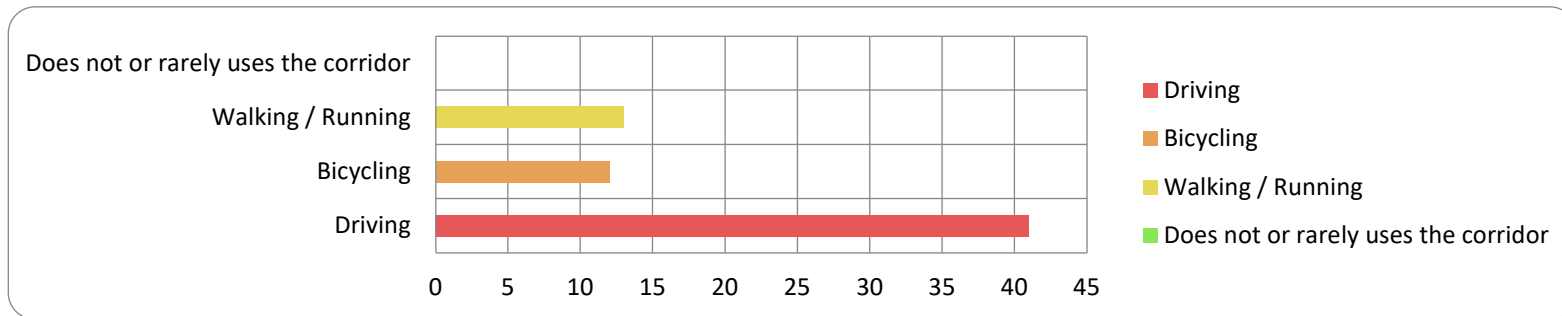


APPENDIX

B: PUBLIC ENGAGEMENT INFO & SURVEY RESULTS

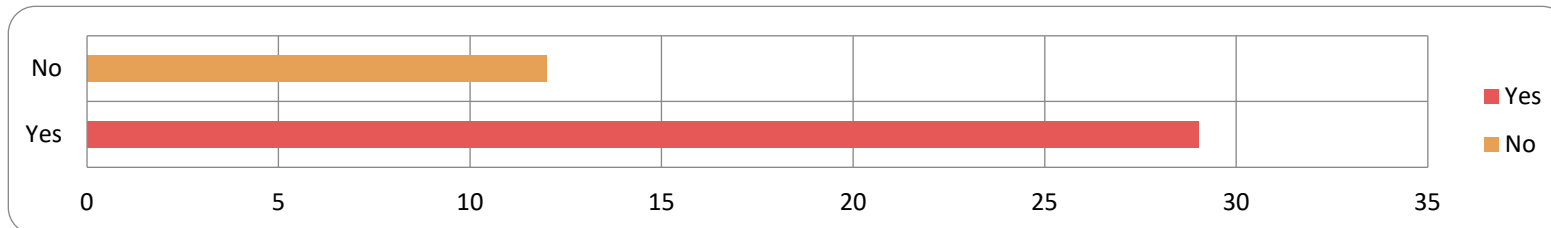
How do you use the corridor?

Choice	Responses	
Driving	41	95.35%
Bicycling	12	27.91%
Walking / Running	13	30.23%
Does not or rarely uses the corridor	0	0.00%
Answered	43	
Skipped	0	



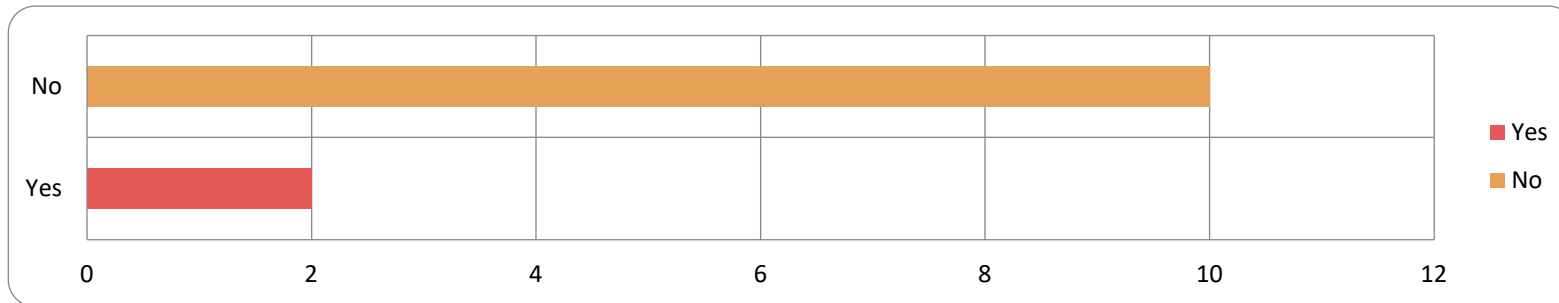
Do you feel safe driving along the corridor?

Rating	Responses	
Yes	29	70.73%
No	12	29.27%
Average	0	
Answered	41	
Skipped	2	



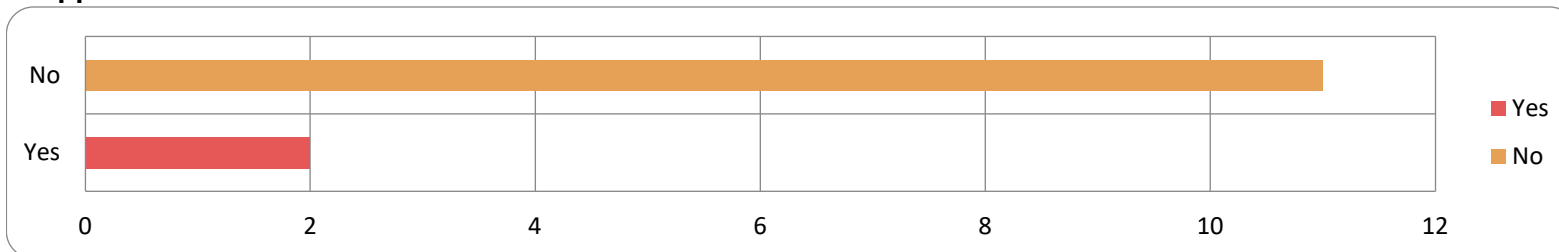
Do you feel safe bicycling along the corridor?

Rating	Responses	
Yes	2	16.67%
No	10	83.33%
Average	0	
Answered	12	
Skipped	31	



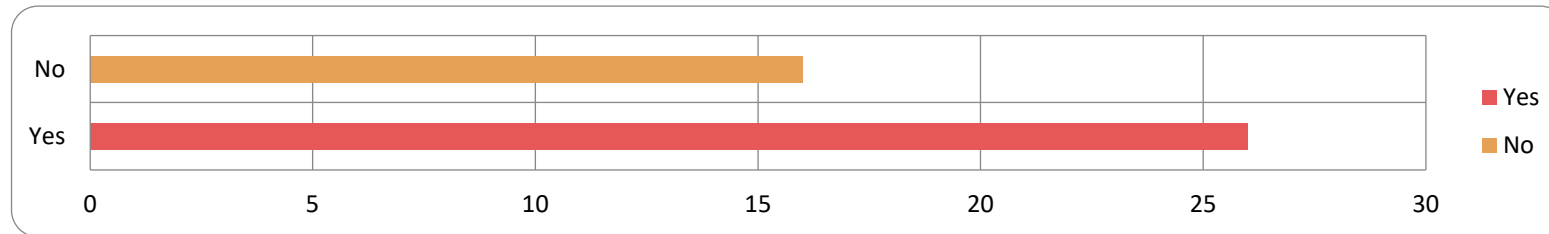
Do you feel safe walking / running along the corridor?

Rating	Responses	
Yes	2	15.38%
No	11	84.62%
Average	0	
Answered	13	
Skipped	30	



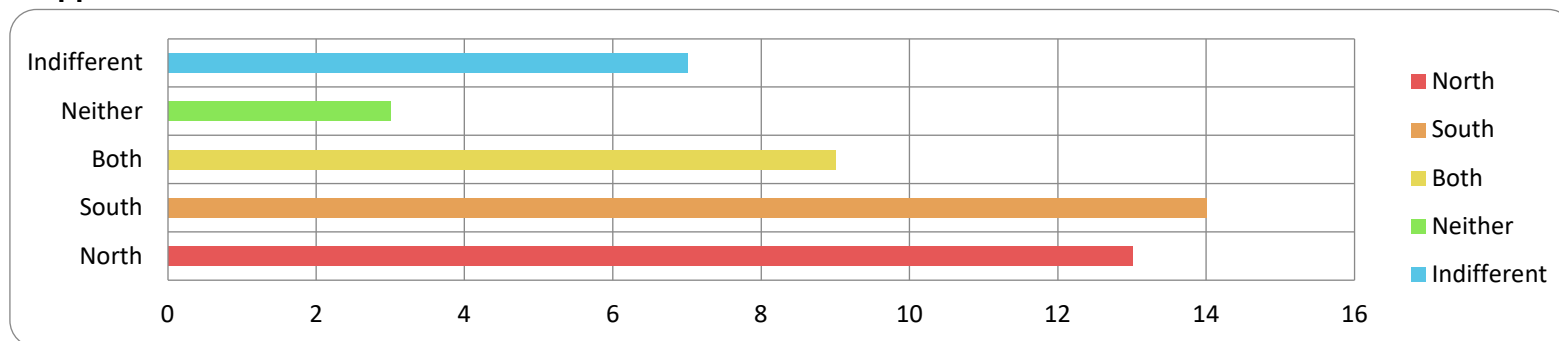
Do you feel that speeding is an issue along the corridor?

Rating	Responses	
Yes	26	61.90%
No	16	38.10%
Average	0	
Answered	42	
Skipped	1	



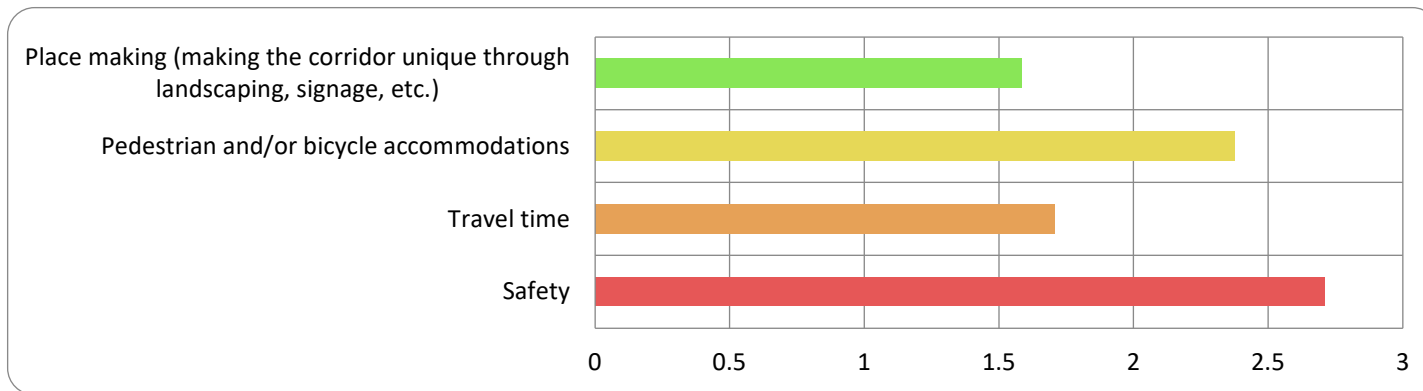
Which side of East Pershing Boulevard would you like to see a shared use path (Sidewalk / Greenway) constructed on?

