median, another option is to place glue-down plastic bollards along the yellow centerline to similarly prevent left-turn exits from these access roads.

Briarwood Lane

According to data published in the Institute of Transportation Engineers Trip Generation Manual, 10th edition, the 30 homes on Briarwood Lane and Grandview Avenue generate 26 morning and 30 evening peak hour trips. The Converse Avenue spacing between the Briarwood Lane and Point Bluff intersections is approximately 250 feet. Based on the 2045 signalized operation analysis for the Enhanced 3-Lane roadway alternative cross-section, the 95th percentile southbound through movement queue is expected to extend 450 feet during the morning peak and 525 feet during the evening peak hour north of the Point Bluff intersection. Under this condition, access management is needed for traffic flow and safety on Converse Avenue due to left turns entering and exiting Briarwood Lane that can be blocked by southbound queuing on Converse Avenue. Based on this concern, it is recommended cul-de-sacing Briarwood at its intersection with Converse Avenue with all neighborhood traffic using the Grandview intersection. Typically, neighborhood design would involve 2 points of access. It is, therefore, recommended to construct a 10-foot wide emergency vehicle access surface connecting Converse Avenue to the Briarwood Lane cul-de-sac.

An alternative to the cul-de-sac is a two-lane "right in/right out" access point. From a traffic safety perspective, the cul-de-sac is preferred due to the complete elimination of a conflict point. However, the project team received strong resident opposition to the full closure, and the right in/right out option would eliminate the greatest conflict risk (left turns in and out of Briarwood) while still allowing free movement outside of the peak traffic hours. A right in/right out would marginally complicate maintenance and snow removal activities.

Table 10 provides a general LOS operation summary of the Grandview Avenue intersection with Converse Avenue under the cul-de-saced Briarwood Lane recommendation for both the Enhanced 3-Lane Roadway and 4-Lane Median Divided Roadway cross-section alternatives.

Table 10: Grand View Avenue Intersection Traffic Movement Summary
Year 2045 with a Cul-de-Saced Briarwood Lane

Alternative Section	Midday Peak Hour	Evening Peak Hour
Enhanced 3-Lane Roadway	All at LOS 'C' or better	All at LOS 'C' or better
4-Lane Median Divided Roadway	All at LOS 'B' or better	All at LOS 'C' or better

Under this access management improvement, all traffic movements on Converse Avenue at its intersection with Grandview Avenue, including the northbound left turn, are expected to operate at LOS 'A' under an Enhanced 3-Lane or a 4-Lane Median Divided Roadway design. The eastbound approach of Grandview Avenue operates at LOS 'C' or better during peak hour traffic periods.

Dell Range Boulevard Truck Turning Issue

In addition to analyzing corridor improvement alternatives, this study also investigated an existing eastbound semi-truck turning problem at the northeast corner of the Dell Range Boulevard intersection with Converse Avenue. It has been reported that semi-trucks can not make the eastbound left turn without traveling over the intersection corner curbing and crossing into oncoming southbound left-turn traffic lane. Existing semi-truck traffic includes WB-53 foot long vehicles. The USPS has indicated they will start using WB-53 trucks with an attached "pup" at their facility on Converse Avenue at Point Bluff.

Figure 11 illustrates the additional right-of-way required to accommodate right-turn movements for both of these truck classifications. Design of the recommended Converse Avenue improvements should include the truck turning need which will require additional right-of-way on the northeast intersection quadrant.

Street Network Continuity

Three street network continuity options were identified by the Project Steering Committee to improve accessibility to future residential development and Anderson Elementary School located east of Converse Avenue and north of a future Carlson Street intersection.

Figure 12 shows three street connection route options between Converse Avenue and Ogden Road. The southern option (green) connects to Apache Street, the center option (red) connects to Pattison Avenue, with the third option (blue) connecting to Ogden Road in the vicinity of Plainview Boulevard or Council Bluff.

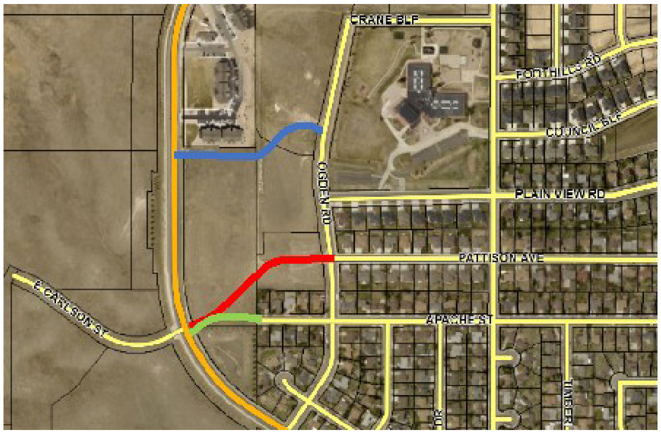
The PlanCheyenne Long-Range Transportation Model was

Figure 11: Eastbound Right Turn Truck Turning Requirements at the Dell Range Boulevard Intersection with Converse Avenue

WB-53 Semi Truck Turning Requirement

WB-53 Semi Truck with Pup Turning Requirement

Figure 12: Street Network Connectivity Options



used to identify Year 2045 traffic projections for each street network connectivity option, which are summarized on Table 11 below. A new neighborhood street network connection is projected to carry approximately 1,100 vehicles per day except for the Plainview Boulevard/Council Bluff connection, which is projected to carry 400 vehicles per day.

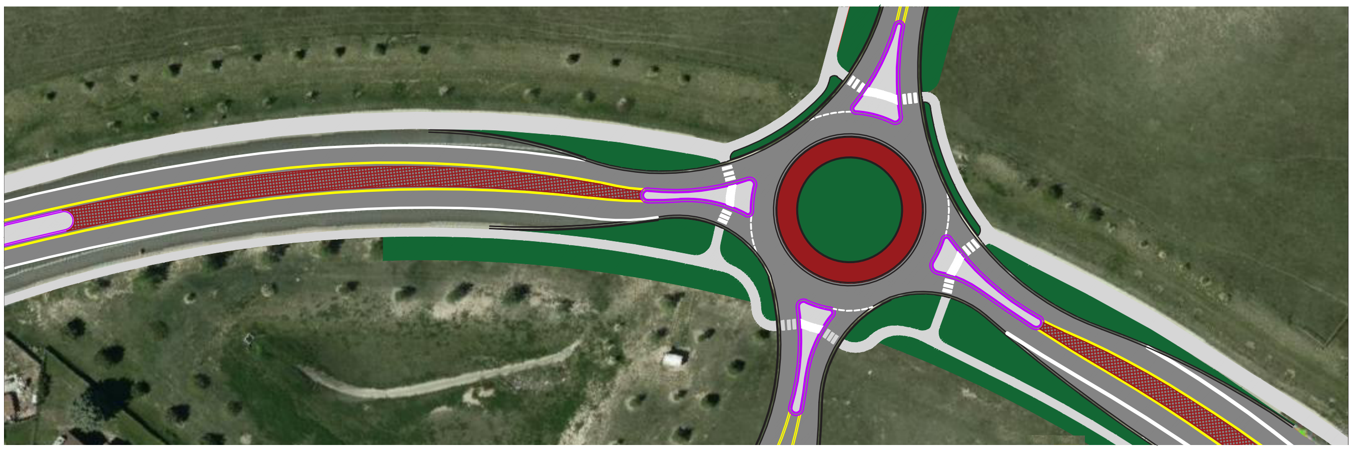
Table 11: Year 2045 Traffic Volume Impact of Neighborhood Street Connectivity Options

New Street Network Connection	Percent Traffic Reduction: Ogden Road	Percent Traffic Reduction: Point Bluff
Plainview Boulevard/Council Bluff	19%	0%
Pattison Avenue	40%	0%
Apache Street	40%	0%

As shown on Table 11, both the Apache Street and the Pattison Avenue connections between Converse Avenue and Ogden Road provide the most efficient routes to reduce traffic on Ogden Road. Based on street intersection spacing guidelines, the connection located between Plainview Boulevard and Crane Bluff Road (800 feet) provides the greatest separation spacing from the new Carlson Street intersection with Converse Avenue.

Should the Apache Street or Pattison Avenue Connections be selected, they would create a fourth leg to the future Carlson Street intersection with Converse Avenue. A 4-leg roundabout operation analysis was conducted for the 3-Lane Enhanced Roadway alternative. Figure 13 shows a 4-leg roundabout design at a future Carlson Street intersection.

Figure 13: 4-Leg Roundabout Design for a Future Carlson Street Intersection



All 4-leg roundabout Year 2045 peak hour traffic movements are expected to operate at LOS ‘C’ or better with the Enhanced 3-Lane roadway design alternative. Table 12 provides a general LOS operation summary of a single lane roundabout at a future 4-leg Carlson Street intersection with Converse Avenue under the Enhanced 3-lane Roadway Alternative.

Table 12: Future Carlson Street Intersection LOS Operation Summary – Year 2045 4-Leg Roundabout

Intersection	Midday Peak Hour	Evening Peak Hour
Future Carlson Street	All at LOS ‘B’ or better	All at LOS ‘C’ or better

3.4 | Decision Matrix Evaluation Development

Each of the two cross-section design improvement alternatives were evaluated based on the criteria shown in Table 13. It is noted that the evaluation is subjective on each alternative's qualitative ability to satisfy each of the criteria.

Table 13: Evaluation of Converse Avenue Design Alternatives

Criteria	Enhanced 3-Lane	4-Lane Divided
Safety	★	●
Traffic Operation	★	★
Pedestrian Friendly	★	●
Speed Management	★	●
Connectivity	★	●
Drainage	★	●
Right-of-Way	★	●

Note
★ = Very Good
● = Good
■ = Poor
— = Very Poor

The evaluation findings shown on Table 13 are based on the following general qualitative impacts:

- **Safety** | The enhanced 3-lane alternative reduces pedestrian crossing distances, tames traffic speeds, and reduces potential sideswipe crashes by providing only one traffic lane in each direction, as compared to the 4-lane alternative.
- **Traffic Operation** | Both alternatives provide acceptable LOS at the study intersections with traffic signal controls at Mason Way, Point Bluff, and a new Carlson Street intersection. The Year 2045 daily traffic on Converse Avenue between Mason Way to north of Carlson Street is projected to range between 18,000 vpd to 9,000 vpd. Based on FHWA criteria, a 3-lane continuous left-turn lane roadway can accommodate 17,000 to 21,000 vpd.
- **Pedestrian Friendly** | Both alternatives provide median refuge islands, a continuous sidewalk along the east side of Converse Avenue and greenway path along the west side of Converse Avenue. The enhanced 3-lane alternative provides reduced pedestrian crossing distances of Converse Avenue and exposure to oncoming traffic.
- **Speed Management** | Both alternatives provide a raised median, urban street crosswalk cadence, and tree lawn terrace landscaping. The enhanced 3-lane alternative provides narrower northbound and southbound pavement perspectives to drivers which impacts vehicle speeds.
- **Connectivity** | Both alternatives provide similar existing cross-street accessibility to adjacent residential and commercial land uses.
- **Drainage** | Both alternatives will require replacing the existing drainage swale with an underground drainage system and curb inlets. The enhanced 3-lane option provides less impervious surface and additional opportunities for vegetated swales compared to the 4-lane alternative.
- **Right-of-Way** | The 4-lane alternative may require additional right-of-way at selected locations to accommodate a buffered tree lawn and full-width sidewalk due to its total 100-foot width, compared to the 86-foot back of sidewalk to back of greenway path width requirement of the enhanced 3-lane alternative.

Recommendations

Based on the evaluation of street design cross-sections, public comments, and according to the previously stated criteria, the following recommendations are made:

- It is recommended to construct the 4-Lane Median Divided Roadway design between Dell Range Boulevard and Mason Way, transitioning to the 3-Lane Enhanced Roadway design north of Mason Way as illustrated in Figure 14.
- It is recommended to install traffic signals at the Mason Way and Point Bluff intersections with Converse Avenue.
- It is recommended to construct a single-lane roundabout at a future Carlson Street intersection with Converse Avenue based on its ability to tame traffic speeds, enhance intersection safety, and serve as a gateway to the future fully developed urban area south of a future Carlson Street.
- It is recommended to install "Continental" design marked crosswalks at the Converse Avenue intersections with Mason Way, Point Bluff and a future Carlson Street. (See Figure 15.)
- It is recommended to construct a new street connection to Converse Avenue at a location between Apache Road and Crane Bluff Road.

Figure 14 illustrates the recommended corridor design improvement for Converse Avenue.

Figure 14: Recommended Converse Avenue Design Improvements

Figure 15: Example of Continental crosswalk

Image courtesy of US Department of Transportation, Federal Highway Administration

Section 4

Preliminary Engineering Design

In this section:

Ayres performed preliminary engineering on project elements sufficient to determine project limits and construction costs to a confidence level appropriate for 35% design for Converse Avenue (hereafter called Converse). Major elements were identified and quantified, and minor elements were estimated based on typical percentages for similar projects.

The design utilized recommendations from the Traffic Operations Report as a starting point, and adjustments were made based on conversations with the City. The design also took into account the logical limitations of the project site, such as limiting the number of private property parcels impacted by the project, aligning the project with the existing Dell Range intersection, and considering potential future projects (the Dell Range intersection and possible changes to Converse south of Dell Range).

Based on conversations with the City, Ayres has developed an ultimate design which illustrates the greatest benefit and most desirable configuration, which is included as Attachment A. Ayres also developed an interim design at the Dell Range intersection that incorporates most of the ultimate design improvements, but which limits cost and right-of-way (ROW) impact. The interim design also postpones improvements at Point Bluff that may not be warranted at the time of construction (current traffic volumes do not warrant the need for traffic signals at Point Bluff). It will be important for the City to determine the most appropriate design to construct based on available funding and traffic volumes at the time of anticipated construction.

Besides improved lane configuration north of Dell Range, the design includes a realignment of the lanes north of Dell Range. The project should align the new lanes with the existing lanes south of the intersection to eliminate the current angle break across the intersection, reduce driver confusion, and fix the unusual situation of having unbalanced left turn lanes. In addition, the recommended alignment was made parallel to the ROW lines so that acquisition legal descriptions are clearer and simpler.

It is important to note that while improved, the lane alignment is not ideal. Specifically, a better operational lane configuration would have the lanes south of the intersection balance with the lanes north of the intersection (two southbound lanes, two left turn lanes, and two northbound lanes). To create proper lane balance, widening of Converse an additional 12 feet both north and south of Dell Range would be required. South of Dell Range, this is only feasible by widening to the west where the pedestrian bridge would not be impacted. North of Dell Range, this is only feasible by widening to the east where the Aspen Ridge complex would not be impacted. In this scenario, a new angle point across the intersection would be introduced, “breaking” one of the major improvements this project has to offer.

4.1 | Typical Sections

As described in Section 3 and the Traffic Operations Report, the corridor sees a wide range of traffic volumes and movements, and as such, the project will require a variety of lane configurations, or Typical Sections, to best accommodate the anticipated needs. All segments or sections should include a variable-width raised* median, 24-inch curb and gutters, a tree lawn**, and 6-foot sidewalk or 10-foot greenway.

With traffic near the Dell Range and Mason Way intersections the heaviest and most varied, the segment from Dell Range to Mason Way will require a 5-lane typical section plus additional southbound right-turn lanes at Dell Range and Mason Way. Due to the extra lanes, no shoulder is recommended.

As traffic volumes lighten north of Mason Way, one through lane should be dropped in each direction. The southbound lane should drop between the southern USPS truck access and the Point Bluff intersection. This will allow southbound vehicles slowing and entering the USPS facility (primarily freight trucks) to exit the primary lane and thus reduce traffic conflicts due to speed differential. A 6-foot shoulder should be constructed along southbound Converse between the lane drop and Point Bluff. The northbound lane should terminate as a right-turn only lane at the Point Bluff intersection. This extra lane allows slowing, right-turning vehicles to maintain separation from through traffic and likewise reduces conflicts due to speed differential. Due to the extra lane, no northbound shoulder is recommended between Point Bluff and Mason Way.

North of Point Bluff, the corridor should maintain the enhanced 3-lane typical section; a single lane in each direction with 6-foot shoulders and a raised* median that acts as an alternating left-turn lane (or Two-Way Left Turn Lane).

In all cases through the project, the median should be either 16 feet when no left turn lane is present or 4 feet (face of curb to face of curb) wide when a left turn lane is present. The project should construct a 10-foot concrete greenway along the west side of the road between Carlson Street and Mason Way, and 6-foot concrete sidewalks in all other locations.

An 8-foot tree lawn has been included per City standards; however, the use of this buffer space should be carefully considered by the City and future designers, taking into account cost of irrigating and maintaining any vegetation that is installed. Specific elements that should be considered include:

- Buffer zone: the tree lawn buffer provides both a real and perceived safety benefit to cyclists and pedestrians; it is comforting to these users and the separation should be maintained if at all possible.
- Trees arguably provide the greatest aesthetic and environmental benefit for the lowest irrigation and maintenance cost, provided the species are carefully selected, they are properly irrigated, and they can fully establish prior to onset of harsh weather.
- Landscaping the buffer zone has a great deal of aesthetic value, but also comes with high installation, irrigation, and/or maintenance costs.
- The final design phase should include careful consideration of these elements and include a landscape architect review to make specific, targeted recommendations for low-water, drought-tolerant species that minimize the City's maintenance efforts.

** Median curb should be 6" raised where traffic is being channelized (i.e. lane tapers), and where pedestrian crosswalks are present. In other locations, a flat or 2" lipped curb could be utilized with colored and/or textured pavement to reduce snow drifting, damage from vehicle and snowplow strikes, etc.*

*** Tree lawn space should be provided wherever practical given adjacent constraints. Where additional right-turn lanes are provided, buffer space typically is not.*

4.2 | Right-of-Way and Access Management

ROW Impacts

Generally speaking, the effort was made to design the proposed improvements to minimize ROW impacts to the most beneficial extent. For example, the roadway template was aligned to avoid ROW impacts to the numerous parcels along the east side of the project in favor of greater impacts to only two parcels along the west side of the project. The rationale for this was that minimal sliver impacts to several parcels would require a great deal of ROW acquisition effort for minimal benefit. On the other hand, once a parcel is impacted, a greater area of impact is only marginally more effort and cost than a small impact to that same parcel. The design was tailored to keep ROW impacts limited to the empty parcel south of Mason Way, the USPS parcel north of Mason Way, and the Blackmarket parcel northeast of the Dell Range intersection. The benefits of this approach are as follows:

- The USPS parcel will be impacted in any condition in order to bury the existing drainage which partially lies in the utility easement. While some of the impact is due to permanent roadway widening, a portion of the impact will likely be expansion of the utility easement which will be landscaped and available for USPS use or beautification.
- There is more buffer space between Converse and the USPS facility than any other parcel, making the project's impacts less evident at this location.
- The parcel southwest of Mason Way is vacant, so the City can work with the owner/developer to accommodate the project instead of the project causing or mitigating impacts to an existing facility or buffer zone.
- Impacts to the Black Market parcel are unavoidable due to necessary improvements to the northeast corner of the Dell Range intersection to accommodate truck turning movements. Given this unavoidable impact, it makes sense to maximize improvements in this area in order to avoid sliver impacts to the Aspen Ridge parcel west of Converse. The Black Market owner is believed to be a willing and cooperative property owner, and a total buyout of the parcel is believed to be feasible. This parcel impact allowed us to incorporate other very beneficial intersection improvements as well, such as lane alignment and continuity improvements.

Access Management

As described in detail in Section 3 and the Traffic Operations Report, the project should incorporate a number of minor Access Management elements; primarily limiting left turn movements at Aspen Ridge and Black Market via construction of the center raised median, and at Briarwood Lane via closure of the open cul-de-sac. It is noted that in the ultimate configuration, we have shown the Black Market access remaining, though it could be eliminated should the parcel be a total acquisition as discussed above. Additional improvements include sharpening the leading curb radius at the Aspen Ridge exit-only to dissuade right turns into the property from Converse.

Particular consideration should be given to thoughtful and effective directional messaging in the greater business plaza west of and including Aspen Ridge Plaza. The existing exit at this location serves the entire development west of Aspen Ridge, including Apple Ridge Plaza (5 businesses), Spruce Ridge Plaza (7 businesses), and Big 5 Sporting Goods in addition to the 13 businesses in Aspen Ridge Plaza. Customers have grown accustomed to the convenient access to northbound Converse Avenue through this exit; eliminating left turns here will require a relatively long alternative route via westbound Dell Range, northbound Grandview, and eastbound Mason Way (which will accommodate the increased traffic volume with the recommended traffic signal). Initially, this will be an unfamiliar and inconvenient movement, and the final design should accommodate and mitigate it to the greatest extent possible.

Traffic analysis of eastbound Mason Way indicates that the minimal additional eastbound traffic generated from Aspen Ridge exits will have little to no effect on operations or delay at the Mason Way intersection due to the addition of a traffic signal. Under this condition, all left-turning vehicles will experience delay for a red lights phase, but all vehicles entering the red light queue will pass through a single green phase. Right turning vehicles may experience an additional delay of a few seconds due to the increased traffic from Aspen Ridge exits.

The reconfiguration of the Briarwood intersection (closure or conversion to right in/right out) is only recommended with the installation of a future traffic signal at Point Bluff under the ultimate design. In this scenario, southbound queues at Point Bluff are expected to extend through the Briarwood intersection. This creates additional conflicts and delays for vehicles entering and exiting Briarwood. For this reason, we are showing the closure of the Briarwood cul-de-sac in the ultimate design configuration, but maintaining the intersection in the interim design condition is both feasible and likely. It is noted that the project team received strong feedback from residents of Century West subdivision (Briarwood Lane and Grandview Avenue) against closing the Briarwood cul-de-sac. The objections were heard and documented. While Ayres does not believe the objections have any engineering or safety merit to them, the feedback is important, and the City should consider the right-in/right-out option as discussed in Section 3. See the Section 2 Public Involvement references for these objections and the project team's responses.

4.3 | Posted Speed Limit and Design Speed

The project is currently posted at 30 mph, which is in line with the project's context and use (heavy retail access adjacent to dense residential). Common observation by local residents is that much of the traffic along the project corridor exceeds that speed and many residents expressed concern with current vehicle speeds and are hesitant to walk or bicycle along the project. A major factor contributing to the excessive speeds is the open, rural feel of the corridor north of Ogden Ave, where speeds of 45 mph are comfortable. The addition of development at and north of Carlson in the coming years will help reduce that perception, and the construction of the recommended roundabout at Carlson will both force and emphasize the low-speed, urban context of the segment of Converse this project represents. The project recommendations are intended to calm traffic and bring the average speed down to the 30 mph posted limit. As such, we propose no changes to the posted speed limit.

The design speed for the project design is 30 mph, and the existing horizontal alignment is within acceptable ranges for this design speed, so no alignment changes are recommended.

4.4 | Pedestrian, Bicycle, and Transit Facilities

At the project onset, the City expressed a specific interest in accommodating multi-modal options, and feedback from the public involvement efforts verified the need for bicycle and pedestrian improvements in particular. Specifically, sidewalk gaps and lack of crosswalks were identified as major problems. The extension of the existing Greenway was well received by the public.

The project should improve pedestrian and bicycle access primarily by providing new sidewalk connectivity, extending the existing Greenway to Mason Way, providing three new marked crosswalks, and by widening the existing sidewalk along the east side of the project. In addition, the tree lawn will provide much needed comfort and safety benefits to sidewalk and Greenway users.

The 10-foot-wide concrete Greenway should be rebuilt along the west side of Converse from north of Carlson, through the recommended roundabout, and south to Mason Way, where it will connect to the existing Greenway running west. In doing so, the project will complete a 2.37-mile stretch of Greenway. The Greenway will need to include ADA-compliant ramps and crosswalks at all intersections along the west side of the project. South of Mason Way, the project should construct new 6-foot sidewalk all the way to the Dell Range intersection, including ADA-compliant ramps at the Aspen Ridge exit.

The project should replace the existing sidewalk along the east side of Converse with a new 6-foot sidewalk with ADA compliant ramps at each intersection, as well as ADA-compliant ramps and crosswalks crossing Converse at Mason Way, Point Bluff, and Ogden Road. The roundabout at Carlson should include ramps to connect the 6-foot shoulders with the adjacent sidewalks or Greenway so that cyclists riding on the shoulder can utilize the roundabout crosswalks if they so choose.

There is an existing Cheyenne Transit Progam (CTP) bus stop on southbound Converse just north of Mason Way, in front of the USPS facility. The existing stop is located in the right-turn lane for Mason Way, creating high risk for bus/car conflicts. In discussions with the City and CTP, it was determined that moving the stop out of the right-turn lane and on to Mason Way would be advantageous for vehicle and rider safety as well as rider and CTP convenience since the current route turns west on Mason Way. The project should reconstruct a new bus stop just west of the USPS entrance on Mason Way, including a concrete bus turn-out.

In addition, the new Ridge View apartment complex in the southwest corner of Carlson Street intersection presents a promising opportunity for transit use. A bus stop should be considered and evaluated south of the recommended roundabout. Since a route doesn't currently serve this location, consultation and coordination with CTP will be required.

4.5 | Dry Creek Structure

The Sheridan Reach of Dry Creek crosses Converse Avenue in a generally east/west direction approximately 250 feet north of the Dell Range intersection, crossing at a skew of approximately 20 degrees from perpendicular. The channel is heavy wetland and is approximately 66 feet wide with 3:1 side slopes. There is a history of flooding along Dry Creek in the vicinity of the project, and a flood control/diversion structure was constructed 3,700 feet upstream to mitigate this hazard and maintain a predictable flood stage water elevation.

Existing Structure

The existing structure is a 5-cell, 8-by-10-foot concrete box culvert (CBC) structure with a 20-degree skew to match the channel alignment as it crosses under Converse Avenue. The inlet consists of 45-degree wingwalls 25 feet long. The outlet consists of parallel wingwalls following the channel to accommodate a sidewalk and a driveway adjacent to the creek; the north wingwall is approximately 70 feet long and the south wingwall is approximately 60 feet long. An existing 48-inch storm drain carries roadside drainage from Mason Way outlets into the north side of the channel just west of Converse Avenue. The storm drain outlet consists of headwall and wingwalls with grouted riprap outlet protection. The south channel bank has been stabilized with riprap gabions opposite the storm outlet. A second storm sewer line collecting roadside and surface drainage from the Converse Avenue corridor and Section 20 parcel northwest of the project crosses Converse Avenue north of the Dry Creek structure and outlets into a 6th partial bay in the northeast corner of the structure. The headwalls and wingwalls are outfitted with box beam pedestrian railings, and box beam guardrail bolted to a special 18-inch concrete curb separates vehicles and pedestrians. There are two curb inlets on the north end of the structure, draining to the storm sewer outlet in the northeast corner of the structure.

Originally the project team anticipated extending the existing CBC to the east and west to accommodate widening of Converse Avenue for traffic and improved pedestrian accessibility. However, during the traffic study and preliminary design, it was discovered that a recent WYDOT inspection report indicated the existing Dry Creek structure was in worse condition than was previously known. Based on that report's findings, the City anticipates the need to replace the structure soon, possibly before a Converse Avenue roadway project is funded. With this information, the decision was made to design Converse Avenue improvements without the constraints the existing structure might place on the design and instead include an entirely new structure in the project.

Proposed Structure and Impacts

With this approach, improvements were directed entirely to the east. The new structure is expected to be 16 feet longer along the flow path than the existing structure to accommodate Converse Avenue widening to the downstream (east) side. Based on flow calculations explained in Section 5 Drainage, it is estimated that the entire structure will need to be approximately 5 feet wider than the existing structure to maintain the current top of box elevations. The proposed structure is expected to be a 5-cell, 8-by-11-foot CBC similar to the existing structure. Because the ditch along the west side of Converse Avenue outlets into a separate, adjacent structure in the northwest (downstream) corner of the CBC, only that portion of the structure will need to accommodate increased design flows from the piped ditch (also explained in Section 5). No significant grade changes on Converse Avenue are anticipated for the new structure.

The new structure will largely maintain the existing inlet wingwall and box footprint to limit impacts to the wetlands, riprap bank stabilization, and existing storm outlet in the Dry Creek channel. Analysis indicates that the existing inlet wingwall and structure opening provide appropriate geometry to provide sufficient flow for the design storm event, including increased flows from the enlarged storm drain. Construction will require some temporary wetlands impacts at the structure inlet, conservatively estimated at 0.1 acres.

Due to the increased width of the structure, downstream impacts will include complete removal and reconstruction of the existing wingwalls and significant permanent and temporary wetlands impacts. Permanent impacts are estimated to be 0.05 acres and temporary impacts are estimated to be 0.1 acres, for a conservative total of approximately 0.25 acres of wetland impacts related to the structure replacement.

Constructability and Phasing

With a proposed structure width of 99 feet curb-to-curb (increased from 85 feet), the east half of the new structure (52 feet) can be constructed while maintaining one northbound and two southbound lanes of traffic and a sidewalk (47 feet total, including temporary concrete barrier and shy distance) on the west half. Once completed, a traffic shift to the new eastern half of the structure would allow construction of the western half.

It is noted that an existing storm sewer manhole is in the north bank approximately 20 feet from the end of the northeast wingwall; during final design, an investigation of that storm line should be conducted, and special consideration made for how the proposed wingwall will impact it or can avoid it.

The final design project team should also consider additional design options to accommodate construction, including restricting Converse Avenue to a single southbound lane over the structure, the temporary use of 11-foot lanes during this configuration, and increasing the width of the proposed structure to ensure safe accommodation of both traffic and work site safety during construction. Final design should also consider packaging the structure work as a separate project from the Converse Avenue improvements to allow for winter construction of the CBC, in coordination with traditional low-flow season. In addition, the City may wish to consider solicitation of Alternative Technical Concepts (ATCs) from prospective bidders to encourage and better understand innovative ideas, and maximize construction efficiencies.

4.6 | Utilities

Like most urban corridors, a variety of underground utilities exist along Converse Avenue. There are no existing overhead utilities on the project aside from traffic signal mast arms at Dell Range Boulevard. Ayres performed utility locating and designating on the corridor from Dell Range Boulevard north to Carlson Street. The following is a list of utilities and owners identified within and adjacent to the ROW:

- Black Hills Electric
- Black Hills Gas
- CenturyLink/Lumen
- Cheyenne City Department of Public Works
- Cheyenne Water Department
- 360 Networks
- Charter Communications

For much of the corridor, Converse Avenue sits in a 100-foot ROW with 16-foot utility easements along both sides. Fiber-optic, electric, and gas utilities are present in the eastern utility easement and electric, fiber optic, and copper communications are present in the west easement. Water and sanitary sewer are present in the ROW, primarily under the existing pavement or curb and gutter, and storm sewer occasionally crosses under the pavement. The Converse Avenue template generally sits along the east edge of the ROW adjacent to residential development, with a drainage ditch running along the west side, occupying much of the utility easement. Due to this existing roadway alignment within the ROW and the constraints east of the ROW, improvements must primarily be constructed to the west, which will have a significant impact to the existing drainage and utility easement on that side, but which largely avoids utility impacts along the east side, where most of the dry utilities are located.

The team's general design approach is to limit utility and ROW impacts wherever practical while accommodating priority project elements. For example, the alignment near Dell Range Boulevard was shifted east to avoid ROW and utility impacts near Aspen Ridge Office Plaza that would have had minimal benefits, in favor of expanded ROW and utility impacts at the Blackmarket property, which was going to be impacted regardless of alignment due to necessary turning radius improvements. In particular, the project can avoid numerous existing surface utility boxes in the northwest corner of the Dell Range Boulevard intersection and all the underground utilities on the west side of Converse Avenue, south of Dry Creek. Similarly, the project can generally avoid impacts to utilities along the entire eastern edge of the project north of Mason Way. The intent is to direct impacts to locations the project is already going to disturb.

Dell Range Boulevard to Mason Way

The greatest impact from roadway widening will occur in the northeast corner of the Dell Range Boulevard intersection on the Black Market property and extending 200 feet to the north across Dry Creek. In this area are known Xcel gas, Black Hills electric, CenturyLink fiber, and City of Cheyenne water lines. Primary utility impacts include relocation of the existing traffic signal pole/streetlight and all related electrical and communications utilities, relocation of an existing gas vent immediately adjacent to the signal pole, and relocation and reconnection of several existing streetlights. Although the new signal pole location is well outside any identified utilities in the area, it will require a deep foundation, so a careful review of the existing utilities and utility potholing should be performed during final design. Due to the grade differential between Converse Avenue and the Black Market parking lot, widening to the east will represent a fill condition of approximately 2 feet, so other utility impacts are expected to be negligible.

Four private utilities cross Dry Creek as well as a City water line, so final design will need to include potholing at the new Dry Creek structure to determine exact utility locations and depths to minimize conflicts. Because the new structure is not anticipated to be deeper than the existing structure, no direct impacts are anticipated to the utilities crossing Dry Creek, although construction loading is a very important design consideration. Many private utilities require 3 to 4 feet of vertical clearance for construction to occur over their facilities. The required clearance may be greater in the saturated subgrade conditions one would expect in the creek channel. In addition, there are 3 existing water valves in the immediate vicinity of the structures' northeast corner, which are likely to require relocation or resetting due to the roadway widening and/or structure work.

The only impact expected on the west side of this segment is the relocation of an existing streetlight just north of Dry Creek.

Mason Way to Point Bluff

With the same utilities continuing north, direct utility impacts include several more streetlight relocations and an electrical transformer relocation in front of the USPS facility. Additional conflicts can be assumed along the ditch west of Converse Avenue; while utilities are deep enough to run under the existing ditch, construction activities to install the new culverts will be significant. It is noteworthy to point out that the existing storm sewer that drains the roadside ditch does share the utility easement with the three existing dry utilities from Mason Way to the USPS freight entrance. This suggests that a carefully designed storm sewer system can be installed to the north in the same utility easement without damage to the existing utilities.

It is possible these utilities will not agree to having storm sewer pipes in parallel above them. In this case, it will be important to design the storm system within existing (not proposed) ROW to avoid purchasing an additional easement and paying to relocate these utilities. Placement of the pipe culverts in the existing ROW will require crossings with the streetlight service feeds, which need to be carefully considered. In the case of this culvert alignment, an additional 300 feet of new storm sewer pipe will be installed below the proposed Converse Avenue pavement, compared to 400 feet of culvert that exists under Converse Avenue currently. For the remainder of the project to the north, the proposed storm sewer will be under the new Greenway.

Due to the density of existing utilities at the Point Bluff intersection, the future traffic signal is likely to require some minor utility relocation. Three of the required poles can be installed without any conflicts. Depending on mast arm reach, the pole in the southeast corner may require relocation of a portion of the existing electrical line. This is probably not a major item since a new service feed and pull box will have to be installed at each corner to power the signals.

Point Bluff to Carlson Street

North of Point Bluff, no utility conflicts are anticipated; the existing streetlights will remain undisturbed, and the new storm sewer pipes can be installed between the existing dry utilities. Electrical services may still conflict with the storm sewer and should be potholed.

At Ogden Road, the existing triple storm sewer inlets will need to be reconstructed at the proposed curb line, and north of Ogden Road, a series of four new streetlights will need to be installed along Converse Avenue, with an additional four streetlights installed at the Carlson Street roundabout. The existing electrical line crosses Converse just north of Ogden Road, so a new west service line will likely need to be installed to feed the west lights.

Coordination with new infrastructure

During preliminary design, it was noted that the Ridge View Apartments development was designing water line improvements at the Carlson Street intersection and the City is planning a number of water line improvements along the corridor. Because the water lines generally run under the pavement, and the project does not have significant impacts to most of the intersections, the primary design effort to avoid, mitigate, or accommodate these improvements will be to ensure the roadway pavement section is determined with water and storm sewer depths carefully considered, and to carefully coordinate the project schedule with the City's water improvements to allow these improvements to be constructed in conjunction with the roadway project. Special consideration is being made as part of this project to coordinate Converse Avenue improvements with the Ridge View development so that new water line improvements do not need to be relocated when the Carlson Street roundabout is constructed.

Installation of an empty conduit or bank of conduits along Converse Avenue is highly recommended as part of any construction project to provide future capacity for communications infrastructure to be easily installed. When installed along the western ROW line (possibly at the same time as the new pipe culverts), this is a low-cost addition to the project and will save tens of thousands of dollars.

Section 5

Drainage

In this section:

Ayres performed a brief analysis of the Section 20 drainage basin and a floodplain review of the Sheridan Reach of Dry Creek, as well as preliminary drainage calculations for a storm sewer collection, conveyance, and detention system from Mason Way to Carlson Street. Drainage planning and conceptual design followed the Cheyenne Stormwater Management Manual and the Cheyenne Unified Development Code (UDC).

5.1 | Section 20 and Converse Avenue Storm Sewer

The Section 20 drainage basin is impacted by this roadway improvement project. In general, the basin slopes southeast across Section 20 to an existing roadside ditch along Converse Avenue, which collects runoff and conveys it south along the west side of Converse Avenue to Dry Creek. Per the UDC, all new development on Section 20 must detain flows from any new impervious areas.

Existing inlets at the Ogden Road and Point Bluff intersections drain curbside street runoff from Converse Avenue, Ogden Road, and Point Bluff to the ditch immediately west of the intersections. Rain and snowmelt on southbound Converse Avenue surface flows to the ditch on the west side of Converse Avenue from south of Ogden Road down to Mason Way, where no curb or inlets are present. Flows in this ditch are piped from the USPS freight truck entry south via a single-cell 6-by-8-foot RCBC, which outlets to Dry Creek in the northeast corner of the Dry Creek structure. Street runoff south of Point Bluff runs curbside south to inlets on the Dry Creek structure, which drain directly into Dry Creek.

The project requires widening into the area currently occupied by the roadside ditch. To avoid significant ROW impacts and utility relocations, the project should pipe the flows in this ditch from Ogden Road to the USPS facility. Because the project will add curb and gutter to this section, it will also require new curb inlets along the west edge of the roadway. Curb inlets are recommended upstream (north) of the Grandview Avenue, Briarwood Lane, and Point Bluff intersections as well as the USPS freight entrance north of Mason Way. The inlets will drain to the adjacent piped storm system.

Drain inlets will be sized and placed along the west curb line to adequately capture stormwater runoff while limiting street flooding in compliance with standards. Our recommendation is to install curb inlets upstream of each intersection. Dual 48-inch pipes and a 5-by-8-foot RCBC are recommended to replace the existing roadside ditch, with single 24-inch lateral pipes (minimum size) draining the inlets into the trunk line. See the Drainage Plan & Profile sheets (see Appendix A) for details.

North of the future Carlson Street intersection, runoff from the existing roadway is captured into inlets and piped to the existing detention pond on the east side of Converse Avenue just south of Carlson Street, which then discharges to the existing roadside ditch on the west side of Converse, just north of the Ogden Road intersection. The west roadside ditch, north of Ogden, receives and conveys offsite drainage flowing from the large undeveloped area of Section 20 to the northwest. Plans for the proposed Ridge View Apartments on the west side of Converse at Carlson Street show an intent to intercept some of this drainage and route it through proposed local detention facilities and into an existing drainage system to the south and not into the existing Converse roadside ditch. This reduces the amount of runoff reaching the west roadside ditch. The proposed Converse Avenue road improvements encroach upon the roadside ditch, but leave room to maintain open channel stormwater conveyance through this reach. We recommend maintaining the roadside ditch between the Carlson Street culverts and the Ogden Road culverts.

The area east of the post office between the Point Bluff intersection and the driveway entrance (north of Mason Way), should be considered as a potential location for detention and water quality improvements. Reconfiguration of this area to maintain the visual buffer from the post office and provide stormwater improvements should be analyzed further during final design.

A preliminary assessment has been completed to size the storm sewer pipes and inlets. Further analysis will be required to validate storm sewer flows, size inlets, refine conveyance infrastructure sizing, develop detention and water quality opportunities, and further analyze the upstream and downstream impacts to Dry Creek.

Section 6

Costs

In this section:

6.1 | Overview

The goal of the 35% cost estimate is to develop a reasonable funding target for budgeting purposes. For this reason, time is not spent at 35% to nail down precise item quantities or unit costs, because it is almost certain that by the time the design is complete, both quantities and units cost will have changed. By design, quantities and costs are estimated, and typically, conservatively so. In addition, since most of the details are not yet developed at the 35% phase, some items are estimated using a historical percentage basis. For example, it is typical for erosion control, signing and striping, and construction traffic control each to cost between 3% and 5% of the total project cost, so those are simple work items to bundle and use a ratio to estimate.

A 35% cost estimate also typically includes a contingency line item to account for all of the site conditions, proposed equipment, and contractor work items that won't be known until final design (for example detailed utility conflicts, impacts, and costs; exact traffic control communications and networking equipment; dimensions, layout, and impacts of sidewalk ramps at intersections, miscellaneous contractor equipment needs). Although a 20% contingency is common at the preliminary phase, Ayres has worked hard to quantify more individual pay items than a typical 35% plan, and have therefore reduced the contingency to 10%.

In addition, at 35% design, we typically don't have a firm handle on when the project will be constructed, especially when funding has not yet been obligated. For this reason, we have added an inflation line item to adjust 2020 dollars to a likely future construction year. We used 2023 as the target construction year for Converse Avenue.

Our intent is to give our client a cost that we are very confident the project will not exceed; it's far better to spend less than your budget on the project than to spend more than you budgeted.

6.2 | Methodology

To the extent possible, Ayres utilized actual quantities from the CAD design files to determine quantities (removals, pavement, sidewalks, curbs, pipes and inlets, revegetation, etc.). For items not represented by actual design lines in the CAD files, Ayres calculated quantities using dimensions based on mapping and project length, and known or estimated depths and thicknesses (earthwork, structural subexcavation, CBC and wingwalls, plantings, topsoil, miscellaneous concrete, etc.).

For all items - whether measured, calculated, or estimated - quantities from these sources were rounded up to the nearest logical unit (generally, the nearest 5 for items under 50, the nearest 10 for items 50 to 200, and the nearest 50 for items 200 to 1,000, and so on). The intent of rounding is to illustrate and reflect the nature of the 35% cost estimate; using the unit quantity of 14,356 feet for curb and gutter from the CAD files implies a significant degree of confidence that the actual quantity will be very near that estimate. It is a near certainty that almost every quantity will change during final design based on changes in the design during that phase, or because an item might be broken into more detailed items during that phase.

6.3 | Costs Basis

Individual pay item costs were estimated using WYDOT's 2020 Weighted Average Bid Prices when pay items matched well (typically for common construction items). Unusual or specific items, like a specific size of CBC, require adjustments or additional cost sources because it is rare to find past construction projects with a specific size structure. CDOT Historic Bid Prices were used to cost items that were not on WYDOT's published list of items (traffic signal poles, for example).

Again, for all items, calculated costs from these sources were rounded up to the nearest logical dollar (generally, the nearest $5 for items under $50, the nearest $10 for items $50 to $200, and the nearest $50 for items $200 to $1,000). And again, the intent of rounding is to illustrate and reflect the nature of the 35% cost estimate; using the unit cost of $5,070.49 for Clearing and Grubbing straight from the WYDOT document implies a significant degree of confidence that the actual price will be very near that estimate, and construction costs are known to fluctuate significantly over time.

6.4 | Cost Estimate

Ayres estimates the overall cost for the Converse Avenue ultimate configuration to be just under $11M. This is in line with our previous 10% design estimate of $10M, which did not include full reconstruction of the Dry Creek structure or utility relocation costs. The added utility relocation cost includes a planned City water line replacement, representing the largest share of the utility costs. As noted above, this is intended to be a conservative estimate, and during final design there may be opportunities to reduce this cost by refining both quantities and unit costs.

Ayres has developed cost adjustments for the pavement items, since there are three different pavement alternatives specified in the UDC. The pavement selection will need to be determined at the final design phase based on market costs and the City's goals for the project. For example, concrete is traditionally more expensive, but also more durable and requires less maintenance. With asphalt prices as volatile as they are in 2021, concrete may be an attractive and cost-feasible option.

CONVERSE AVENUE 35% CONSTRUCTION COST ESTIMATE

ITEM DESCRIPTION	PAY UNIT	PAY UNIT QUANTITY	PAY UNIT COST	BID COST
CLEARING, REMOVALS, & EARTHWORK				**$974,774**
Clearing and Grubbing	ACRE	2.8	$5,000.00	$13,774
Clearing Small Trees & Shrubs	EA	15	$500.00	$7,500
Clearing Large Trees	EA	15	$1,000.00	$15,000
Removal of Pipe	LF	1,000	$46.00	$46,000
Removal of Curb Inlet	EA	10	$1,600.00	$16,000
Removal of Sidewalk	SY	2,600	$20.00	$52,000
Removal of Curb and Gutter	LF	4,600	$15.00	$69,000
Removal of Concrete Pavement	SY	5,100	$100.00	$510,000
Removal of Asphalt Material (Milling)	SY	13,300	$10.00	$133,000
Sawing Asphalt Material (8 Inch)	LF	500	$5.00	$2,500
Unclassified Excavation	CY	11,000	$10.00	$110,000
PAVEMENT, CURB, & SIDEWALK				**$2,856,351**
Aggregate Base Course (8" Depth)	CY	5,539	$45.00	$249,240
Hot Mix Asphalt (6" Depth) (includes binder agent)	TON	5,100	$160.00	$816,000
Concrete Sidewalk/Greenway (6" Depth)	SY	7,000	$70.00	$490,000
Curb Ramps & Detectable Warnings	SF	800	$100.00	$80,000
Curb and Gutter Type A	LF	7,500	$50.00	$375,000
Curb and Gutter Type C	LF	7,100	$50.00	$355,000
Decorative Concrete Median Cover (4" Colored, Stamped)	SY	2,456	$200.00	$491,111
TRAFFIC SIGNALS				**$280,000**
Traffic Signal Pole w/55' Mastarm, 4-12" x 36" Signal Heads	EA	1	$80,000.00	$80,000
Traffic Signal Pole w/45' Mastarm, 3-12" x 36" Signal Heads	EA	1	$70,000.00	$70,000
Traffic Signal Pole w/30' Mastarm, 2-12" x 36" Signal Heads	EA	1	$60,000.00	$60,000
Traffic Signal Pole w/6' Mastarm, 2-12" x 36" Signal Heads	EA	1	$50,000.00	$50,000
Pedestrian Push Button Assembly	EA	2	$10,000.00	$20,000
STORM SEWER				**$1,350,850**
Pipe Outlet (12 inch Riprap)	CY	30	$160.00	$4,800
18 Inch Reinforced Concrete Pipe	LF	180	$100.00	$18,000
24 Inch Reinforced Concrete Pipe	LF	100	$125.00	$12,500
36 Inch Reinforced Concrete Pipe	LF	300	$150.00	$45,000
48 Inch Reinforced Concrete Pipe	LF	2,000	$250.00	$500,000
24x36 Inch Reinforced Concrete Pipe Arch	LF	126	$350.00	$44,100
36 Inch Reinforced Concrete End Section	EA	2	$850.00	$1,700
24x 36 Inch Reinforced Concrete Arch End Section	EA	6	$1,000.00	$6,000
Pipe Collars	CY	8	$900.00	$6,750
8' x 5' Concrete Box Culvert (Precast)	LF	500	$1,000.00	$500,000
Curb Inlet Type A	EA	25	$8,000.00	$200,000
Manhole and Base (10 Foot) Type D	EA	2	$6,000.00	$12,000
STRUCTURES				**$1,610,300**
Removal of Structure	EA	1	$150,000.00	$150,000
Removal of Wingwalls	EA	4	$5,000.00	$20,000
Culvert Subexcavation	CY	500	$25.00	$12,500
Culvert Base (Geotextile & 18 inch Riprap)	CY	500	$150.00	$75,000
Remove & Reset Bridge & Pedestrian Rail	LF	300	$100.00	$30,000
10' x 8' Concrete Box Culvert (Cast In Place)	LF	530	$2,000.00	$1,060,000
Culvert Toe Wall (Class B Concrete)	CY	11	$2,300.00	$25,300

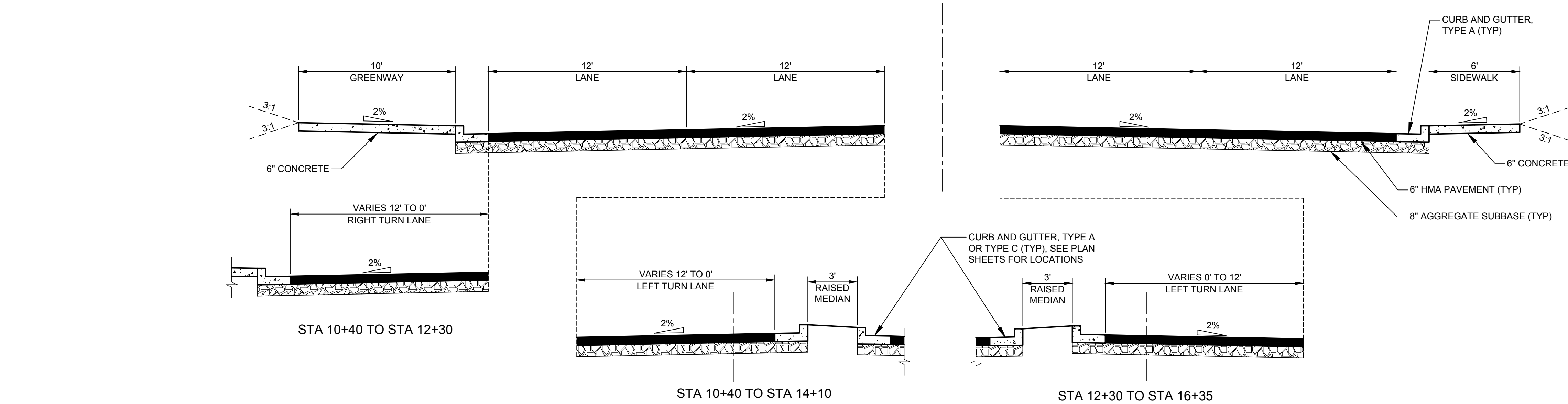
Culvert Apron (Class B Concrete)	CY	21	$2,000.00	$42,000
Culvert Headwalls (Class B Concrete)	CY	10	$2,300.00	$23,000
Culvert Wingwalls (Class B Concrete)	CY	75	$2,300.00	$172,500
REVEGETATION				**$31,767**
Topsoil Storing	CY	1,200	$5.00	$6,000
Topsoil Stripping and Placing (Onsite)	CY	1,200	$6.00	$7,200
Soil Conditioning	ACRE	2.8	$2,500.00	$6,887
Seeding (Bluegrass)	ACRE	2.8	$1,500.00	$4,132
Sod	SY		$10.00	$0
Dry Mulching (Weed Free Hay)	ACRE	2.1	$1,500.00	$3,099
Hydraulic Mulching	ACRE	0.7	$5,000.00	$3,444
Mulch Tackifier	ACRE	2.1	$2.50	$5
Soil Retention Blanket (Straw-Coconut) (Biodegradable)	SY	333	$3.00	$1,000
PLANTINGS				**$199,200**
Deciduous Tree (2.5 Inch Caliper)	EA	144	$1,300.00	$187,200
Landscape Maintenance (Quarterly for 1 year)	EA	4	$3,000.00	$12,000
IRRIGATION				**$45,100**
UTILITIES				**$553,900**
Removal of Lighting Pole	EA	14	$1,000.00	$14,000
Reset Lighting Pole	EA	14	$1,000.00	$14,000
Lighting Pole Foundation	EA	14	$600.00	$8,400
Water Line Replacement/Relocation	LF	3,500	$105.00	$367,500
Fiber Relocation	LF	500	$100.00	$50,000
Phone/Communications Relocation	LF	500	$100.00	$50,000
Electrical Service Relocation	LF	500	$100.00	$50,000
Erosion Control (3%)		2%		$158,045
Traffic Control (5%)		5%		$395,112
Signing & Striping (2%)		2%		$158,045
Subtotal Construction Items				**$8,613,444**
Contractor Mobilization & General Conditions		10%		$861,344
Contingency		10%		$861,344
Inflation 2020 - 2023		2% per year		$620,168
TOTAL ESTIMATED CONSTRUCTION COST				**$10,956,301**

PAVEMENT OPTIONS (Principal Arterial):				
Hot Mix Asphalt Pavement (6" Depth on 8" Aggregage Base)	(included above)			$1,065,240
Hot Mix Asphalt Pavement (8" Depth - no Aggregate Base)	TON	8,500	$160.00	+ $294,760
Concrete Pavement (8" Depth - no Aggregate Base)	SY	28,000	$75.00	+ $1,034,760
OTHER OPTIONS (Future Years):				
Traffic Signals w/45' Mastarms (Point Bluff) (**future**)	EA	4	$80,000.00	$320,000
Road Connection to Apache/Pattison/Plainview	SY	10,000	$75.00	$750,000

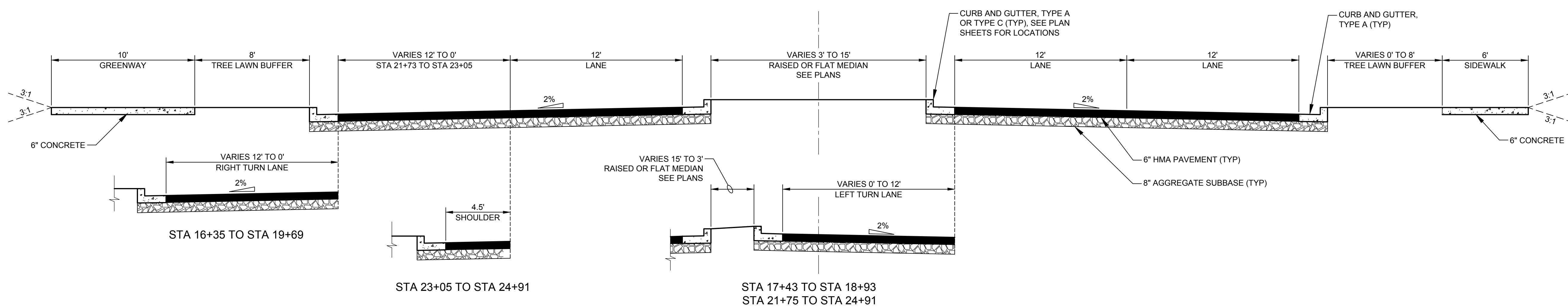
Notes: Costs above reflect 2020 costruction cost data

Appendix A

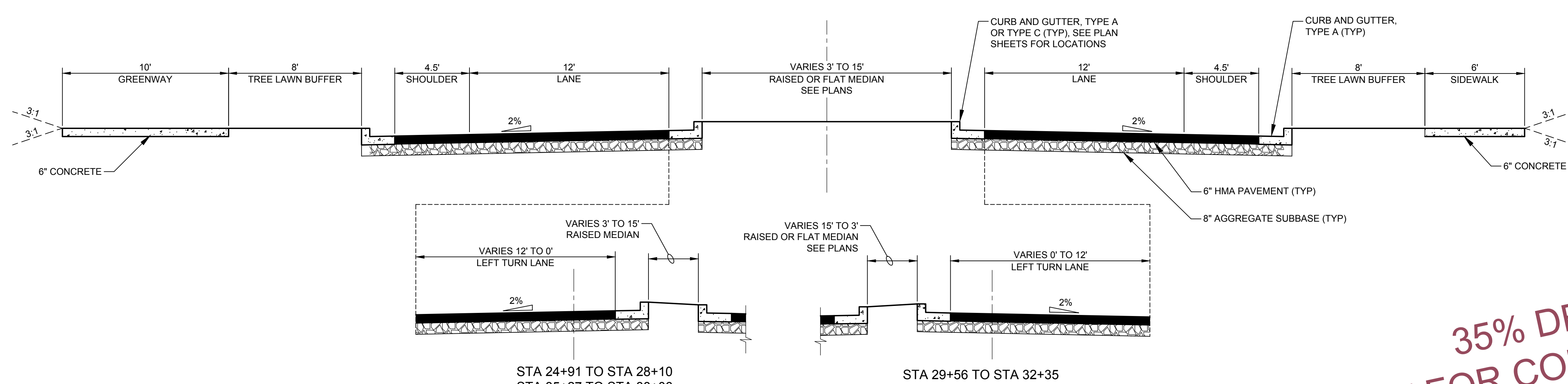
Recommended Improvement Plan Sheets



STA 10+40 TO STA 16+35



STA 16+35 TO STA 24+91



STA 24+91 TO END

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Revisions

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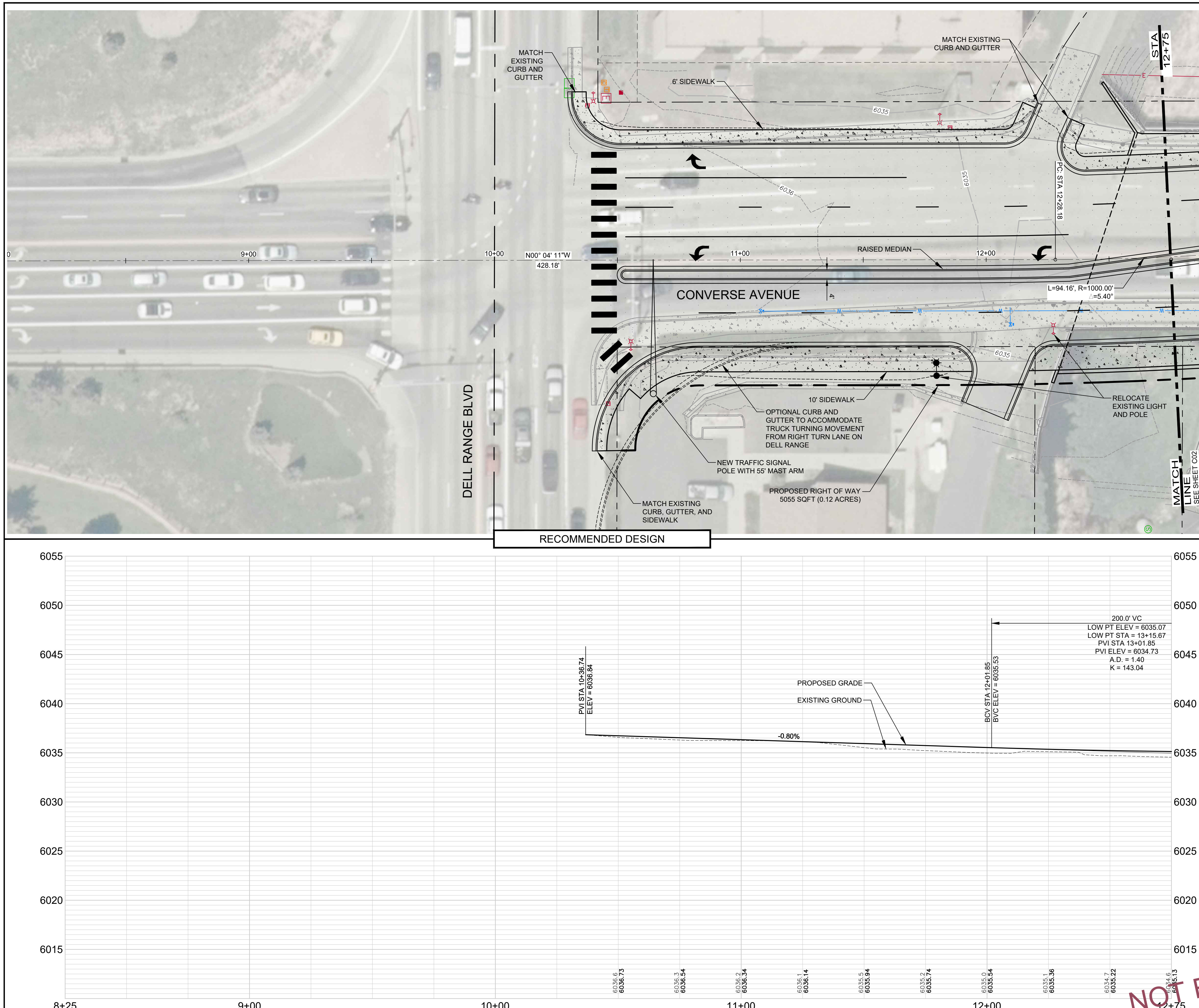
CITY OF CHEYENNE, WYOMING

TYPICAL SECTIONS

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO.
45-0508.00
DRAWING NO.
T01
SHEET XX OF XX



HORIZ 0 20' 40'
VERT 0 5' 10'
SCALE IN FEET

NOTES:

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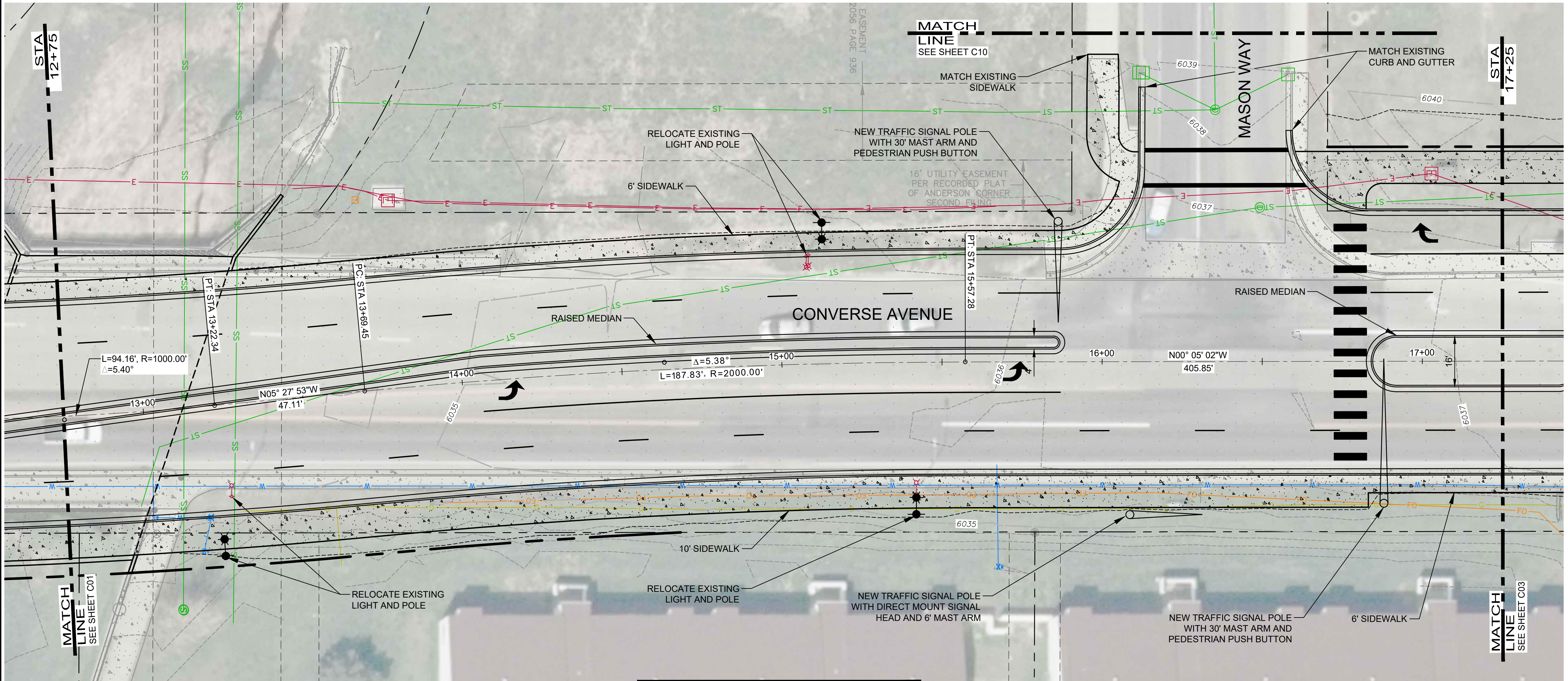
CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO.
45-0508.00
DRAWING NO.
C01
SHEET XX OF XX

Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL



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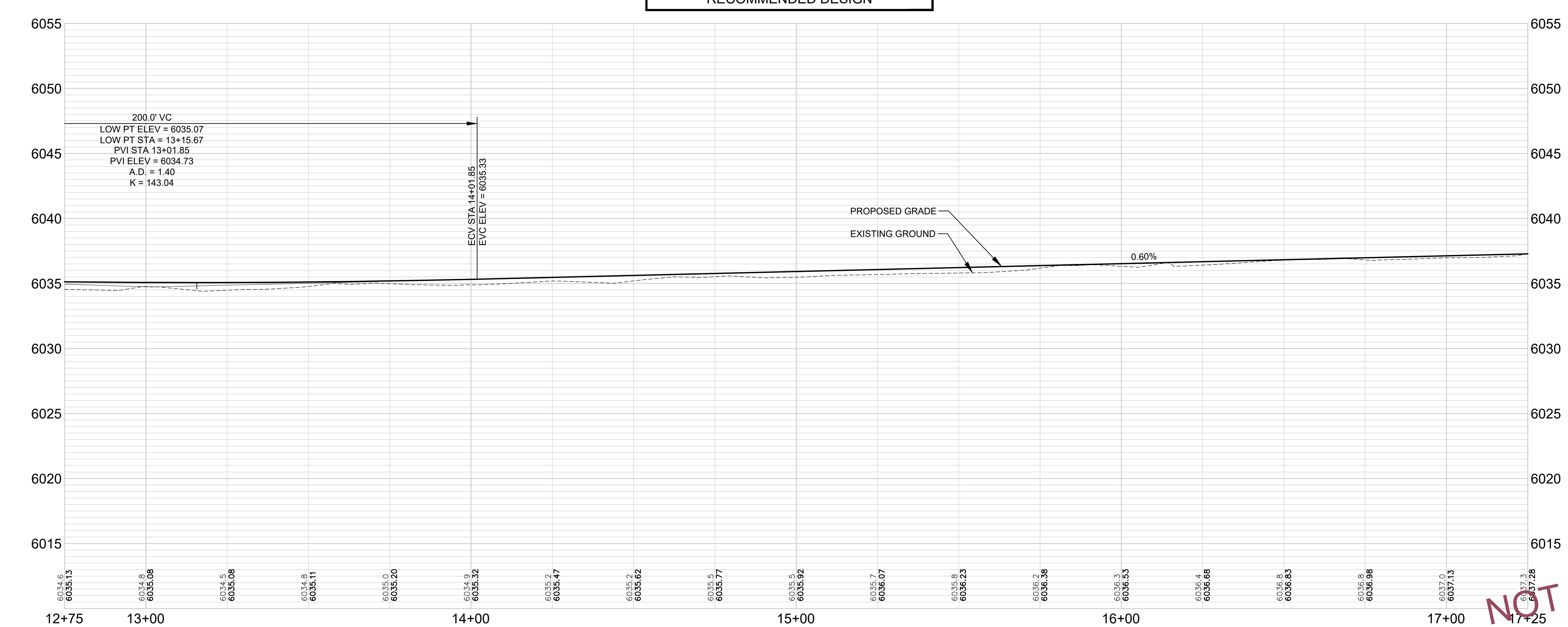

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VERT 0 5' 10'
SCALE IN FEET

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CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE

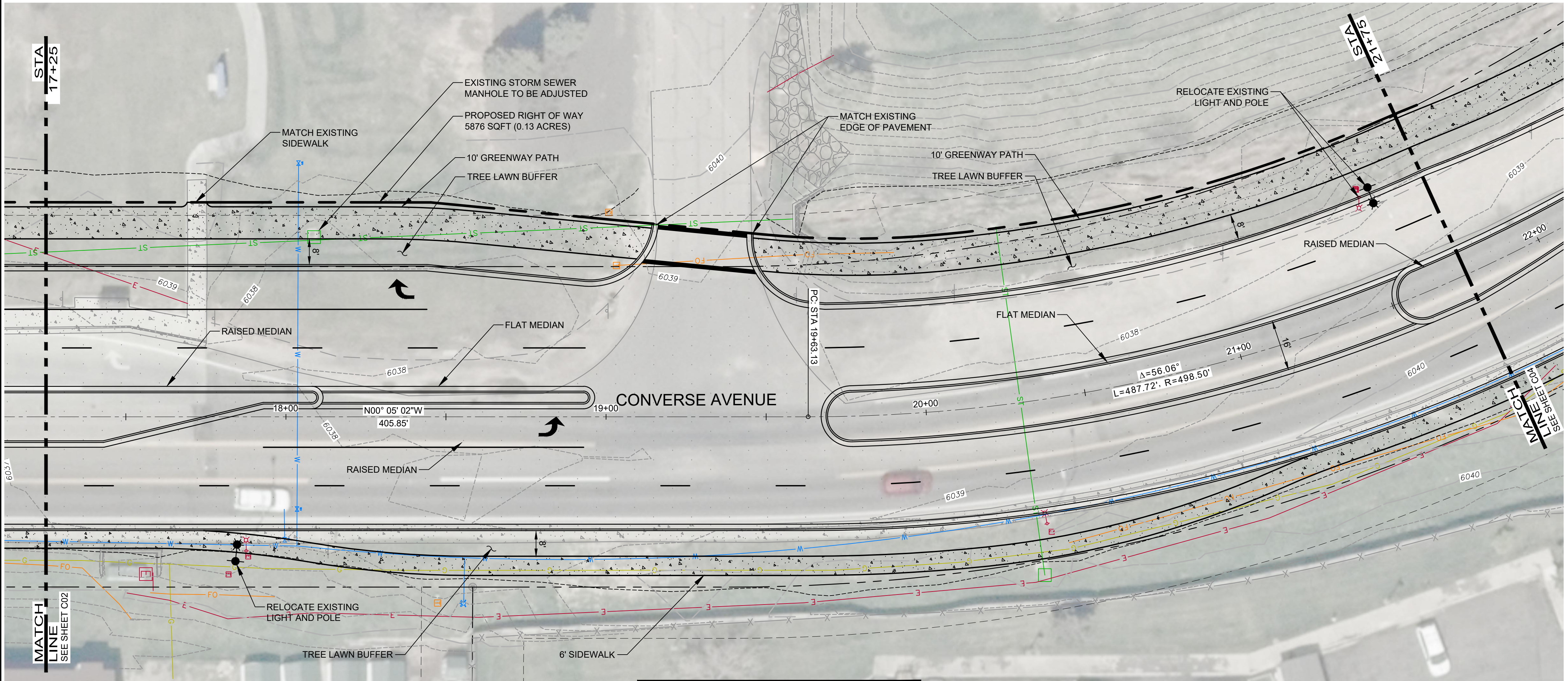
Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00

DRAWING NO. C02

SHEET XX OF XX

Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL



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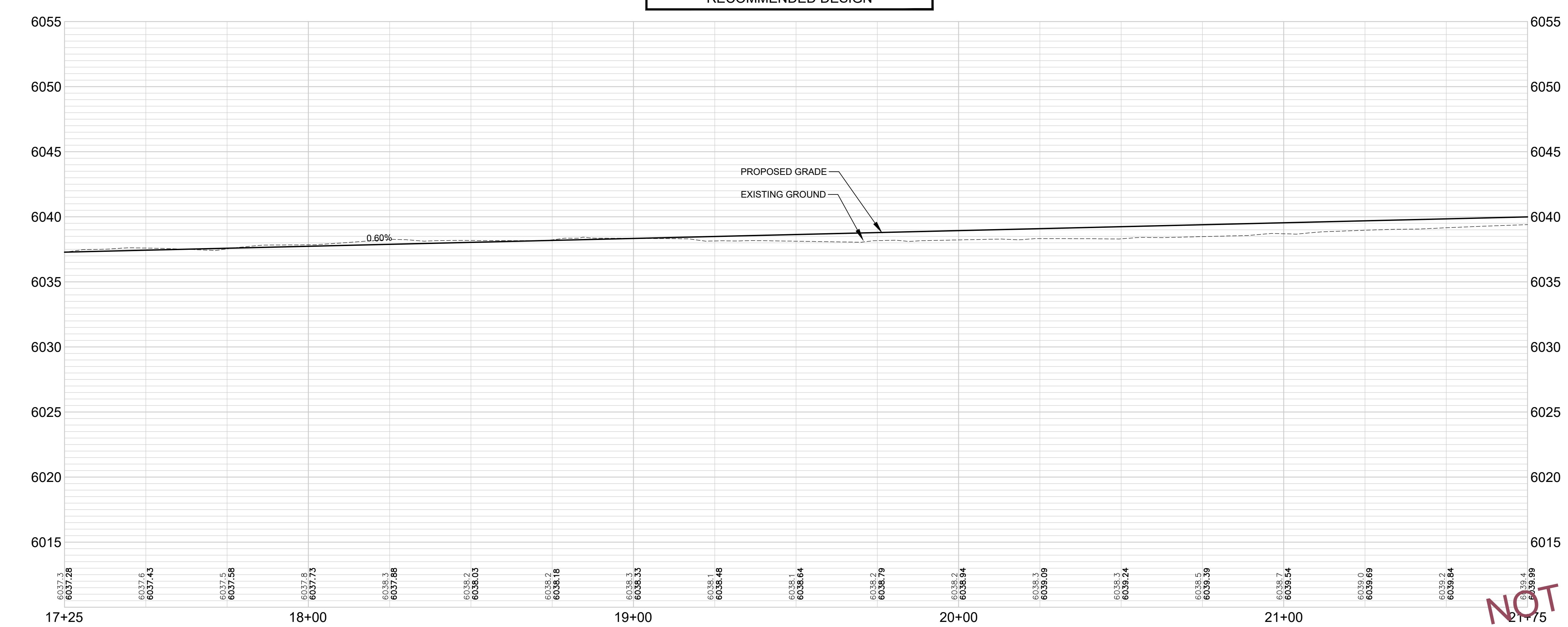

HORIZ 0 20' 40'
VERT 0 5' 10'
SCALE IN FEET

NOTES:

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CITY OF CHEYENNE, WYOMING

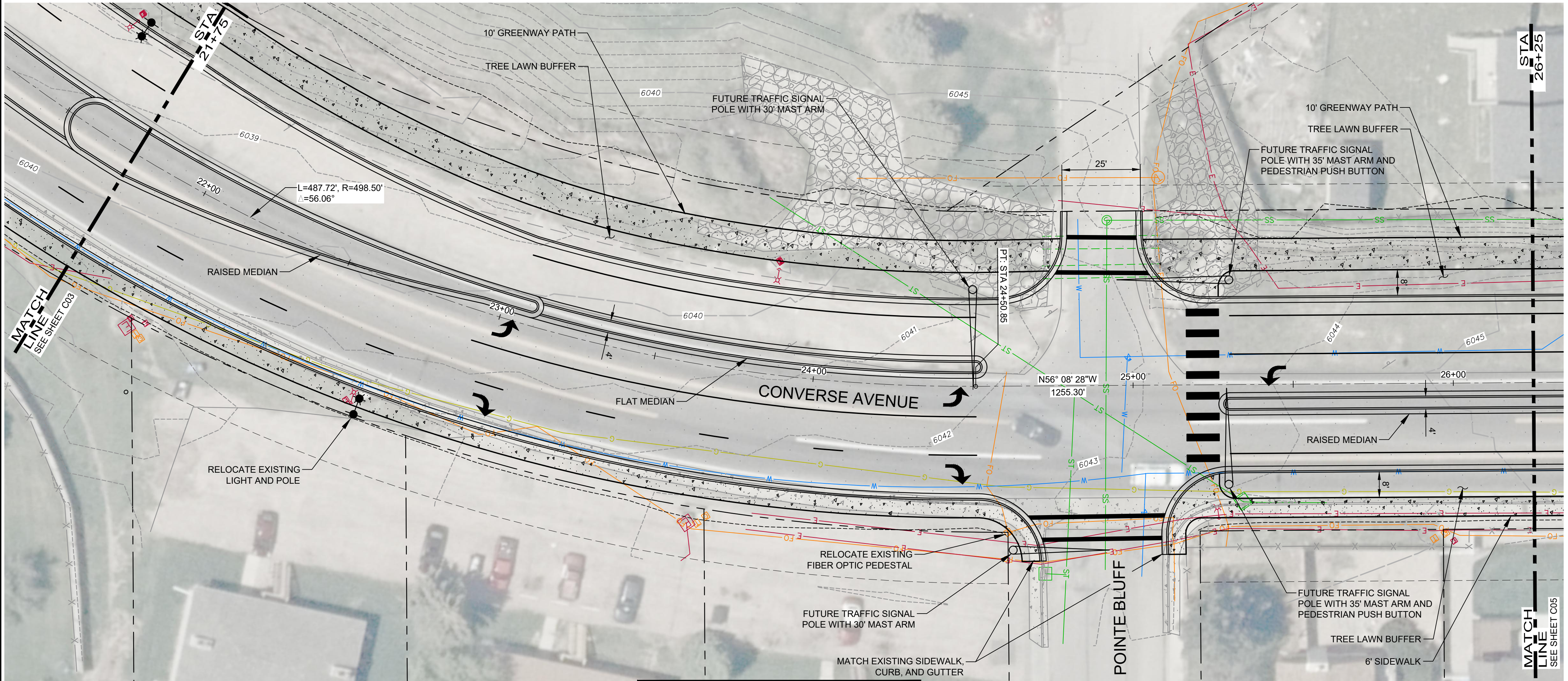
ROADWAY PLAN AND PROFILE

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00

DRAWING NO. C03

SHEET XX OF XX



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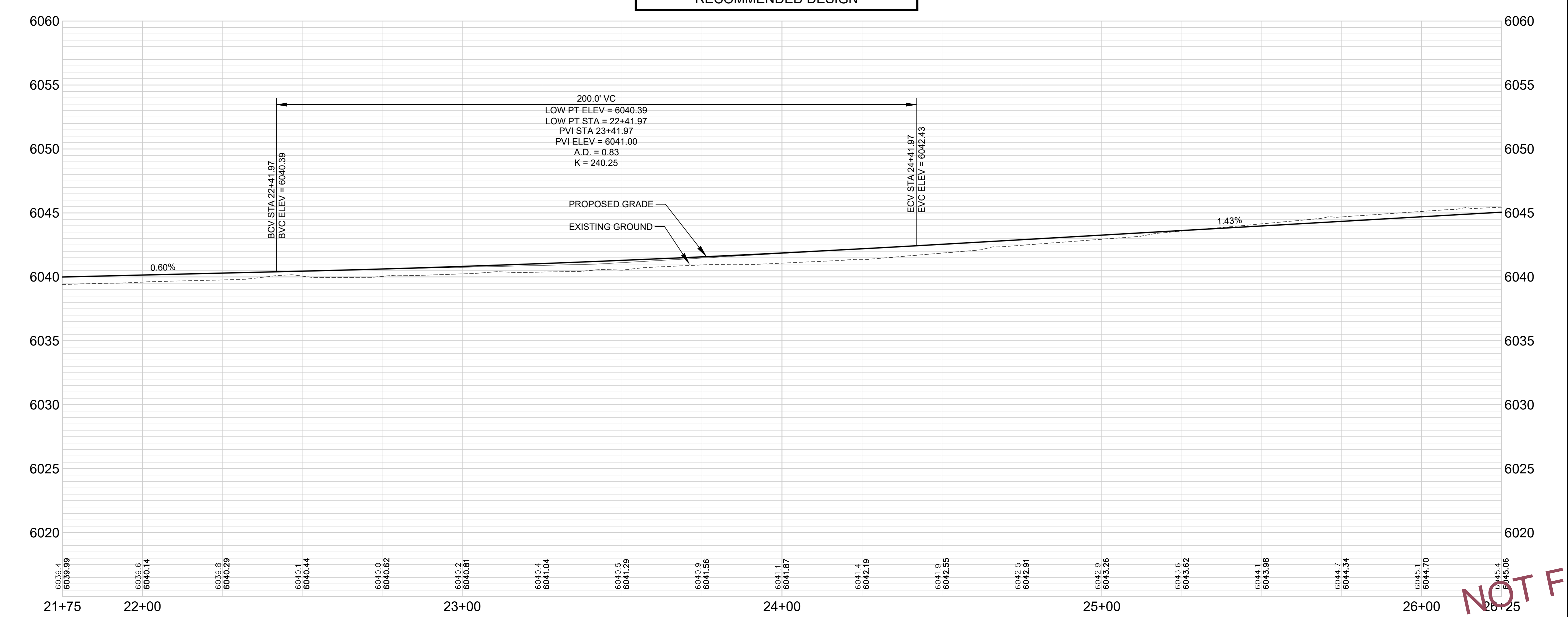