Choice	Responses	
North	13	30.23%
South	14	32.56%
Both	9	20.93%
Neither	3	6.98%
Indifferent	7	16.28%
Answered	43	
Skipped	0	



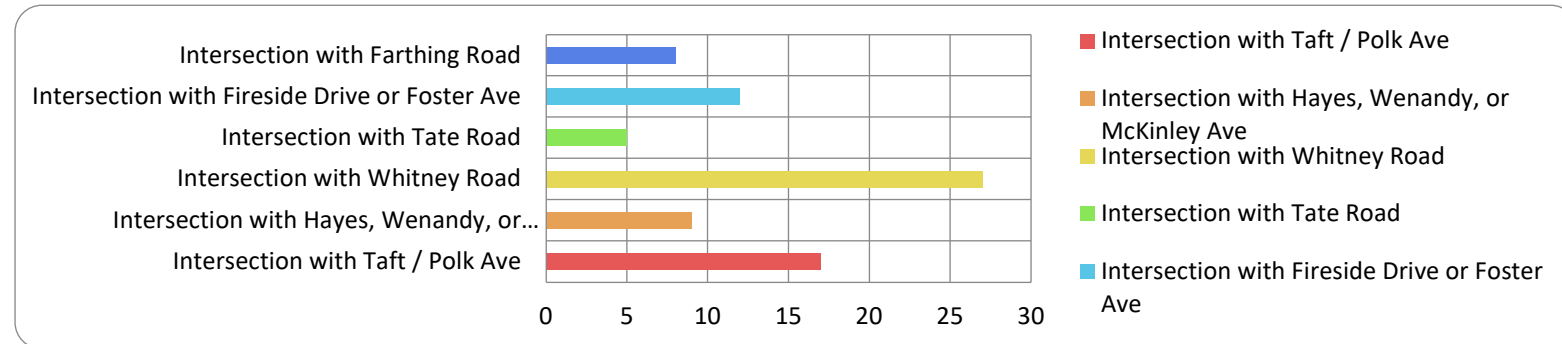
Rank your priorities for the corridor from top to bottom.

Choice	Ranking								Weighted Score
	1	2	3	4	5	6	7	8	
Safety	8	33.33%	9	37.50%	3	12.50%	0	0.00%	2.708333333
Travel time	5	20.83%	2	8.33%	3	12.50%	9	37.50%	1.708333333
Pedestrian and/or bicycle accommodations	8	33.33%	5	20.83%	4	16.67%	2	8.33%	2.375
Place making (making the corridor unique through landscaping, signage, etc.)	3	12.50%	2	8.33%	7	29.17%	6	25.00%	1.583333333
Answered	24								
Skipped	19								



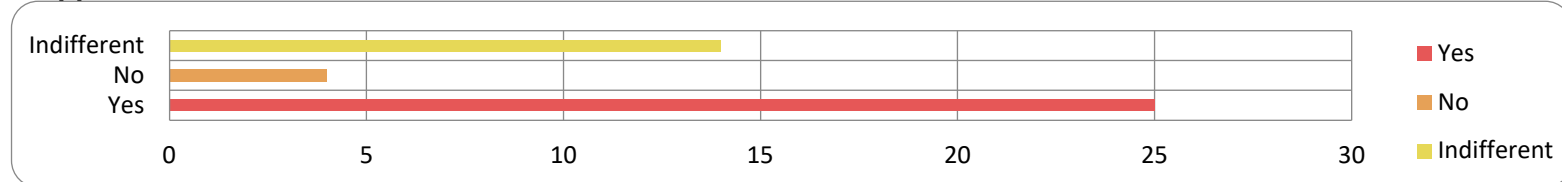
Are there intersections along the corridor that should be provided pedestrian crossing improvements?

Choice	Responses	
Intersection with Taft / Polk Ave	17	48.57%
Intersection with Hayes, Wenandy, or McKinley Ave	9	25.71%
Intersection with Whitney Road	27	77.14%
Intersection with Tate Road	5	14.29%
Intersection with Fireside Drive or Foster Ave	12	34.29%
Intersection with Farthing Road	8	22.86%
Answered	35	
Skipped	8	



Given the recent opening of the East Cheyenne Community Open Space, do you feel that a pedestrian crossing should be provided to help cross East Pershing Boulevard?

Choice	Responses	
Yes	25	58.14%
No	4	9.30%
Indifferent	14	32.56%
Answered	43	
Skipped	0	



Where do you believe a crossing would be effective?

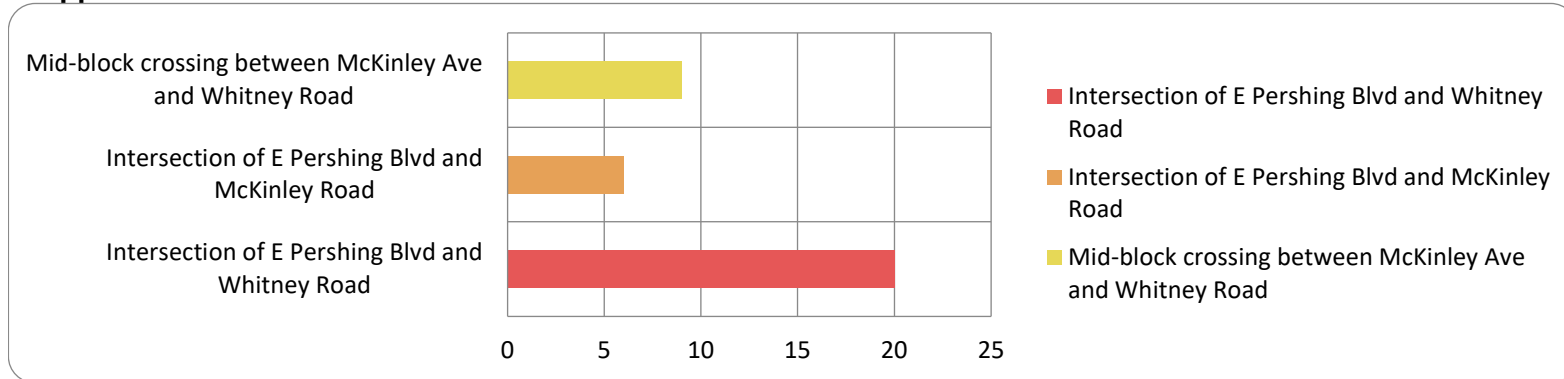
Choice	Responses	
Intersection of E Pershing Blvd and Whitney Road	20	86.96%
Intersection of E Pershing Blvd and McKinley Road	6	26.09%
Mid-block crossing between McKinley Ave and Whitney Road	9	39.13%

Answered

23

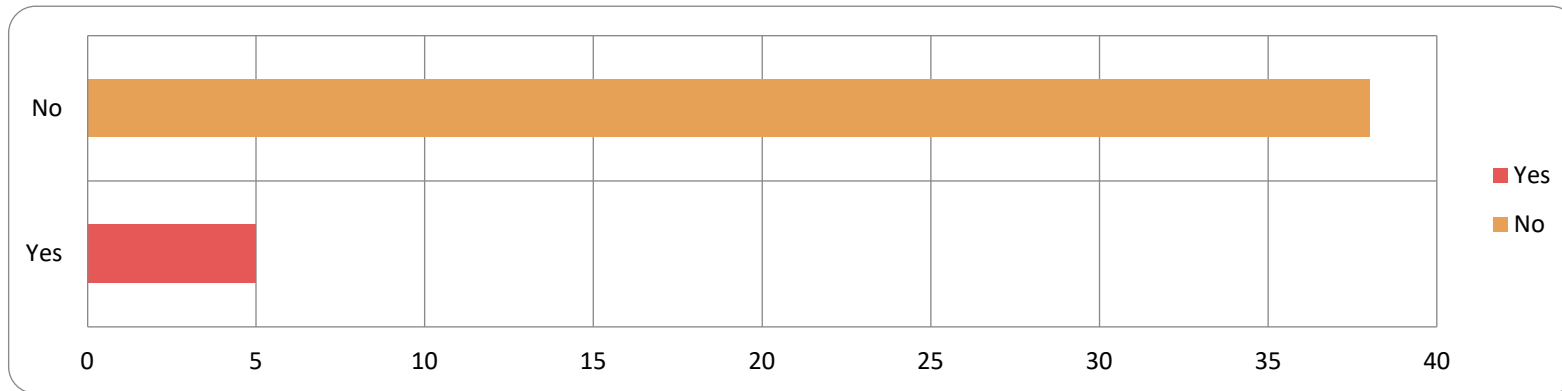
Skipped

20



Have you noticed any drainage issues along the corridor?

Rating	Responses	
Yes	5	11.63%
No	38	88.37%
Average	0	
Answered	43	
Skipped	0	



Can you describe the drainage issues?

Response	
Excess storm water from the North West of the US 30/ Pershing intersection floods down Uintah Rd and across Pierce.	
The tire channels in the road collect water and ice	
Minor flooding	
The greenway tunnel under highway 30 at Polk was filled with water and impassable for literally months this past summer.	
Answered	4
Skipped	39

What else should we consider when reviewing the corridor for the future?

Response

If no separate bike path along East Pershing, continue to have wide shoulder to allow safe bicycling. Development of North College Dr. years ago took that opportunity away.

4 lanes from Lincoln way to Taft, or right turn lane onto Taft

Increasing speed limit. Correcting right turn onto Taft eastbound on Pershing. It needs to have a separate turn lane. Also, there needs to be a turn lane red-yellow-green light from Pershing westbound to HWY 30.

Maybe start with stop lights, the intersection of 30/Whitney. Mow and landscaping along this corridor would make it more appealing. Now all that grows are weeds and trees in and along the drainage ditch. The Saddle Ridge entrance sign looks horrible. There is no safe way to walk from neighborhoods to the new park. This could be a very nice area of town if it received the same landscaping and care from the city as other parts of town. Keep it residential housing, no apartments. It would be different if rentals we're taking care of and not trashed. Patrol the area more often, has been a lot of unwanted foot traffic, causing crime to go up. I can go on and on but nothing will come of this anyway.

Traffic lights at the intersection of Whitney and hwy30

Stop building out in the county and realize food comes from somewhere, Agriculture is and should always be a priority!

Stop the uncontrolled building! You are losing the uniqueness of Cheyenne and turning it into CO all for your love of money. I personally fear for my well with all the new well drilling in the county are you going to pay for that. No I don't think so.

Consider the future growth of Saddle Ridge and whether we want to promote a culture of walking, bicycling, children outside playing, etc.

Put a roundabout at Pershing Christensen Rd

Fix/replace all the bumps on E Pershing from Christensen road to Reese.

More flashing lights on Lincolnway at the intersection of Pershing and Lincolnway. Traffic from the east comes up fast and sometimes runs the red light. I have to be extremely defensive at this intersection.

Intersection with US 30

Please note, my answers relate to utilizing the area of the corridor from Highway 30 to Taft.

A big concern I have is being able to get out of the Cheyenne Ranch subdivision. Wait times to turn into traffic on Pershing seem to be increasing and my concern is it will only get worse as traffic and population increase. The timing of the stoplights at Highway 30 and Taft Keep the split median (such as at Hayes). Turning left out of Dakota Crossing is hard and usually the only safe way to do it is to cross east bound, wait in median and then turn left when traffic is clear.

It gets narrower the more east it goes.

Protected green arrows at the light onto Taft, it is very difficult to turn onto Taft after picking my kids up from Saddle Ridge area.

Answered

16

Skipped

27

Public Meeting 1 - 11/2/2021

Saddle Ridge Elementary

PLEASE SIGN IN

Name	Address	Phone	EMAIL
Lori Altenbern	3542 Shenandoah St, Cheyenne	(307) 631-9740	laltenbern@yahoo.com
Teri Weisz	10532 Cherry Wood Ln	3077606254	tlweisz62@gmail.com
Jody Madson	3305 Fire Side Dr	719-458-9697	jody.madson@yahoo.com
Mark Christensen	1750 Christine Dr	307 637-6552	mchristensen@cheyennecity.org
Steve Lee	8912 East Peckish	307 631-4798	emerkat@aol.com
Anthony Wallace	10663 Choke Cherry Road	307-632-6072	awallace@vcn.com
Greg Weisz	10532 Cherry Wood Lane		gweisz@penceandmac.com
Charles Bloom	2101 O'neil -	638-4303	cblomd@cheyennecity.org
Dan Placke	3934 Farthing Rd	(970) 397-9082	dplacke@outlook.com
JEFF NIETERS	3806 Blue Sage Rd. 82801	(307) 871-6256	JNIETERS@LIVE.COM
Bob Simpson	3402 Hayes Ave	(307) 220-1999	kotablessing12@gmail.com
Kodi King	3405 McKinley Ave	3072756220	Kodi.King990@gmail.com
Bryant Holly Gay	3675 Purple Sage Rd	5107248237	
ED WADDELL	WESTERN RD		
GARY GRIGSBY	" "	307-632 5656	GGRIGSBY@WRD-htd.com
Christopher Yancy	2101 O'Neil Ave	307-638 4308	cyancy@cheyennempco.org

Public Meeting 1 - 11/2/2021

Saddle Ridge Elementary

PLEASE SIGN IN

Name	Address	Phone	EMAIL
Rick + D'Aun Griego	6705 Tate Rd.	307-421-6323	daunrd01@yahoo.com
Dave Burrill	3534 Saratoga	307-534-6717	dave_burrill@yahoo.com
Mick + Staci Merrill	8331 E Pershing Blvd	307-632-2835	
Tom + Debbie Dimick	3633 Christensen Rd	307-314-8287	dimick3633@live.com
Dawn L Edmunds	7309 E Pershing Blvd	630-4835	edmundsdms2@yahoo.com
Tom Mason	2101 O'Neil Ave	637-6299	tmason@cheyennepo.org
Jennie Vetter	2101 O'Neil Ave	638-4371	jvetten@cheyennecity.org
Tavis Vogel	3402 Campfire Trl	605-765-4592	tvogel@yahoo.com
Donna Witaszewski	6214 E Pershing Blvd	307-638-4468	dwoita@hotmail.com
Earl Mehl	3423 Christensen Rd	630-4448	earlmehl57@icloud.com
Juli Monahan	1908 Grasslands Pkwy		julimonahanwy@gmail.com
Rusty Brinkman	4713 Utah Rd / 4704 E Pershing	303-523-7581	LavacaPurpura@gmail.com
Carrie King	3405 Hayes Ave	307-996-6364	
Galen King	3905 McKinley #V	307-414-0823	
Chae Kling	3525 Ranch Vine Dr	307-778-7362	Chae.Kling@va.gov
Sherby Carlson	Y2 Consultants		



EAST PERSHING BOULEVARD



CORRIDOR STUDY



DATA DRIVEN DECISION MAKING

Introduction



Existing Conditions

East Pershing Boulevard, within the study limits, exists as a three-lane road section with little or no non-motorized accommodations. The rural three lane section stands in contrast to the evolving community to which it serves. The wide open feel of the roadway provides the impression that drivers can drive above the posted speed limit, endangering those that walk or bike along the shoulder of the roadway.



Evolving Community

Recent developments along the corridor that are reshaping the community include the Saddle Ridge Sub division and the East Cheyenne Community Park. Full build out of the Saddle Ridge Development will see an almost doubling in the current residential homes and the addition of an elementary school. Full build out is expected to be completed by 2025.

The East Cheyenne Community Open Space was officially opened on July 1st of this year. The City of Cheyenne is currently developing a Master Plan for the development of this park. Both of these developments will reshape the dynamic of this corridor through the introduction of pedestrians and children. It is paramount that this corridor is re-envisioned with them in mind.



Background

There has been significant growth in residential and industrial development within the immediate vicinity. This combined with the recent extension of Christensen Road from US 30 to the Campstool Road Interchange have had direct impacts on how those in the community use the East Pershing Boulevard corridor. Based on these changes, it is time to provide a new vision for the future of the corridor that meets the needs of local citizens and the public..

Goals

This project will undertake a comprehensive review of the current and future traffic demands as well as the needs of non-motorized users along the corridor. The final goal of this project is to develop a conceptual design for the future of East Pershing Boulevard that meets the needs and desires of the community. There is currently no estimated timeline for the final design and implementation of the outcomes of this plan.

GOAL / RANK	Plan Cheyenne Connect 2045 Goal Statements
MAINTENANCE / 1	Extend the life of the transportation system and promote fiscal responsibility by emphasizing maintenance over system expansion.
SAFETY / 2	Transportation facilities provide safe travel options for all residents and visitors.
EFFICIENCY / 3	Optimize the use of existing infrastructure and opportunistic funding options to make prudent investments in the transportation network to maintain system predictability.
CONNECTIVITY / 4	Develop and maintain a multimodal transportation system that provides direct, continuous, and safe connections between local and regional destinations and services.
GROWTH / 5	Stimulate growth in the economy, development, and tourism by providing a transportation system that accommodates current and future demand for the movement of residents, visitors, and goods.
RESILIENCY / 6	Design transportation facilities and networks so they are secure and resilient to impacts from manmade or natural disasters.
INTEGRATION/ 7	Integrate transportation and land use decisions to create and preserve neighborhoods that promote vibrant community character and encourage active living.
CHOICES / 8	Provide travel choices that are accessible to all travelers, promote local mobility, and reduce the impacts of transportation on the environment and neighborhoods.



EAST PERSHING BOULEVARD



CORRIDOR STUDY



DATA DRIVEN DECISION MAKING

Potential Treatments

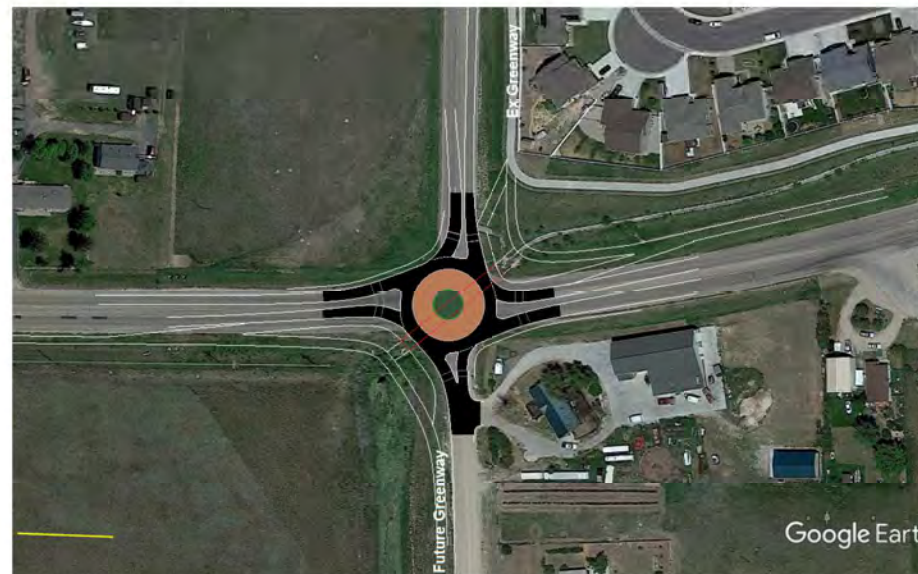
Intersection at Whitney Road

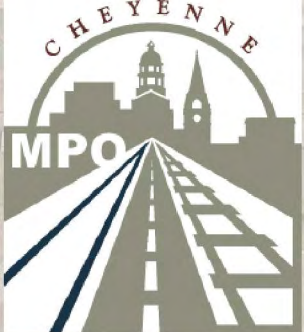
The intersection with Whitney Road currently operates acceptably without stop control measures along East Pershing Boulevard. With the expected increased capacity as a result of development, this intersection will eventually fall below an acceptable level of service, requiring the implementation of some form of vehicle control to alleviate demand from Whitney Road. The options available for implementation include:

- A four way stop
 - Pro—Cheap. Easy to implement in the short term.
 - Con— Every vehicle must stop.
- A signalized intersection
 - Pro—Provides ability to create gaps for secondary street movements.
 - Con—Expensive to construct and maintain. May increase accidents.
- A Roundabout
 - Pro—Statistically safest option for drivers and pedestrians. Operates at highest Level of Service.
 - Con—May require Right of Way acquisition to accommodate full design. Snow removal can be problematic.

All three options will provide a safe at-grade crossing for pedestrians.