HORIZ 0 20' 40'
VERT 0 5' 10'
SCALE IN FEET

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CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00

DRAWING NO. C04

SHEET XX OF XX

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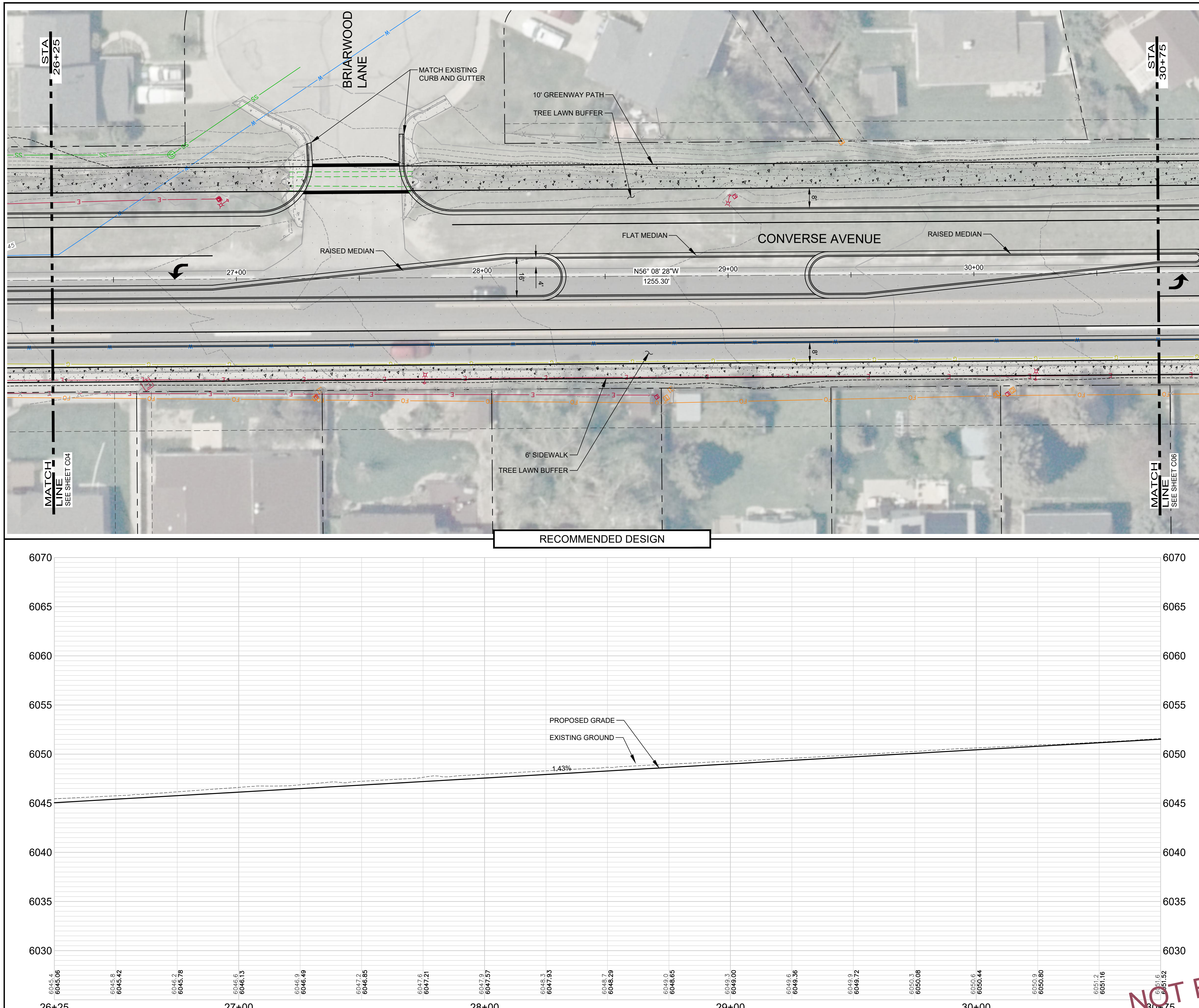
Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL



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VERT 0 5' 10'

SCALE IN FEET

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CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE

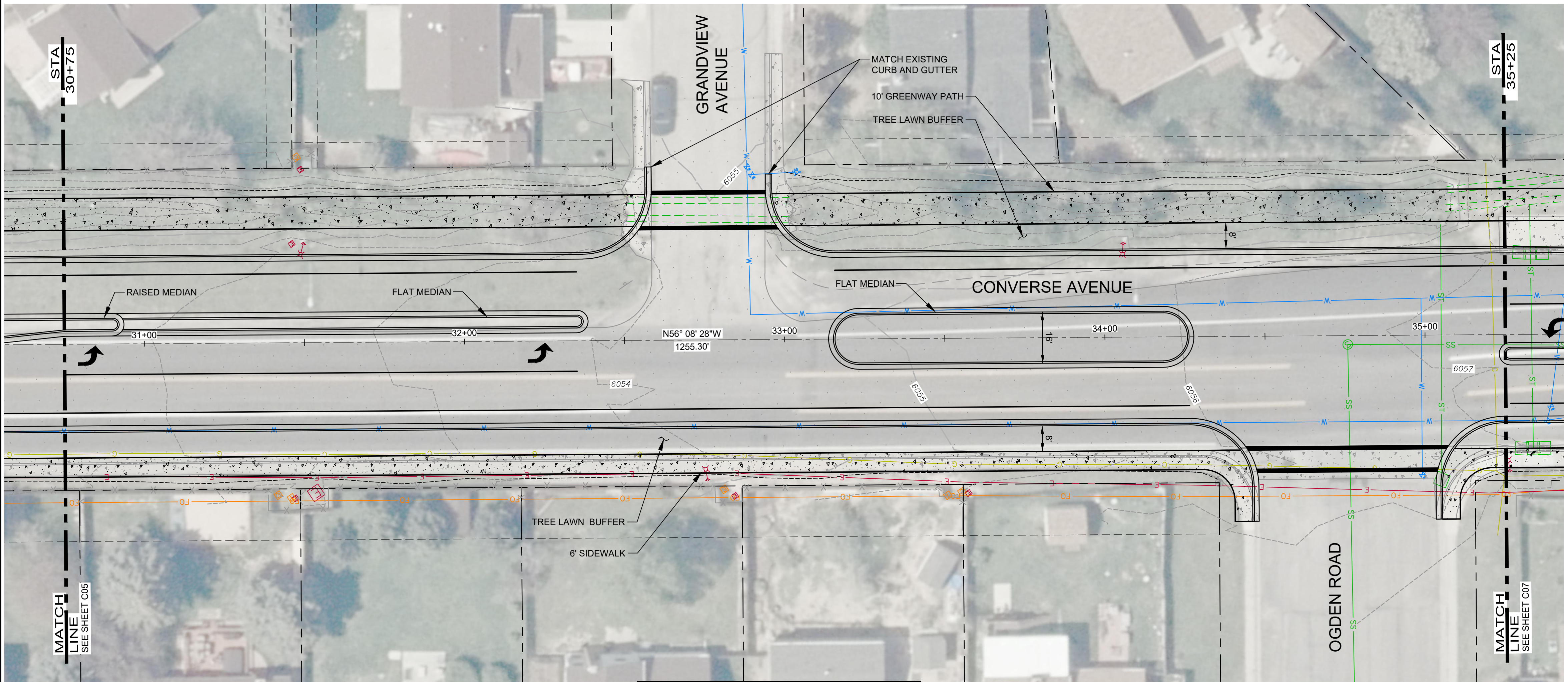
Project Mgr.: NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO.
45-0508.00

DRAWING NO.
C05

SHEET XX OF XX

Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL



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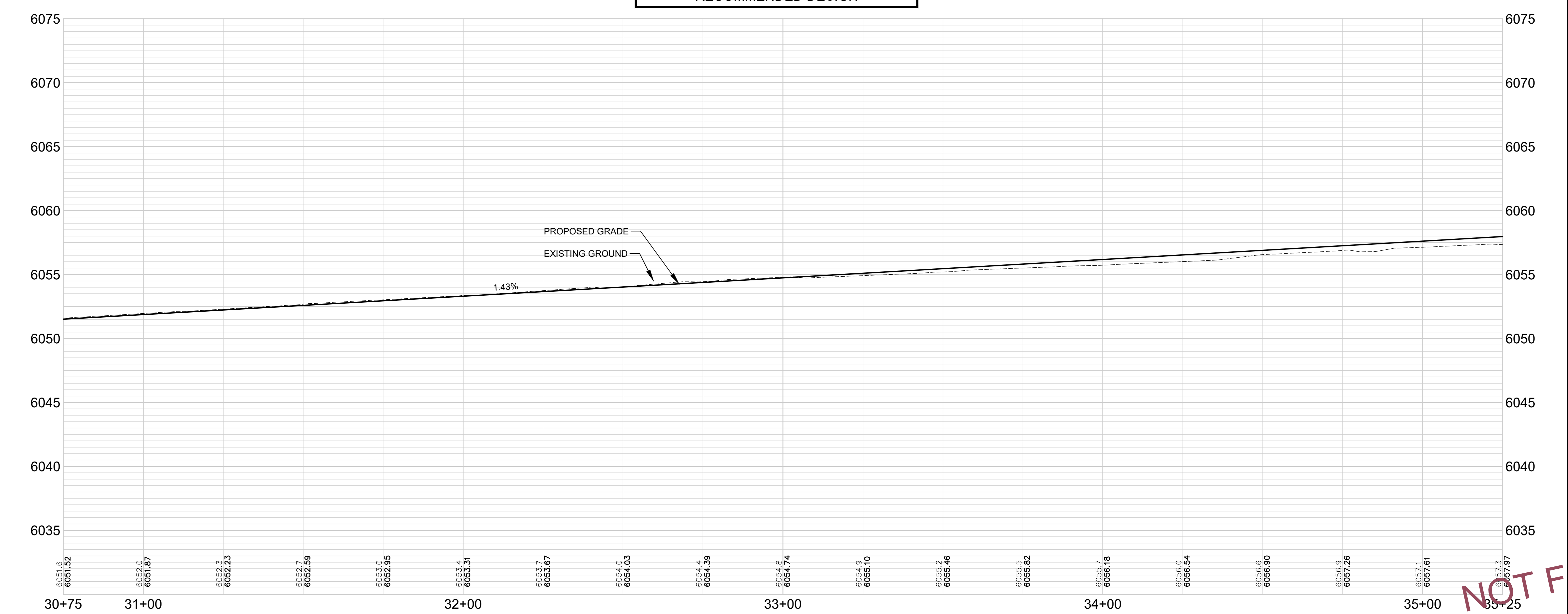

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VERT 0 5' 10'
SCALE IN FEET

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CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE

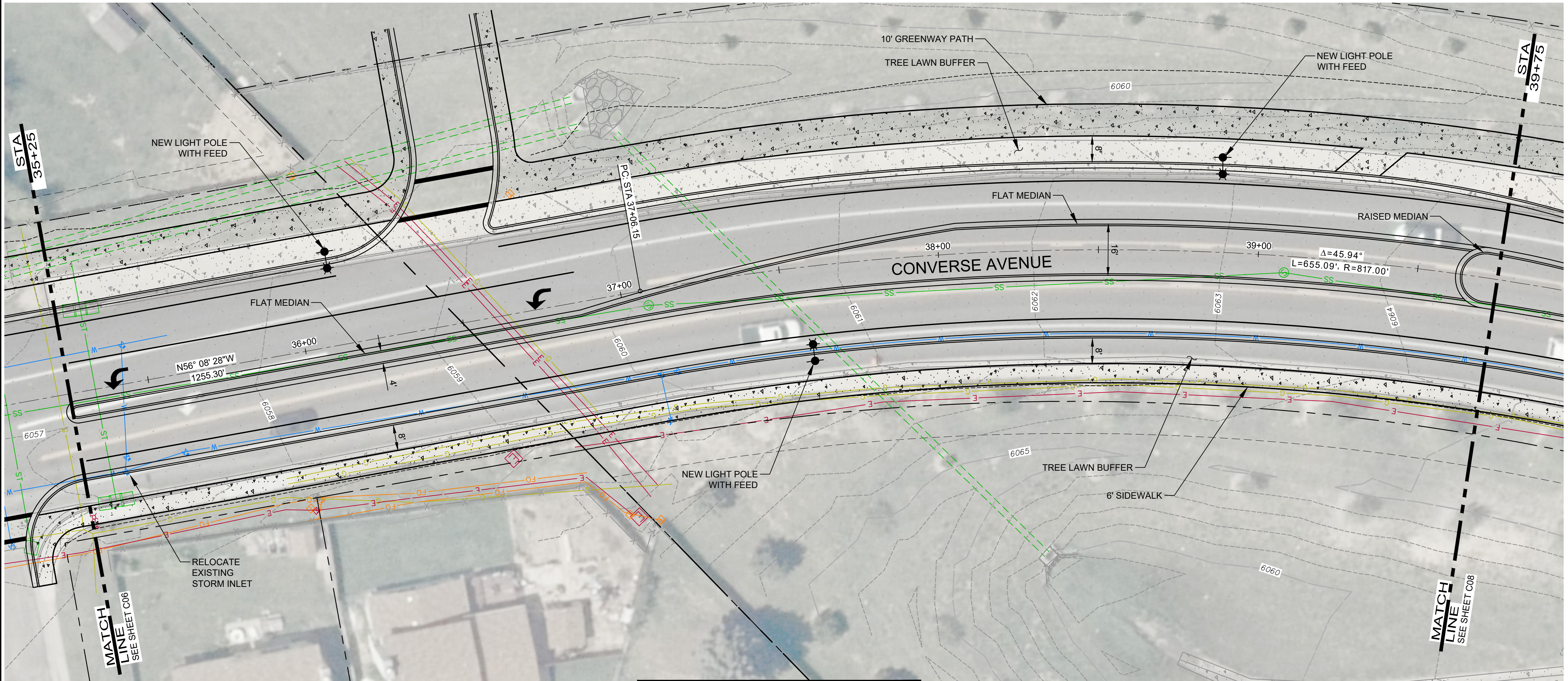
Project Mgr: NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00

DRAWING NO. C06

SHEET XX OF XX

Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL



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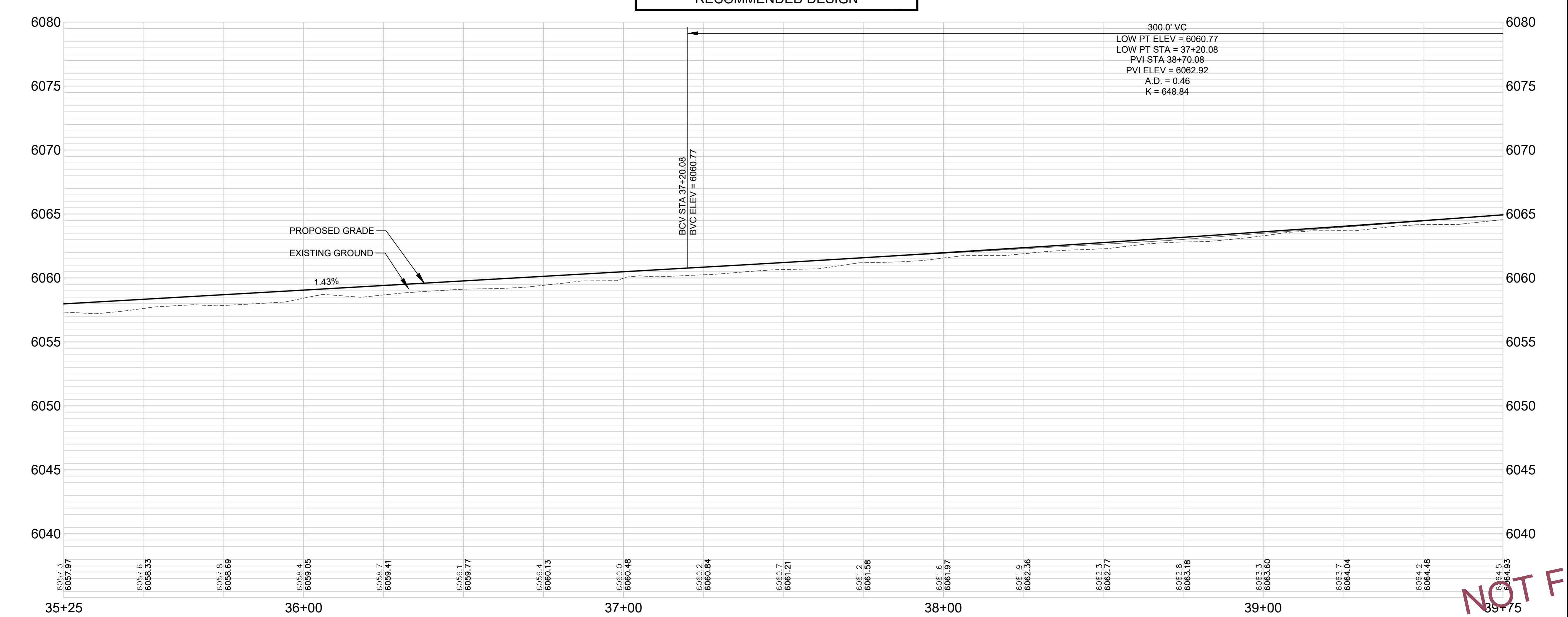

HORIZ 0 20' 40'
VERT 0 5' 10'
SCALE IN FEET

NOTES:

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CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE

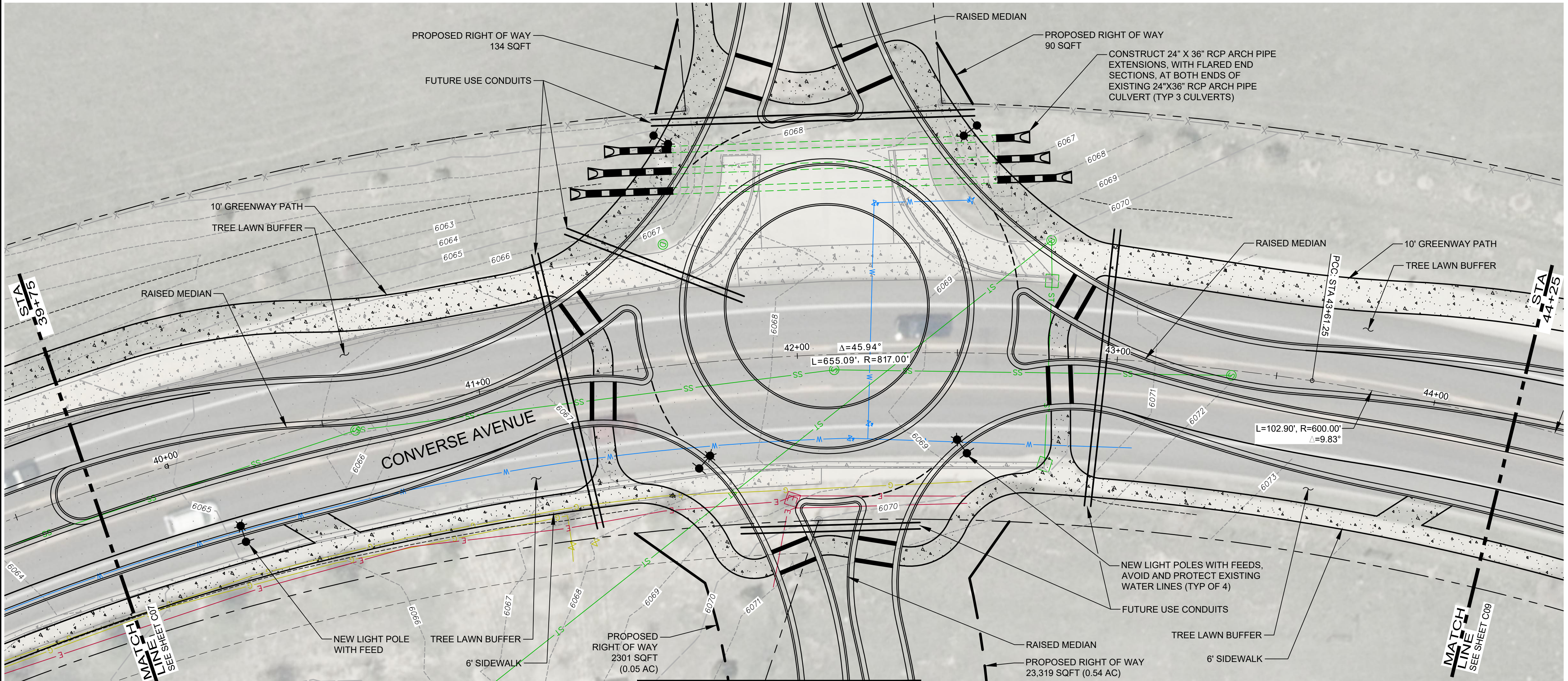
Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

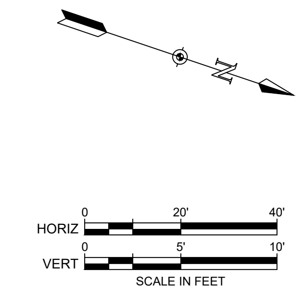
PROJECT NO.
45-0508.00

DRAWING NO.
C07

SHEET XX OF XX

Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL





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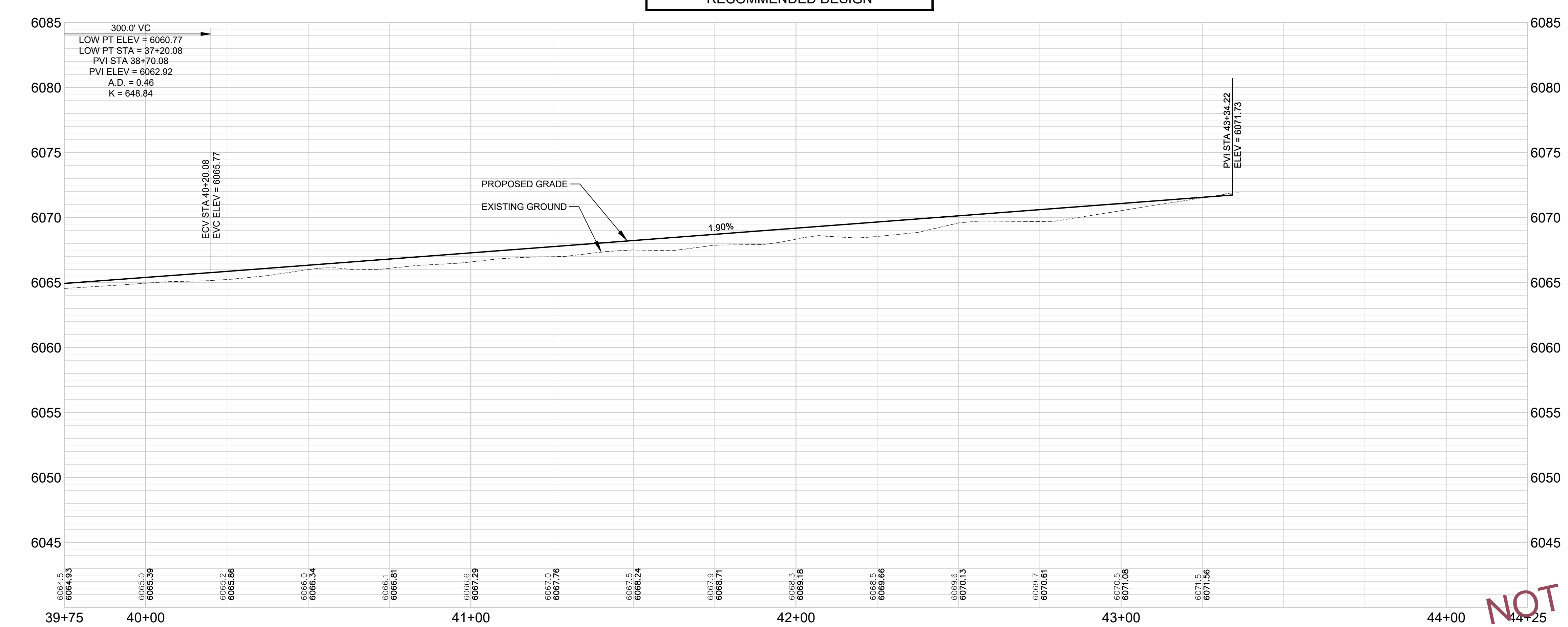

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CITY OF CHEYENNE, WYOMING

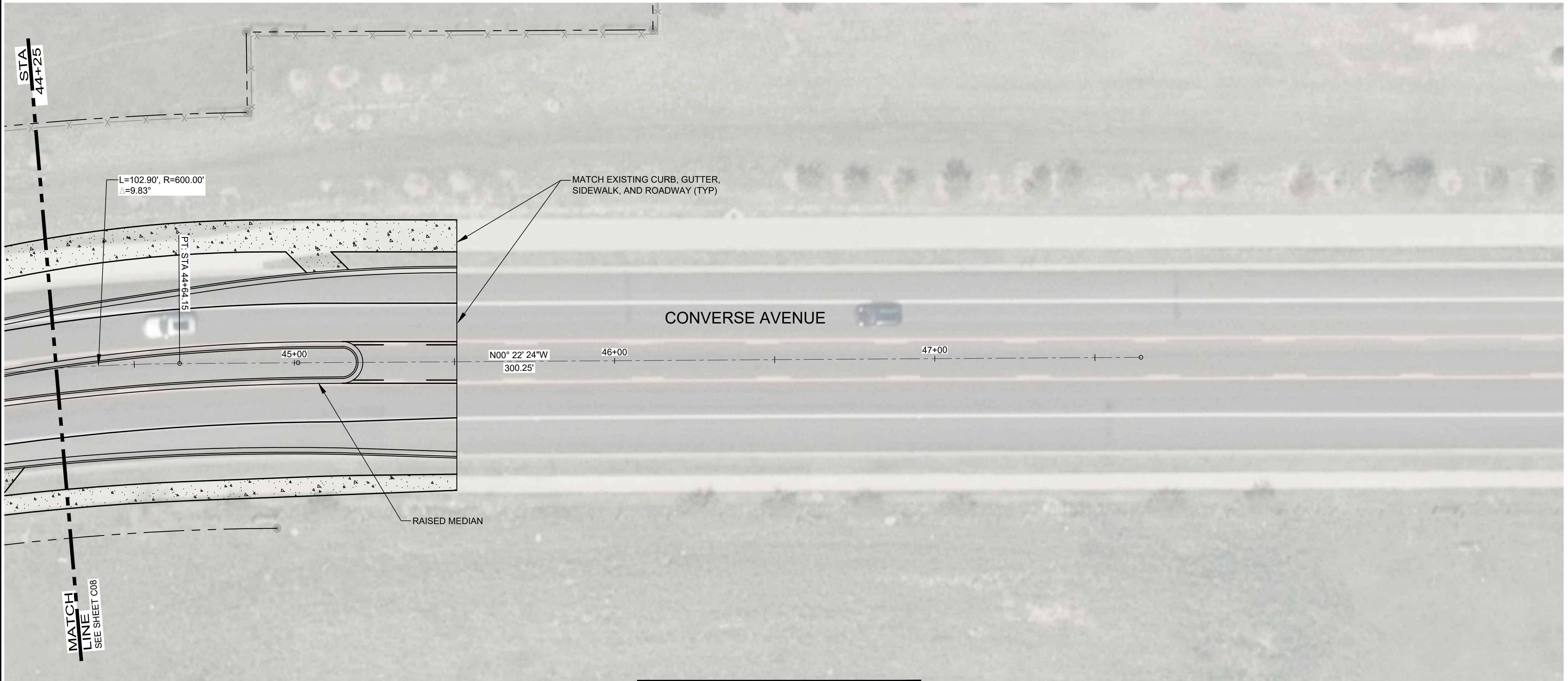
ROADWAY PLAN AND PROFILE

Project Mgr.: NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00

DRAWING NO. C08

SHEET XX OF XX



RECOMMENDED DESIGN

HORIZ 0 20' 40'
VERT 0 5' 10'
SCALE IN FEET

NOTES:

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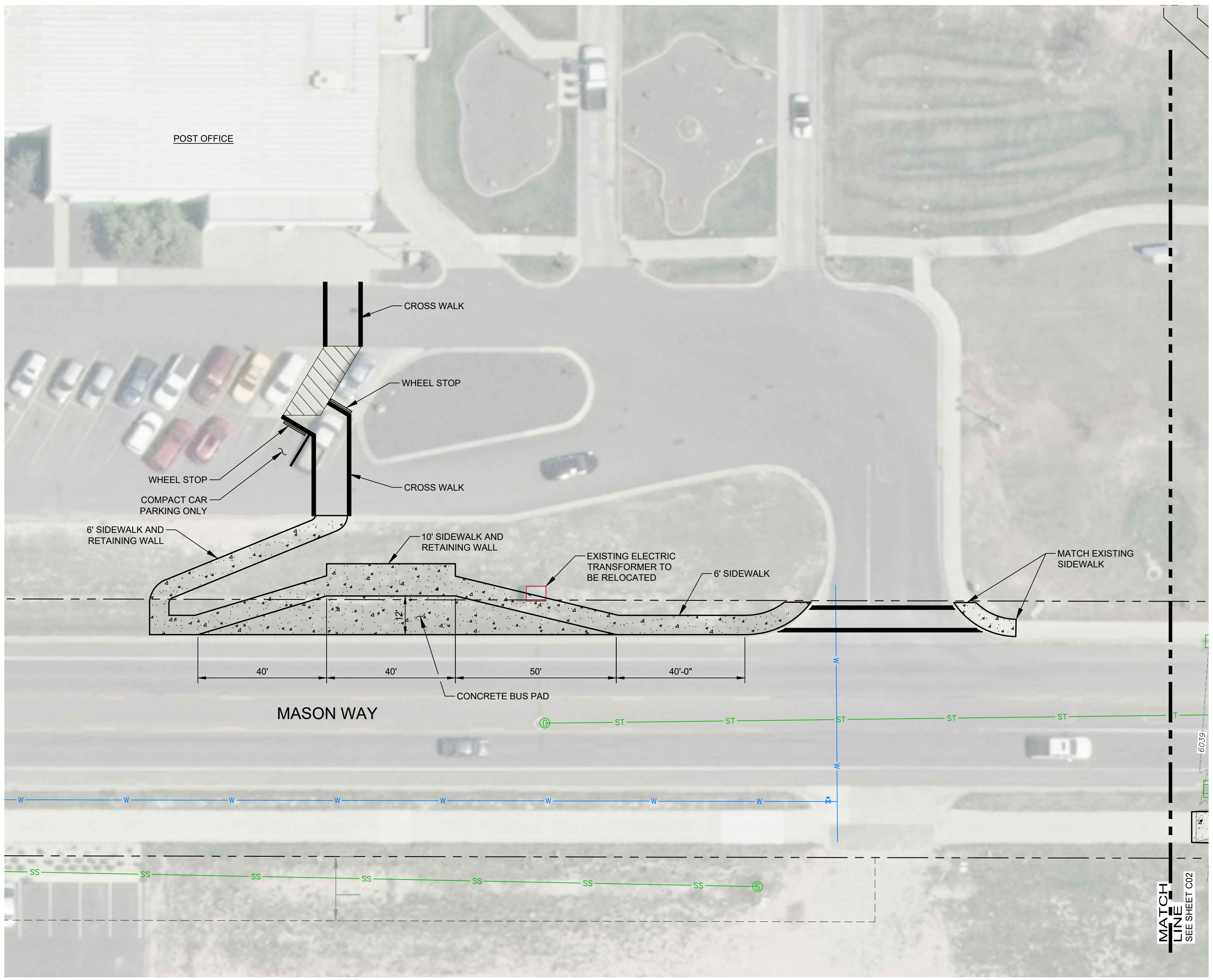
CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO.
45-0508.00
DRAWING NO.
C09



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0 10' 20' 40'
SCALE IN FEET

NOTES:

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Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL

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CONVERSE AVENUE
CITY OF CHEYENNE, WYOMING

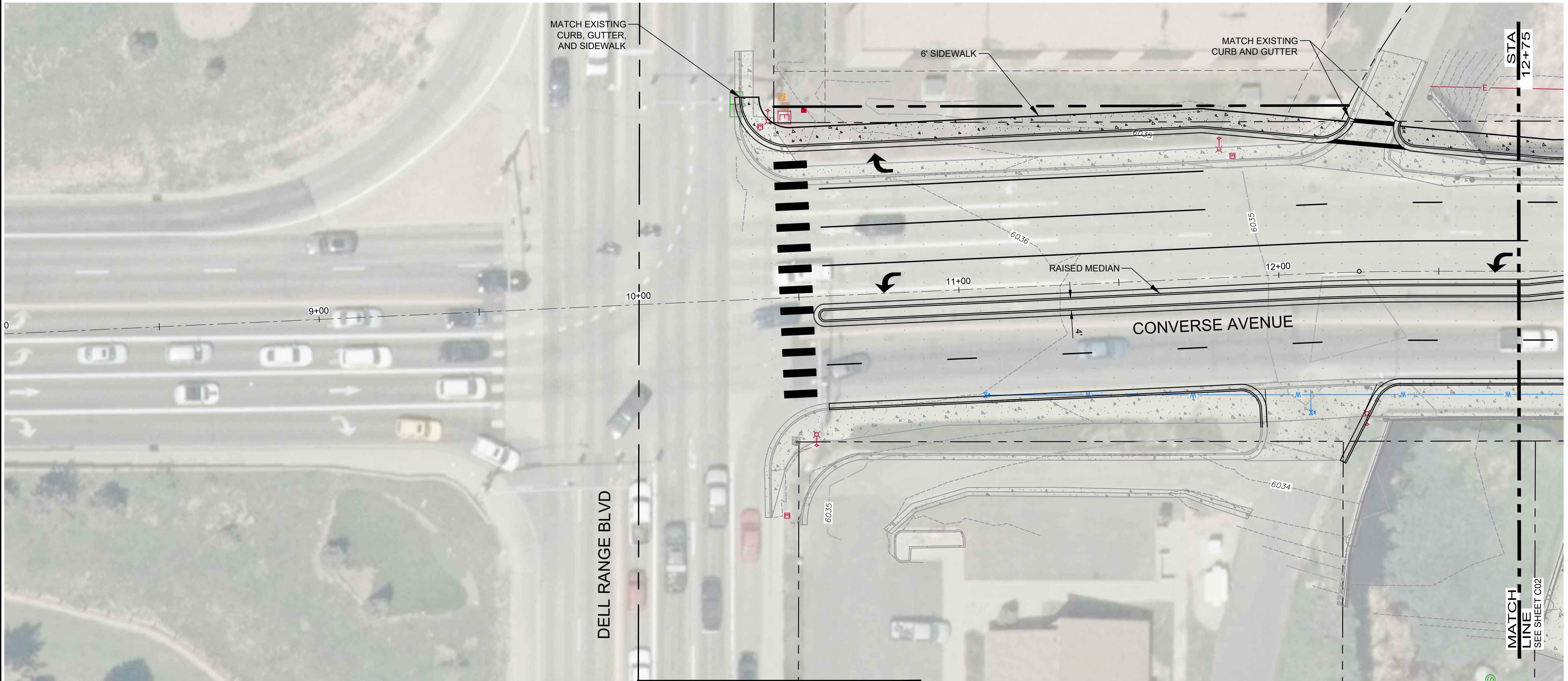
MASON WAY PLAN

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO.
45-0508.00

DRAWING NO.
C10

SHEET XX OF XX



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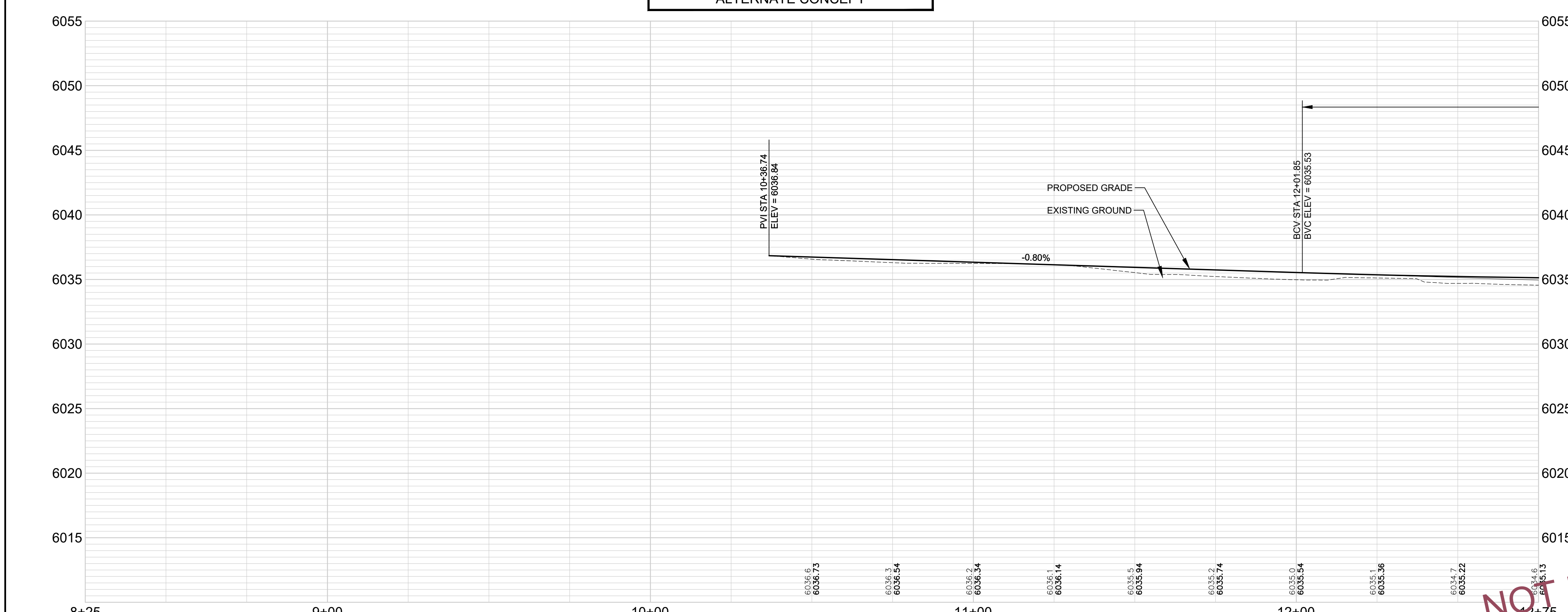

HORIZ 0 20' 40'
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SCALE IN FEET