Single Lane Roundabout

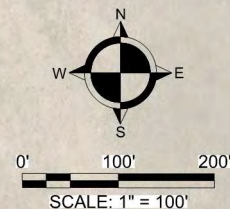




EAST PERSHING BOULEVARD



CORRIDOR STUDY



Y2 CONSULTANTS

8½'	6'	3'	3'	2'	4'	2'	12'	12'	12'	2'	4'	2'	3'	3'	10'	3'	8½'
Planting strip	Sidewalk						Drive lane	Turn lane	Drive lane						Sidewalk		Planting strip

Made with **Streetmix**

LEGEND

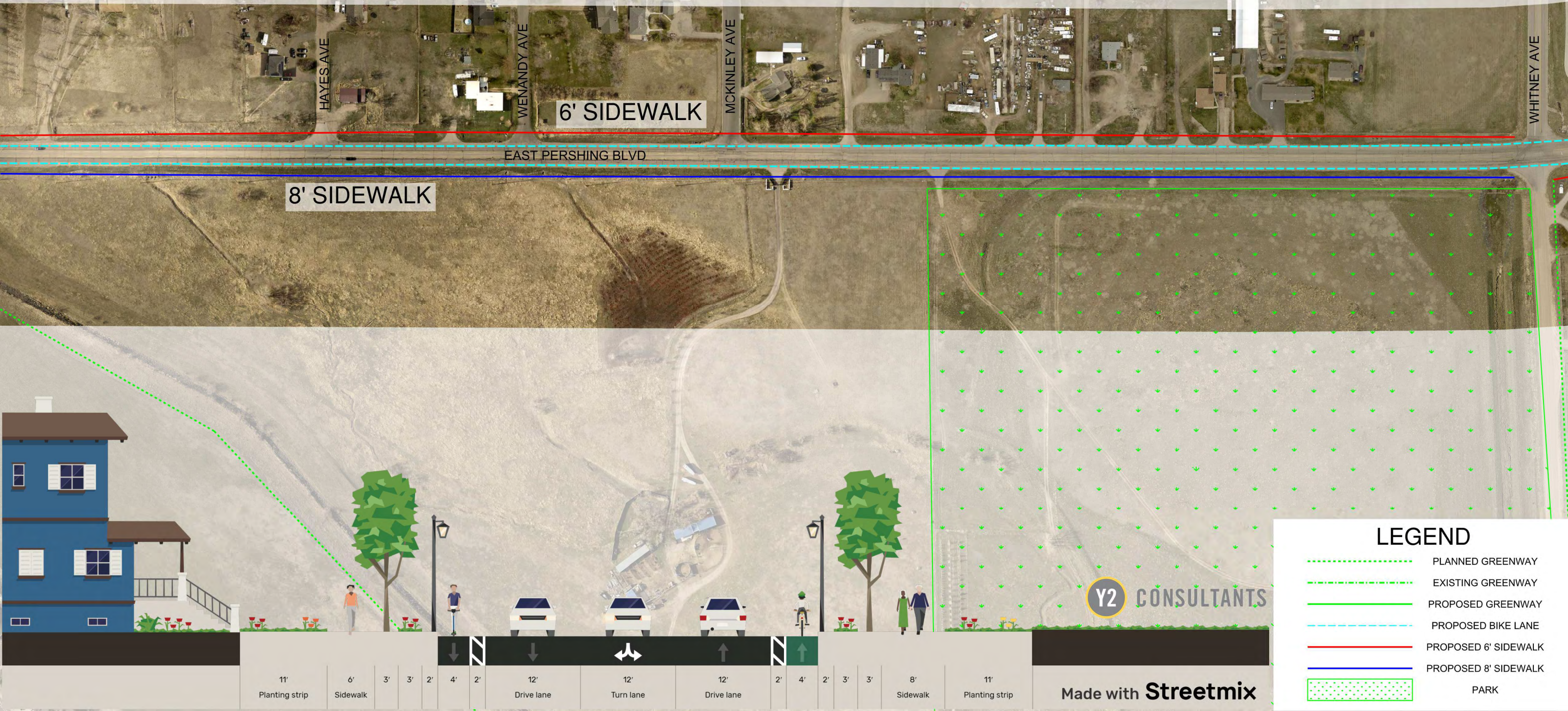
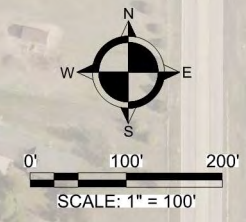
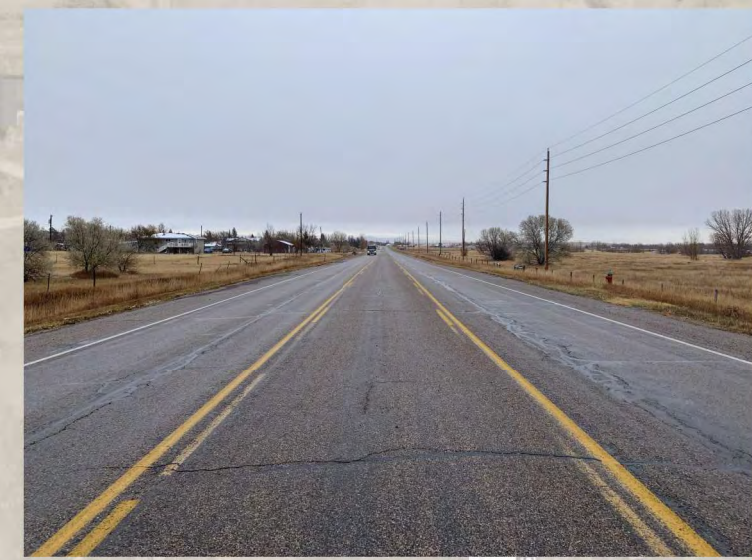
- PLANNED GREENWAY
- EXISTING GREENWAY
- PROPOSED GREENWAY
- PROPOSED BIKE LANE
- PROPOSED 6' SIDEWALK
- PROPOSED 8' SIDEWALK
- PARK



EAST PERSHING BOULEVARD



CORRIDOR STUDY



LEGEND

- PLANNED GREENWAY
- EXISTING GREENWAY
- PROPOSED GREENWAY
- PROPOSED BIKE LANE
- PROPOSED 6' SIDEWALK
- PROPOSED 8' SIDEWALK
- PARK

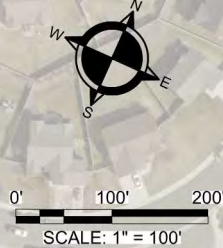
Made with **Streetmix**



EAST PERSHING BOULEVARD



CORRIDOR STUDY



Y2 CONSULTANTS

Made with **Streetmix**

LEGEND

- PLANNED GREENWAY
- EXISTING GREENWAY
- PROPOSED GREENWAY
- PROPOSED BIKE LANE
- PROPOSED 6' SIDEWALK
- PROPOSED 8' SIDEWALK
- PARK



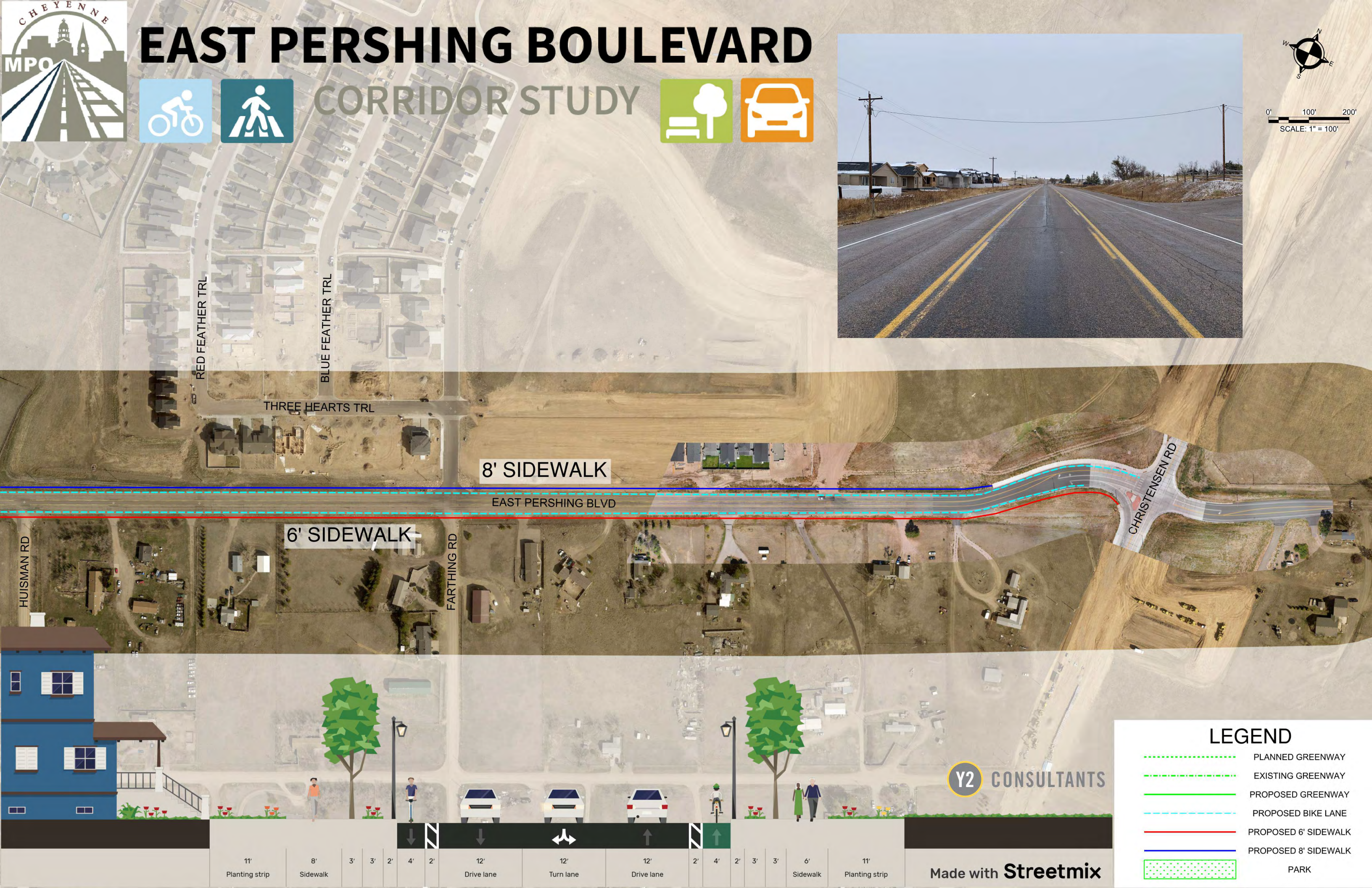
EAST PERSHING BOULEVARD



CORRIDOR STUDY



0' 100' 200'
SCALE: 1" = 100'



8' SIDEWALK

EAST PERSHING BLVD

6' SIDEWALK

CHRISTENSEN RD

HUISMAN RD

FARTHING RD



Y2 CONSULTANTS

LEGEND

- PLANNED GREENWAY
- EXISTING GREENWAY
- PROPOSED GREENWAY
- PROPOSED BIKE LANE
- PROPOSED 6' SIDEWALK
- PROPOSED 8' SIDEWALK
- PARK

Made with Streetmix

How do you currently relate to the corridor?

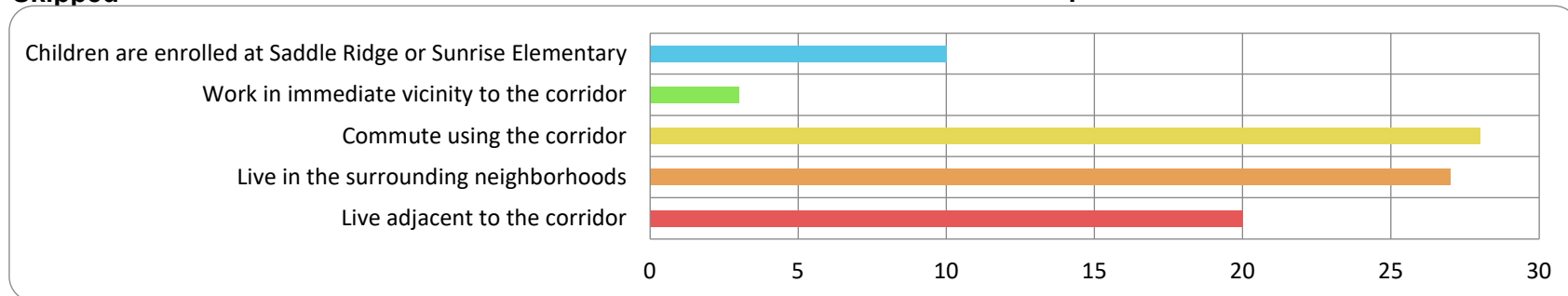
Choice	Responses	
Live adjacent to the corridor	20	47.62%
Live in the surrounding neighborhoods	27	64.29%
Commute using the corridor	28	66.67%
Work in immediate vicinity to the corridor	3	7.14%
Children are enrolled at Saddle Ridge or Sunrise Elementary	10	23.81%

Answered

42

Skipped

1



How do your children get to school?

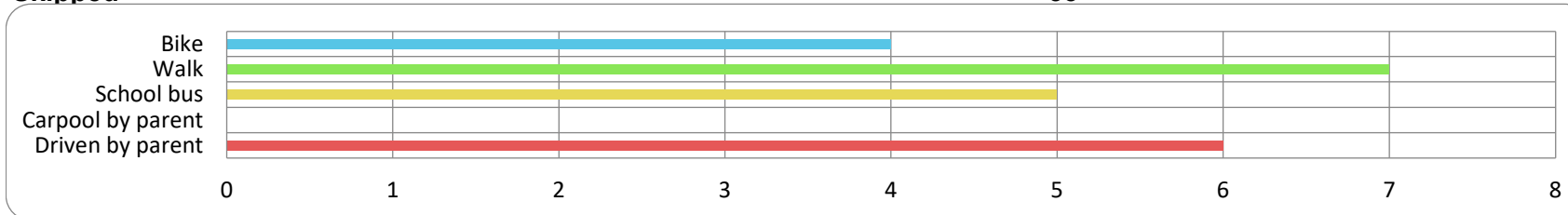
Choice	Responses	
Driven by parent	6	60.00%
Carpool by parent	0	0.00%
School bus	5	50.00%
Walk	7	70.00%
Bike	4	40.00%

Answered

10

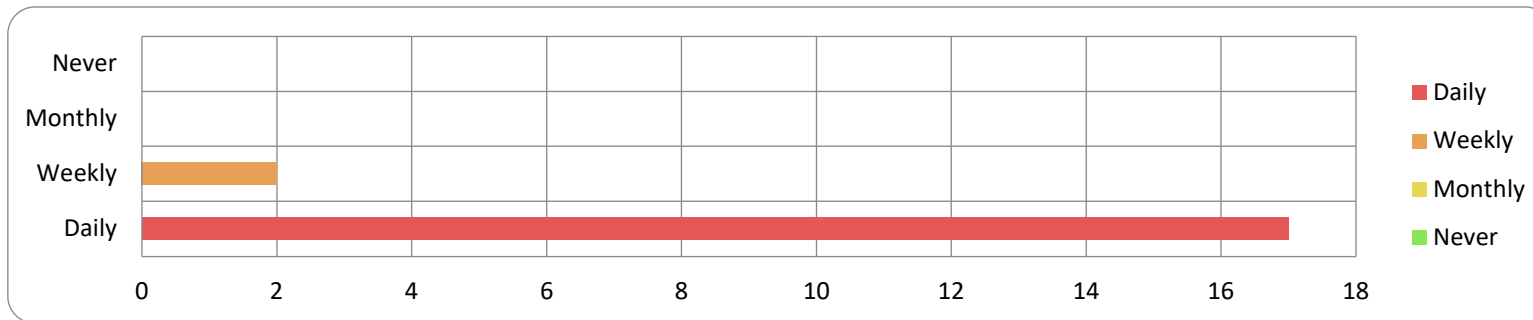
Skipped

33



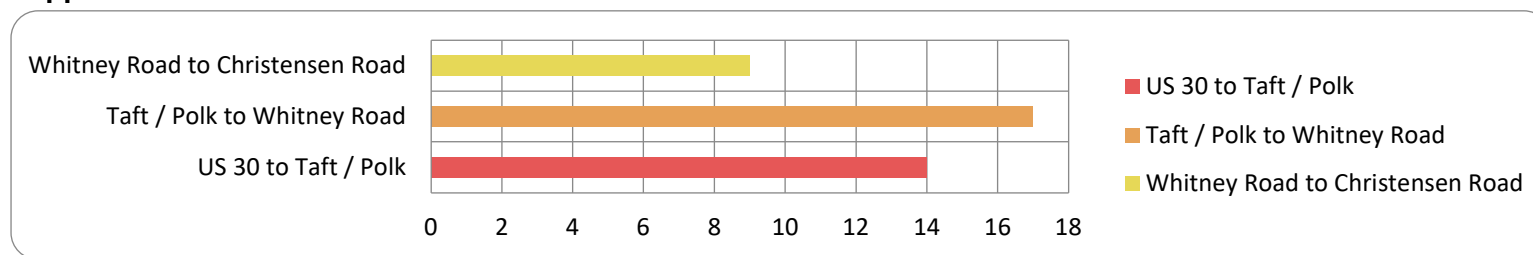
How often do you drive on East Pershing Boulevard?

Choice	Responses	
Daily	17	89.47%
Weekly	2	10.53%
Monthly	0	0.00%
Never	0	0.00%
Answered	19	
Skipped	1	



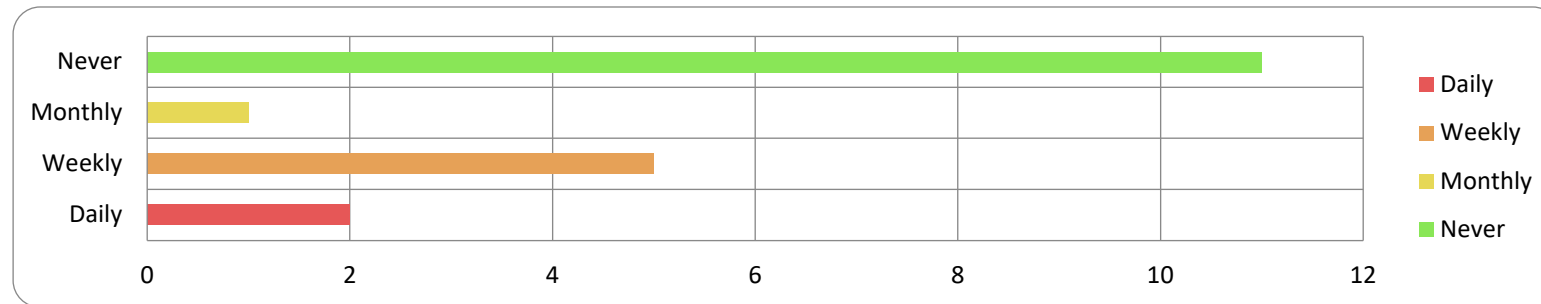
What sections of East Pershing Boulevard do you use most often?

Choice	Responses	
US 30 to Taft / Polk	14	73.68%
Taft / Polk to Whitney Road	17	89.47%
Whitney Road to Christensen Road	9	47.37%
Answered	19	
Skipped	1	



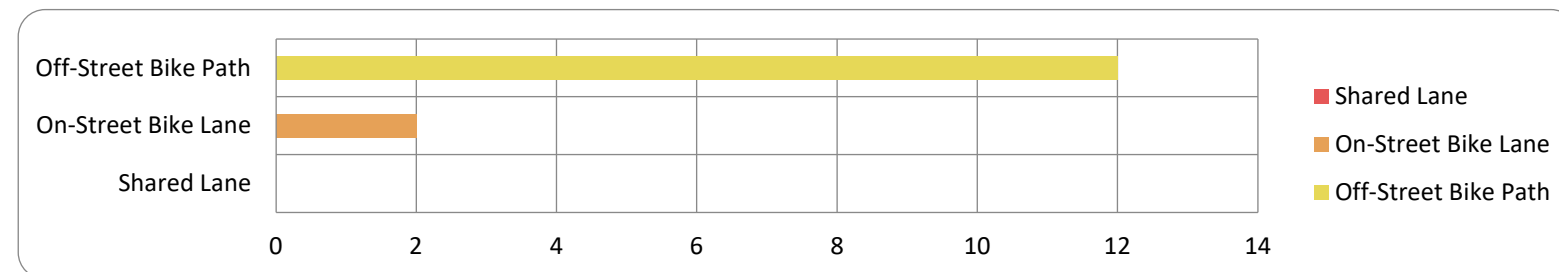
How often do you use East Pershing Boulevard as a pedestrian or Bicyclist?

Choice	Responses	
Daily	2	10.53%
Weekly	5	26.32%
Monthly	1	5.26%
Never	11	57.89%
Answered	19	
Skipped	1	



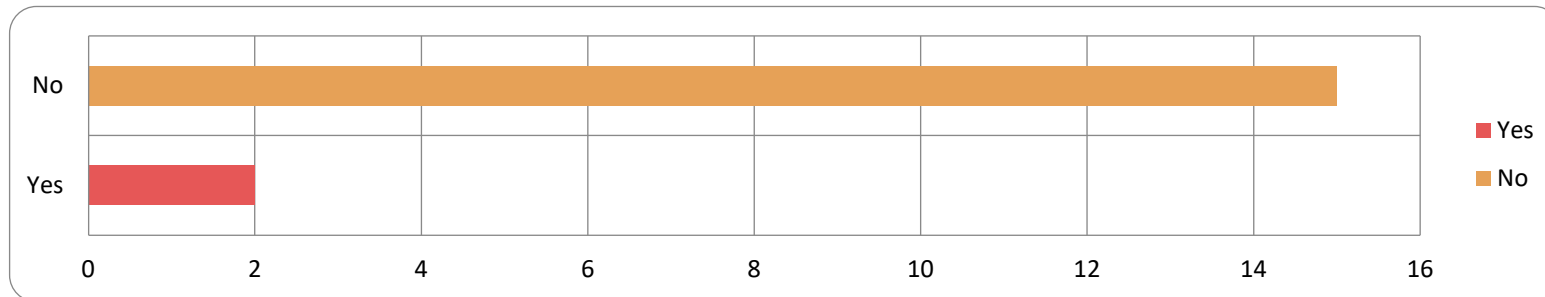
What type of bicycle facility do you prefer?

Choice	Responses	
Shared Lane	0	0.00%
On-Street Bike Lane	2	14.29%
Off-Street Bike Path	12	85.71%
Answered	14	
Skipped	6	



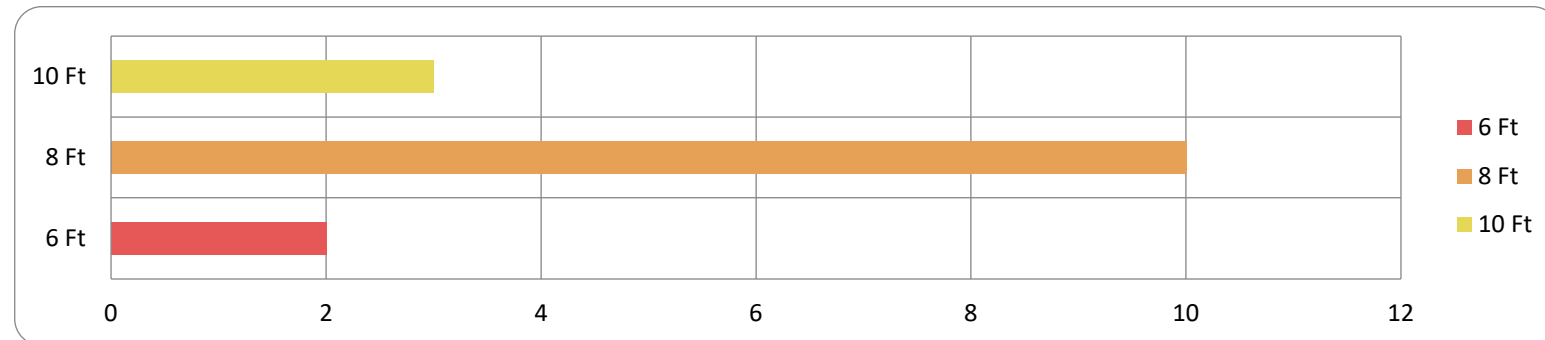
If a transit service was provided along East Pershing Boulevard, would a member of your household use it?