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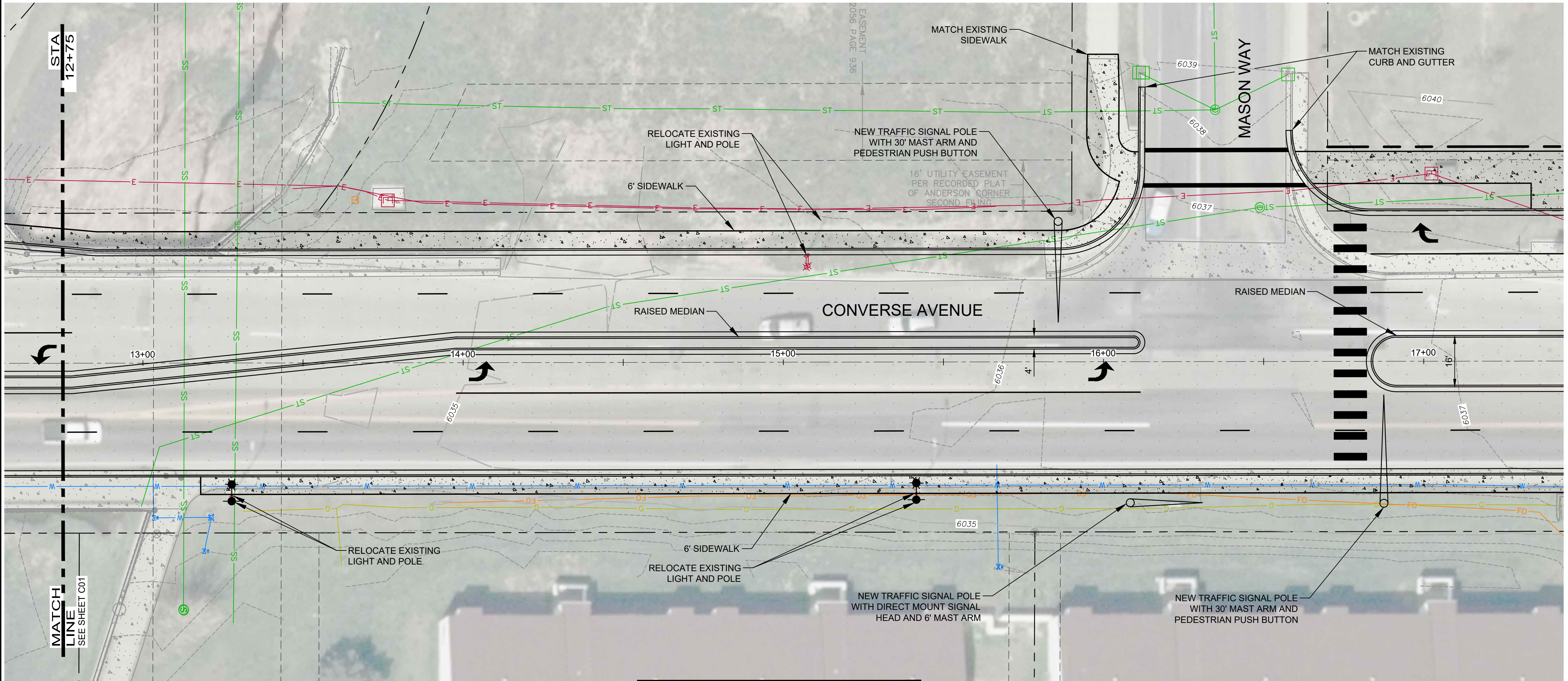
CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE
INTERIM

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00
DRAWING NO. C11
SHEET XX OF XX

Drawing Name: I:\36\45-0508 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE ROADWAY INTERIM.DWG Thursday, October 28, 2021 4:08 PM By: BOLTZE, BILL



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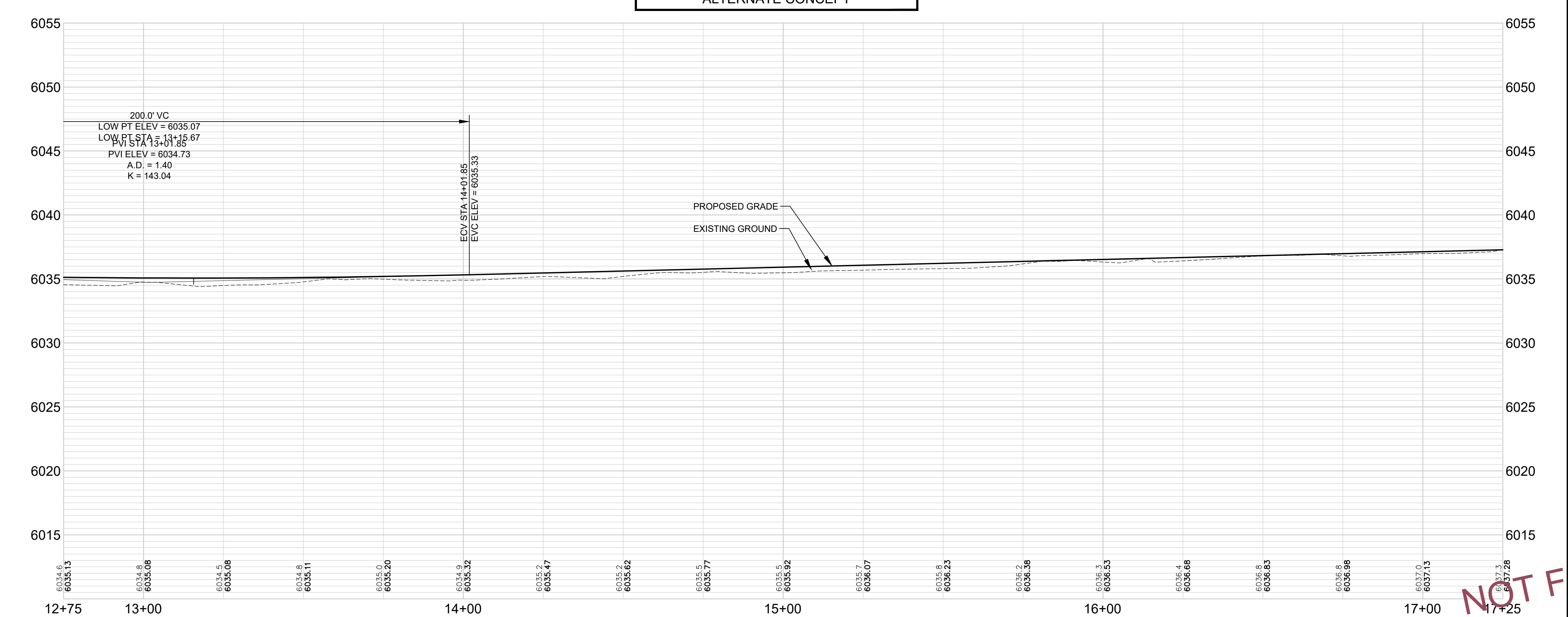

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NOTES:

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CONVERSE AVENUE
CITY OF CHEYENNE, WYOMING

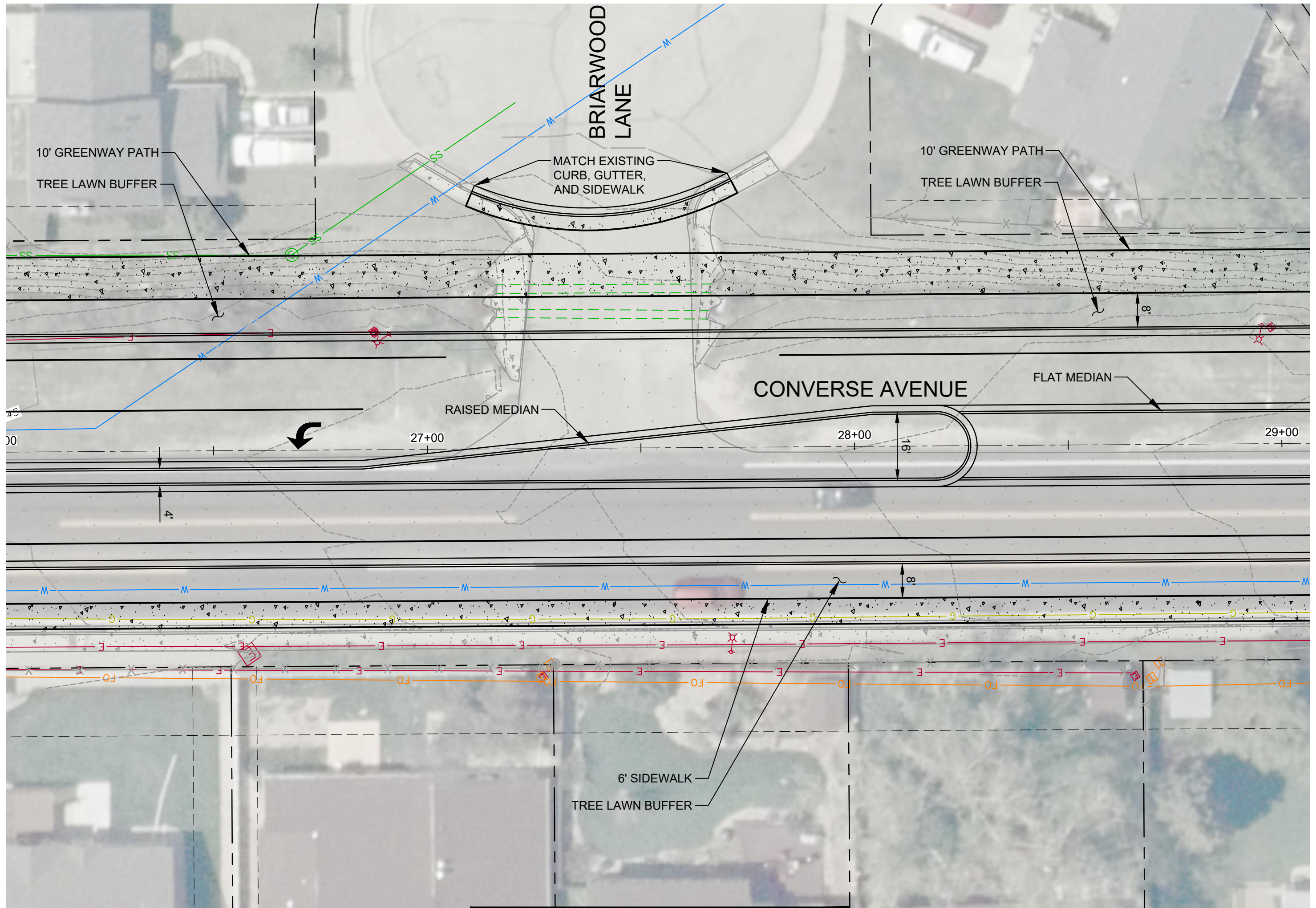
ROADWAY PLAN AND PROFILE
INTERIM

Project Mgr. NTS
Designed By. RBR
Drawn By. RBR
Approved By. XXX
Date: 09/08/21

PROJECT NO. 45-0508.00

DRAWING NO. C12

SHEET XX OF XX



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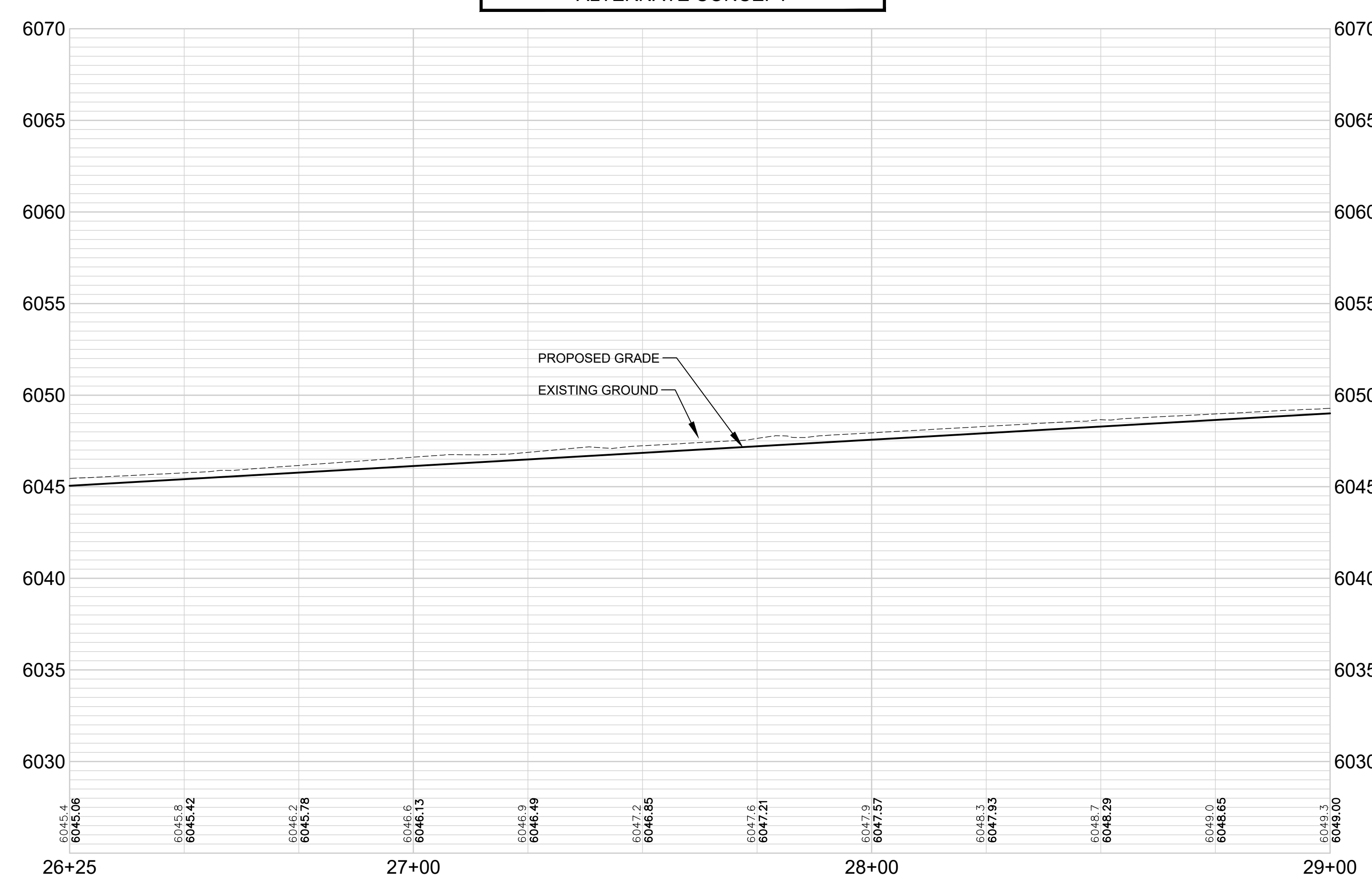

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SCALE IN FEET

NOTES:

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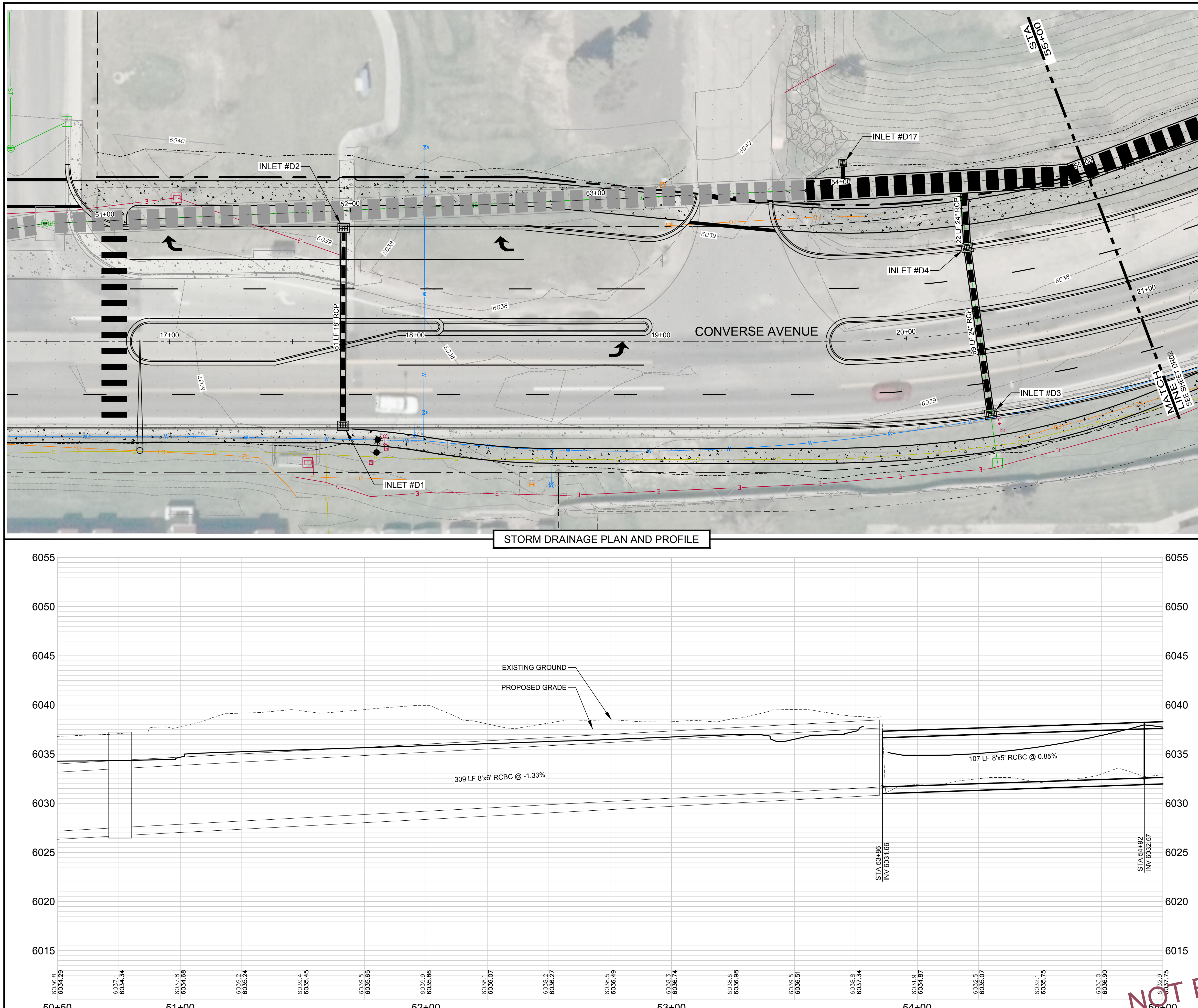
CITY OF CHEYENNE, WYOMING

ROADWAY PLAN AND PROFILE
INTERIM

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00
DRAWING NO. C13
SHEET XX OF XX



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NOTES:

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CITY OF CHEYENNE, WYOMING

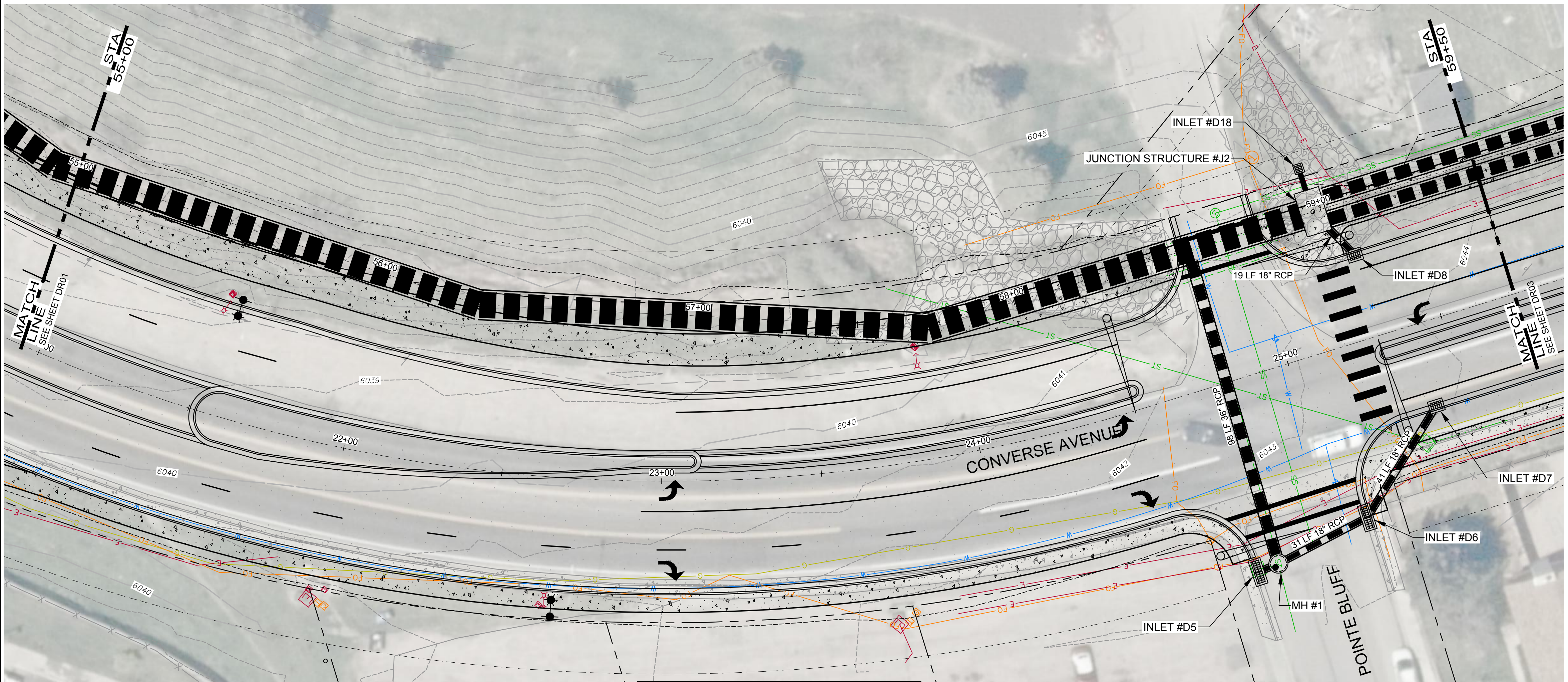
STORM DRAINAGE
PLAN AND PROFILE

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

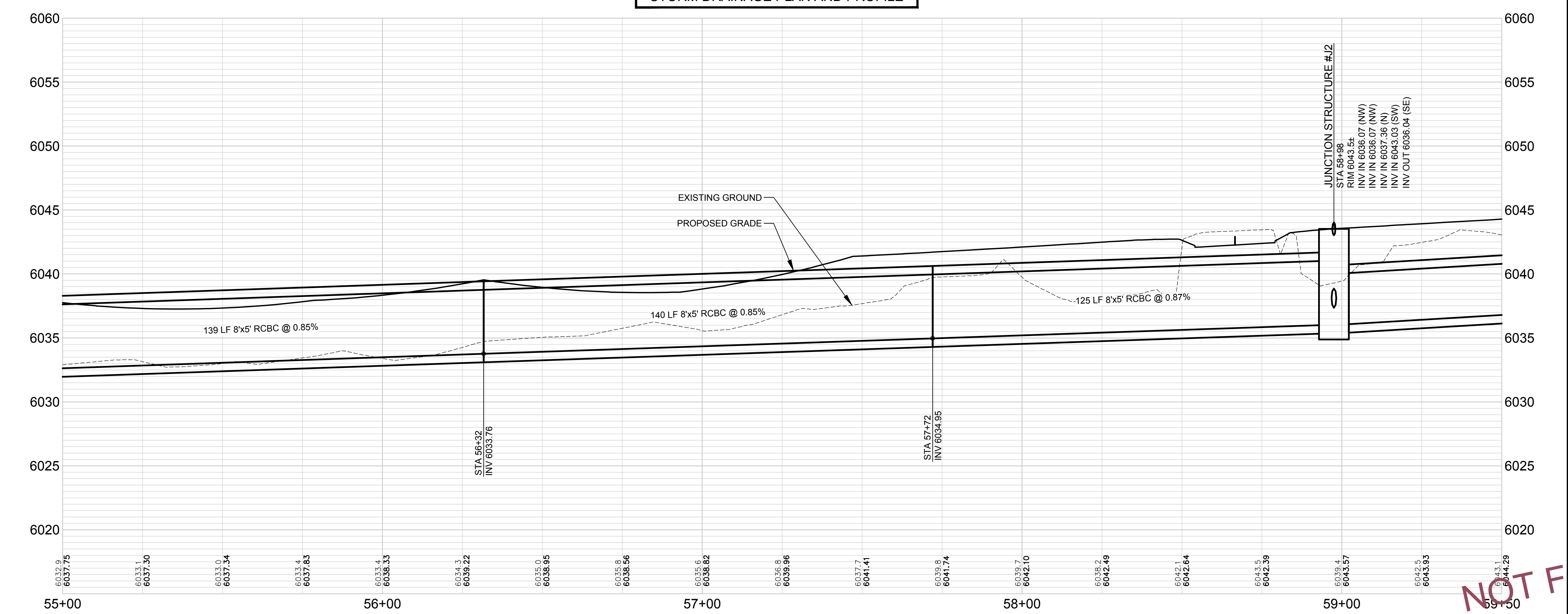
PROJECT NO.
45-0508.00

DRAWING NO.
DR01

SHEET XX OF XX



STORM DRAINAGE PLAN AND PROFILE



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VERT 0 5' 10'

SCALE IN FEET

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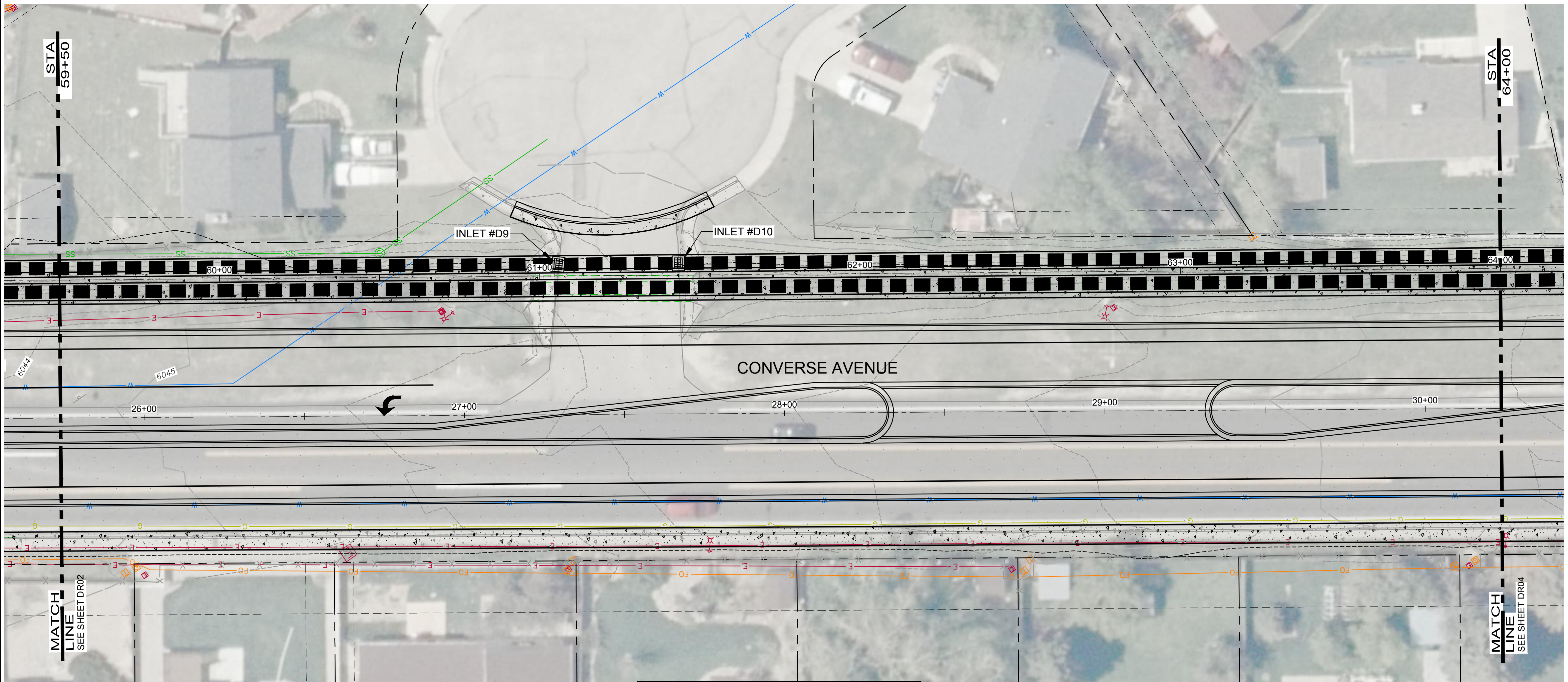
STORM DRAINAGE
PLAN AND PROFILE

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

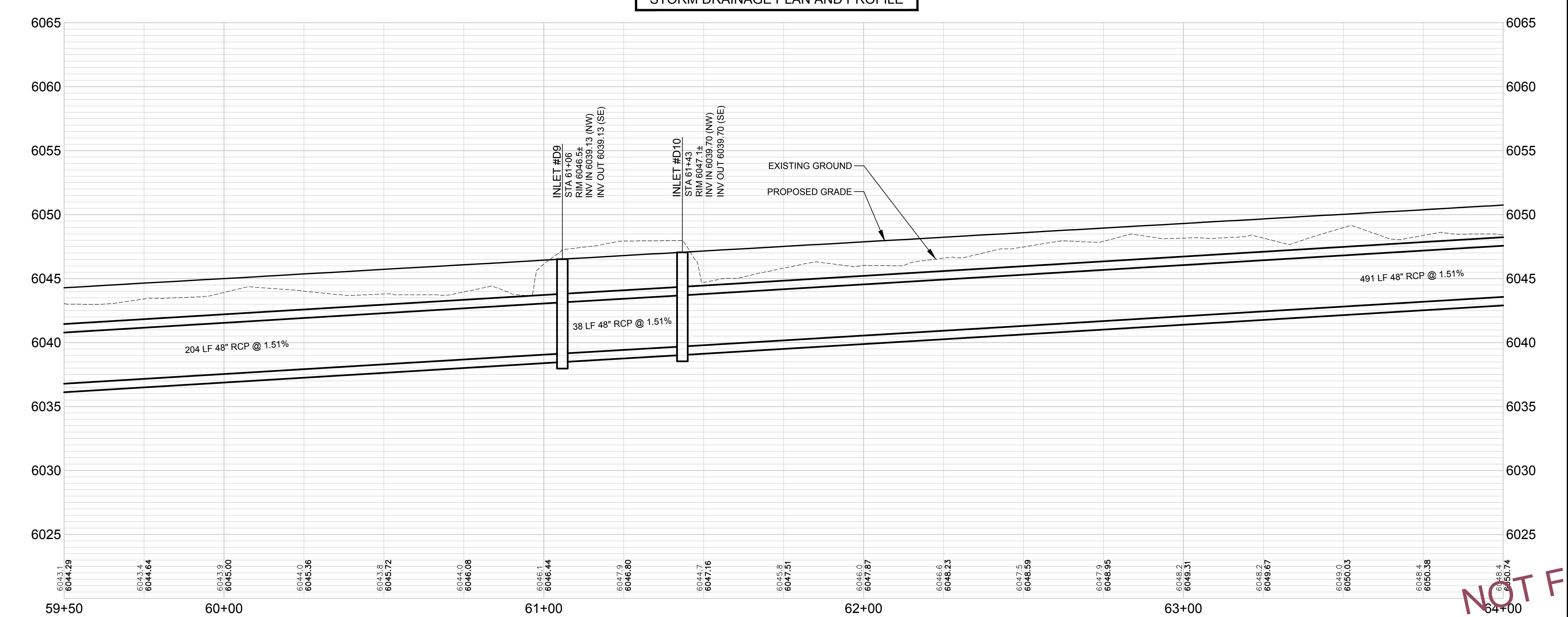
PROJECT NO. 45-0508.00

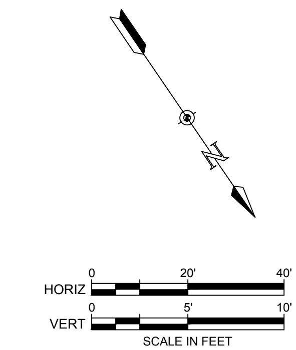
DRAWING NO. DR02

SHEET XX OF XX



STORM DRAINAGE PLAN AND PROFILE





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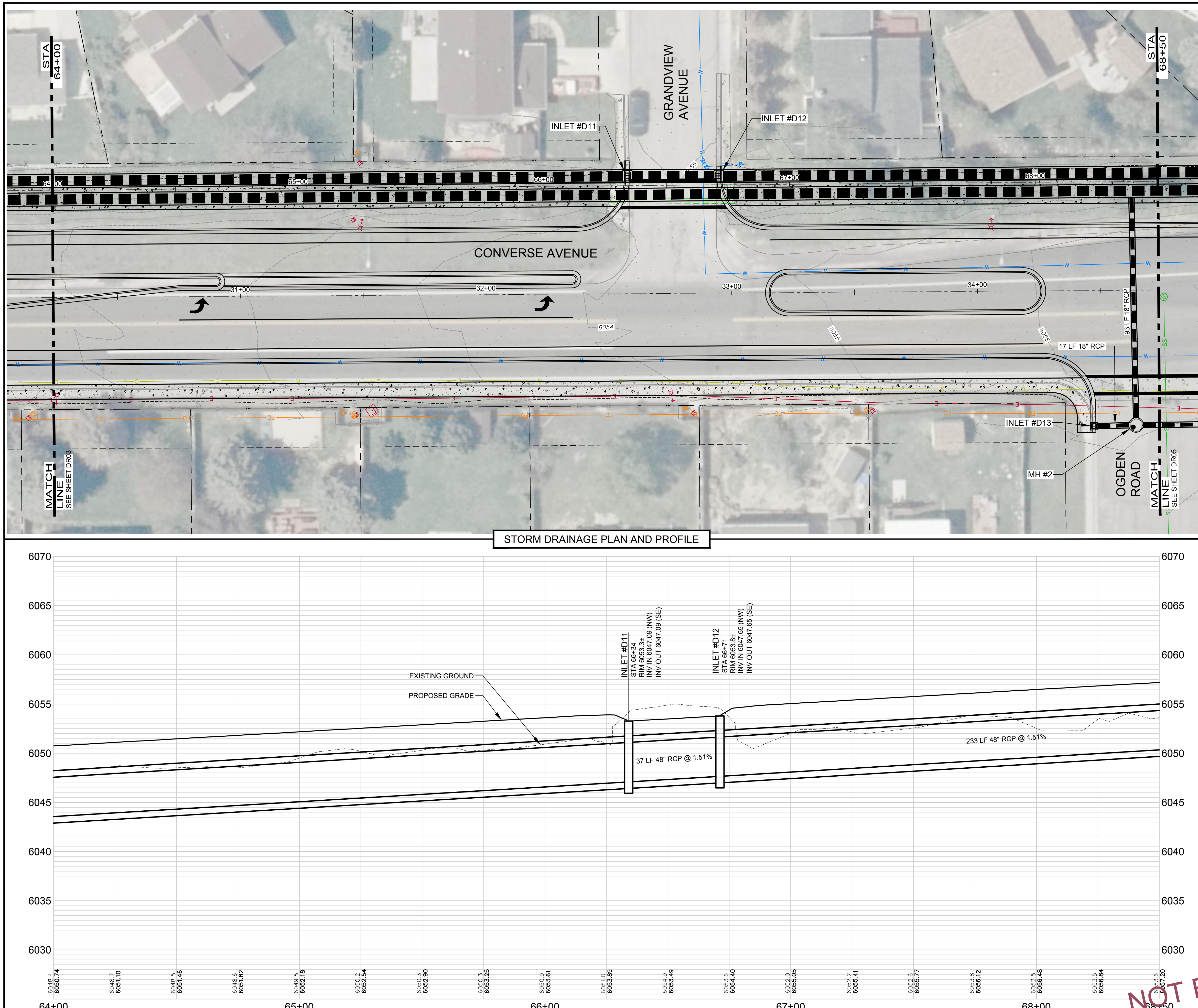
STORM DRAINAGE
PLAN AND PROFILE

Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO.
45-0508.00

DRAWING NO.
DR03

SHEET XX OF XX



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SCALE IN FEET

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CITY OF CHEYENNE, WYOMING

STORM DRAINAGE
PLAN AND PROFILE

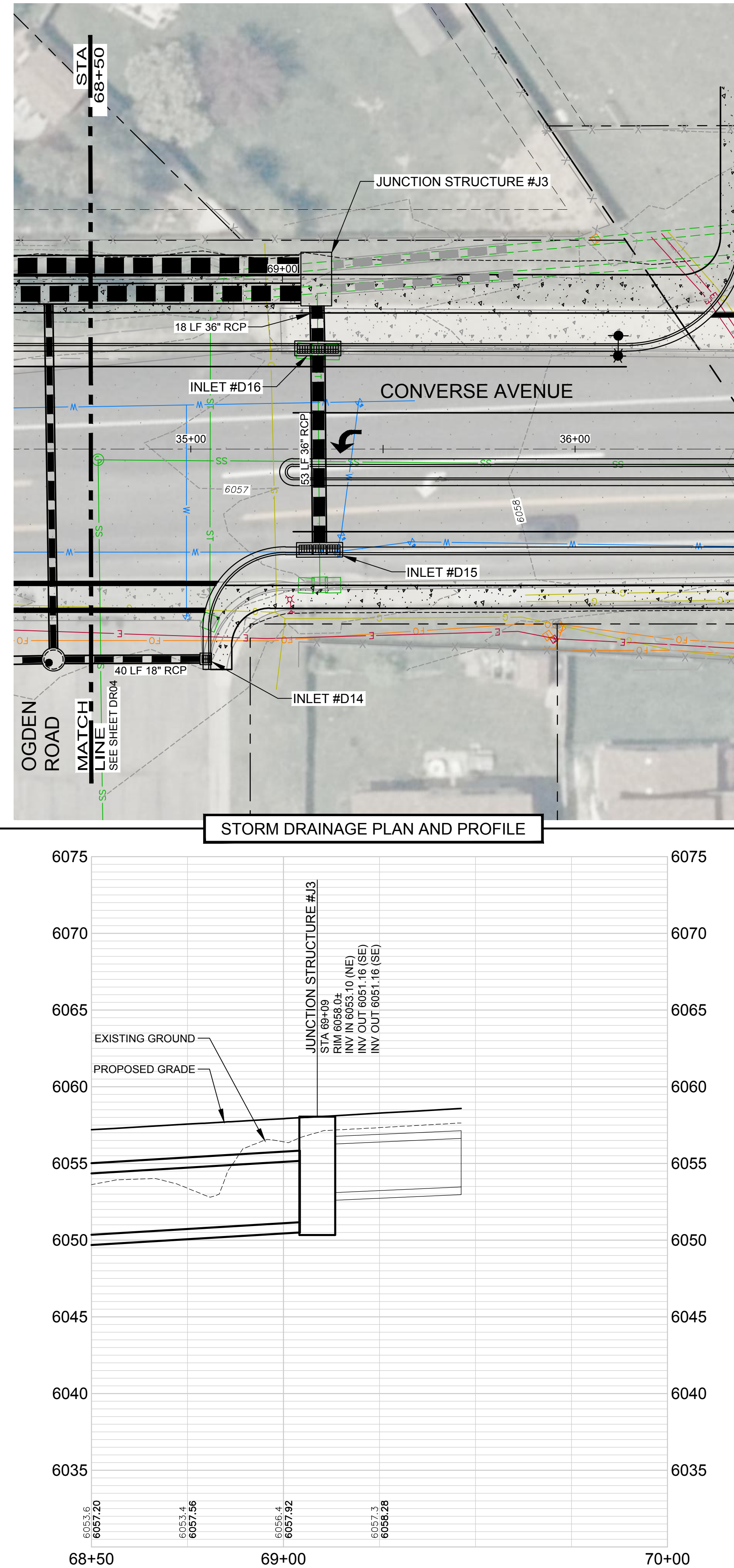
Project Mgr. NTS
Designed By: RBR
Drawn By: RBR
Approved By: XXX
Date: 09/08/21

PROJECT NO. 45-0508.00

DRAWING NO. DR04

SHEET XX OF XX

Drawing Name: I:\36\45-050800 CHEYENNE CONVERSE AVE\MAINDWGS\SHEETS\45-0508.00 PLAN AND PROFILE DRAINAGE.DWG Tuesday, August 31, 2021 12:47 PM By: RICKS, RONALD



HORIZ 0 20' 40'
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CITY OF CHEYENNE, WYOMING

STORM DRAINAGE
PLAN AND PROFILE

Project Mgr. NTS
Designed By. RBR
Drawn By. RBR
Approved By. XXX
Date: 09/08/21

PROJECT NO. 45-0508.00
DRAWING NO. DR05
SHEET XX OF XX

Appendix B

Public Meeting Presentations

Focus Group Meeting Summaries

CONVERSE AVENUE
Improvement Plan

FOCUS GROUP #1 MEETING MINUTES

Meeting Location: USPS (Mason Way)	Project No.: 45-00508
Date/Time: Thursday 2/10/21, 1:00pm MST	Re: Focus Group Meeting #1

Attendees: Jillian Harris, Cory Stibley (Plant Manager), Al Web (Network Specialist), Scott Boyd (Network Specialist), Kurt Kouba (Expediter), Nathan Silberhorn, Darci Hendon

Discussion & Comments:

- Truck traffic:
  - Trucks enter and exit thru the first approach north of Mason Way.
  - 50 trucks a day on average, with 70-80 trucks during the Christmas holiday.
  - The location of the approach is ideal. Moving it would be difficult because of the existing security fencing there. A larger approach is desired to accommodate the trucks.
  - Trucks are 53' long and may have pups added in the near future, also many 80 cy box trucks.
  - Trucks enter and exit in both directions on Converse Blvd. Incoming truck routes vary greatly: PO can only control trucks from Cheyenne – out of state and out of city trucks are being routed differently
  - With all of the truck traffic the USPS would see a benefit to having a center turn lane and a right turn lane (for south-bound truck traffic to enter the truck approach.)
- Postal Carriers:
  - Utilize the approach north of the truck approach.
  - Size and location is just fine.
  - Security gates/fencing at this approach also.
- Employee Parking:
  - Employees park on the west side of the building.
  - Entrance to employee parking is off of Mason Way.
  - During snow storms employees will use the exit to the north side of the employee parking because of a snow drifting issue at the approach off of Mason Way.
- Discussion:
  - Transit stop seems fine – not a concern.
  - Left turn from south bound Converse to east bound Dell Range is difficult. When there is a USPS truck in the turn lane that is the only vehicle that can make it thru on the left turn arrow.
  - Radius of the NE corner of the intersection of Dell Range/Converse is small.
  - No drainage concerns.
  - Frequently see pedestrians trying to cross Converse near Mason Way.