Rating	Responses	
Yes	2	11.76%
No	15	88.24%
Average	0	
Answered	17	
Skipped	3	



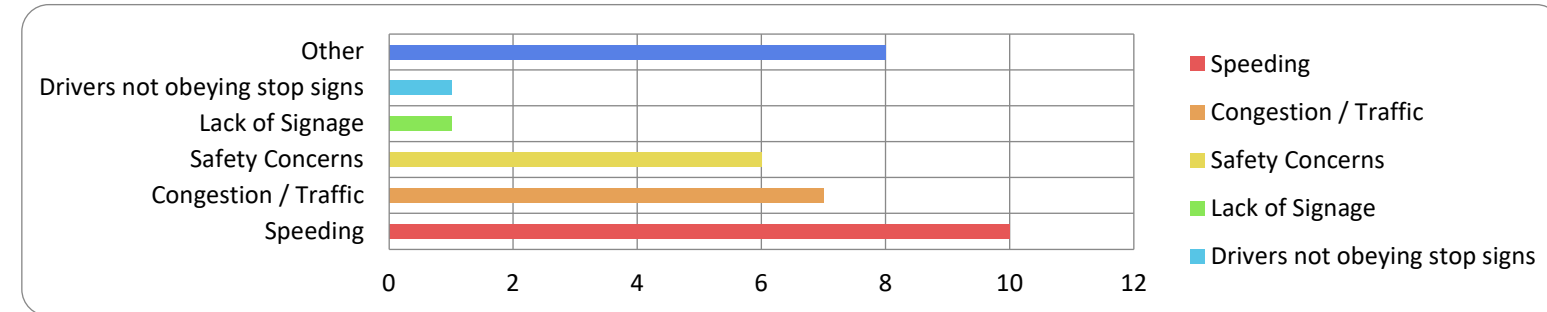
If a sidewalk was provided along East Pershing, what width would you prefer?

Choice	Responses	
6 Ft	2	13.33%
8 Ft	10	66.67%
10 Ft	3	20.00%
Answered	15	
Skipped	5	



Have you experienced or observed any problems along East Pershing Boulevard?

Choice	Responses	
Speeding	10	55.56%
Congestion / Traffic	7	38.89%
Safety Concerns	6	33.33%
Lack of Signage	1	5.56%
Drivers not obeying stop signs	1	5.56%
Other	8	44.44%
Answered	18	
Skipped	2	



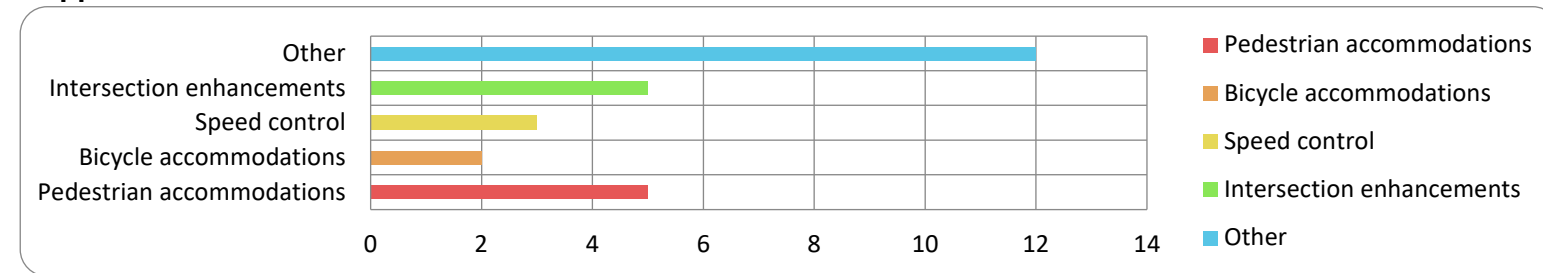
Please describe the problems encountered.

Response	Response
Racing	Bicycles, People walking at night.
People turning in front of bicycles	uneven pavement
Large volume of traffic turning south of Taft	narrow and rough road beyond Christensen
Ridiculous traffic	No place to walk safely. Whitney / Pershing is dangerous
Speeding, Have formally complained with no results.	People pulling out in front of others. Light cycle at Taft
East bound traffic from 4:45-5:30 PM	People driving too slowly
I have no problem speeding.	Crashes
too narrow beyond Christensen.	Traffic light at Taft routinely gets out of sorts.

Answered 16
Skipped 4

What improvements do you think are most needed on the East Pershing boulevard corridor?

Choice	Responses	
Pedestrian accommodations	5	29.41%
Bicycle accommodations	2	11.76%
Speed control	3	17.65%
Intersection enhancements	5	29.41%
Other	12	70.59%
Answered	17	
Skipped	3	



Please describe the improvements that you believe are most needed on East Pershing Boulevard.

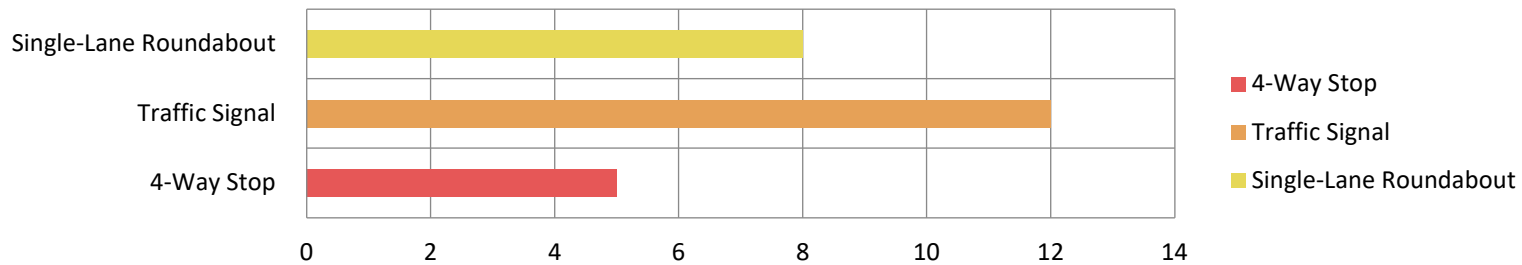
Response
Police Enforcement
Widening east of Christensen
Lighting at intersections.
Turn lane at Taft.
2nd east bound lane from US 30 to Taft
Roundabout at Whitney
Local traffic only past Christensen
Shoulder, curb and gutter, and sidewalk
Keep trucks / semis off east pershing
Put up signs
Pavement widening and extend project further east of Christensen
Remove S curve prior to Christensen and add lighting.

Answered	12
Skipped	8

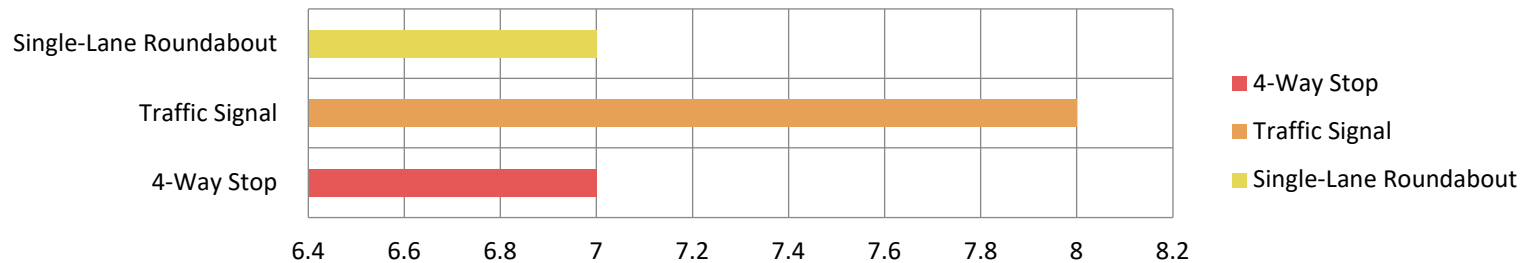
Given the likely need for traffic control at the intersection of Whitney and E Pershing Boulevard in the future, please provide your feedback on the following possibilities:

	Prefer		Do not prefer	
4-Way Stop	5	25.00%	7	35.00%
Traffic Signal	12	60.00%	8	40.00%
Single-Lane Roundabout	8	40.00%	7	35.00%
Answered	20			
Skipped	0			

Prefer



Do not prefer



Why is a 4-Way Stop not a preferred option?

Response

must be observed

Requires all vehicles to stop.

People will run sign.

E Pershing should have right of way more often than 4 way

Answered

4

Skipped

16

Why is a Traffic Signal not a preferred option?

Response

Requires unnecessary stops

Answered

1

Skipped

19

Why is a Single-Lane Roundabout not a preferred option?

Response

Roundabout at converse

Slow down flow of traffic. People in this town don't know how to use these for some reason.

Narrow and useless. Larger vehicles need more room.

Big trucks cannot fit

Answered

4

Skipped

16

Is there anything else that should be considered moving forward with the project?

Response

Pull out areas for mailboxes

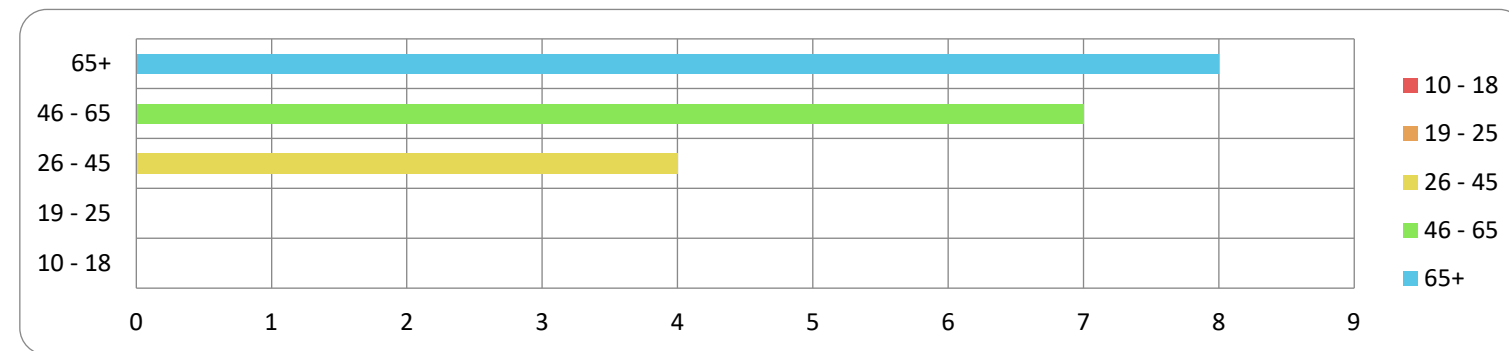
Worst part of East Pershing is between Christensen and the Old railroad bridge at Archer. This part is narrow, very rough and poor quality pavement and has high traffic. Some pedestrians and bicycles with no sidewalks or shoulders. Likely belongs to Laramie County but has high traffic and needs to be considered as part of the whole network.

Answered 2
Skipped 18

What age bracket do you fall in?

Choice	Responses	
10 - 18	0	0.00%
19 - 25	0	0.00%
26 - 45	4	21.05%
46 - 65	7	36.84%
65+	8	42.11%

Answered 19
Skipped 1



Public Meeting 2 - 3/24/2022

Baggs Elementary School

PLEASE SIGN IN

Name	Address	Phone	EMAIL
Buddy Tennant	2800 Mc Conn B-12		buddy-tennant@yahoo.com
Jon Hazlett	4720 Split Rail Ct	307-631-6282	jonhazlett@gmail.com
Pam Mason	3403 Foxcroft Rd	307-632-8724	
Kim Prince-Carlson	3314 Fireside Dr	307-214-2878	kpcowgirlz@gmail.com
Edward & Ann Carlson	7435 Three Hearts Trail	307-632-5222	ecarlson2009@gmail.com
Donna Spatz	1126 Albin Ln	307-231-5554	dspatz@yahoo.com
Karen Lockhart	2013 PRAIRIE DR DR	267-229-9486	lockhart205@MAIL.COM
D. Michelle Aldrich	4503 E 17 St	307-760-6113	teachergoo@yahoo.com
Bryant Ginn Stevens	7224 Heritage Dr	303-269-5410	ginnstevens@gmail.com
Barry & Carol Stark	5326 Fir Side Dr	307-247-0065	bstark@bresnan.net
Karen Milmont	2111 Meadow Dr.	514-2386	
Rick Houser	4720 E 17th St	425 351 7319	REHouser@GMAIL.com
Bill Inman	7112 E. Pershing	214-2938	beWillie98@a.mail.com
KAROLYN MIDDLESON	6220 E PERSHING	220-1090	rcmKkm@bresnan.net

Public Meeting 2 - 3/24/2022
Baggs Elementary School

PLEASE SIGN IN

Name	Address	Phone	EMAIL
Sandra Koehn	4713 Long Branch h ⁸²⁰⁰¹		slkmarketingva1@gmail.com
Al Simpson	200 Gardenia Dr		al-simpson@wyoming.com
Tom Dimick	3633 Christensen Rd		dimick3633@live.com
Dann Edmunds	7308 E Pershing		edmunds4m32@yahoo.com
Don Kerner	1211 HESS AVE		dkerner@gmail
Mark Titus	5916 E. Pershing		burning-bronco@yahoo.com
Marv Steiner	5916 E. Pershing		
Chris Milmont	2111 Meadow Dr.		cmilmont@hotmail.com
Jim Boyd	4608 Van Buren Ave		j1boyd6@gmail.com
Barbara Boyd	4608 Van Buren Ave		b1boyd7@gmail.com
Steve Laybarn	Council		
Darryl Johnson	3385 Hales Ranch		
Galen King	3405 McKinley AV		

Public Meeting 2 - 3/24/2022

Baggs Elementary School

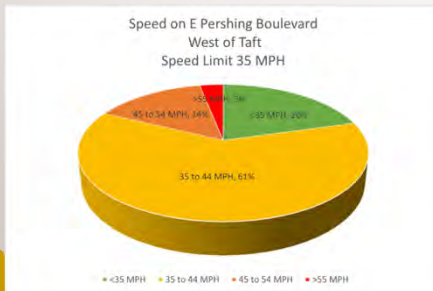
PLEASE SIGN IN

[illegible]

Existing Conditions & Issues

Existing Conditions & Driving Forces:

- Development along corridor is reshaping the community and generating a more diverse user base
- New connection of Christensen to Campstool Interchange
- East Cheyenne Park is currently undergoing master planning
- Existing road section promotes speeding
- Largely void of pedestrian and bicycle accommodations
- Inconsistent Right Of Way from Wenandy to Fireside drive



Traffic Analysis:

- Safety Review – Core Issue
 - 85th percentile speed is 10 MPH over posted speed
- A three-lane section is more than adequate
- Intersection of Whitney and Pershing encounters issues around 2026



1

Public Engagement and Survey Feedback

Initial Survey Findings

- Identified issues of speeding and lack of signage
- Non-motorized users do not feel safe
- Need for Pedestrian accommodations and protected crossings

Saddle Ridge Elementary School

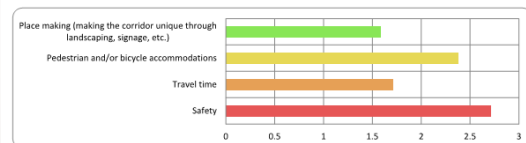
- Issue of speeding, lack of signage, and driver disregard for stop signs
- Desire for larpedes
- Desire for dedicated right turn lanes

Public Meeting Survey Findings

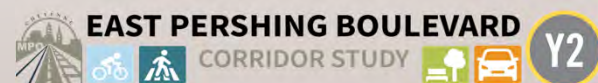
- Preference for wider sidewalk option
- Openness to roundabout at Whitney

Rank your priorities for the corridor from top to bottom.

Choice	1	2	3	4
Safety	8 33.33%	9 37.50%	3 12.50%	0 0.00%
Travel time	5 20.83%	2 8.33%	3 12.50%	9 37.50%
Pedestrian and/or bicycle accommodations	8 33.33%	5 20.83%	4 16.67%	2 8.33%
Place making (making the corridor unique through landscaping, signage, etc.)	3 12.50%	2 8.33%	7 29.17%	6 25.00%
Answered	24			
Skipped	19			



If a sidewalk was provided along East Pershing, what width would you prefer?



2

Proposed Corridor Treatments

Typical Section per Cheyenne UDC



- Three lane with Shared Left Turn
- Curb and Gutter
- Bike lanes
- Alternating 6' & 8' width detached sidewalks

Short Term

- Pedestrian accommodations
- Safety - additional signage & enforcement
- Four-way stop at Whitney and Pershing

Long Term

- Right of Way Acquisition, Access Management, & Geometry realignment
- Roundabout at Whitney & E Pershing

EAST PERSHING BOULEVARD
CORRIDOR STUDY

Icons: Bicycle, Pedestrian, Tree, Car, Y2


3

Drainage Review

Drainage Review

- Four discharge locations
 - Dry Creek
 - Private Property – Identified issue →
 - East Park / Whitney Road South
 - Christensen Road South
- Curb and Gutter w/ Inlets to open ditch conveyance

Public Engagement Phase II
Social Pinpoint website to follow meeting



EAST PERSHING BOULEVARD
CORRIDOR STUDY

Icons: Bicycle, Pedestrian, Tree, Car, Y2

4



EAST PERSHING BOULEVARD



CORRIDOR STUDY



DATA DRIVEN DECISION MAKING

Introduction



Existing Conditions

East Pershing Boulevard, within the study limits, exists as a three-lane road section with little or no non-motorized accommodations. The rural three lane section stands in contrast to the evolving community to which it serves. The wide open feel of the roadway provides the impression that drivers can drive above the posted speed limit, endangering those that walk or bike along the shoulder of the roadway.



Evolving Community

Recent developments along the corridor that are reshaping the community include the Saddle Ridge Sub division and the East Cheyenne Community Park. Full build out of the Saddle Ridge Development will see an almost doubling in the current residential homes and the addition of an elementary school. Full build out is expected to be completed by 2025.

The East Cheyenne Community Open Space was officially opened on July 1st of this year. The City of Cheyenne is currently developing a Master Plan for the development of this park. Both of these developments will reshape the dynamic of this corridor through the introduction of pedestrians and children. It is paramount that this corridor is re-envisioned with them in mind.



Background

There has been significant growth in residential and industrial development within the immediate vicinity. This combined with the recent extension of Christensen Road from US 30 to the Campstool Road Interchange have had direct impacts on how those in the community use the East Pershing Boulevard corridor. Based on these changes, it is time to provide a new vision for the future of the corridor that meets the needs of local citizens and the public..

Goals

This project will undertake a comprehensive review of the current and future traffic demands as well as the needs of non-motorized users along the corridor. The final goal of this project is to develop a conceptual design for the future of East Pershing Boulevard that meets the needs and desires of the community. There is currently no estimated timeline for the final design and implementation of the outcomes of this plan.

GOAL / RANK	Plan Cheyenne Connect 2045 Goal Statements
MAINTENANCE / 1	Extend the life of the transportation system and promote fiscal responsibility by emphasizing maintenance over system expansion.
SAFETY / 2	Transportation facilities provide safe travel options for all residents and visitors.
EFFICIENCY / 3	Optimize the use of existing infrastructure and opportunistic funding options to make prudent investments in the transportation network to maintain system predictability.
CONNECTIVITY / 4	Develop and maintain a multimodal transportation system that provides direct, continuous, and safe connections between local and regional destinations and services.
GROWTH / 5	Stimulate growth in the economy, development, and tourism by providing a transportation system that accommodates current and future demand for the movement of residents, visitors, and goods.
RESILIENCY / 6	Design transportation facilities and networks so they are secure and resilient to impacts from manmade or natural disasters.
INTEGRATION/ 7	Integrate transportation and land use decisions to create and preserve neighborhoods that promote vibrant community character and encourage active living.
CHOICES / 8	Provide travel choices that are accessible to all travelers, promote local mobility, and reduce the impacts of transportation on the environment and neighborhoods.



EAST PERSHING BOULEVARD



CORRIDOR STUDY

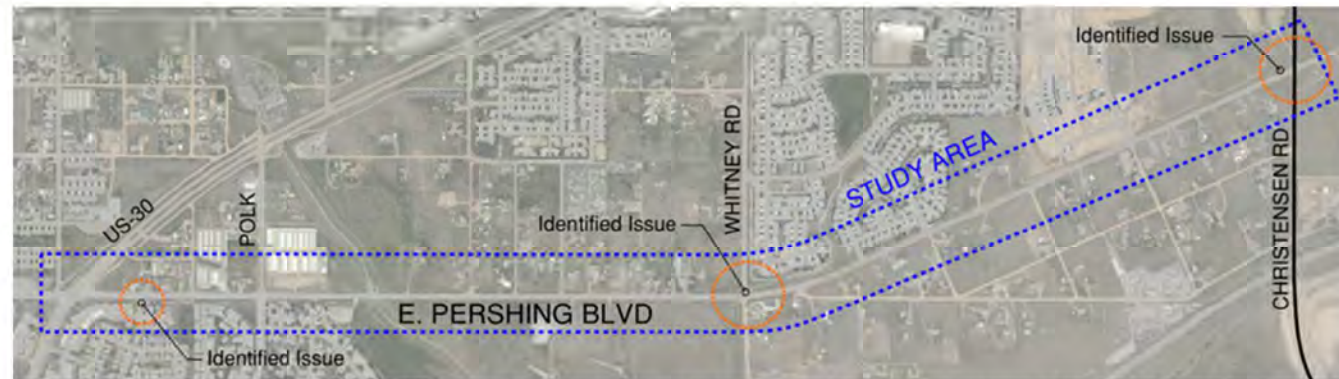


Traffic Data

Under the current (2021) traffic volumes, all of the intersections operate at or above an acceptable level.