5-Minute Corridor Plans and an aerial map were given to Cory on 2-11-2021 for employees to leave comments. Both items were also emailed to Cory.

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FOCUS GROUP #2 MEETING MINUTES

CONVERSE AVENUE Improvement Plan

Meeting Location: City, Room 208	Project No.: 45-00508
Date/Time: Friday 02/11/21, 4:00pm MST	Re: Focus Group Meeting #2

Attendees: Tom Mason, Jillian Harris, Rande Pouppirt (Owner of Black Market / AAA / Cold Stone building), Charlie Moore (Building Supervisor of Aspen Ridge), Steve Wehmeyer (Owner of Aspen Ridge), Sue ____ (tenant in Aspen Ridge building), Justin Beckner (Civil Engineer for Ridge View Apartments), Nathan Silberhorn, Ken Voigt, Darci Hendon

Discussion & Comments:

- **Aspen Ridge**
  - The largest concern is people using the exit only driveway on the north side of the building to enter the Aspen Ridge parking lot. There have been a few accidents and several near misses. (Because this is private property, the accidents may not be reflected in the City provided crash data.)
  - This exit approach onto Converse is wide enough for Aspen Ridge (as a one-way exit.)
  - Charlie asked if there would be an opportunity to expand their parking lot to the north. It was discussed that we don't want to impact Dry Creek because of the existing wetlands and because Dry Creek conveys floodwaters.
  - Charlie and Sue are worried about the impacts during construction. Currently whenever the intersection of Dell Range/Converse is impacted due to an accident, that is when traffic increases thru their parking lot and particularly people entering thru the exit. *Asked specifically to address that in construction*.
  - Steve's biggest concern is getting new leases in the building during construction as well as the impact on the businesses currently in the building – especially those businesses that rely on clients coming into the building.
    - Maintaining easy access during construction is a top concern.
- **Pouppirt's Properties**
  - Randy would like to see a right turn lane into his property off of Converse Blvd. Due to the speeds vehicles are travelling on Converse north-bound, it makes turning into the property difficult (need a low speed to make the very tight right turn).
    - Discussion about the tight right-of-way in this location. It was suggested that perhaps there doesn't need to be 2 south-bound lanes to cross Dell Range from Converse.
  - Randy recently reconstructed the approach to the building(s) off of Converse Blvd.
- **Ridge View Apartments**
  - Justin is most interested in what will happen at the Carlson Intersection.
  - It was stated that there are no plans to relocate the Carlson Intersection at Converse Ave.
  - Ridge View apartments will have 232 units in Phase 1 and 250 units in Phase 2.
  - Phase 1 is expected to start construction Spring 2021. 2027 for full build-out, but that will be market driven.
  - Phase 1 will build Carlson Rd. thru the first entrance into the apartments.
  - Phase 2 will build Carlson Rd. between first and second entrances.
  - Justin believes that a signal at Carlson would be a good idea. His client is pro signal as well. They have no plans to install conduit for a future signal.
  - He does think that a left turn from Carlson to Converse could be an issue without a signal. He thinks that a lower speed limit on Converse would help.
- **General Corridor Comments**
  - The intersection of Dell Range and Converse doesn't function well for south-bound Converse to east-bound Dell Range (left turners).
    - Left turn arrow is WAY too short (time/duration)

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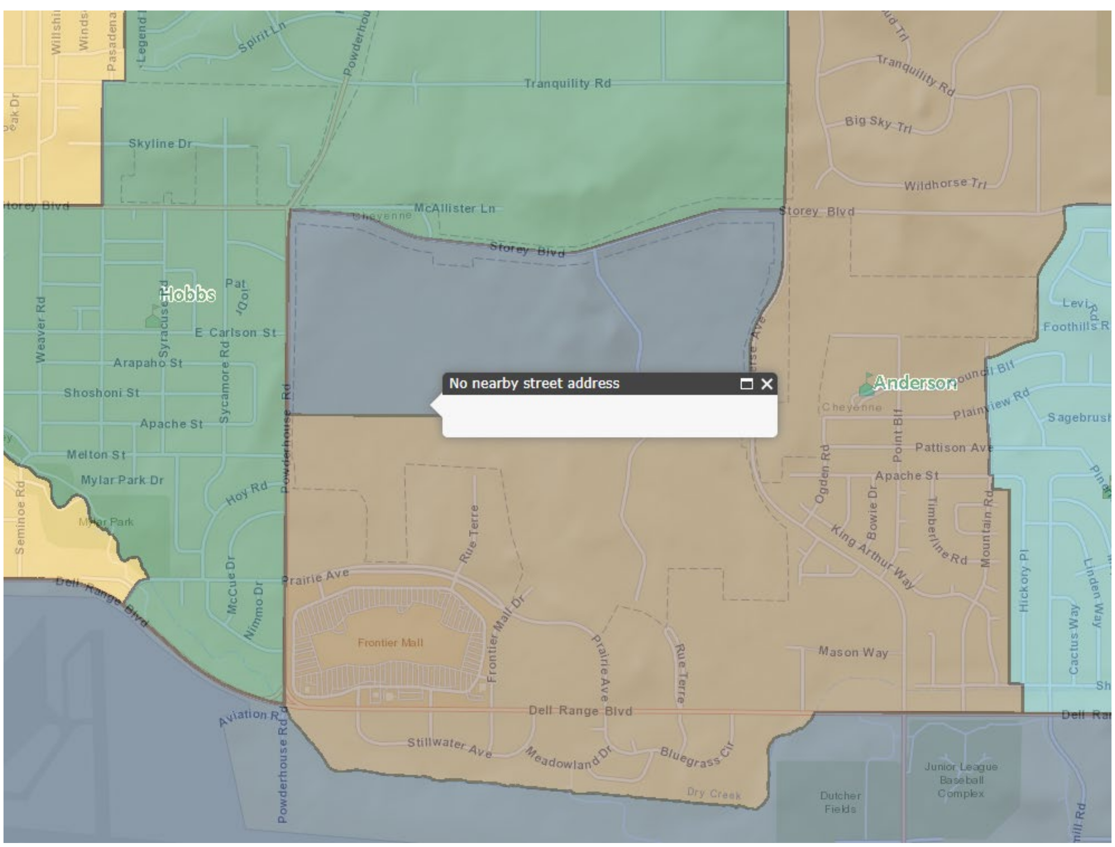
        - There doesn't seem to be a need for 2 south-bound lanes, maybe make a dual left
        - Frequently they see people getting tired of waiting for the left turn and will go south thru the intersection and turn into the ball fields in order to turn around to be able to go east on Dell Range.
        - There is a man that rides his bike along Dell Range. He gets off to walk his bike across Converse, but the light isn't long enough for him to make the crossing.
    - Definitely see the need for a pedestrian crossing from Sagebrush apartments, near Mason Way.
        - Charlie did not have a contact for the apartments. – Tom to call or visit? Phone 307-220-2950 https://sagebrush.apartments/
    - Transit Stop:
        - Aspen Ridge has a transit stop at the front door of their building.
        - No one had any concerns about the location of the transit stop along Converse Blvd.
    - Drainage:
        - No one had any concerns about drainage.
    - The group does not see a variation in traffic amounts based on time of year or weather.

5-Minute Corridor Plans were given to Charlie, Randy and Sue. Darci also emailed a PDF of the 5-Minute Plan to Charlie.

Follow-up: Darci will ask Frank Cole when he forsees the connection of Carlson between the 5-6 School and Ridge View Apartments happening.

Additional Information: Below is a snip of the LCSD1 boundaries. As you can see, the school district has not assigned the area where Ridge View Apartments will be to a specific school/triad because there are no current addresses associated with this area in Section 21 (blue area are unassigned.) The brown area has kids assigned to Anderson Elementary, the green area has kids assigned to Hobbs Elementary. The new 5-6 school will be in the Central Triad, which is the same triad as Hobbs Elementary.



Public Meeting Presentations

CONVERSE AVENUE
Improvement Plan

CHEYENNE WYOMING Live the Legend

CHEYENNE METROPOLITAN PLANNING ORGANIZATION

Converse Avenue Improvement Plan

Public Meeting #1
March 3, 2021

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CONVERSE AVENUE
Improvement Plan

CHEYENNE WYOMING Live the Legend

CHEYENNE METROPOLITAN PLANNING ORGANIZATION

Welcome!

We appreciate this opportunity to meet with you and the time you're taking to learn about this project!

We would love to hear from you.

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Housekeeping

- Rules
- Presentation Agenda:
  - Introductions & Study Background
  - Existing Conditions & Future Growth
  - Traffic Engineering Considerations
  - Improvement Options
  - Q&A

Zoom Meeting Tools

- Chat – use the everyone option
  - Best place to log questions for later
  - When closing, DON'T close your browser
- Reactions – we will be using them later
- Raise Hand – save this for the Q&A session
- Polls – let's do one now

CONVERSE AVENUE Improvement Plan
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Poll Question #1

How did you hear about tonight's meeting?

CONVERSE AVENUE Improvement Plan

The Project Team

- Tom Mason, Cheyenne MPO
- Jillian Harris, Cheyenne MPO
- Christopher Yaney, Cheyenne MPO
- Tom Cobb, City of Cheyenne
- Anissa Gerard, City of Cheyenne
- Nathan Silberhorn, Ayers Associates
- Ken Voigt, Ayres Associates
- Darci Hendon, Summit Engineering

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CONVERSE AVENUE Improvement Plan

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Previous planning projects in Cheyenne:

- Dell Range Corridor Study
- East Pershing Corridor Plan
- Archer Greenway Trail Connector Plan
- Missile Drive Corridor Plan
- Evers Blvd Plan
- Cheyenne Frontier Days Traffic Study
- Cheyenne Freight Mobility Study

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The Project (The "Plan")

Objective:

Develop a corridor improvement plan that enhances mobility and safety for all users to serve existing and future land use and traffic growth projections between Dell Range Boulevard and the new Carlson Street extension.

Goals:

- Identify the community's vision for the corridor.
- Identify the corridor roadway cross-section.
- Enhance pedestrian and bicycle mobility and safety, including crossings of Converse Avenue and connections to other facilities.
- Improve intersection design and evaluate the need for traffic signals.
- Minimize traffic conflicts through corridor access management.

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Study Considerations

1. Safety
2. Traffic Operation
3. Speed Management
4. Pedestrian Friendly
5. Connectivity
6. Right-of-way impacts
7. Drainage

Study Intersections

1. Business accesses
2. Mason Way
3. USPS truck access
4. Point Bluff & USPS
5. Briarwood Lane
6. Grandview Avenue
7. Ogden Road
8. Future Carlson Street

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Why Public Involvement?

- To provide a project that serves the City
- You know the corridor best
- We want to understand your concerns
- We want to hear your ideas
- We want to incorporate as many of your ideas as possible and still meet the City's objectives and needs and industry standards and best practices

Public Involvement Events

- Public Information Meeting #1
  - March 3
- Public Information Meeting #2
  - Mid-May
- Project Website
  - plancheyenne.org
    - > View Plans and Programs
    - > Converse Avenue Improvement Plan

CONVERSE AVENUE Improvement Plan

Poll question #2

From Converse, which street do you most frequently use?

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Existing Conditions

- Low crash frequency – mostly rear-enders at Dell Range and Mason Way
- SB left turns onto Dell Range are a problem
- EB left turns from Mason Way are a problem
- Crossing Converse Ave on foot is a problem

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Existing Conditions - Access

- Business accesses near Dry Creek bridge complicate traffic conflicts
- Wrong-way traffic to Aspen Ridge
- Tight right turn into Blackmarket/AAA
- US Post Office Truck entrance near Mason Way

Existing Conditions - Other

- Lane marking issues, especially from Post Office to Dell Range
- Lane continuity issues
- Pedestrian access & safety issues
- Pavement conditions issues

Poll question #3

What elements of this street are most important to you?

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Poll question #4

Do you think speeding is an issue on the corridor?

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Opportunities for Improvement

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Connectivity

The corridor divides more than it connects

We can connect the community to amenities!

- Homes to Homes
- Homes to Schools
- Homes to Retail
- Retail to Retail

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Opportunities for Improvement

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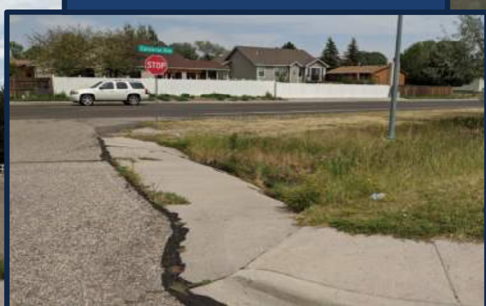
Pedestrian Considerations



- ADA Accessibility
- Routes to School
- Routes to Retail

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Opportunities for Improvement

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Greenway Considerations

- ADA ramps & accessibility
- Safe crossing
- Connections to retail

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Opportunities for Improvement

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Transit Considerations:

- Safe crossing
- Sidewalk connections to residential
- ADA accessibility to transit
- Separate transit stop from turn movements

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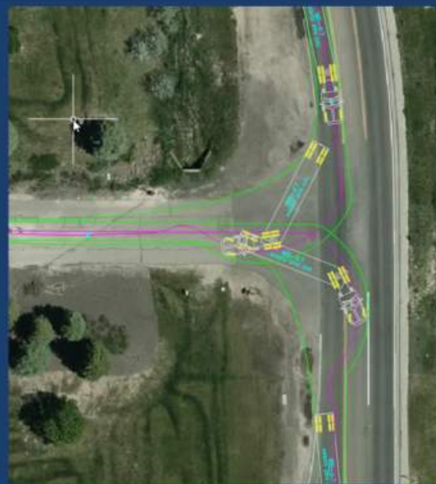
Freight Truck Accommodation

Dell Range Intersection



Post Office Truck Entrance

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Poll question #5

How comfortable are you walking on a sidewalk right next to the street?

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Poll question #6

How comfortable are you riding a bicycle on a street with a shoulder?

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Poll question #7

How comfortable are you riding a bicycle on a <u>Greenway</u>?

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So what about traffic?

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Traffic Analysis Steps

Existing Conditions
- ADT Trends
- Safety
- Capacity

Future Traffic
- Land Use/Transportation Model
- Section 20 Growth

Future Signals

Pedestrian Connectivity

Access Management

Oneida Street & Pilgrim Way
4 Lane Alternative

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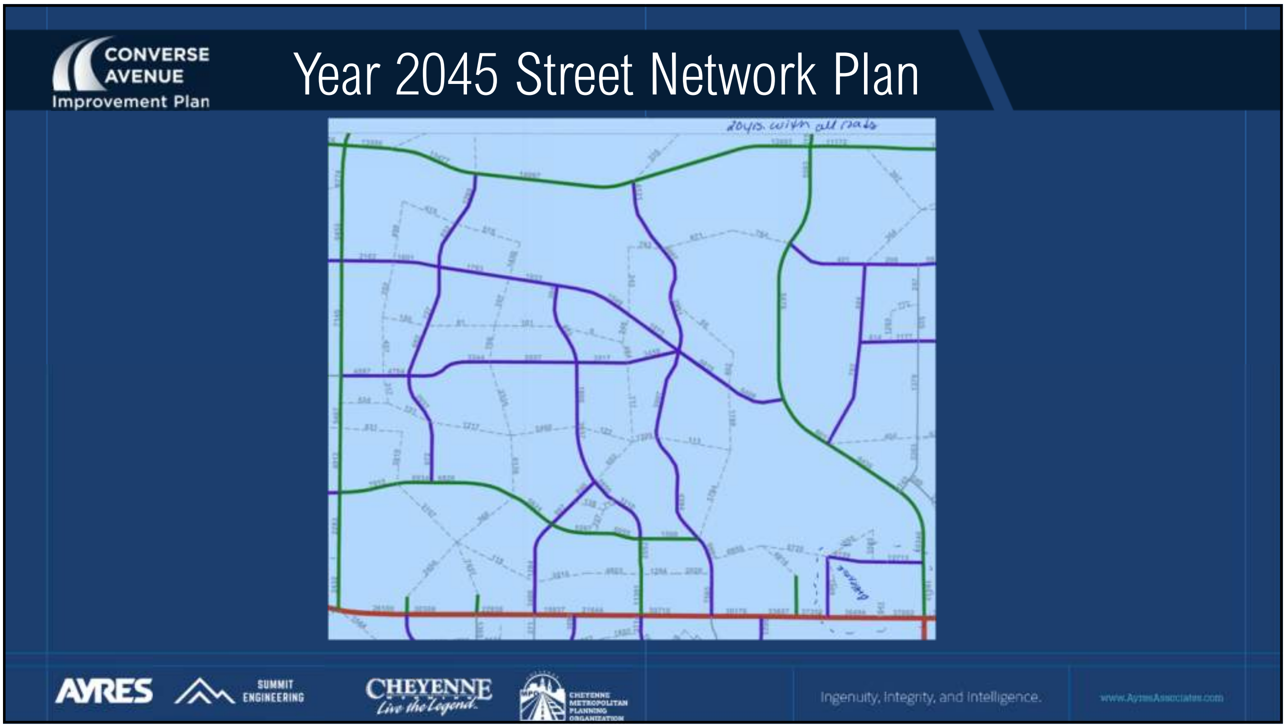
CONVERSE AVENUE Improvement Plan
Year 2045 Street Network Plan
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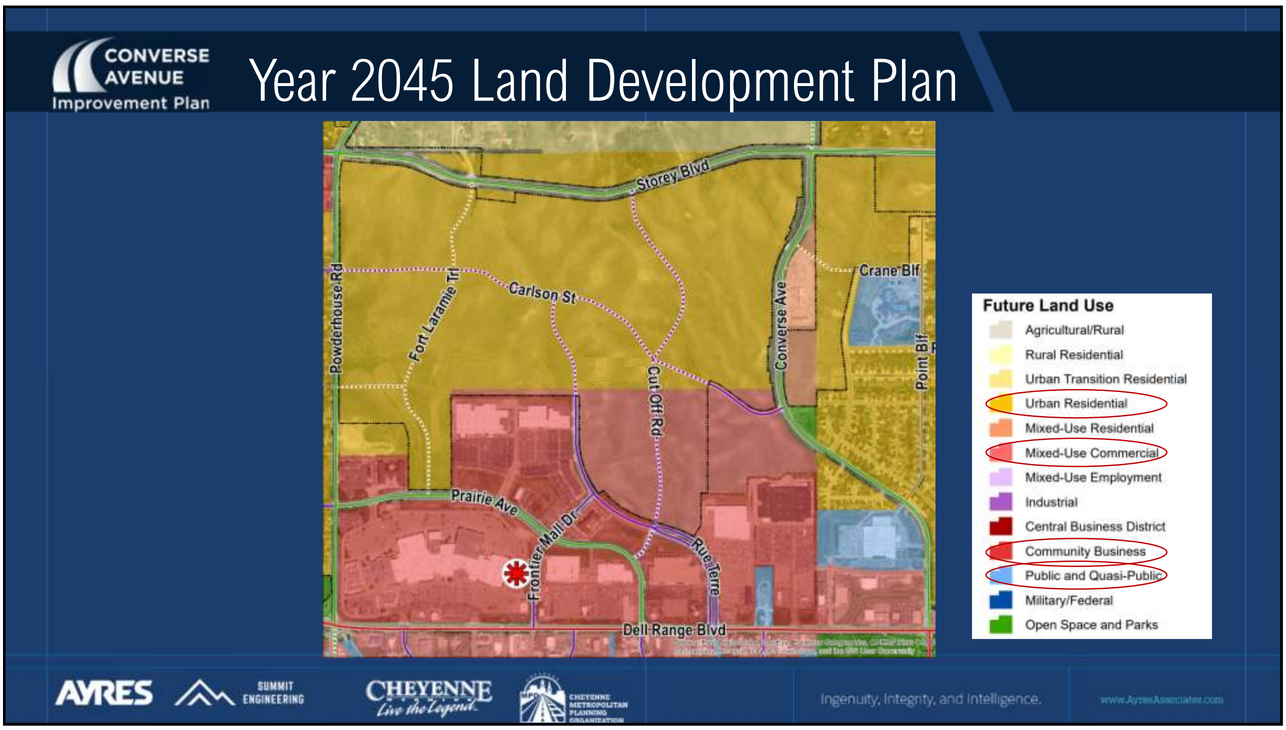
CONVERSE AVENUE Improvement Plan
Year 2045 Land Development Plan
Storey Blvd
Crane Blf
Carlson St
Powderhouse Rd
Fort Laramie Trl
Cut Off Rd
Converse Ave
Point Blf
Prairie Ave
Frontier Mall Dr
Rue Terre
Dell Range Blvd
Future Land Use
Agricultural/Rural
Rural Residential
Urban Transition Residential
Urban Residential
Mixed-Use Residential
Mixed-Use Commercial
Mixed-Use Employment
Industrial
Central Business District
Community Business
Public and Quasi-Public
Military/Federal
Open Space and Parks
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Existing Traffic

2045 Traffic

Existing Intersection Operation

Mason Way Traffic Operations

Scenario	Control	MOE	Movement						OVERALL
			EBL	EBR	NBL	NBT	SBT	SBR	
2020 Midday Existing	Stop	LOS	D	B	A	A	A	A	A
		Delay (sec)	28.1	10.8	8.6	0.0	0.0	0.0	7.1
		Queue (ft)	50'	50'	25'	0'	0'	0'	--
2020 PM Existing	Stop	LOS	F	B	A	A	A	A	B
		Delay (sec)	62.9	12.2	9.0	0.0	0.0	0.0	11.0
		Queue (ft)	125'	50'	25'	0'	0'	0'	--

USPS Driveway/Point Bluff Traffic Operations

Scenario	Control	MOE	Movement												OVERALL
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
2020 Midday Existing	Stop	LOS	B			C			A	A		A	A		A
		Delay (sec)	12.0			16.9			8.0	0.0		7.8	0.0		3.1
		Queue (ft)	25'			50'			25'	0'		25'	0'		--
2020 PM Existing	Stop	LOS	B			C			A	A		A	A		A
		Delay (sec)	12.4			17.5			8.1	0.0		7.8	0.0		3.2
		Queue (ft)	25'			50'			25'	0'		25'	0'		--

Existing Intersection Operation

Ogden Road Traffic Operations									
Scenario	Control	MOE	Movement						OVERALL
			WBL	WBR	SBL	SBT	NBT	NBR	
2020 Midday Existing	Stop	LOS	B	A	A	A	A		A
		Delay (sec)	11.1	9.5	7.7	0.0	0.0		1.0
		Queue (ft)	25'	25'	25'	0'	0'		--
2020 PM Existing	Stop	LOS	B	B	A	A	A		A
		Delay (sec)	12.7	10.4	8.1	0.0	0.0		1.9
		Queue (ft)	25'	25'	25'	0'	0'		--

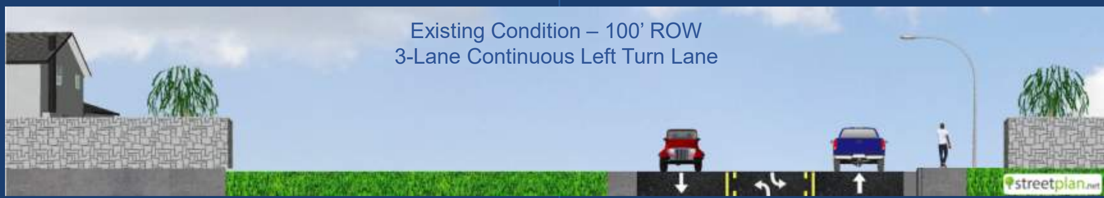
Preliminary Improvement Options

From 3-Lane Continuous Left Turn Lane (Existing)

1. Enhanced 3-Lane Continuous Left Turn Lane (Raised Median)

2. 4-Lane Divided Roadway with Median

Enhanced 3-Lane Continuous Left Turn Lane

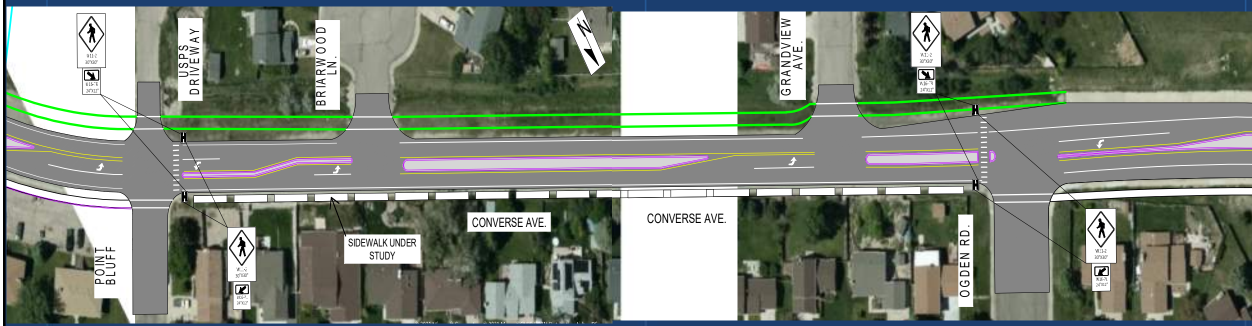


Enhanced 3-Lane Continuous Left Turn Lane

Dell Range Blvd to US Post Office

LEGEND
- CONCRETE PAVEMENT
- CONCRETE MEDIAN
- CONCRETE SIDEWALK
- CONCRETE CURB
- GREENWAY
- CENTERLINE PAVEMENT MARKING
- LANE LINE PAVEMENT MARKING
- CONTINUOUS LEFT-TURN LANE
- SIGN ON PERMANENT SUPPORT

Enhanced 3-Lane Continuous Left Turn Lane



US Post Office to north of Ogden Road

LEGEND
- CONCRETE PAVEMENT
- CONCRETE MEDIAN
- CONCRETE SIDEWALK
- CONCRETE CURB
- GREENWAY
- CENTERLINE PAVEMENT MARKING
- LANE LINE PAVEMENT MARKING
- CONTINUOUS LEFT-TURN LANE
- SIGN ON PERMANENT SUPPORT

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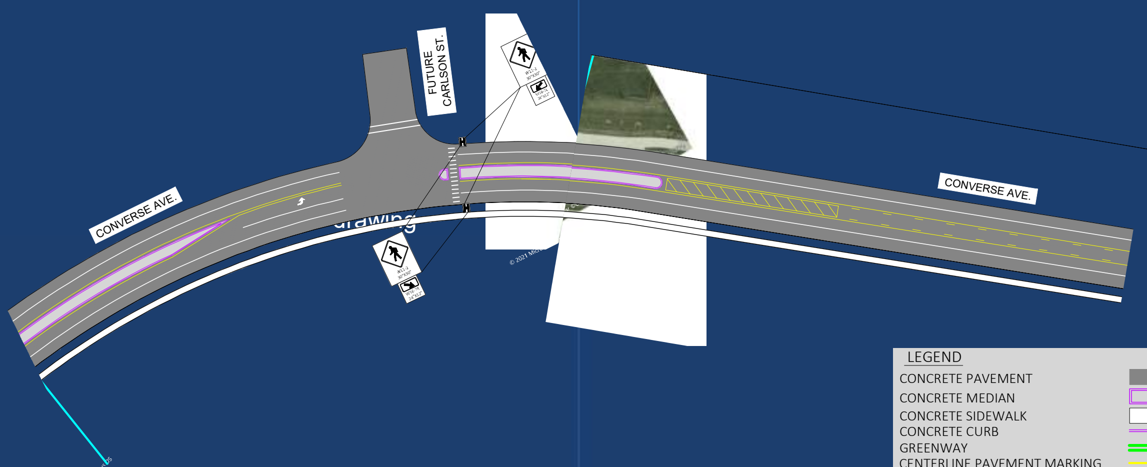
Enhanced 3-Lane Continuous Left Turn Lane



North of Ogden Road to north of Carlson St

LEGEND
- CONCRETE PAVEMENT
- CONCRETE MEDIAN
- CONCRETE SIDEWALK
- CONCRETE CURB
- GREENWAY
- CENTERLINE PAVEMENT MARKING
- LANE LINE PAVEMENT MARKING
- CONTINUOUS LEFT-TURN LANE
- SIGN ON PERMANENT SUPPORT

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Converse Avenue today

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Enhanced 3-Lane Continuous Left Turn Lane

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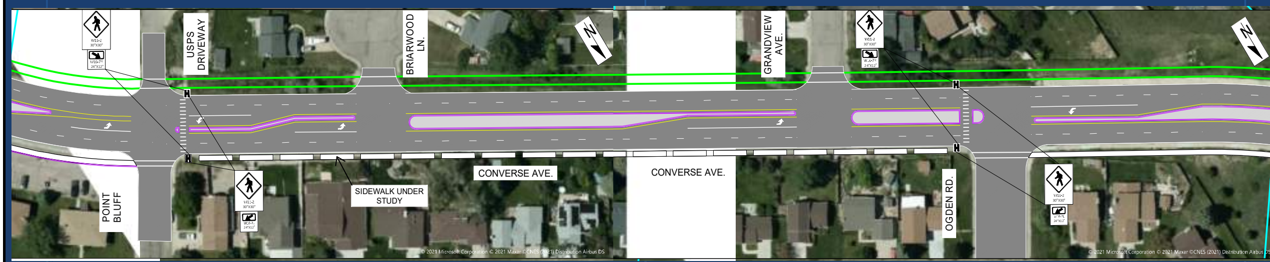
4-Lane Divided Roadway with Median

4-Lane Divided Roadway with Median

Dell Range Blvd to US Post Office

LEGEND
- CONCRETE PAVEMENT
- CONCRETE MEDIAN
- CONCRETE SIDEWALK
- CONCRETE CURB
- GREENWAY
- CENTERLINE PAVEMENT MARKING
- LANE LINE PAVEMENT MARKING
- CONTINUOUS LEFT-TURN LANE
- SIGN ON PERMANENT SUPPORT

4-Lane Divided Roadway with Median



US Post Office to north of Ogden Road

LEGEND	
CONCRETE PAVEMENT	
CONCRETE MEDIAN	
CONCRETE SIDEWALK	
CONCRETE CURB	
GREENWAY	
CENTERLINE PAVEMENT MARKING	
LANE LINE PAVEMENT MARKING	
CONTINUOUS LEFT-TURN LANE	
SIGN ON PERMANENT SUPPORT	

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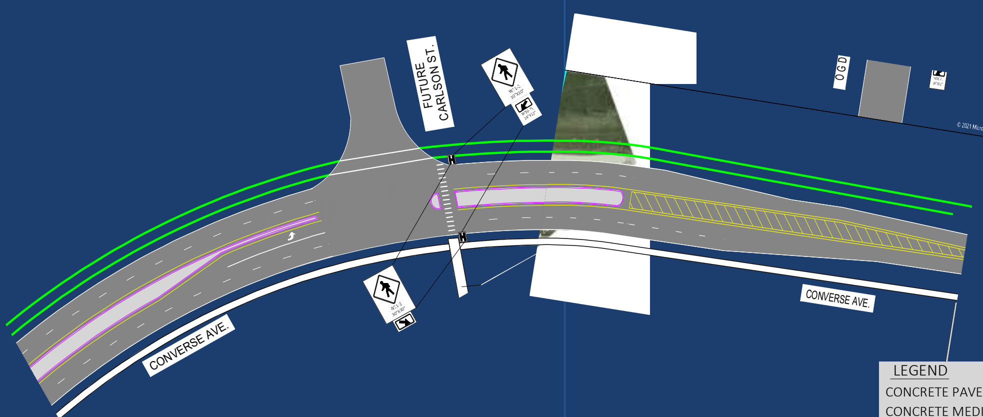
4-Lane Divided Roadway with Median



LEGEND	
CONCRETE PAVEMENT	
CONCRETE MEDIAN	
CONCRETE SIDEWALK	
CONCRETE CURB	
GREENWAY	
CENTERLINE PAVEMENT MARKING	
LANE LINE PAVEMENT MARKING	
CONTINUOUS LEFT-TURN LANE	
SIGN ON PERMANENT SUPPORT	

North of Ogden Road to north of Carlson St

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4-Lane Divided Roadway with Median

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Poll question #8

Do you like the idea of a raised center median?

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Engineering Improvements Under Study

1. Extension to Converse
   - Plainview Rd
   - Pattison Ave
   - Apache St
2. Extension to Storey; Ogden Rd or Mountain Rd
3. Traffic Signal Warrants
   - Point Bluff
   - Ogden Road
   - Carlson Street
4. Transit Stop Location

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CONVERSE AVENUE Improvement Plan

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Poll question #9

How do you feel about traffic signals?

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Other Chat question

What did we miss? What is the biggest need for Converse Avenue that we didn't touch on?

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Other Chat questions

Where do you think a traffic signal would be beneficial?

Are there too many intersections on Converse?

Send your email address to jharris@cheyennempo.org

- Project Website
  - plancheyenne.org
    - > View Plans and Programs
    - > Converse Avenue Reconstruction Plan

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CONVERSE AVENUE
Improvement Plan

Thank You!

We appreciate your time!

We appreciate this opportunity!

Send your email address to jharris@cheyennempo.org

- Public Information Meeting #2
  - Mid-May
- Project Website
  - plancheyenne.org
    - > View Plans and Programs
    - > Converse Avenue Reconstruction Plan

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Converse Avenue Improvement Plan

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CONVERSE AVENUE Improvement Plan

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Converse Avenue Improvement Plan

Public Meeting #2
May 26, 2021

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CONVERSE AVENUE Improvement Plan

The Project Team

- Nathan Silberhorn, Ayers Associates
- Ken Voigt, Ayres Associates
- Darci Hendon, Summit Engineers
- Tom Mason, Cheyenne MPO
- Jillian Harris, Cheyenne MPO
- Christopher Yaney, Cheyenne MPO
- Tom Cobb, City of Cheyenne
- Anissa Gerard, City of Cheyenne

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The Project

Scope:

Study and develop recommendations for the future Converse Avenue corridor

Limits:

Dell Range Blvd to north of Carlson Street

Goals:

- Identify the corridor roadway cross-section
- Improve intersection design and evaluate the need for traffic signals
- Minimize traffic conflicts through corridor access management
- Identify the community's vision for the corridor
- Enhance pedestrian and bicycle mobility and safety, including crossings of Converse Avenue and connections to other facilities

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Step 1: Existing Conditions

- Lane marking & continuity issues, especially from Post Office to Dell Range
- Pedestrian access & safety issues
  - Pedestrian Crossing (at Dell Range crosswalk and mid-block)
- Pavement conditions; 25-30 years old
- Dry Creek culvert condition

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Existing Conditions - Access

- Business accesses near Dry Creek bridge likely complicate traffic conflicts
- Tight right turn into Blackmarket/AAA
- Wrong-way traffic to Aspen Ridge
- US Post Office Truck entrance near Mason Way

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Existing Conditions – Other Input

- SB left turns onto Dell Range
- EB left turns from Mason Way
- Crossing Converse Ave on foot

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Step 2: Opportunities for Improvement

The corridor divides more than it connects

Connectivity

Opportunities for Improvement

Pedestrian Considerations

- Sidewalks along
- Connections to
- Crossings of

Opportunities for Improvement

Greenway Considerations

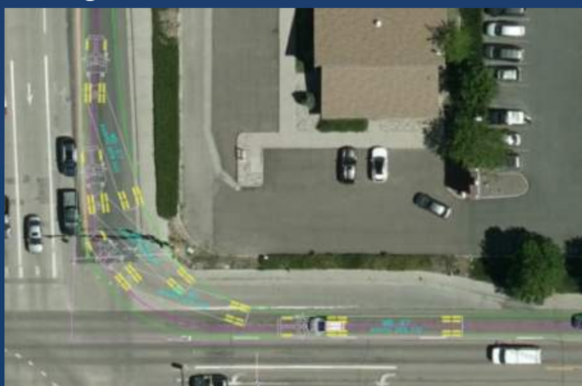
- Continuing the Greenway corridor
- Ensure Greenway is accessible & ADA compliant

Opportunities for Improvement

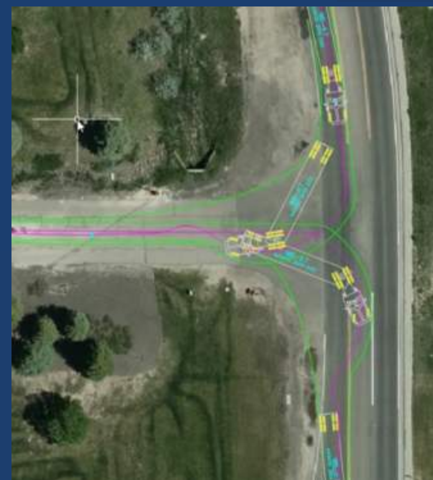
Transit Considerations:

- Safe crossings & connections
- ADA accessibility to transit
- Separate transit stop from turn movements
- Consider additional bus stops and/or improvements

Freight Truck Accommodation



Dell Range Intersection



Post Office Truck Entrance

Study Intersections

1. Business accesses
2. Mason Way
3. USPS truck access
4. Point Bluff & USPS
5. Briarwood Lane
6. Grandview Avenue
7. Ogden Road
8. Future Carlson Street*

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Study Evaluation Criteria

1. Safety
2. Traffic Operation
3. Speed Management
4. Pedestrian Friendliness
5. Connectivity
6. Right-of-way impacts
7. Drainage
8. Cost
9. Maintenance impacts

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Step 3a: Public Involvement (direct)

Initial Focus Groups

- Post Office
- Businesses

Public Meeting #1 – March 3

- Project overview
- Asked polling questions
- Presented initial alternatives
- Invited live and online feedback

Public Meeting #2 – May 26

- Project review
- Present study findings
- Present recommendations
- Invite live and online feedback

Document all feedback and post online

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Step 3b: Public Involvement (via city presentations)

MPO and City Committees

- MPO Technical Committee – May 19
- Citizens Advisory Committee – June 9
- Special Technical Committee – July 14
- City Planning Commission – July 19
- City Governing Body – August 9
- Public Service Committee – August 17
- City Governing Body – August 23
- MPO Policy Committee – September 22

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Step 4: Traffic Analysis

Existing Conditions

- Traffic Volume Trends
- Safety
- Capacity

Future Conditions

- Land Use/Transportation Model
- Section 20 Growth

Corridor Templates and Cross Sections

Traffic Signals and Intersection Configurations

Access Management

Pedestrian Connectivity

These affect traffic!

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Year 2045 Land Development Plan

Future Land Use

- Agricultural/Rural
- Rural Residential
- Urban Transition Residential
- Urban Residential
- Mixed-Use Residential
- Mixed-Use Commercial
- Mixed-Use Employment
- Industrial
- Central Business District
- Community Business
- Public and Quasi-Public
- Military/Federal
- Open Space and Parks

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Existing Traffic

2045 Traffic

Existing Intersection Operation

Mason Way Traffic Operations

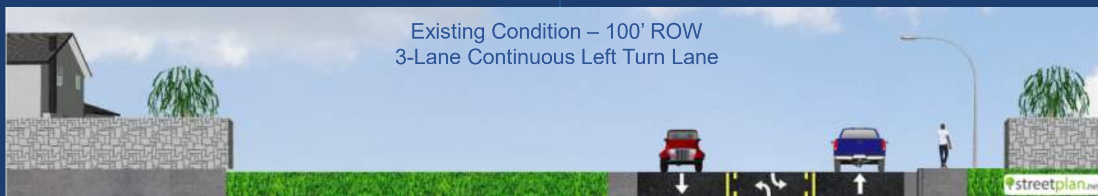
Scenario	Control	MOE	Movement: EBL	EBR	NBL	NBT	SBT	SBR	OVERALL
2020 Midday Existing	Stop	LOS	D	B	A	A	A	A	A
		Delay (sec)	28.1	10.8	8.6	0.0	0.0	0.0	7.1
		Queue (ft)	50'	50'	25'	0'	0'	0'	--
2020 PM Existing	Stop	LOS	F	B	A	A	A	A	B
		Delay (sec)	62.9	12.2	9.0	0.0	0.0	0.0	11.0
		Queue (ft)	125'	50'	25'	0'	0'	0'	--

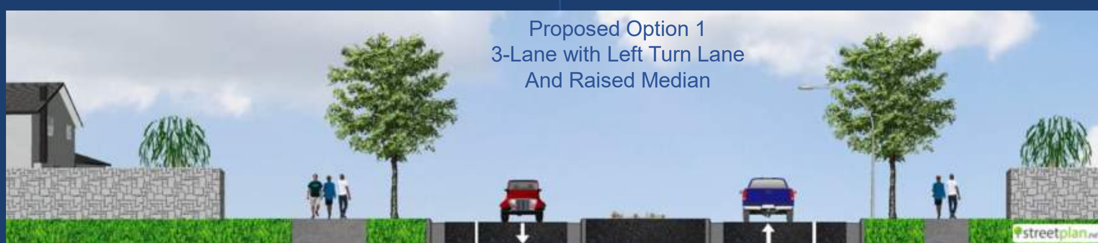
Step 5(a): Evaluating Improvement Options

From existing 3-Lane with Continuous Left Turn Lane (CLTL)

1. Enhanced 3-Lane with CLTL (Shoulders, Raised Median, Tree Lawn)
2. 4-Lane Divided Roadway with CLTL (Raised Median & Tree Lawn)
3. Signalized Intersections (Mason Way, Point Bluff, & Carlson)
4. Roundabouts (Mason Way, Point Bluff, & Carlson)

Enhanced 3-Lane Continuous Left Turn Lane





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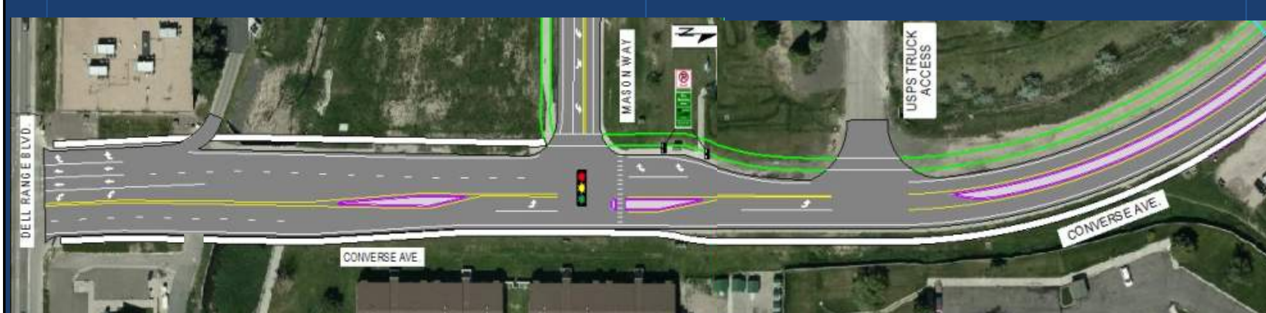
Enhanced 3-Lane Continuous Left Turn Lane



Dell Range Blvd to US Post Office

LEGEND
- CONCRETE PAVEMENT
- CONCRETE MEDIAN
- CONCRETE SIDEWALK
- CONCRETE CURB
- GREENWAY
- CENTERLINE PAVEMENT MARKING
- LANE LINE PAVEMENT MARKING
- CONTINUOUS LEFT-TURN LANE
- SIGN ON PERMANENT SUPPORT

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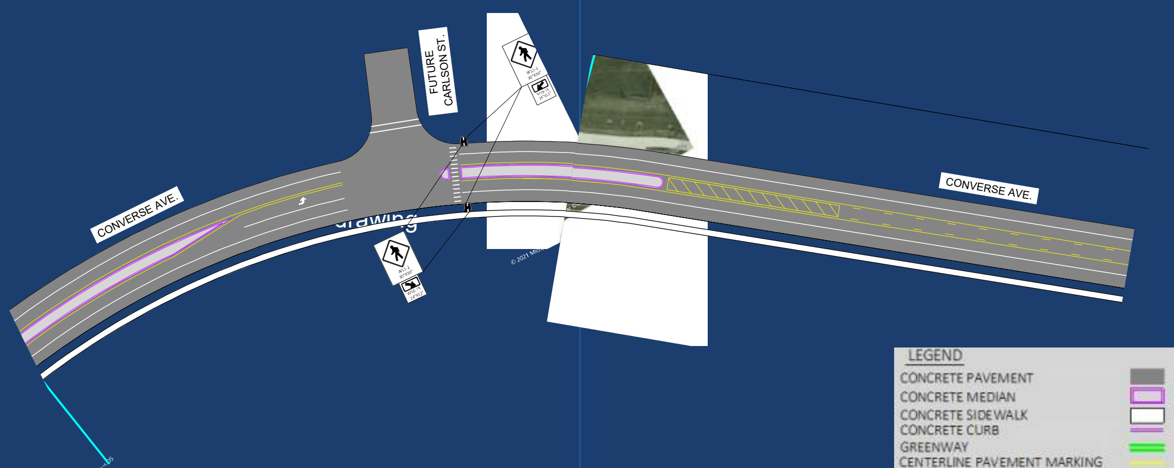
Enhanced 3-Lane Continuous Left Turn Lane



North of Ogden Road to north of Carlson St

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Enhanced 3-Lane Continuous Left Turn Lane

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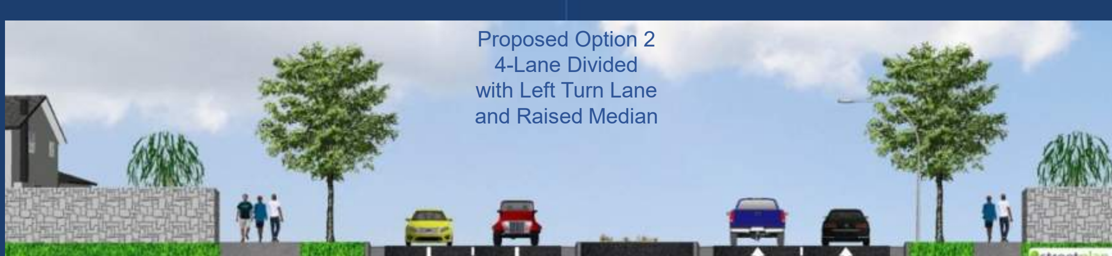
4-Lane Divided Roadway with Median



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4-Lane Divided Roadway with Median

Dell Range Blvd to US Post Office

LEGEND
- CONCRETE PAVEMENT
- CONCRETE MEDIAN
- CONCRETE SIDEWALK
- CONCRETE CURB
- GREENWAY
- CENTERLINE PAVEMENT MARKING
- LANE LINE PAVEMENT MARKING
- CONTINUOUS LEFT-TURN LANE
- SIGN ON PERMANENT SUPPORT

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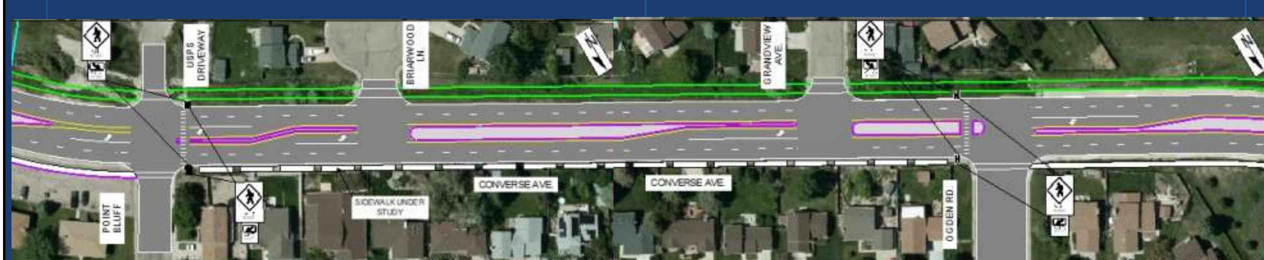
4-Lane Divided Roadway with Median



US Post Office to north of Ogden Road

LEGEND
- CONCRETE PAVEMENT
- CONCRETE MEDIAN
- CONCRETE SIDEWALK
- CONCRETE CURB
- GREENWAY
- CENTERLINE PAVEMENT MARKING
- LANE LINE PAVEMENT MARKING
- CONTINUOUS LEFT-TURN LANE
- SIGN ON PERMANENT SUPPORT

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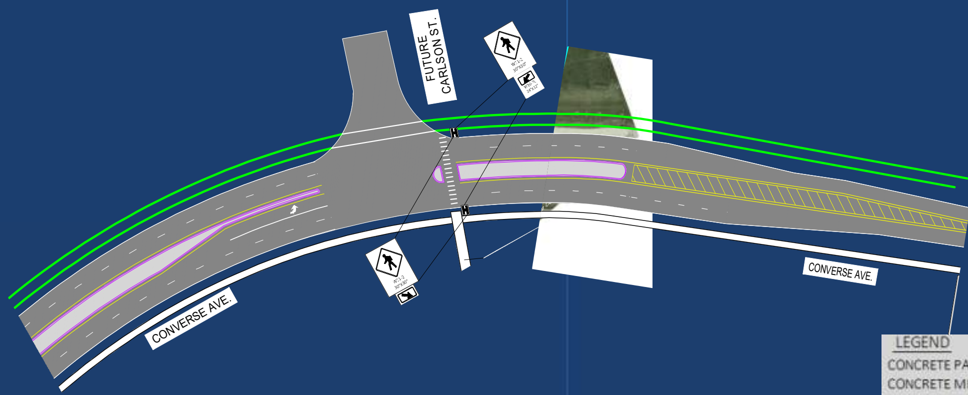
4-Lane Divided Roadway with Median



LEGEND
CONCRETE PAVEMENT
CONCRETE MEDIAN
CONCRETE SIDEWALK
CONCRETE CURB
GREENWAY
CENTERLINE PAVEMENT MARKING
LANE LINE PAVEMENT MARKING
CONTINUOUS LEFT-TURN LANE
SIGN ON PERMANENT SUPPORT

North of Ogden Road to north of Carlson St

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4-Lane Divided Roadway with Median

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Step 5(b): Improvements Studied

1. Traffic Signal Warrants
   - Mason Way
   - Point Bluff
   - Ogden Road
   - Carlson Street
2. Roundabout Analysis
   - Point Bluff
   - Ogden Road
   - Carlson Street
3. Dell Range Modifications
   - SB lane configuration
   - Widening the NE turn Radius
4. Access Management
   - Business Accesses south of Dry Creek
   - Grandview Ave / Briarwood Lane
5. E-W Extension to Converse
   - Plainview Rd
   - Pattison Ave
   - Apache St

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Improvements Studied

4. E-W Extension to Converse
   - Plainview Rd
   - Pattison Ave
   - Apache St

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Step 6: Preliminary Recommendations

1. Modified 3-lane template (hybrid)
   - 5/6-lane section Dell Range to Post Office
   - Extend NB lane to Point Bluff (3+ Lane)
   - 3-lane north of Point Bluff
   - Low-profile median (raised in select locations)
   - Stamped concrete and/or xeriscape median
2. Traffic signal at Mason Way (soon)
3. Traffic signal at Point Bluff (future)
4. Roundabout at Carlson Street
5. Close the cul-de-sac at Briarwood Lane
6. Prohibit left turns at business accesses
7. Bury & pipe the ditch west of Converse
8. Extend Greenway south to Mason Way (connect existing Greenway going west)
9. Construct crosswalks at Carlson, Point Bluff, and Mason Way
10. E-W extension to Converse from:
    - Pattison or Apache to Carlson intersection*
    - Plainview to Converse*

*location not determined yet

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Modified 5-Lane Divided Roadway with Variable Median

Dell Range Blvd to US Post Office

- 6 lanes at Dell Range Intersection (maintain existing SB)
- Prohibited left turns from Aspen Ridge and Blackmarket
- Sliver ROW impacts at both corners
- Tree lawns on both Sides of Converse
- Complete sidewalk connections both sides of Converse
- Greenway connection and crosswalk at Mason Way

- 5 lanes at Mason Way
- 5 lanes at Post Office
- Widened Post Office Access
- Maintain existing bus stop
- Extend NB outside lane to Point Bluff

LEGEND
PAVEMENT
CONCRETE MEDIAN
STAMPED CONCRETE
CONCRETE SIDEWALK
CONCRETE CURB
GREENWAY
CENTERLINE PAVEMENT MARKING
LANE LINE PAVEMENT MARKING
CONTINUOUS LEFT-TURN LANE
SIGN ON PERMANENT SUPPORT

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Modified 3-Lane Continuous Left Turn Lane

US Post Office to Ogden Way

- NB outside lane extends to Point Bluff (becomes RT only)
- 3-lane section Point Bluff to Ogden Rd
- Crosswalk at Point Bluff
- Close off Briarwood Lane Cul-de-sac (fire access only)
- Variable median (raised at tapers to direct traffic/protect pedestrians)
- Extend existing Greenway to the south

- No anticipated ROW impacts
- Tree lawns on both sides

LEGEND
PAVEMENT
CONCRETE MEDIAN
STAMPED CONCRETE
CONCRETE SIDEWALK
CONCRETE CURB
GREENWAY
CENTERLINE PAVEMENT MARKING
LANE LINE PAVEMENT MARKING
CONTINUOUS LEFT-TURN LANE
SIGN ON PERMANENT SUPPORT

Modified 3-Lane Continuous Left Turn Lane

LEGEND
PAVEMENT
CONCRETE MEDIAN
STAMPED CONCRETE
CONCRETE SIDEWALK
CONCRETE CURB
GREENWAY
CENTERLINE PAVEMENT MARKING
LANE LINE PAVEMENT MARKING
CONTINUOUS LEFT-TURN LANE
SIGN ON PERMANENT SUPPORT

Ogden Way to Carlson Street

- 3-lane section tapers to 2-lane for roundabout
- Variable median (raised at tapers to direct traffic)
- Connect existing Greenway to intersection sidewalks
- Tree lawns on both sides of Converse
- Minor ROW impacts at NW and SW corners
- Transition to existing 3-lane section

Questions and discussion

- Traffic Related
- Types of Function of Intersections
- Technical findings
- Levels of Service

What's next?

Walk the room & review the exhibits

- Use stickies to make notes on all boards
- Talk to us!!
- Fill out comment cards if you can't fit it on a sticky note

Visit the MPO website

- plancheyenne.org > Plans & Programs
- Leave comments and feedback

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Thank You!

We appreciate your time!

We appreciate this opportunity!

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Converse Avenue Improvement Plan

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Public Meeting Comment Log

Converse Avenue Draft & Final Report Comment Log		
Committee / Agency / Source	**Date / Comment**	**Response**
MPO Technical Advisory Committee	**Tuesday, May 18, 2021**	
MPO Citizen Advisory Committee	**Tuesday, June 8, 2021**	
	Aspen Ridge access: is making Aspen Ridge a right-in right-out access really a good idea? NB traffic will have to jump hoops to get out to NB Converse.	Project team to evaluate the secondary impacts of Aspen Ridge traffic having to make a R-R-R-L maneuver to go NB. Add discussion to the Planning Report for June 18 deliverable – consider ways to encourage/direct traffic to make the R-R-R to Grandview/Mason Way.
	Would like to see additional details of how the Greenway will continue through the Carlson Street roundabout.	Noted. The 35% design plans will show standard trail connections through the roundabout and will accommodate bicycle use. The discussion and level of detail will need to be continued during the final design phase.
WYDOT Review	**Monday, October 11, 2021**	
Juli Monahan Planning & Policy Analyst WYDOT	On page 3, I believe the plan should also acknowledge FHWA (and FTA if they are involved due to the transit stops mentioned) due to the funding stream that is financing the consultant.	WYDOT, FHWA, CTP, and Larimie County added to Ackowledgements page
	Is there no summary of the meeting with Mr. Cole? It is referenced in the calendar on page 11 but no summary is provided on page 13 or the meeting minutes in Appendix B.	Note of Frank Cole meeting added to page 12/13 and summary added to Appendix B.
	Later on in the document, the different business access roads are mentioned separately as the Aspen Ridge one-way access and the Black Market entrance but Tables 1 & 2 on page 16 don't specify which "business access road" those statistics are referring to.	Noted. Unfortunately this information is not available (police reports identify "Intersection", "Business Entrance", or "Driveway Related", in the vicinity of Dry Creek.
MPO Comment	**Monday, October 11, 2021**	
Tom Mason Director of MPO City of Cheyenne	Should we add language to encourage installation of conduit or alternative into the Dell Range intersection and the corridor for future fiber or other communications?	Added paragraph recommending conduit installation to page 40.
MPO Technical Advisory Committee	**Wednesday, October 13, 2021**	
Charles Bloom Director of Planning & Development City of Cheyenne	Expressed concerns at the onset of the planning process regarding the narrow Right-of-Way (ROW) of Point Bluff and the impact of heavy traffic on a street that is designed as a local street but sees the traffic volumes of a collector. Requested a shift of traffic to Ogden Rd, due to the design of Ogden being better suited to accommodate existing and future traffic volumes. Suggested to accomplish this via closing or reconfiguring of Point Bluff intersection. Expressed disappointment that this was not recommended in the plan and still has concerns about traffic being diverted to Point Bluff and the impact it will have on the neighborhood.	Extension of the NB right turn lane to Ogden Road should be evaluated during the final design phase.
	Requests the sidewalk on the east side of Converse between Sheridan and the proposed Mason Way crosswalk be widened to 10' match the existing greenway to the north and to provide better access and connectivity for bicyclists and pedestrians; it also has the potential to divert non-motorized users away from the Converse/Dell Range intersection in order to cross Converse.	
Jeff Daughtery Laramie County School District #1	Had 3 major concerns going into this planning process, two of which have been addressed (roundabout designed for school busses & improved pedestrian infrastructure for school children to use).	
	Previously requested a bus stop near the new Frontier Ridge Aprtments. Requests information regarding the placement of potential bus pull-outs on Converse near high density areas around the proposed Carlson roundabout.	The project team looked at a potential bust stop on Converse just south of Carlson Street roundabout, but in conversations with CTP, it was determined they may not be served due to a restructuring of the CTP routes. This will need to be a continuing conversation during final design between the City, developers, and CTP.
Tom Cobb City Engineer City of Cheyenne	Noted that as a planning level report, this document was intended to be relatively flexible and 'living'. Requested to include a statement or paragraph at the beginning of the final report that highlights the intended flexibility of this document, especially in the event of new information or changed circumstances.	The phrase "Additional data, calibration, and validation may be required prior to use for design purposes" is included in the disclaimer notice, however a similar sentence will be added to the end of the Introduction (Section 1) of the Report indicating that final design may change parts or details of the recommendations.

MPO Citizen Advisory Committee	**Wednesday, October 13, 2021**	
Meeker	Can you clarify what 35% design means and why the project stopped there?	MPO Planning dollars allow for up to 35% completion of a recommended design to be included in the formal Plan, then City or County Engineering proceeds to final design. 35% design is typically enough to establish the footprint of the construction and a construction cost estimate. The MPO noted that language will be added to the report indicating the plan is intended to be fluid and needs to be flexible in order to move through the design process.
Meeker	Noted the preliminary recommendations and the $11M construction cost estimate, and appreciation for the well put together report.	Clarification that the June cost estimate of $10M did not include full replacement of the Dry Creek structure, which the current estimate includes. The cost estimate also includes annual inflation assuming 2023 construction.
Wiggam	Does the proposed pipe along Converse reduce the capacity relative to the existing open channel ditch.	At 35% design, we did not do a detailed analysis of the entire drainage basin, so it's hard to say definitively what the exact impact will be. However, the project did include a broad review of the Section 20 drainage basin and the pipe was sized for flows expected from a 100-Year frequency storm event. Note that as development occurs on Section 20, each development must detain stormwater for a 10-Year or a 100-Year frequency storm event (depending on size of development), so actual flows to the proposed pipe are likely to be small than today's flows.
Wiggam	At what point would we find out more about the east-west connection.	There is still a lot to work out with developers and property owners, and we will continue to watch this area as the area develops. Any of the potential connections will reduce intersection volumes at Ogden and Point Bluff. This will largely be a decision based on negotiations and agreements between developments and not primarily a traffic issue as all options work. The MPO's preference is for the Plainview option.
Muirhead	How much of this plan will proceed to final?	A lot of work has gone into this plan; we will go to Planning Commission on Monday to certify the plan. We expect the general concept of this plan will move forward through final design, but there is always an expectation of some modifications to the design. There is also a public process where citizens can follow through and ask questions during final design.
Waiting on MPO notes/minutes	How concrete is this plan and can anything be changed in the future?	The Plan is designed to be a guide for future projects, not to dictate what must or cannot be built. During the final design phase, it is common for details and some elements to move or change based on new information or changed circumstanses.
		Note: This presentation included preliminary exhibits that were presented in May and did not show ROW impacts near teh Dell Range intersection. The actual design plan sheets are in the report in appendix A page 49-60. The right of way impacts at the Dell Range Intersection were not modeled when we put the exhibits together.
City Planning Commission	**Monday, October 18, 2021**	
Phillip Regeski Planning Commission	Noted that the Dell Range and Converse intersection is known as the highest volume intersection in the state. Asked what the larger Dell Range intersection would look like (roundabout?).	MPO wasn't sure about exact status but verified it is in the top 3 busiest intersections in the state. Noted that the future intersect would not be a roundabout due to high traffic volumes.
	The Roundabout dimensions shown in the report design do not match the dimensions used for calculations in the technical appendix.	Ayres reviewed the design calculations in the appendix. The calculation worksheets do no use dimensions or reference the size of the roundabout in any way; the calculations are generic in nature and only analyze the traffic operations of the roundabout concept as a comparison to a signalized or stop controlled intersection.
	Will this plan dictate how developers build the road? What's the likelihood of the road being reconstructed all at once or piecemeal by developers?	Because the project is largely built out, there will be very little if any developer involvement in the funding of construction projects. Because of this, the project will largely be build on the City's schedule, not the developers. City Engineer Tom Cobb anticipates reconstruction the north and south legs of Dell Range up to and including Mason Way in 2023. Construction of the remainder of Converse to Carlson is not yet funded or scheduled.
Philip Griggs	Asked when traffic counts were taken because Covid kept may drivers home and recent volumes are not representative of a typical year.	The MPO collected traffic volumes in December of 2020 and used historical counts to adjust the 2020 volumes to account for the Covid impact to traffic.
Ray Valdez	Comment that full closure of Briarwood Lane would present a safety risk as previously noted at PIM#2 and in the Public Feedback on the project webpage. Requested a right-in/right-out.	Noted. Text has been added to include a right-in.right-out option.

Rande Pouppert	Rande Pouppert expressed frustration with the design theat appeared to remove the access to his Blackmarket business in the north east corner of Dell Range intersection. He indicated that loss of the access and the 5 parking spots west of the building (as indicated by the proposed ROW line)would be detrimental to his business. He submitted a formal response noting his opposition to the Plan.	The missing access was a design oversight and will be added to the design sheets in the report. It was noted after the comment that the project would likely not impact the parking spaces, but would likely reduce the width of the west lot and could potentially require cars to drive around the building to park in the west parking spaces.
MPO Project Webpage 'Contact Us' Form	**Sunday, October 17, 2021**	
	I would have to respectfully disagree with your conclusion that a one point entry and exit to a neighborhood is not a safety issue. I am referring to your assessment of closing the Briarwood intersection. Without a second entry-or-exit to our neighborhood, safety issues can arise with our school buses, snow equipment, emergency vehicles, snow exit, etc. I believe you may also be misunderstanding our request. We requested a- RIGHT TURN ONLY-- exit out of Briarwood. In your summary you explain that during peak times the traffic would extend from the Point Bluff traffic lights beyond the Briarwood intersection and cars making left hand turns into and out of Briarwood would block and adversely affect traffic flow on Converse. A right turn only lane would do neither. It would not affect traffic flow on Converse in any way. Left hand turns would not be possible from Converse on to Briarwood and from Briarwood onto Converse. The right hand turn exit would naturally have a stop sign and right hand traffic entering Converse from Briarwood would wait for a proper opening before proceeding and in no way would hamper traffic flow. Since we are in the planning phase it would be prudent to consider and approve the Right Turn Only exit at the Briarwood intersection.	Modified the paragraph on Briarwood Lane treatment to include right-in/right-out per public comments.

Appendix C

Traffic Analysis Technical Documents

Converse Avenue Corridor Traffic Study
Technical Supplement

Image courtesy of Google Maps

CONVERSE AVENUE Improvement Plan

Prepared by: Ayres Associates

AYRES

April 7, 2021

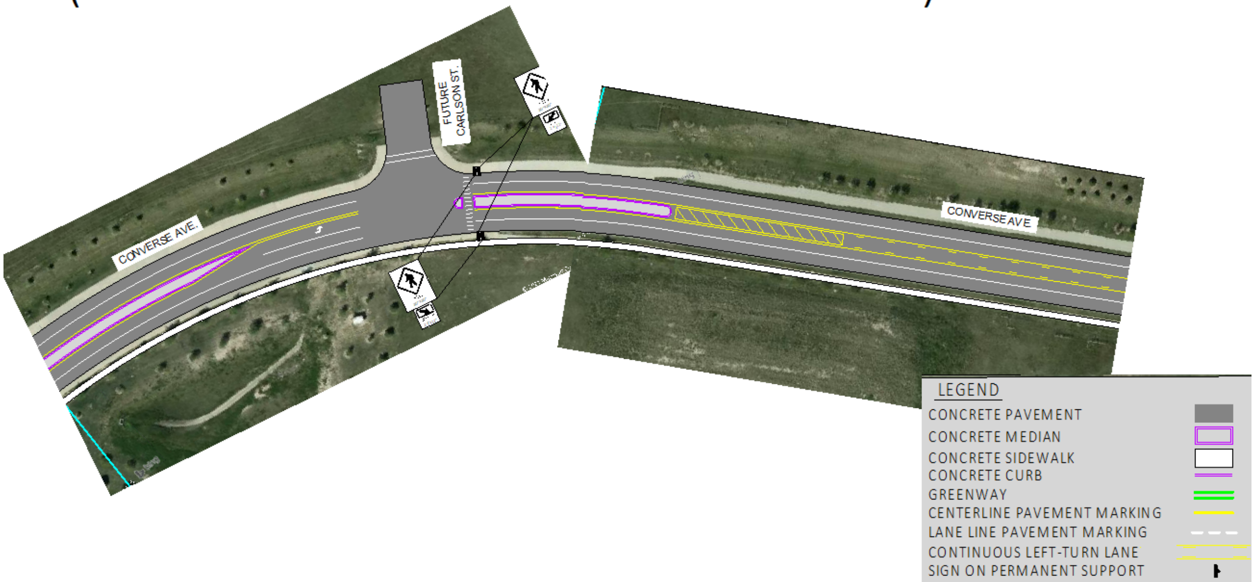
Table of Contents

1. Enhanced Three-Lane Roadway with Continuous Left Turn Lane Concept Drawings

Enhanced 3-Lane Continuous Turn Lane Concept (Dell Range Boulevard to USPS Truck Driveway)

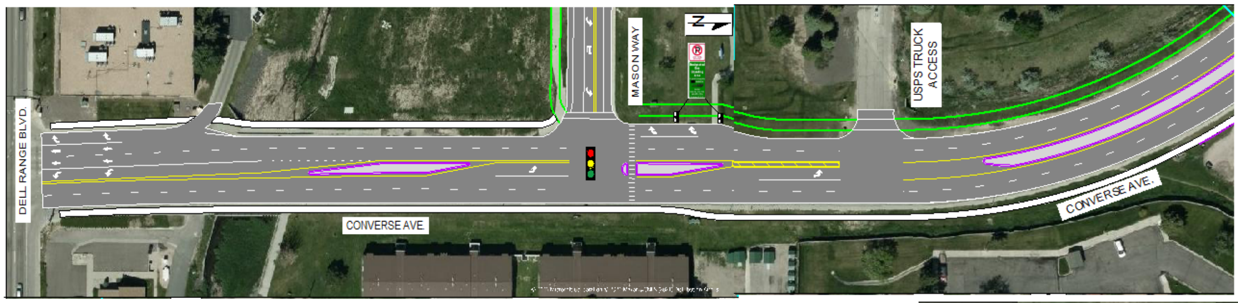
Enhanced 3-Lane Continuous Turn Lane Concept (Point Bluff to Ogden Road)

Enhanced 3-Lane Continuous Turn Lane Concept (At Future Carlson Street Intersection)



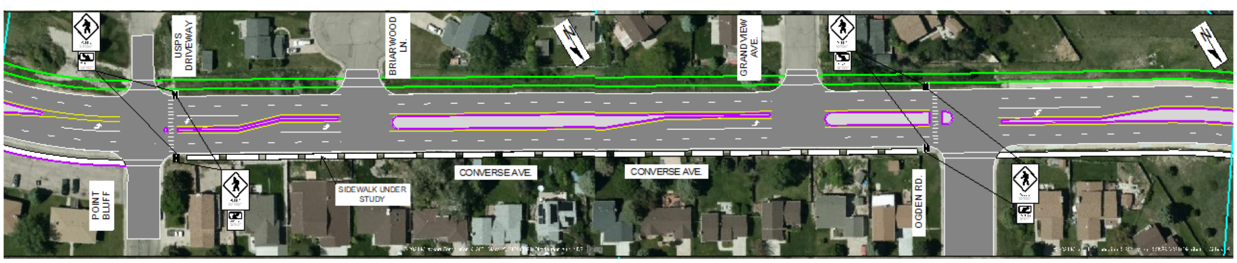
2. Four-Lane Divided Roadway with Raised Median Concept Drawings

4-Lane Divided Roadway with Median
(Dell Range Boulevard to USPS Truck Driveway)



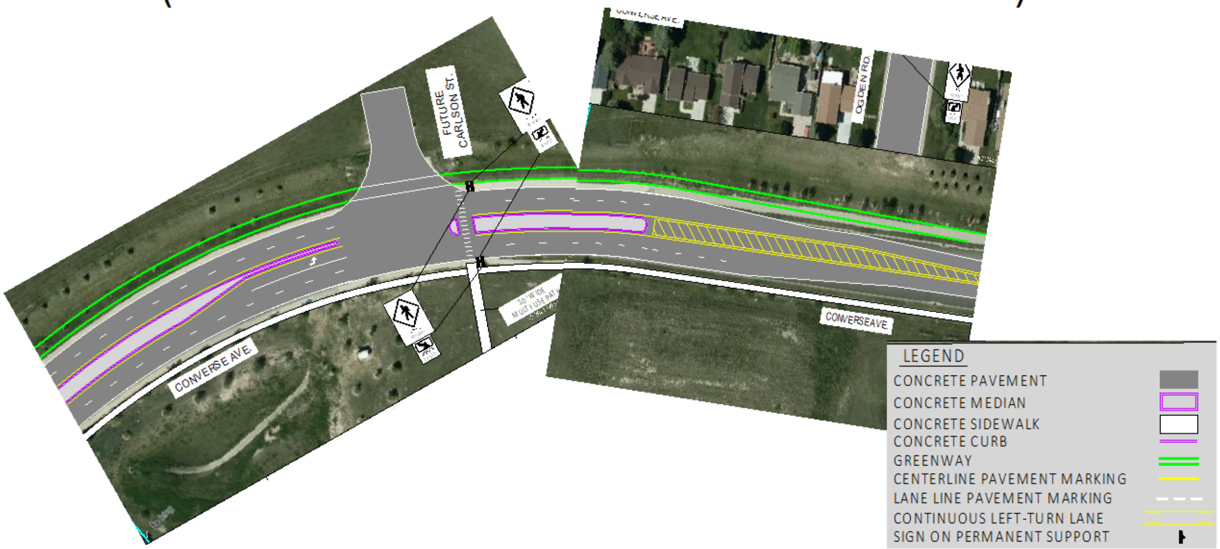
LEGEND
CONCRETE PAVEMENT
CONCRETE MEDIAN
CONCRETE SIDEWALK
CONCRETE CURB
GREENWAY
CENTERLINE PAVEMENT MARKING
LANE LINE PAVEMENT MARKING
CONTINUOUS LEFT-TURN LANE
SIGN ON PERMANENT SUPPORT

4-Lane Divided Roadway with Median
(Point Bluff to Ogden Road)



LEGEND
CONCRETE PAVEMENT
CONCRETE MEDIAN
CONCRETE SIDEWALK
CONCRETE CURB
GREENWAY
CENTERLINE PAVEMENT MARKING
LANE LINE PAVEMENT MARKING
CONTINUOUS LEFT-TURN LANE
SIGN ON PERMANENT SUPPORT

4-Lane Divided Roadway with Median
(At Future Carlson Street Intersection)



3a.i) Existing 2020 Mid-Day Peak Hour Intersection Operation Computer Capacity Worksheets

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	245	235	190	170	130
Future Vol, veh/h	100	245	235	190	170	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	100	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	112	253	242	196	175	134

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	855	175	309	0	-	0
Stage 1	175	-	-	-	-	-
Stage 2	680	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	329	868	1252	-	-	-
Stage 1	855	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	266	868	1252	-	-	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	503	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.1	4.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1252	-	266	868	-	-
HCM Lane V/C Ratio	0.194	-	0.422	0.291	-	-
HCM Control Delay (s)	8.6	-	28.1	10.8	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.7	-	2	1.2	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	255	5	5	225	90	5	0	5	105	0	10
Future Vol, veh/h	20	255	5	5	225	90	5	0	5	105	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	263	5	5	232	93	5	0	5	108	0	10

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	325	0	0	268	0	0	602	643	266	599	599	279
Stage 1	-	-	-	-	-	-	308	308	-	289	289	-
Stage 2	-	-	-	-	-	-	294	335	-	310	310	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1235	-	-	1296	-	-	412	392	773	413	415	760
Stage 1	-	-	-	-	-	-	702	660	-	719	673	-
Stage 2	-	-	-	-	-	-	714	643	-	700	659	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1235	-	-	1296	-	-	400	384	773	404	406	760
Mov Cap-2 Maneuver	-	-	-	-	-	-	400	384	-	404	406	-
Stage 1	-	-	-	-	-	-	690	649	-	707	670	-
Stage 2	-	-	-	-	-	-	702	640	-	684	648	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.1	12	16.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	527	1235	-	-	1296	-	-	421
HCM Lane V/C Ratio	0.02	0.017	-	-	0.004	-	-	0.282
HCM Control Delay (s)	12	8	-	-	7.8	-	-	16.9
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	1.1

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	230	200	15	15	20
Future Vol, veh/h	15	230	200	15	15	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	237	206	15	15	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	221	0	-	0	481	214
Stage 1	-	-	-	-	214	-
Stage 2	-	-	-	-	267	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1348	-	-	-	544	826
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1348	-	-	-	538	826
Mov Cap-2 Maneuver	-	-	-	-	608	-
Stage 1	-	-	-	-	813	-
Stage 2	-	-	-	-	778	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1348	-	-	-	608	826
HCM Lane V/C Ratio	0.011	-	-	-	0.025	0.025
HCM Control Delay (s)	7.7	-	-	-	11.1	9.5
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0.1

Intersection						
Int Delay, s/veh	0.3					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	275	0	5	235	5	5
Future Vol, veh/h	275	0	5	235	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	284	0	5	242	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	284	0	536	284
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	252	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1278	-	505	755
Stage 1	-	-	-	-	764	-
Stage 2	-	-	-	-	790	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1278	-	503	755
Mov Cap-2 Maneuver	-	-	-	-	583	-
Stage 1	-	-	-	-	764	-
Stage 2	-	-	-	-	787	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	658	-	-	1278	-
HCM Lane V/C Ratio	0.016	-	-	0.004	-
HCM Control Delay (s)	10.6	-	-	7.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	245	0	5	210	5	5
Future Vol, veh/h	245	0	5	210	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	253	0	5	216	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	253	0	479	253
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	226	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1312	-	545	786
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	812	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1312	-	543	786
Mov Cap-2 Maneuver	-	-	-	-	612	-
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	809	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	10.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	688	-	-	1312	-
HCM Lane V/C Ratio	0.015	-	-	0.004	-
HCM Control Delay (s)	10.3	-	-	7.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

3a.ii) Existing 2020 PM Peak Hour Intersection Operation Computer Capacity Worksheets

Intersection	
Int Delay, s/veh	11

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	115	295	255	275	210	150
Future Vol, veh/h	115	295	255	275	210	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	100	-	-	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	91	95	95	95	95
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	146	324	268	289	221	158

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1046	221	379	0	-	0
Stage 1	221	-	-	-	-	-
Stage 2	825	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	253	819	1179	-	-	-
Stage 1	816	-	-	-	-	-
Stage 2	430	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	196	819	1179	-	-	-
Mov Cap-2 Maneuver	196	-	-	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	430	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.9	4.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1179	-	196	819	-	-
HCM Lane V/C Ratio	0.228	-	0.743	0.396	-	-
HCM Control Delay (s)	9	-	62.9	12.2	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.9	-	4.9	1.9	-	-

Intersection												
Int Delay, s/veh	3.2											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations												
Traffic Vol, veh/h	15	220	5	15	235	105	5	0	5	90	0	20
Future Vol, veh/h	15	220	5	15	235	105	5	0	5	90	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	247	6	17	264	118	6	0	6	101	0	22
Major/Minor	**Major1**			**Major2**			**Minor1**			**Minor2**		
Conflicting Flow All	382	0	0	253	0	0	652	700	250	644	644	323
Stage 1	-	-	-	-	-	-	284	284	-	357	357	-
Stage 2	-	-	-	-	-	-	368	416	-	287	287	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1176	-	-	1312	-	-	381	363	789	386	391	718
Stage 1	-	-	-	-	-	-	723	676	-	661	628	-
Stage 2	-	-	-	-	-	-	652	592	-	720	674	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1176	-	-	1312	-	-	362	353	789	375	380	718
Mov Cap-2 Maneuver	-	-	-	-	-	-	362	353	-	375	380	-
Stage 1	-	-	-	-	-	-	713	667	-	652	620	-
Stage 2	-	-	-	-	-	-	623	584	-	705	665	-
Approach	**EB**			**WB**			**NB**			**SB**		
HCM Control Delay, s	0.5			0.3			12.4			17.5		
HCM LOS							B			C		
Minor Lane/Major Mvmt	**NBLn1**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**SBLn1**				
Capacity (veh/h)	496	1176	-	-	1312	-	-	411				
HCM Lane V/C Ratio	0.023	0.014	-	-	0.013	-	-	0.301				
HCM Control Delay (s)	12.4	8.1	-	-	7.8	-	-	17.5				
HCM Lane LOS	B	A	-	-	A	-	-	C				
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	1.2				

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	235	275	20	35	45
Future Vol, veh/h	40	235	275	20	35	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	5	2	2	5	5
Mvmt Flow	44	261	306	22	39	50

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	328	0	-	0	666	317
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	349	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1215	-	-	-	420	717
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1215	-	-	-	405	717
Mov Cap-2 Maneuver	-	-	-	-	507	-
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1215	-	-	-	507	717
HCM Lane V/C Ratio	0.037	-	-	-	0.077	0.07
HCM Control Delay (s)	8.1	-	-	-	12.7	10.4
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.2

Intersection						
Int Delay, s/veh	0.4					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	235	0	10	250	5	5
Future Vol, veh/h	235	0	10	250	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	261	0	11	278	6	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	261	0	561	261
Stage 1	-	-	-	-	261	-
Stage 2	-	-	-	-	300	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1303	-	489	778
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	752	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1303	-	485	778
Mov Cap-2 Maneuver	-	-	-	-	570	-
Stage 1	-	-	-	-	783	-
Stage 2	-	-	-	-	746	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	658	-	-	1303	-
HCM Lane V/C Ratio	0.017	-	-	0.009	-
HCM Control Delay (s)	10.6	-	-	7.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	270	0	5	290	5	5
Future Vol, veh/h	270	0	5	290	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	300	0	6	322	6	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	300	0	634	300
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	334	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1261	-	443	740
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	725	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1261	-	441	740
Mov Cap-2 Maneuver	-	-	-	-	537	-
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	721	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	622	-	-	1261	-
HCM Lane V/C Ratio	0.018	-	-	0.004	-
HCM Control Delay (s)	10.9	-	-	7.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

3b.i) Year 2045 Mid-Day Peak Hour Intersection Operation Computer Capacity Worksheets

Intersection	
Int Delay, s/veh	110.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	130	300	300	650	750	170
Future Vol, veh/h	130	300	300	650	750	170
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	300	0	150	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	146	192	309	670	773	109

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2061	773	882	0	-	0
Stage 1	773	-	-	-	-	-
Stage 2	1288	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 60	399	767	-	-	-
Stage 1	455	-	-	-	-	-
Stage 2	259	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 36	399	767	-	-	-
Mov Cap-2 Maneuver	~ 36	-	-	-	-	-
Stage 1	272	-	-	-	-	-
Stage 2	259	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 705.5	4.1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	767	-	36	399	-	-
HCM Lane V/C Ratio	0.403	-	4.057	0.481	-	-
HCM Control Delay (s)	12.8	-	$ 1602.7	22.1	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	2	-	17	2.5	-	-

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

Intersection	
Int Delay, s/veh	60.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	720	5	10	600	170	5	0	10	190	0	20
Future Vol, veh/h	40	720	5	10	600	170	5	0	10	190	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	100	-	100	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	742	5	10	619	175	5	0	10	196	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	794	0	0	747	0	0	1564	1641	745	1471	1468	619
Stage 1	-	-	-	-	-	-	827	827	-	639	639	-
Stage 2	-	-	-	-	-	-	737	814	-	832	829	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	827	-	-	861	-	-	91	100	414	~ 105	128	489
Stage 1	-	-	-	-	-	-	366	386	-	464	470	-
Stage 2	-	-	-	-	-	-	410	391	-	363	385	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	827	-	-	861	-	-	83	94	414	~ 98	120	489
Mov Cap-2 Maneuver	-	-	-	-	-	-	83	94	-	~ 98	120	-
Stage 1	-	-	-	-	-	-	348	367	-	441	464	-
Stage 2	-	-	-	-	-	-	388	386	-	336	366	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	27.1	$ 503.8
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	178	827	-	-	861	-	-	98	489
HCM Lane V/C Ratio	0.087	0.05	-	-	0.012	-	-	1.999	0.042
HCM Control Delay (s)	27.1	9.6	-	-	9.2	-	-	$ 555.5	12.7
HCM Lane LOS	D	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0	-	-	16.6	0.1

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

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	730	600	30	25	40
Future Vol, veh/h	25	730	600	30	25	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	753	619	31	26	41

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	650	0	-	0	1440	635
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	805	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	936	-	-	-	146	478
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	440	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	936	-	-	-	142	478
Mov Cap-2 Maneuver	-	-	-	-	280	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	440	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	936	-	-	-	280	478
HCM Lane V/C Ratio	0.028	-	-	-	0.092	0.086
HCM Control Delay (s)	9	-	-	-	19.2	13.2
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3	0.3

Intersection						
Int Delay, s/veh	6.8					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	150	200	140	500	555	110
Future Vol, veh/h	150	200	140	500	555	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	150	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	217	152	543	603	120

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1450	603	723	0	-	0
Stage 1	603	-	-	-	-	-
Stage 2	847	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 144	499	879	-	-	-
Stage 1	546	-	-	-	-	-
Stage 2	420	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 119	499	879	-	-	-
Mov Cap-2 Maneuver	253	-	-	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	420	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28	2.2	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	879	-	253	499	-	-
HCM Lane V/C Ratio	0.173	-	0.644	0.436	-	-
HCM Control Delay (s)	10	-	41.8	17.7	-	-
HCM Lane LOS	A	-	E	C	-	-
HCM 95th %tile Q(veh)	0.6	-	4	2.2	-	-

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

Intersection						
Int Delay, s/veh	0.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	760	0	5	620	5	5
Future Vol, veh/h	760	0	5	620	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	784	0	5	639	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	784	0	1433	784
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	649	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	834	-	148	393
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	520	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	834	-	147	393
Mov Cap-2 Maneuver	-	-	-	-	286	-
Stage 1	-	-	-	-	450	-
Stage 2	-	-	-	-	517	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		16.2	
HCM LOS					C	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	331	-	-	834	-
HCM Lane V/C Ratio	0.031	-	-	0.006	-
HCM Control Delay (s)	16.2	-	-	9.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	755	0	5	625	5	5
Future Vol, veh/h	755	0	5	625	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	778	0	5	644	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	778	0	1432	778
Stage 1	-	-	-	-	778	-
Stage 2	-	-	-	-	654	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	839	-	148	396
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	517	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	839	-	147	396
Mov Cap-2 Maneuver	-	-	-	-	286	-
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	514	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	16.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	332	-	-	839	-
HCM Lane V/C Ratio	0.031	-	-	0.006	-
HCM Control Delay (s)	16.2	-	-	9.3	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

3b.ii) Year 2045 PM Peak Hour Intersection Operation Computer Capacity Worksheets

Intersection	
Int Delay, s/veh	137.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	400	300	990	720	200
Future Vol, veh/h	100	400	300	990	720	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	300	0	150	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	91	95	95	95	95
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	127	273	316	1042	758	131

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2432	758	889	0	-	0
Stage 1	758	-	-	-	-	-
Stage 2	1674	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 35	407	762	-	-	-
Stage 1	463	-	-	-	-	-
Stage 2	167	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 20	407	762	-	-	-
Mov Cap-2 Maneuver	~ 20	-	-	-	-	-
Stage 1	271	-	-	-	-	-
Stage 2	167	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 902.4	3	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	762	-	20	407	-	-
HCM Lane V/C Ratio	0.414	-	6.329	0.67	-	-
HCM Control Delay (s)	13		$ 2780.6	30	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	2	-	16.2	4.7	-	-

Notes

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

Intersection	
Int Delay, s/veh	150.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	735	5	15	845	230	5	0	5	180	5	40
Future Vol, veh/h	50	735	5	15	845	230	5	0	5	180	5	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	100	-	100	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	56	826	6	17	949	258	6	0	6	202	6	45

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1207	0	0	832	0	0	2079	2182	829	1927	1927	949
Stage 1	-	-	-	-	-	-	941	941	-	983	983	-
Stage 2	-	-	-	-	-	-	1138	1241	-	944	944	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	578	-	-	801	-	-	39	46	370	~ 50	67	316
Stage 1	-	-	-	-	-	-	316	342	-	299	327	-
Stage 2	-	-	-	-	-	-	245	247	-	315	341	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	578	-	-	801	-	-	28	41	370	~ 45	59	316
Mov Cap-2 Maneuver	-	-	-	-	-	-	28	41	-	~ 45	59	-
Stage 1	-	-	-	-	-	-	285	309	-	270	320	-
Stage 2	-	-	-	-	-	-	202	242	-	280	308	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.1	92.4	$ 1408.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	52	578	-	-	801	-	-	45	213
HCM Lane V/C Ratio	0.216	0.097	-	-	0.021	-	-	4.494	0.237
HCM Control Delay (s)	92.4	11.9	-	-	9.6	-	-	$ 1754.4	27.1
HCM Lane LOS	F	B	-	-	A	-	-	F	D
HCM 95th %tile Q(veh)	0.7	0.3	-	-	0.1	-	-	23	0.9

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

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	750	840	40	40	50
Future Vol, veh/h	50	750	840	40	40	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	5	2	2	5	5
Mvmt Flow	56	833	933	44	44	56

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	977	0	-	0	1900	955
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	945	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	694	-	-	-	75	309
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	373	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	694	-	-	-	69	309
Mov Cap-2 Maneuver	-	-	-	-	194	-
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	373	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	23.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	694	-	-	-	194	309
HCM Lane V/C Ratio	0.08	-	-	-	0.229	0.18
HCM Control Delay (s)	10.6	-	-	-	29	19.2
HCM Lane LOS	B	-	-	-	D	C
HCM 95th %tile Q(veh)	0.3	-	-	-	0.9	0.6

Intersection						
Int Delay, s/veh	6.6					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	200	240	650	600	150
Future Vol, veh/h	100	200	240	650	600	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	150	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	109	217	261	707	652	163

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1881	652	815	0	-	0
Stage 1	652	-	-	-	-	-
Stage 2	1229	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 78	468	812	-	-	-
Stage 1	518	-	-	-	-	-
Stage 2	276	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 53	468	812	-	-	-
Mov Cap-2 Maneuver	165	-	-	-	-	-
Stage 1	352	-	-	-	-	-
Stage 2	276	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	33.2	3.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	812	-	165	468	-	-
HCM Lane V/C Ratio	0.321	-	0.659	0.465	-	-
HCM Control Delay (s)	11.5	-	61.2	19.2	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	1.4	-	3.8	2.4	-	-

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

Intersection						
Int Delay, s/veh	0.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	785	0	10	880	0	5
Future Vol, veh/h	785	0	10	880	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	872	0	11	978	0	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	872	0	1872	872
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	1000	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	773	-	79	350
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	356	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	773	-	78	350
Mov Cap-2 Maneuver	-	-	-	-	208	-
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	351	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	350	-	-	773	-
HCM Lane V/C Ratio	0.016	-	-	0.014	-
HCM Control Delay (s)	15.5	-	-	9.7	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	785	5	5	875	5	0
Future Vol, veh/h	785	5	5	875	5	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	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	872	6	6	972	6	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	878	0	1859	875
Stage 1	-	-	-	-	875	-
Stage 2	-	-	-	-	984	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	769	-	81	349
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	362	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	769	-	80	349
Mov Cap-2 Maneuver	-	-	-	-	211	-
Stage 1	-	-	-	-	408	-
Stage 2	-	-	-	-	359	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	22.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	211	-	-	769	-
HCM Lane V/C Ratio	0.026	-	-	0.007	-
HCM Control Delay (s)	22.5	-	-	9.7	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

3c.i) Year 2045 Mid-Day Peak Hour Intersection Operation with Traffic Signal Control at Mason Way, Point Bluff and a New Carlson Street Intersection Computer Capacity Worksheets

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	130	300	300	650	750	170
Future Volume (vph)	130	300	300	650	750	170
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	27.0	12.0	12.0	24.0	24.0	24.0
Total Split (s)	27.0	12.0	12.0	48.0	36.0	36.0
Total Split (%)	36.0%	16.0%	16.0%	64.0%	48.0%	48.0%
Maximum Green (s)	22.0	7.0	7.0	43.0	31.0	31.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0				7.0	7.0
Flash Dont Walk (s)	14.0				11.0	11.0
Pedestrian Calls (#/hr)	0				0	0

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 4: Converse Ave. & Mason Way

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	146	192	309	670	773	109
v/c Ratio	0.53	0.27	0.61	0.51	1.00	0.17
Control Delay	35.7	14.1	19.9	7.1	51.1	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	14.1	19.9	7.1	51.1	13.6
Queue Length 50th (ft)	64	53	72	113	~360	14
Queue Length 95th (ft)	109	96	#201	225	#583	m61
Internal Link Dist (ft)	528			242	321	
Turn Bay Length (ft)	300		150			100
Base Capacity (vph)	519	713	503	1324	775	658
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.27	0.61	0.51	1.00	0.17

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	130	300	300	650	750	170
Future Volume (veh/h)	130	300	300	650	750	170
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	192	309	670	773	109
Peak Hour Factor	0.89	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	255	374	423	1353	1055	894
Arrive On Green	0.14	0.14	0.09	0.72	0.56	0.56
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	146	192	309	670	773	109
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	5.7	7.9	5.0	11.6	23.0	2.4
Cycle Q Clear(g_c), s	5.7	7.9	5.0	11.6	23.0	2.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	255	374	423	1353	1055	894
V/C Ratio(X)	0.57	0.51	0.73	0.50	0.73	0.12
Avail Cap(c_a), veh/h	523	612	424	1353	1055	894
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	24.9	12.6	4.5	12.2	7.7
Incr Delay (d2), s/veh	2.0	1.1	6.3	1.3	4.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	7.2	3.2	3.5	9.5	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.0	26.0	18.9	5.8	16.7	7.9
LnGrp LOS	C	C	B	A	B	A
Approach Vol, veh/h	338			979	882	
Approach Delay, s/veh	28.6			9.9	15.6	
Approach LOS	C			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		59.3		15.7	12.0	47.3
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		43.0		22.0	7.0	31.0
Max Q Clear Time (g_c+I1), s		13.6		9.9	7.0	25.0
Green Ext Time (p_c), s		5.2		0.9	0.0	2.9

Intersection Summary			
HCM 6th Ctrl Delay			15.1
HCM 6th LOS			B

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	40	720	10	600	170	5	0	190	0
Future Volume (vph)	40	720	10	600	170	5	0	190	0
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	50.0	50.0	50.0	50.0	50.0	25.0	25.0	25.0	25.0
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%
Maximum Green (s)	45.0	45.0	45.0	45.0	45.0	20.0	20.0	20.0	20.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag									
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 5: USPS dwy/Point Bluff & Converse Ave.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	41	747	10	619	109	15	196	21
v/c Ratio	0.09	0.61	0.03	0.50	0.10	0.05	0.70	0.07
Control Delay	5.1	11.7	4.5	6.6	4.3	21.9	40.2	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.1	11.7	4.5	6.6	4.3	21.9	40.2	22.2
Queue Length 50th (ft)	0	314	1	85	13	6	84	8
Queue Length 95th (ft)	m16	446	m3	117	26	19	141	23
Internal Link Dist (ft)		180		386		121		254
Turn Bay Length (ft)	75		100		100		75	
Base Capacity (vph)	443	1234	349	1236	1050	424	371	422
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.61	0.03	0.50	0.10	0.04	0.53	0.05

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

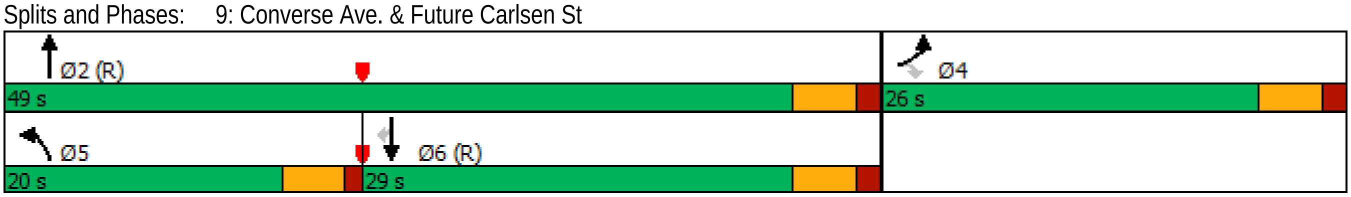
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	720	5	10	600	170	5	0	10	190	0	20
Future Volume (veh/h)	40	720	5	10	600	170	5	0	10	190	0	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	41	742	5	10	619	109	5	0	10	196	0	21
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	500	1304	9	456	1314	1114	122	27	171	329	0	260
Arrive On Green	0.70	0.70	0.70	0.70	0.70	0.70	0.16	0.00	0.16	0.16	0.00	0.16
Sat Flow, veh/h	727	1856	13	714	1870	1585	354	166	1041	1405	0	1585
Grp Volume(v), veh/h	41	0	747	10	619	109	15	0	0	196	0	21
Grp Sat Flow(s),veh/h/ln	727	0	1868	714	1870	1585	1561	0	0	1405	0	1585
Q Serve(g_s), s	2.0	0.0	14.9	0.5	11.0	1.6	0.0	0.0	0.0	9.4	0.0	0.8
Cycle Q Clear(g_c), s	13.0	0.0	14.9	15.4	11.0	1.6	0.6	0.0	0.0	10.0	0.0	0.8
Prop In Lane	1.00		0.01	1.00		1.00	0.33		0.67	1.00		1.00
Lane Grp Cap(c), veh/h	500	0	1313	456	1314	1114	320	0	0	329	0	260
V/C Ratio(X)	0.08	0.00	0.57	0.02	0.47	0.10	0.05	0.00	0.00	0.60	0.00	0.08
Avail Cap(c_a), veh/h	500	0	1313	456	1314	1114	475	0	0	473	0	423
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.8	0.0	5.5	9.3	5.0	3.6	26.4	0.0	0.0	30.3	0.0	26.6
Incr Delay (d2), s/veh	0.3	0.0	1.8	0.1	1.2	0.2	0.1	0.0	0.0	1.7	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	4.8	0.1	3.5	0.4	0.2	0.0	0.0	3.5	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.2	0.0	7.3	9.4	6.2	3.7	26.5	0.0	0.0	32.0	0.0	26.7
LnGrp LOS	A	A	A	A	A	A	C	A	A	C	A	C
Approach Vol, veh/h		788			738			15			217	
Approach Delay, s/veh		7.4			5.9			26.5			31.5	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		57.7		17.3		57.7		17.3				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		45.0		20.0		45.0		20.0				
Max Q Clear Time (g_c+I1), s		16.9		2.6		17.4		12.0				
Green Ext Time (p_c), s		6.5		0.0		5.1		0.4				
Intersection Summary												
HCM 6th Ctrl Delay			9.9									
HCM 6th LOS			A									

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	150	200	140	500	555	110
Future Volume (vph)	150	200	140	500	555	110
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		4				6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)	26.0	26.0	9.5	23.0	23.0	23.0
Total Split (s)	26.0	26.0	20.0	49.0	29.0	29.0
Total Split (%)	34.7%	34.7%	26.7%	65.3%	38.7%	38.7%
Maximum Green (s)	21.0	21.0	15.5	44.0	24.0	24.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.5	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0			7.0	7.0
Flash Dont Walk (s)	14.0	14.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0			0	0

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 23 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 9: Converse Ave. & Future Carlsen St



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	163	135	152	543	603	74
v/c Ratio	0.58	0.53	0.55	0.42	0.67	0.10
Control Delay	36.4	35.7	38.1	8.2	22.2	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	35.7	38.1	8.2	22.2	13.7
Queue Length 50th (ft)	71	58	76	62	202	18
Queue Length 95th (ft)	120	102	127	261	#451	50
Internal Link Dist (ft)	406			650	865	
Turn Bay Length (ft)	75		150			100
Base Capacity (vph)	479	428	368	1306	905	769
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.32	0.41	0.42	0.67	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	150	200	140	500	555	110
Future Volume (veh/h)	150	200	140	500	555	110
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	135	152	543	603	74
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	222	197	192	1388	1074	910
Arrive On Green	0.12	0.12	0.11	0.74	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	1870	1870	1585
Grp Volume(v), veh/h	163	135	152	543	603	74
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1870	1585
Q Serve(g_s), s	6.6	6.1	6.2	7.9	15.2	1.6
Cycle Q Clear(g_c), s	6.6	6.1	6.2	7.9	15.2	1.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	222	197	192	1388	1074	910
V/C Ratio(X)	0.74	0.68	0.79	0.39	0.56	0.08
Avail Cap(c_a), veh/h	499	444	368	1388	1074	910
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.92	0.92	1.00	1.00
Uniform Delay (d), s/veh	31.6	31.4	32.6	3.5	10.0	7.1
Incr Delay (d2), s/veh	4.7	4.2	6.6	0.8	2.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	5.5	3.0	2.2	5.6	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	36.4	35.6	39.2	4.3	12.1	7.3
LnGrp LOS	D	D	D	A	B	A
Approach Vol, veh/h	298			695	677	
Approach Delay, s/veh	36.0			11.9	11.6	
Approach LOS	D			B	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		60.7		14.3	12.6	48.1
Change Period (Y+Rc), s		5.0		5.0	4.5	5.0
Max Green Setting (Gmax), s		44.0		21.0	15.5	24.0
Max Q Clear Time (g_c+I1), s		9.9		8.6	8.2	17.2
Green Ext Time (p_c), s		4.0		0.7	0.2	2.2

Intersection Summary		
HCM 6th Ctrl Delay		16.1
HCM 6th LOS		B

3c.ii) Year 2045 PM Peak Hour Intersection Operation with Traffic Signal Control at Mason Way, Point Bluff and a New Carlson Street Intersection Computer Capacity Worksheets

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	100	400	300	990	720	200
Future Volume (vph)	100	400	300	990	720	200
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	26.0	12.0	12.0	24.0	24.0	24.0
Total Split (s)	26.0	13.0	13.0	49.0	36.0	36.0
Total Split (%)	34.7%	17.3%	17.3%	65.3%	48.0%	48.0%
Maximum Green (s)	21.0	8.0	8.0	44.0	31.0	31.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0				7.0	7.0
Flash Dont Walk (s)	14.0				11.0	11.0
Pedestrian Calls (#/hr)	0				0	0

Intersection Summary

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 4: Converse Ave. & Mason Way

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	127	273	316	1042	758	131
v/c Ratio	0.49	0.43	0.64	0.73	0.90	0.18
Control Delay	35.4	17.5	20.7	11.3	34.2	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	17.5	20.7	11.3	34.2	13.2
Queue Length 50th (ft)	55	82	78	242	377	46
Queue Length 95th (ft)	85	137	#203	#550	#596	m68
Internal Link Dist (ft)	528			242	321	
Turn Bay Length (ft)	300		150			100
Base Capacity (vph)	495	635	497	1431	842	715
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.43	0.64	0.73	0.90	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	100	400	300	990	720	200
Future Volume (veh/h)	100	400	300	990	720	200
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1826	1826
Adj Flow Rate, veh/h	127	273	316	1042	758	131
Peak Hour Factor	0.79	0.91	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	5	5
Cap, veh/h	331	460	383	1273	931	789
Arrive On Green	0.19	0.19	0.10	0.68	0.51	0.51
Sat Flow, veh/h	1781	1585	1781	1870	1826	1547
Grp Volume(v), veh/h	127	273	316	1042	758	131
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1826	1547
Q Serve(g_s), s	4.7	11.1	5.8	30.1	26.1	3.4
Cycle Q Clear(g_c), s	4.7	11.1	5.8	30.1	26.1	3.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	331	460	383	1273	931	789
V/C Ratio(X)	0.38	0.59	0.82	0.82	0.81	0.17
Avail Cap(c_a), veh/h	499	609	387	1273	931	789
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.8	22.8	14.7	8.6	15.4	9.8
Incr Delay (d2), s/veh	0.7	1.2	13.5	5.9	7.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	9.9	4.1	11.0	11.5	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.5	24.1	28.2	14.6	23.2	10.3
LnGrp LOS	C	C	C	B	C	B
Approach Vol, veh/h	400			1358	889	
Approach Delay, s/veh	25.1			17.7	21.3	
Approach LOS	C			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		56.1		18.9	12.8	43.2
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		44.0		21.0	8.0	31.0
Max Q Clear Time (g_c+I1), s		32.1		13.1	7.8	28.1
Green Ext Time (p_c), s		6.5		0.9	0.0	1.6

Intersection Summary			
HCM 6th Ctrl Delay			20.0
HCM 6th LOS			C

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	50	735	15	845	230	5	0	180	5
Future Volume (vph)	50	735	15	845	230	5	0	180	5
Turn Type	Perm	NA	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		2		6			4		8
Permitted Phases	2		6		6	4		8	
Detector Phase	2	2	6	6	6	4	4	8	8
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	50.0	50.0	50.0	50.0	50.0	25.0	25.0	25.0	25.0
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%	33.3%	33.3%	33.3%	33.3%
Maximum Green (s)	45.0	45.0	45.0	45.0	45.0	20.0	20.0	20.0	20.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag									
Lead-Lag Optimize?									
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 23 (31%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Splits and Phases: 5: USPS dwy/Point Bluff & Converse Ave.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBL	SBT
Lane Group Flow (vph)	56	832	17	949	160	12	202	51
v/c Ratio	0.27	0.68	0.06	0.77	0.15	0.04	0.70	0.15
Control Delay	9.7	9.0	5.8	17.0	5.6	21.5	40.4	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	9.0	5.8	17.0	5.6	21.5	40.4	23.6
Queue Length 50th (ft)	5	96	3	375	30	4	87	19
Queue Length 95th (ft)	m22	235	m5	#618	m43	16	144	43
Internal Link Dist (ft)		180		386		121		254
Turn Bay Length (ft)	75		100		100		75	
Base Capacity (vph)	204	1229	285	1230	1045	417	372	431
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.68	0.06	0.77	0.15	0.03	0.54	0.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

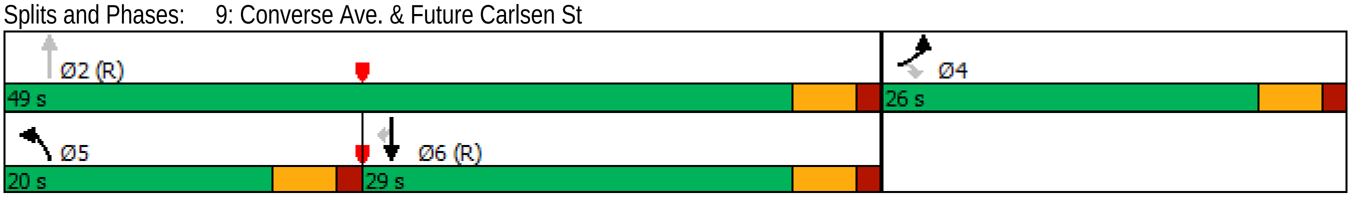
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	735	5	15	845	230	5	0	5	180	5	40
Future Volume (veh/h)	50	735	5	15	845	230	5	0	5	180	5	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	56	826	6	17	949	160	6	0	6	202	6	45
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	297	1302	9	401	1313	1113	172	23	123	338	31	234
Arrive On Green	0.70	0.70	0.70	0.70	0.70	0.70	0.16	0.00	0.16	0.16	0.16	0.16
Sat Flow, veh/h	508	1854	13	660	1870	1585	609	137	746	1410	190	1424
Grp Volume(v), veh/h	56	0	832	17	949	160	12	0	0	202	0	51
Grp Sat Flow(s),veh/h/ln	508	0	1868	660	1870	1585	1493	0	0	1410	0	1614
Q Serve(g_s), s	5.6	0.0	17.9	1.1	23.0	2.5	0.0	0.0	0.0	7.8	0.0	2.0
Cycle Q Clear(g_c), s	28.6	0.0	17.9	19.0	23.0	2.5	2.0	0.0	0.0	9.8	0.0	2.0
Prop In Lane	1.00		0.01	1.00		1.00	0.50		0.50	1.00		0.88
Lane Grp Cap(c), veh/h	297	0	1311	401	1313	1113	318	0	0	338	0	266
V/C Ratio(X)	0.19	0.00	0.63	0.04	0.72	0.14	0.04	0.00	0.00	0.60	0.00	0.19
Avail Cap(c_a), veh/h	297	0	1311	401	1313	1113	467	0	0	482	0	430
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.4	0.0	6.0	11.1	6.8	3.7	26.4	0.0	0.0	30.1	0.0	27.0
Incr Delay (d2), s/veh	1.4	0.0	2.3	0.2	3.5	0.3	0.0	0.0	0.0	1.7	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	5.8	0.2	7.7	0.7	0.2	0.0	0.0	3.6	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.8	0.0	8.3	11.3	10.2	4.0	26.4	0.0	0.0	31.8	0.0	27.4
LnGrp LOS	B	A	A	B	B	A	C	A	A	C	A	C
Approach Vol, veh/h		888			1126			12			253	
Approach Delay, s/veh		8.9			9.4			26.4			30.9	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		57.7		17.3		57.7		17.3				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		45.0		20.0		45.0		20.0				
Max Q Clear Time (g_c+I1), s		30.6		4.0		25.0		11.8				
Green Ext Time (p_c), s		5.9		0.0		8.4		0.5				
Intersection Summary												
HCM 6th Ctrl Delay			11.7									
HCM 6th LOS			B									

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	100	200	240	650	600	150
Future Volume (vph)	100	200	240	650	600	150
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4		5		6	
Permitted Phases		4		2		6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)	26.0	26.0	10.0	23.0	23.0	23.0
Total Split (s)	26.0	26.0	20.0	49.0	29.0	29.0
Total Split (%)	34.7%	34.7%	26.7%	65.3%	38.7%	38.7%
Maximum Green (s)	21.0	21.0	15.0	44.0	24.0	24.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0	7.0			7.0	7.0
Flash Dont Walk (s)	14.0	14.0			11.0	11.0
Pedestrian Calls (#/hr)	0	0			0	0

Intersection Summary
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 9: Converse Ave. & Future Carlsen St



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	109	135	261	707	652	101
v/c Ratio	0.40	0.56	0.70	0.54	0.84	0.15
Control Delay	31.6	37.2	36.5	6.6	34.7	16.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	37.2	36.5	6.6	34.7	16.7
Queue Length 50th (ft)	46	59	112	121	266	28
Queue Length 95th (ft)	85	103	177	202	#552	70
Internal Link Dist (ft)	406			650	865	
Turn Bay Length (ft)	75		150			100
Base Capacity (vph)	479	428	399	1319	776	659
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.32	0.65	0.54	0.84	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	100	200	240	650	600	150
Future Volume (veh/h)	100	200	240	650	600	150
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1826	1826
Adj Flow Rate, veh/h	109	135	261	707	652	101
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	5	5
Cap, veh/h	207	184	304	1404	937	794
Arrive On Green	0.12	0.12	0.17	0.75	0.51	0.51
Sat Flow, veh/h	1781	1585	1781	1870	1826	1547
Grp Volume(v), veh/h	109	135	261	707	652	101
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1870	1826	1547
Q Serve(g_s), s	4.3	6.2	10.7	11.4	20.3	2.5
Cycle Q Clear(g_c), s	4.3	6.2	10.7	11.4	20.3	2.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	207	184	304	1404	937	794
V/C Ratio(X)	0.53	0.73	0.86	0.50	0.70	0.13
Avail Cap(c_a), veh/h	499	444	356	1404	937	794
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.76	0.76	1.00	1.00
Uniform Delay (d), s/veh	31.2	32.0	30.2	3.8	13.8	9.5
Incr Delay (d2), s/veh	2.1	5.6	13.1	1.0	4.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	5.6	5.5	3.0	8.0	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.3	37.6	43.3	4.7	18.1	9.8
LnGrp LOS	C	D	D	A	B	A
Approach Vol, veh/h	244			968	753	
Approach Delay, s/veh	35.7			15.1	17.0	
Approach LOS	D			B	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		61.3		13.7	17.8	43.5
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		44.0		21.0	15.0	24.0
Max Q Clear Time (g_c+I1), s		13.4		8.2	12.7	22.3
Green Ext Time (p_c), s		5.7		0.6	0.2	0.8
Intersection Summary						
HCM 6th Ctrl Delay			18.4			
HCM 6th LOS			B			

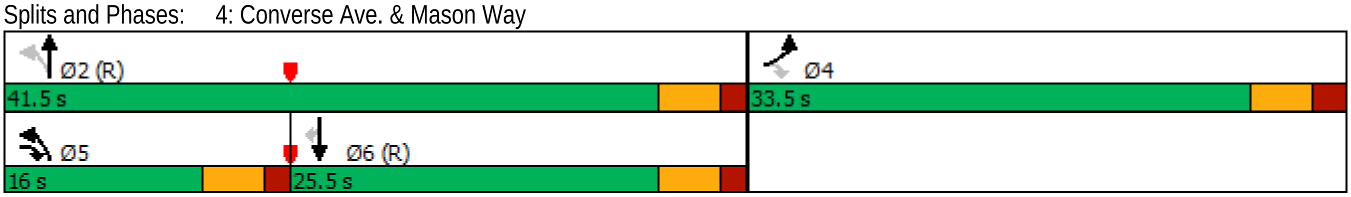
3d.i) Year 2045 Four-Lane Alternative Mid-Day Peak Hour Intersection Operation Computer Capacity Worksheets

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	130	300	300	650	750	170
Future Volume (vph)	130	300	300	650	750	170
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	33.5	12.0	12.0	24.0	24.0	24.0
Total Split (s)	33.5	16.0	16.0	41.5	25.5	25.5
Total Split (%)	44.7%	21.3%	21.3%	55.3%	34.0%	34.0%
Maximum Green (s)	28.0	11.0	11.0	36.5	20.5	20.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0				7.0	7.0
Flash Dont Walk (s)	21.0				11.0	11.0
Pedestrian Calls (#/hr)	0				0	0

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 4: Converse Ave. & Mason Way



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	146	192	309	670	773	109
v/c Ratio	0.53	0.30	0.55	0.27	0.48	0.15
Control Delay	35.5	14.6	8.4	4.8	17.1	15.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	14.6	8.4	4.8	17.1	15.4
Queue Length 50th (ft)	64	60	42	48	122	27
Queue Length 95th (ft)	109	75	89	86	225	74
Internal Link Dist (ft)	528			242	321	
Turn Bay Length (ft)	300		150			100
Base Capacity (vph)	660	658	570	2489	1614	722
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.29	0.54	0.27	0.48	0.15

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	130	300	300	650	750	170
Future Volume (veh/h)	130	300	300	650	750	170
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	192	309	670	773	109
Peak Hour Factor	0.89	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	257	386	540	2544	1955	872
Arrive On Green	0.14	0.14	0.10	0.72	0.55	0.55
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	146	192	309	670	773	109
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585
Q Serve(g_s), s	5.7	7.8	5.1	4.9	9.4	2.5
Cycle Q Clear(g_c), s	5.7	7.8	5.1	4.9	9.4	2.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	257	386	540	2544	1955	872
V/C Ratio(X)	0.57	0.50	0.57	0.26	0.40	0.13
Avail Cap(c_a), veh/h	665	749	625	2544	1955	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.9	24.4	6.5	3.7	9.7	8.2
Incr Delay (d2), s/veh	2.0	1.0	1.0	0.3	0.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	7.1	1.6	1.3	3.4	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.9	25.4	7.4	4.0	10.3	8.4
LnGrp LOS	C	C	A	A	B	A
Approach Vol, veh/h	338			979	882	
Approach Delay, s/veh	28.2			5.1	10.1	
Approach LOS	C			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		58.7		16.3	12.4	46.2
Change Period (Y+Rc), s		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s		36.5		28.0	11.0	20.5
Max Q Clear Time (g_c+I1), s		6.9		9.8	7.1	11.4
Green Ext Time (p_c), s		5.1		1.0	0.4	3.8

Intersection Summary			
HCM 6th Ctrl Delay			10.6
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	31.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	720	5	10	600	170	5	0	10	190	0	20
Future Vol, veh/h	40	720	5	10	600	170	5	0	10	190	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	100	-	-	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	41	742	5	10	619	175	5	0	10	196	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	794	0	0	747	0	0	1157	1641	374	1180	1556	397
Stage 1	-	-	-	-	-	-	827	827	-	727	727	-
Stage 2	-	-	-	-	-	-	330	814	-	453	829	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	823	-	-	857	-	-	151	99	623	~ 146	112	602
Stage 1	-	-	-	-	-	-	332	384	-	381	427	-
Stage 2	-	-	-	-	-	-	657	390	-	556	383	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	823	-	-	857	-	-	139	93	623	~ 137	105	602
Mov Cap-2 Maneuver	-	-	-	-	-	-	139	93	-	~ 137	105	-
Stage 1	-	-	-	-	-	-	315	365	-	362	422	-
Stage 2	-	-	-	-	-	-	627	385	-	520	364	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	18.2	263.4
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	288	823	-	-	857	-	-	137	602
HCM Lane V/C Ratio	0.054	0.05	-	-	0.012	-	-	1.43	0.034
HCM Control Delay (s)	18.2	9.6	-	-	9.3	-	-	290	11.2
HCM Lane LOS	C	A	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0	-	-	13	0.1

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

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	25	730	600	30	25	40
Future Vol, veh/h	25	730	600	30	25	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	753	619	31	26	41

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	650	0	-	0	1064	325
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	429	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	932	-	-	-	218	671
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	932	-	-	-	212	671
Mov Cap-2 Maneuver	-	-	-	-	340	-
Stage 1	-	-	-	-	476	-
Stage 2	-	-	-	-	624	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	12.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	932	-	-	-	340	671
HCM Lane V/C Ratio	0.028	-	-	-	0.076	0.061
HCM Control Delay (s)	9	-	-	-	16.5	10.7
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.2

Intersection						
Int Delay, s/veh	5.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	150	200	140	500	555	110
Future Vol, veh/h	150	200	140	500	555	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	150	-	-	-
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	163	217	152	543	603	120

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1239	362	723	0	-	0
Stage 1	663	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	168	635	875	-	-	-
Stage 1	474	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 139	635	875	-	-	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	392	-	-	-	-	-
Stage 2	525	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24	2.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	875	-	266	635	-	-
HCM Lane V/C Ratio	0.174	-	0.613	0.342	-	-
HCM Control Delay (s)	10	-	37.8	13.6	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.6	-	3.7	1.5	-	-

Notes

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

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	760	0	5	620	5	5
Future Vol, veh/h	760	0	5	620	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	784	0	5	639	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	784	0	1114	392
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	330	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	830	-	202	607
Stage 1	-	-	-	-	410	-
Stage 2	-	-	-	-	701	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	830	-	201	607
Mov Cap-2 Maneuver	-	-	-	-	318	-
Stage 1	-	-	-	-	410	-
Stage 2	-	-	-	-	697	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	417	-	-	830	-
HCM Lane V/C Ratio	0.025	-	-	0.006	-
HCM Control Delay (s)	13.9	-	-	9.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	755	0	5	625	5	5
Future Vol, veh/h	755	0	5	625	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	778	0	5	644	5	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	778	0	1110	389
Stage 1	-	-	-	-	778	-
Stage 2	-	-	-	-	332	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	834	-	203	610
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	834	-	202	610
Mov Cap-2 Maneuver	-	-	-	-	319	-
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	695	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	419	-	-	834	-
HCM Lane V/C Ratio	0.025	-	-	0.006	-
HCM Control Delay (s)	13.8	-	-	9.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

3d.ii) Year 2045 Four-Lane Alternative PM Peak Hour Intersection Operation Computer Capacity Worksheets

Timings
4: Converse Ave. & Mason Way

03/11/2021

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	100	400	300	990	720	200
Future Volume (vph)	100	400	300	990	720	200
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	33.5	12.0	12.0	24.0	24.0	24.0
Total Split (s)	33.5	16.0	16.0	41.5	25.5	25.5
Total Split (%)	44.7%	21.3%	21.3%	55.3%	34.0%	34.0%
Maximum Green (s)	28.0	11.0	11.0	36.5	20.5	20.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0				7.0	7.0
Flash Dont Walk (s)	21.0				11.0	11.0
Pedestrian Calls (#/hr)	0				0	0

Intersection Summary

Cycle Length: 75

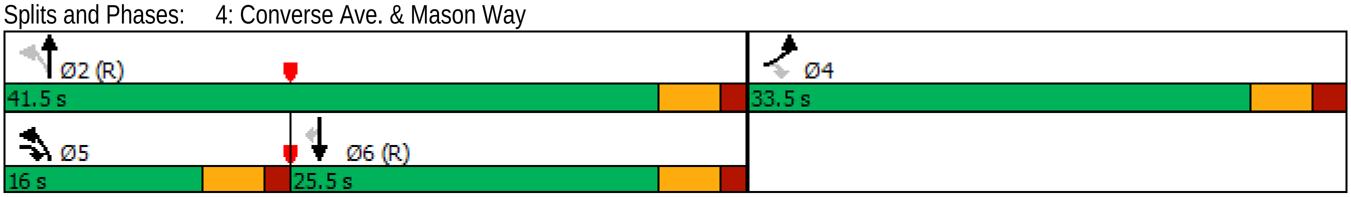
Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 4: Converse Ave. & Mason Way



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	127	273	316	1042	758	131
v/c Ratio	0.49	0.46	0.51	0.39	0.45	0.17
Control Delay	35.2	18.2	7.1	4.8	16.1	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	18.2	7.1	4.8	16.1	15.1
Queue Length 50th (ft)	55	91	41	82	118	33
Queue Length 95th (ft)	85	112	86	141	217	85
Internal Link Dist (ft)	528			242	321	
Turn Bay Length (ft)	300		150			100
Base Capacity (vph)	660	596	614	2697	1684	753
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.46	0.51	0.39	0.45	0.17

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	100	400	300	990	720	200
Future Volume (veh/h)	100	400	300	990	720	200
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1826	1826
Adj Flow Rate, veh/h	127	273	316	1042	758	131
Peak Hour Factor	0.79	0.91	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	5	5
Cap, veh/h	335	473	513	2387	1718	766
Arrive On Green	0.19	0.19	0.11	0.67	0.50	0.50
Sat Flow, veh/h	1781	1585	1781	3647	3561	1547
Grp Volume(v), veh/h	127	273	316	1042	758	131
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1735	1547
Q Serve(g_s), s	4.7	11.0	6.0	10.2	10.6	3.5
Cycle Q Clear(g_c), s	4.7	11.0	6.0	10.2	10.6	3.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	335	473	513	2387	1718	766
V/C Ratio(X)	0.38	0.58	0.62	0.44	0.44	0.17
Avail Cap(c_a), veh/h	665	766	579	2387	1718	766
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.6	22.3	8.3	5.7	12.2	10.4
Incr Delay (d2), s/veh	0.7	1.1	1.6	0.6	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	9.8	2.0	3.1	3.9	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.3	23.4	9.9	6.3	13.1	10.9
LnGrp LOS	C	C	A	A	B	B
Approach Vol, veh/h	400			1358	889	
Approach Delay, s/veh	24.7			7.1	12.7	
Approach LOS	C			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		55.4		19.6	13.2	42.1
Change Period (Y+Rc), s		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s		36.5		28.0	11.0	20.5
Max Q Clear Time (g_c+I1), s		12.2		13.0	8.0	12.6
Green Ext Time (p_c), s		8.3		1.2	0.3	3.4
Intersection Summary						
HCM 6th Ctrl Delay			11.7			
HCM 6th LOS			B			

Intersection	
Int Delay, s/veh	104.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	735	5	15	845	230	5	0	5	180	5	40
Future Vol, veh/h	50	735	5	15	845	230	5	0	5	180	5	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	75	-	-	100	-	-	-	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	56	826	6	17	949	258	6	0	6	202	6	45

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1207	0	0	832	0	0	1453	2182	416	1637	2056	604
Stage 1	-	-	-	-	-	-	941	941	-	1112	1112	-
Stage 2	-	-	-	-	-	-	512	1241	-	525	944	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	574	-	-	796	-	-	91	45	585	~ 67	55	441
Stage 1	-	-	-	-	-	-	283	340	-	223	282	-
Stage 2	-	-	-	-	-	-	513	245	-	504	339	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	574	-	-	796	-	-	68	40	585	~ 60	49	441
Mov Cap-2 Maneuver	-	-	-	-	-	-	68	40	-	~ 60	49	-
Stage 1	-	-	-	-	-	-	255	307	-	~ 201	276	-
Stage 2	-	-	-	-	-	-	442	240	-	450	306	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.1	37.5	$ 974
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	122	574	-	-	796	-	-	60	233
HCM Lane V/C Ratio	0.092	0.098	-	-	0.021	-	-	3.371	0.217
HCM Control Delay (s)	37.5	12	-	-	9.6	-	-	$ 1211.3	24.7
HCM Lane LOS	E	B	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0.3	0.3	-	-	0.1	-	-	21.3	0.8

Notes

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

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	750	840	40	40	50
Future Vol, veh/h	50	750	840	40	40	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	5	2	2	5	5
Mvmt Flow	56	833	933	44	44	56

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	977	0	-	0	1484	489
Stage 1	-	-	-	-	955	-
Stage 2	-	-	-	-	529	-
Critical Hdwy	4.2	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.25	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	684	-	-	-	112	517
Stage 1	-	-	-	-	327	-
Stage 2	-	-	-	-	547	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	684	-	-	-	103	517
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	547	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	18.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	684	-	-	-	219	517
HCM Lane V/C Ratio	0.081	-	-	-	0.203	0.107
HCM Control Delay (s)	10.7	-	-	-	25.6	12.8
HCM Lane LOS	B	-	-	-	D	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.7	0.4

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	100	200	240	650	600	150
Future Vol, veh/h	100	200	240	650	600	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	150	-	-	-
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	5	5
Mvmt Flow	109	217	261	707	652	163

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1610	408	815	0	-	0
Stage 1	734	-	-	-	-	-
Stage 2	876	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 95	593	808	-	-	-
Stage 1	436	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 64	593	808	-	-	-
Mov Cap-2 Maneuver	178	-	-	-	-	-
Stage 1	295	-	-	-	-	-
Stage 2	368	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.2	3.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	808	-	178	593	-	-
HCM Lane V/C Ratio	0.323	-	0.611	0.367	-	-
HCM Control Delay (s)	11.6	-	52.7	14.5	-	-
HCM Lane LOS	B	-	F	B	-	-
HCM 95th %tile Q(veh)	1.4	-	3.4	1.7	-	-

Notes

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

Intersection						
Int Delay, s/veh	0.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	785	0	10	880	0	5
Future Vol, veh/h	785	0	10	880	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	872	0	11	978	0	6

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	872	0	1383	436
Stage 1	-	-	-	-	872	-
Stage 2	-	-	-	-	511	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	769	-	135	568
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	769	-	133	568
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	369	-
Stage 2	-	-	-	-	559	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	568	-	-	769	-
HCM Lane V/C Ratio	0.01	-	-	0.014	-
HCM Control Delay (s)	11.4	-	-	9.8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	785	5	5	875	5	0
Future Vol, veh/h	785	5	5	875	5	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	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	872	6	6	972	6	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	878	0	1373	439
Stage 1	-	-	-	-	875	-
Stage 2	-	-	-	-	498	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	765	-	137	566
Stage 1	-	-	-	-	368	-
Stage 2	-	-	-	-	576	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	765	-	136	566
Mov Cap-2 Maneuver	-	-	-	-	262	-
Stage 1	-	-	-	-	368	-
Stage 2	-	-	-	-	571	-

Approach	EB		WB		NB
HCM Control Delay, s	0		0.1		19
HCM LOS					C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	262	-	-	765	-
HCM Lane V/C Ratio	0.021	-	-	0.007	-
HCM Control Delay (s)	19	-	-	9.7	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

3e.i) Year 2045 Mid-Day Peak Hour Intersection Operation with Traffic Signal Control at Mason Way, Point Bluff and a New Carlson Street Intersection Computer Capacity Worksheets

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	130	300	300	650	750	170
Future Volume (vph)	130	300	300	650	750	170
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	33.5	12.0	12.0	24.0	24.0	24.0
Total Split (s)	33.5	16.0	16.0	41.5	25.5	25.5
Total Split (%)	44.7%	21.3%	21.3%	55.3%	34.0%	34.0%
Maximum Green (s)	28.0	11.0	11.0	36.5	20.5	20.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0				7.0	7.0
Flash Dont Walk (s)	21.0				11.0	11.0
Pedestrian Calls (#/hr)	0				0	0

Intersection Summary

Cycle Length: 75

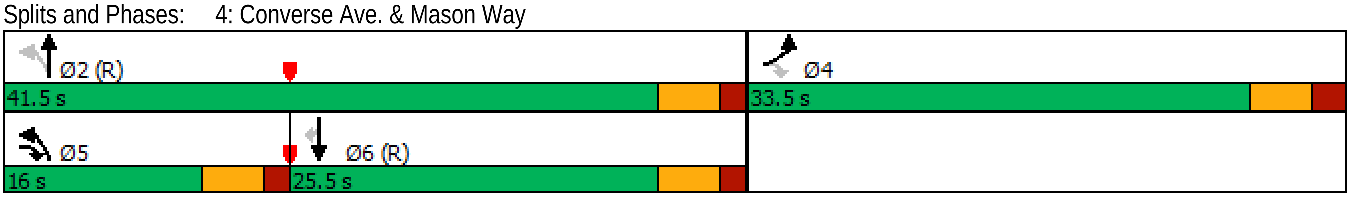
Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 4: Converse Ave. & Mason Way



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	146	192	309	670	773	109
v/c Ratio	0.53	0.30	0.55	0.27	0.48	0.15
Control Delay	35.5	14.6	8.4	4.8	7.2	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	14.6	8.4	4.8	7.2	6.0
Queue Length 50th (ft)	64	60	42	48	50	13
Queue Length 95th (ft)	109	75	89	86	83	32
Internal Link Dist (ft)	528			242	321	
Turn Bay Length (ft)	300		150			100
Base Capacity (vph)	660	658	570	2489	1614	722
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.29	0.54	0.27	0.48	0.15

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	130	300	300	650	750	170
Future Volume (veh/h)	130	300	300	650	750	170
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	192	309	670	773	109
Peak Hour Factor	0.89	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	257	386	540	2544	1955	872
Arrive On Green	0.14	0.14	0.10	0.72	0.55	0.55
Sat Flow, veh/h	1781	1585	1781	3647	3647	1585
Grp Volume(v), veh/h	146	192	309	670	773	109
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1585
Q Serve(g_s), s	5.7	7.8	5.1	4.9	9.4	2.5
Cycle Q Clear(g_c), s	5.7	7.8	5.1	4.9	9.4	2.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	257	386	540	2544	1955	872
V/C Ratio(X)	0.57	0.50	0.57	0.26	0.40	0.13
Avail Cap(c_a), veh/h	665	749	625	2544	1955	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.9	24.4	6.5	3.7	9.7	8.2
Incr Delay (d2), s/veh	2.0	1.0	1.0	0.3	0.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	7.1	1.6	1.3	3.4	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.9	25.4	7.4	4.0	10.3	8.4
LnGrp LOS	C	C	A	A	B	A
Approach Vol, veh/h	338			979	882	
Approach Delay, s/veh	28.2			5.1	10.1	
Approach LOS	C			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		58.7		16.3	12.4	46.2
Change Period (Y+Rc), s		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s		36.5		28.0	11.0	20.5
Max Q Clear Time (g_c+I1), s		6.9		9.8	7.1	11.4
Green Ext Time (p_c), s		5.1		1.0	0.4	3.8

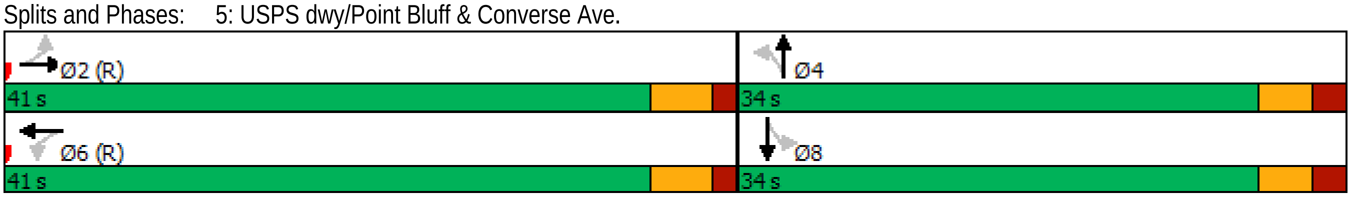
Intersection Summary			
HCM 6th Ctrl Delay			10.6
HCM 6th LOS			B

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	40	720	10	600	5	0	190	0
Future Volume (vph)	40	720	10	600	5	0	190	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	23.5	23.5	23.5	23.5	23.0	23.0	29.0	29.0
Total Split (s)	41.0	41.0	41.0	41.0	34.0	34.0	34.0	34.0
Total Split (%)	54.7%	54.7%	54.7%	54.7%	45.3%	45.3%	45.3%	45.3%
Maximum Green (s)	36.0	36.0	36.0	36.0	29.0	29.0	29.0	29.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			17.0	17.0
Pedestrian Calls (#/hr)	0	0	0	0			0	0

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 5: USPS dwy/Point Bluff & Converse Ave.



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	41	747	10	794	15	196	21
v/c Ratio	0.10	0.32	0.02	0.35	0.04	0.66	0.06
Control Delay	11.5	12.2	5.3	5.3	20.7	37.3	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.5	12.2	5.3	5.3	20.7	37.3	21.1
Queue Length 50th (ft)	13	136	1	57	6	84	8
Queue Length 95th (ft)	40	202	m6	94	18	134	22
Internal Link Dist (ft)		175		386	121		254
Turn Bay Length (ft)	75		100			75	
Base Capacity (vph)	403	2313	427	2239	615	538	612
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.32	0.02	0.35	0.02	0.36	0.03

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	720	5	10	600	170	5	0	10	190	0	20
Future Volume (veh/h)	40	720	5	10	600	170	5	0	10	190	0	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	41	742	5	10	619	175	5	0	10	196	0	21
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	515	2535	17	541	1916	541	123	27	173	332	0	263
Arrive On Green	0.70	0.70	0.70	0.70	0.70	0.70	0.17	0.00	0.17	0.17	0.00	0.17
Sat Flow, veh/h	684	3618	24	714	2736	772	356	164	1040	1405	0	1585
Grp Volume(v), veh/h	41	364	383	10	402	392	15	0	0	196	0	21
Grp Sat Flow(s),veh/h/ln	684	1777	1866	714	1777	1731	1560	0	0	1405	0	1585
Q Serve(g_s), s	1.9	5.8	5.8	0.4	6.6	6.6	0.0	0.0	0.0	9.4	0.0	0.8
Cycle Q Clear(g_c), s	8.4	5.8	5.8	6.2	6.6	6.6	0.6	0.0	0.0	10.0	0.0	0.8
Prop In Lane	1.00		0.01	1.00		0.45	0.33		0.67	1.00		1.00
Lane Grp Cap(c), veh/h	515	1245	1307	541	1245	1213	323	0	0	332	0	263
V/C Ratio(X)	0.08	0.29	0.29	0.02	0.32	0.32	0.05	0.00	0.00	0.59	0.00	0.08
Avail Cap(c_a), veh/h	515	1245	1307	541	1245	1213	657	0	0	642	0	613
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.0	4.2	4.2	5.4	4.3	4.4	26.3	0.0	0.0	30.2	0.0	26.4
Incr Delay (d2), s/veh	0.3	0.6	0.6	0.1	0.7	0.7	0.1	0.0	0.0	1.7	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.7	1.8	0.1	2.0	1.9	0.2	0.0	0.0	3.5	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.3	4.8	4.8	5.5	5.0	5.1	26.4	0.0	0.0	31.8	0.0	26.5
LnGrp LOS	A	A	A	A	A	A	C	A	A	C	A	C
Approach Vol, veh/h		788			804			15			217	
Approach Delay, s/veh		4.9			5.1			26.4			31.3	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		57.5		17.5		57.5		17.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		36.0		29.0		36.0		29.0				
Max Q Clear Time (g_c+I1), s		10.4		2.6		8.6		12.0				
Green Ext Time (p_c), s		5.4		0.0		5.7		0.6				

Intersection Summary			
HCM 6th Ctrl Delay			8.3
HCM 6th LOS			A

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	150	200	140	500	555
Future Volume (vph)	150	200	140	500	555
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	4		5		6
Permitted Phases		4		2	
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	10.0	10.0
Minimum Split (s)	29.0	29.0	12.0	23.0	23.0
Total Split (s)	29.0	29.0	18.0	46.0	28.0
Total Split (%)	38.7%	38.7%	24.0%	61.3%	37.3%
Maximum Green (s)	24.0	24.0	13.0	41.0	23.0
Yellow Time (s)	3.0	3.0	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min
Walk Time (s)	7.0	7.0			7.0
Flash Dont Walk (s)	17.0	17.0			11.0
Pedestrian Calls (#/hr)	0	0			0

Intersection Summary

Cycle Length: 75

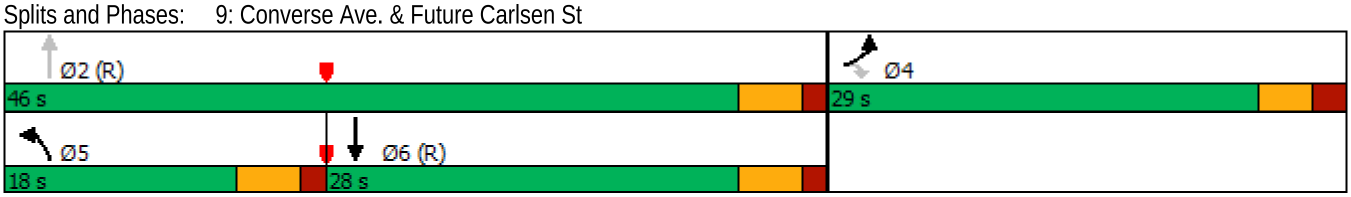
Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Splits and Phases: 9: Converse Ave. & Future Carlsen St



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	163	135	152	543	723
v/c Ratio	0.58	0.53	0.55	0.22	0.44
Control Delay	36.4	35.6	31.8	8.2	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	35.6	31.8	8.2	15.5
Queue Length 50th (ft)	71	58	69	51	110
Queue Length 95th (ft)	119	102	124	148	195
Internal Link Dist (ft)	406			650	865
Turn Bay Length (ft)	75		150		
Base Capacity (vph)	547	489	323	2481	1653
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.30	0.28	0.47	0.22	0.44

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	150	200	140	500	555	110
Future Volume (veh/h)	150	200	140	500	555	110
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	135	152	543	603	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	223	198	191	2635	1677	333
Arrive On Green	0.13	0.13	0.11	0.74	0.57	0.57
Sat Flow, veh/h	1781	1585	1781	3647	3048	587
Grp Volume(v), veh/h	163	135	152	543	362	361
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1777	1765
Q Serve(g_s), s	6.6	6.1	6.2	3.5	8.3	8.3
Cycle Q Clear(g_c), s	6.6	6.1	6.2	3.5	8.3	8.3
Prop In Lane	1.00	1.00	1.00			0.33
Lane Grp Cap(c), veh/h	223	198	191	2635	1008	1002
V/C Ratio(X)	0.73	0.68	0.80	0.21	0.36	0.36
Avail Cap(c_a), veh/h	570	507	309	2635	1008	1002
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.99	0.99	1.00	1.00
Uniform Delay (d), s/veh	31.6	31.4	32.7	3.0	8.8	8.8
Incr Delay (d2), s/veh	4.6	4.1	7.3	0.2	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	5.5	3.0	0.9	2.9	2.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	36.2	35.4	39.9	3.1	9.8	9.8
LnGrp LOS	D	D	D	A	A	A
Approach Vol, veh/h	298			695	723	
Approach Delay, s/veh	35.8			11.2	9.8	
Approach LOS	D			B	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		60.6		14.4	13.0	47.6
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		41.0		24.0	13.0	23.0
Max Q Clear Time (g_c+I1), s		5.5		8.6	8.2	10.3
Green Ext Time (p_c), s		4.1		0.8	0.2	3.4

Intersection Summary			
HCM 6th Ctrl Delay			14.9
HCM 6th LOS			B

3e.ii) Year 2045 PM Peak Hour Intersection Operation with Traffic Signal Control at Mason Way, Point Bluff and a New Carlson Street Intersection Computer Capacity Worksheets

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	100	400	300	990	720	200
Future Volume (vph)	100	400	300	990	720	200
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Detector Phase	4	5	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	6.0	6.0	10.0	10.0	10.0
Minimum Split (s)	33.5	12.0	12.0	24.0	24.0	24.0
Total Split (s)	33.5	16.0	16.0	41.5	25.5	25.5
Total Split (%)	44.7%	21.3%	21.3%	55.3%	34.0%	34.0%
Maximum Green (s)	28.0	11.0	11.0	36.5	20.5	20.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	2.0	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Walk Time (s)	7.0				7.0	7.0
Flash Dont Walk (s)	21.0				11.0	11.0
Pedestrian Calls (#/hr)	0				0	0

Intersection Summary

Cycle Length: 75

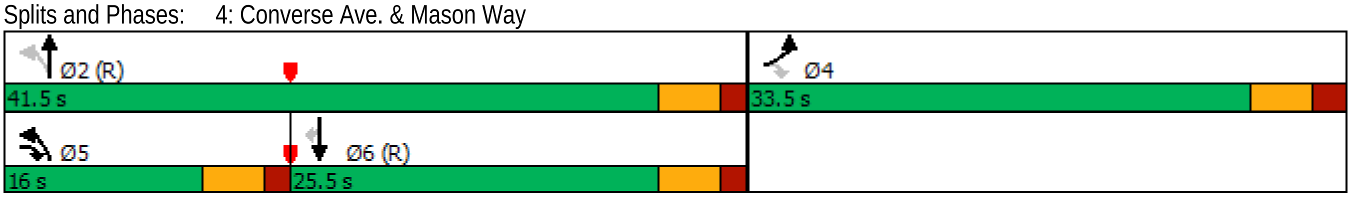
Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 4: Converse Ave. & Mason Way



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	127	273	316	1042	758	131
v/c Ratio	0.49	0.46	0.51	0.39	0.45	0.17
Control Delay	35.2	18.2	7.1	4.8	14.2	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	18.2	7.1	4.8	14.2	15.6
Queue Length 50th (ft)	55	91	41	82	31	8
Queue Length 95th (ft)	85	112	86	141	238	101
Internal Link Dist (ft)	528			242	321	
Turn Bay Length (ft)	300		150			100
Base Capacity (vph)	660	596	614	2697	1684	753
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.46	0.51	0.39	0.45	0.17

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	100	400	300	990	720	200
Future Volume (veh/h)	100	400	300	990	720	200
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1826	1826
Adj Flow Rate, veh/h	127	273	316	1042	758	131
Peak Hour Factor	0.79	0.91	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	5	5
Cap, veh/h	335	473	513	2387	1718	766
Arrive On Green	0.19	0.19	0.11	0.67	0.50	0.50
Sat Flow, veh/h	1781	1585	1781	3647	3561	1547
Grp Volume(v), veh/h	127	273	316	1042	758	131
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1735	1547
Q Serve(g_s), s	4.7	11.0	6.0	10.2	10.6	3.5
Cycle Q Clear(g_c), s	4.7	11.0	6.0	10.2	10.6	3.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	335	473	513	2387	1718	766
V/C Ratio(X)	0.38	0.58	0.62	0.44	0.44	0.17
Avail Cap(c_a), veh/h	665	766	579	2387	1718	766
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.6	22.3	8.3	5.7	12.2	10.4
Incr Delay (d2), s/veh	0.7	1.1	1.6	0.6	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	9.8	2.0	3.1	3.9	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	27.3	23.4	9.9	6.3	13.1	10.9
LnGrp LOS	C	C	A	A	B	B
Approach Vol, veh/h	400			1358	889	
Approach Delay, s/veh	24.7			7.1	12.7	
Approach LOS	C			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		55.4		19.6	13.2	42.1
Change Period (Y+Rc), s		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s		36.5		28.0	11.0	20.5
Max Q Clear Time (g_c+I1), s		12.2		13.0	8.0	12.6
Green Ext Time (p_c), s		8.3		1.2	0.3	3.4

Intersection Summary			
HCM 6th Ctrl Delay			11.7
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	50	735	15	845	5	0	180	5
Future Volume (vph)	50	735	15	845	5	0	180	5
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		4		8
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	23.5	23.5	23.5	23.5	23.0	23.0	29.0	29.0
Total Split (s)	45.0	45.0	45.0	45.0	30.0	30.0	30.0	30.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	40.0%	40.0%	40.0%	40.0%
Maximum Green (s)	40.0	40.0	40.0	40.0	25.0	25.0	25.0	25.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0
All-Red Time (s)	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Min	C-Min	C-Min	C-Min	None	None	None	None
Walk Time (s)	7.0	7.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0			17.0	17.0
Pedestrian Calls (#/hr)	0	0	0	0			0	0

Intersection Summary

Cycle Length: 75

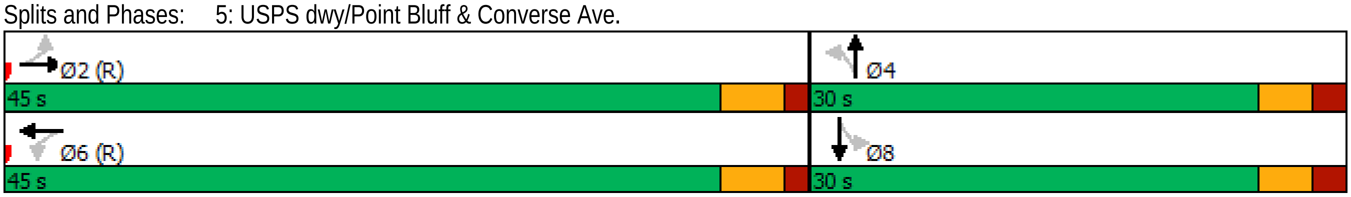
Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Splits and Phases: 5: USPS dwy/Point Bluff & Converse Ave.



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	56	832	17	1207	12	202	51
v/c Ratio	0.25	0.36	0.04	0.54	0.04	0.67	0.15
Control Delay	21.7	16.2	4.2	7.1	20.2	37.1	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	16.2	4.2	7.1	20.2	37.1	22.4
Queue Length 50th (ft)	20	171	2	88	4	87	19
Queue Length 95th (ft)	60	262	m5	268	15	134	40
Internal Link Dist (ft)		175		386	121		254
Turn Bay Length (ft)	75		100			75	
Base Capacity (vph)	228	2299	381	2228	523	465	539
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.36	0.04	0.54	0.02	0.43	0.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	735	5	15	845	230	5	0	5	180	5	40
Future Volume (veh/h)	50	735	5	15	845	230	5	0	5	180	5	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	56	826	6	17	949	258	6	0	6	202	6	45
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	347	2532	18	499	1935	525	174	23	124	341	32	237
Arrive On Green	0.70	0.70	0.70	0.70	0.70	0.70	0.17	0.00	0.17	0.17	0.17	0.17
Sat Flow, veh/h	463	3616	26	660	2763	749	611	136	747	1410	190	1424
Grp Volume(v), veh/h	56	406	426	17	609	598	12	0	0	202	0	51
Grp Sat Flow(s),veh/h/ln	463	1777	1866	660	1777	1736	1493	0	0	1410	0	1614
Q Serve(g_s), s	4.7	6.7	6.7	0.8	11.7	11.8	0.0	0.0	0.0	7.8	0.0	2.0
Cycle Q Clear(g_c), s	16.5	6.7	6.7	7.4	11.7	11.8	2.0	0.0	0.0	9.8	0.0	2.0
Prop In Lane	1.00		0.01	1.00		0.43	0.50		0.50	1.00		0.88
Lane Grp Cap(c), veh/h	347	1244	1306	499	1244	1215	321	0	0	341	0	269
V/C Ratio(X)	0.16	0.33	0.33	0.03	0.49	0.49	0.04	0.00	0.00	0.59	0.00	0.19
Avail Cap(c_a), veh/h	347	1244	1306	499	1244	1215	564	0	0	576	0	538
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.9	4.4	4.4	5.8	5.1	5.1	26.2	0.0	0.0	30.0	0.0	26.9
Incr Delay (d2), s/veh	1.0	0.7	0.7	0.1	1.4	1.4	0.0	0.0	0.0	1.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	2.0	2.1	0.1	3.6	3.5	0.2	0.0	0.0	3.6	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	5.1	5.0	5.9	6.5	6.6	26.3	0.0	0.0	31.6	0.0	27.2
LnGrp LOS	A	A	A	A	A	A	C	A	A	C	A	C
Approach Vol, veh/h		888			1224			12			253	
Approach Delay, s/veh		5.4			6.5			26.3			30.7	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		57.5		17.5		57.5		17.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		40.0		25.0		40.0		25.0				
Max Q Clear Time (g_c+I1), s		18.5		4.0		13.8		11.8				
Green Ext Time (p_c), s		6.3		0.0		9.9		0.7				
Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	100	200	240	650	600
Future Volume (vph)	100	200	240	650	600
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	4		5	2	6
Permitted Phases		4			
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	7.0	7.0	7.0	10.0	10.0
Minimum Split (s)	29.0	29.0	12.0	23.0	23.0
Total Split (s)	29.0	29.0	19.0	46.0	27.0
Total Split (%)	38.7%	38.7%	25.3%	61.3%	36.0%
Maximum Green (s)	24.0	24.0	14.0	41.0	22.0
Yellow Time (s)	3.0	3.0	3.5	3.5	3.5
All-Red Time (s)	2.0	2.0	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	C-Min	C-Min
Walk Time (s)	7.0	7.0			7.0
Flash Dont Walk (s)	17.0	17.0			11.0
Pedestrian Calls (#/hr)	0	0			0

Intersection Summary

Cycle Length: 75

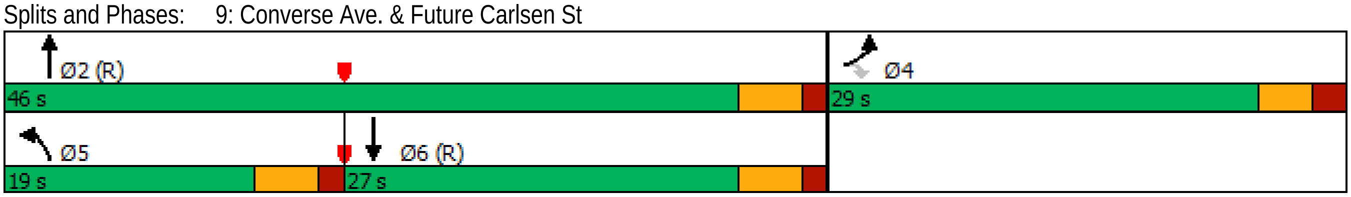
Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Splits and Phases: 9: Converse Ave. & Future Carlsen St



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	109	135	261	707	815
v/c Ratio	0.40	0.56	0.67	0.28	0.58
Control Delay	31.5	37.1	25.5	6.9	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	37.1	25.5	6.9	21.1
Queue Length 50th (ft)	46	59	116	141	148
Queue Length 95th (ft)	84	103	133	107	#278
Internal Link Dist (ft)	406			650	865
Turn Bay Length (ft)	75		150		
Base Capacity (vph)	547	489	403	2503	1400
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.28	0.65	0.28	0.58

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	100	200	240	650	600	150
Future Volume (veh/h)	100	200	240	650	600	150
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1826	1826
Adj Flow Rate, veh/h	109	135	261	707	652	163
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	5	5
Cap, veh/h	208	185	303	2665	1412	353
Arrive On Green	0.12	0.12	0.17	0.75	0.51	0.51
Sat Flow, veh/h	1781	1585	1781	3647	2841	687
Grp Volume(v), veh/h	109	135	261	707	411	404
Grp Sat Flow(s),veh/h/ln	1781	1585	1781	1777	1735	1702
Q Serve(g_s), s	4.3	6.2	10.7	4.7	11.3	11.4
Cycle Q Clear(g_c), s	4.3	6.2	10.7	4.7	11.3	11.4
Prop In Lane	1.00	1.00	1.00			0.40
Lane Grp Cap(c), veh/h	208	185	303	2665	890	874
V/C Ratio(X)	0.52	0.73	0.86	0.27	0.46	0.46
Avail Cap(c_a), veh/h	570	507	333	2665	890	874
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.96	0.96	1.00	1.00
Uniform Delay (d), s/veh	31.2	32.0	30.3	2.9	11.6	11.6
Incr Delay (d2), s/veh	2.0	5.4	18.3	0.2	1.7	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	5.6	5.9	1.1	4.1	4.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.2	37.4	48.6	3.2	13.4	13.4
LnGrp LOS	C	D	D	A	B	B
Approach Vol, veh/h	244			968	815	
Approach Delay, s/veh	35.5			15.4	13.4	
Approach LOS	D			B	B	

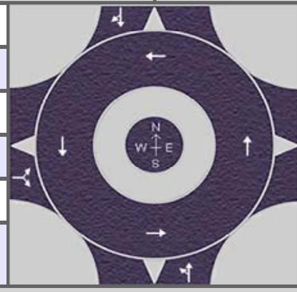
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		61.2		13.8	17.7	43.5
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		41.0		24.0	14.0	22.0
Max Q Clear Time (g_c+I1), s		6.7		8.2	12.7	13.4
Green Ext Time (p_c), s		5.6		0.6	0.1	3.2

Intersection Summary			
HCM 6th Ctrl Delay			17.0
HCM 6th LOS			B

3f.i) Year 2045 Mid-Day Future Carlson Street Operation – Roundabout Control Computer Capacity Worksheets

HCS7 Roundabouts Report

General Information / Site Information



General Information		Site Information	
Analyst	NY	Intersection	Converse Ave./Carlson St.
Agency or Co.	Ayres Associates	E/W Street Name	Future Carlson St.
Date Performed	3/15/2021	N/S Street Name	Converse Ave.
Analysis Year	2045	Analysis Time Period (hrs)	0.25
Time Analyzed	Mid-day	Peak Hour Factor	0.92
Project Description	Carlson Street Roundabout	Jurisdiction	City of Cheyenne

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0
Lane Assignment			LR								LT				TR	
Volume (V), veh/h	0	150		200					0	140	500		0		555	110
Percent Heavy Vehicles, %	2	2		2					2	2	2		2		2	2
Flow Rate (v_{PCE}), pc/h	0	166		222					0	155	554		0		615	122
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1								1				1			
Pedestrians Crossing, p/h	0								0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763						4.9763			4.9763	
Follow-Up Headway (s)		2.6087						2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		388						709			737	
Entry Volume, veh/h		380						695			723	
Circulating Flow (v_c), pc/h	615			875			166			155		
Exiting Flow (v_{ex}), pc/h	0			277			720			837		
Capacity (c_{pce}), pc/h		737						1165			1178	
Capacity (c), veh/h		723						1142			1155	
v/c Ratio (x)		0.53						0.61			0.63	

Delay and Level of Service

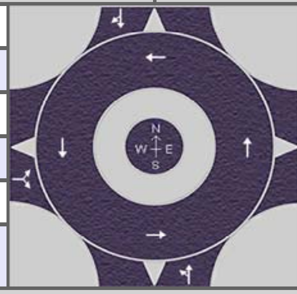
Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		13.0						11.0			11.3	
Lane LOS		B						B			B	
95% Queue, veh		3.1						4.3			4.6	
Approach Delay, s/veh	13.0						11.0			11.3		
Approach LOS	B						B			B		
Intersection Delay, s/veh | LOS	11.5						B					

3f.ii) Year 2045 PM Future Carlson Street Operation – Roundabout Control Computer Capacity Worksheets

HCS7 Roundabouts Report

General Information

Site Information



Analyst	NY	Intersection	Converse Ave./Carlson St.
Agency or Co.	Ayres Associates	E/W Street Name	Future Carlson St.
Date Performed	3/15/2021	N/S Street Name	Converse Ave.
Analysis Year	2045	Analysis Time Period (hrs)	0.25
Time Analyzed	PM	Peak Hour Factor	0.92
Project Description	Carlson Street Roundabout	Jurisdiction	City of Cheyenne

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0
Lane Assignment			LR								LT				TR	
Volume (V), veh/h	0	100		200					0	240	650		0		600	150
Percent Heavy Vehicles, %	2	2		2					2	2	2		2		2	2
Flow Rate (v_{PCE}), pc/h	0	111		222					0	266	721		0		665	166
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1								1				1			
Pedestrians Crossing, p/h	0								0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763						4.9763			4.9763	
Follow-Up Headway (s)		2.6087						2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		333						987			831	
Entry Volume, veh/h		326						968			815	
Circulating Flow (v_c), pc/h	665			1098			111			266		
Exiting Flow (v_{ex}), pc/h	0			432			832			887		
Capacity (c_{pce}), pc/h		700						1232			1052	
Capacity (c), veh/h		687						1208			1031	
v/c Ratio (x)		0.48						0.80			0.79	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.3						17.7			19.1	
Lane LOS		B						C			C	
95% Queue, veh		2.6						9.2			8.6	
Approach Delay, s/veh	12.3						17.7			19.1		
Approach LOS	B						C			C		
Intersection Delay, s/veh | LOS	17.4						C					