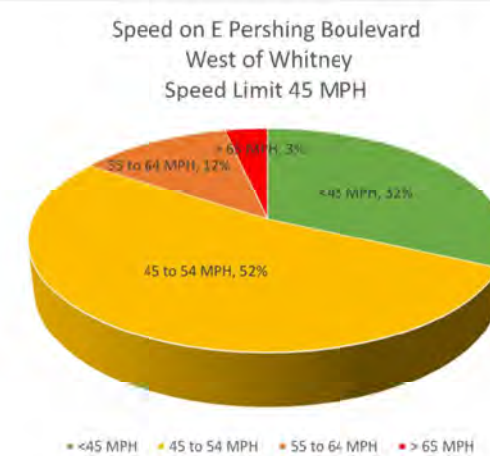
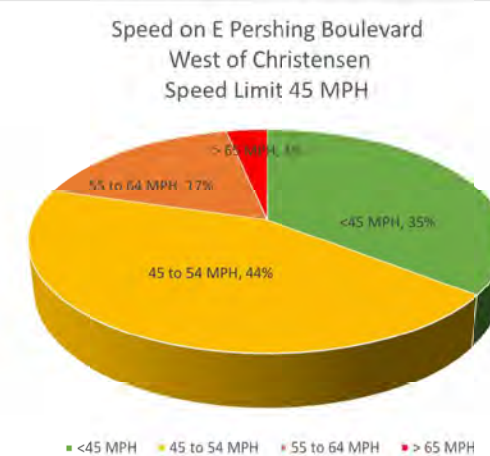
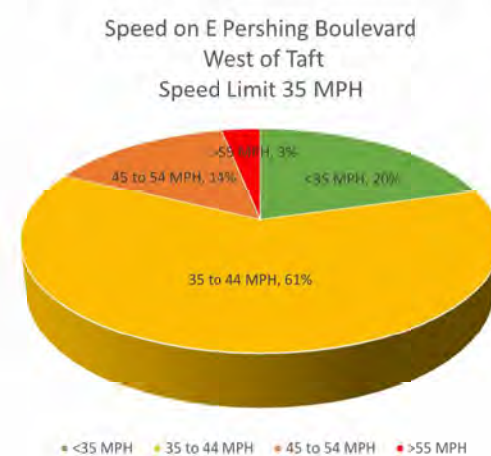
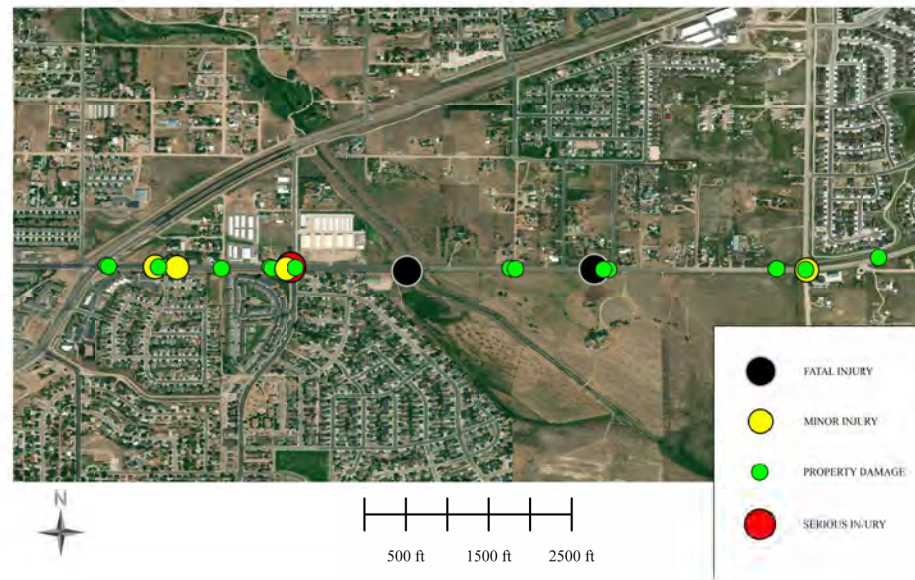
Future traffic volumes for the corridor were projected to 2045 using Cheyenne MPO's Regional Traffic Model, as well as, potential land use changes and redevelopments that may occur in the next 25 years. Under these projected volumes, three locations were identified for concern and are list below:

- Grasslands Parkway northbound turning movement onto E Pershing Boulevard
- Whitney Road northbound turning movement onto E Pershing Boulevard
- Christensen Road northbound turning movement onto E Pershing Boulevard



A three-lane road section provides adequate capacity up to and beyond the 2045 design year for the corridor.

Recorded Crash Locations



DATA DRIVEN DECISION MAKING

Preliminary Findings

Core Issue—Speeding and Safety

East Pershing Boulevard currently lacks continuous bicycle and pedestrian facilities for the length of the corridor. Based on recent developments in the vicinity it is crucial that accommodations be provided for the evolving community. The recent opening of the East Cheyenne Community Green Space and its future planned development creates an additional need of providing a safe pedestrian crossing.

Speeds along the corridor appear to be a prevailing issue. The recorded 85th percentile speeds were found to be consistently 10 mph above the posted limit. The 85th percentile speed benchmark is used in traffic studies as it captures the generally observed flow of traffic while excluding gross offenders.

Location	Posted Speed (MPH)	Percent Speeding		85th Percentile Speed (MPH)	
		EB	WB	EB	WB
Taft / Polk	35	87.80%	70.95%	48.75	43.27
Hayes	45	86.59%	93.35%	58.86	61.16
Whitney	45	82.74%	54.33%	58.8	51.71
Fireside	45	91.43%	73.77%	68.6	58.66
Farthing	45	79.45%	35.61%	59.84	49.98
Christensen	45	64.31%	73.51%	54.8	57.65



EAST PERSHING BOULEVARD



CORRIDOR STUDY



DATA DRIVEN DECISION MAKING

Potential Treatments

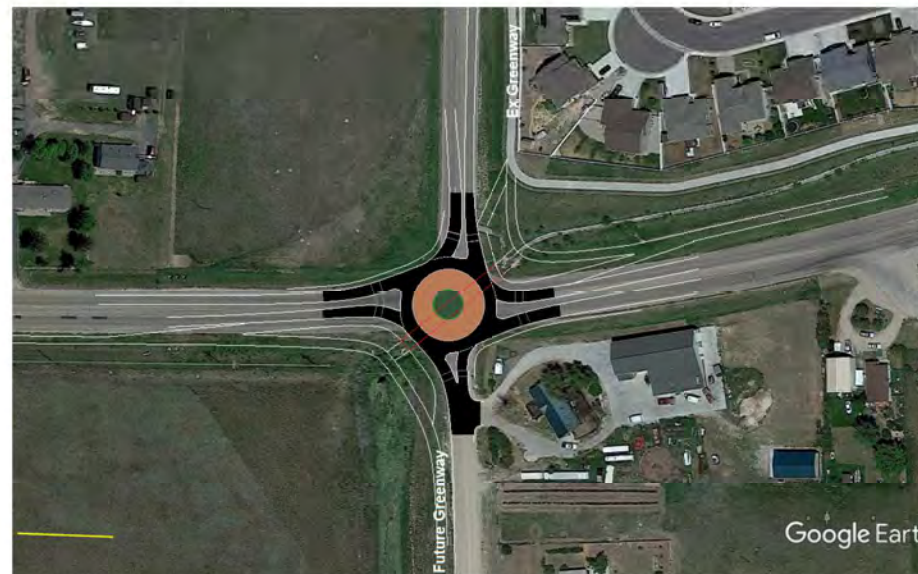
Intersection at Whitney Road

The intersection with Whitney Road currently operates acceptably without stop control measures along East Pershing Boulevard. With the expected increased capacity as a result of development, this intersection will eventually fall below an acceptable level of service, requiring the implementation of some form of vehicle control to alleviate demand from Whitney Road. The options available for implementation include:

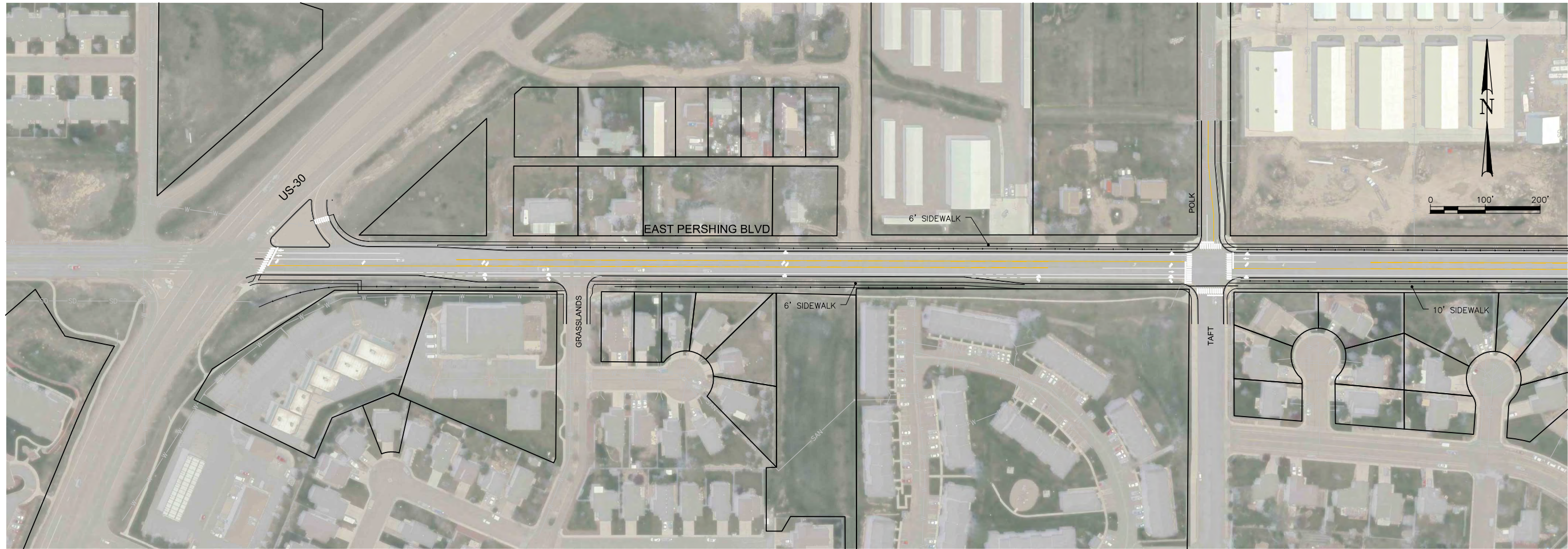
- A four way stop
 - Pro—Cheap. Easy to implement in the short term.
 - Con— Every vehicle must stop.
- A signalized intersection
 - Pro—Provides ability to create gaps for secondary street movements.
 - Con—Expensive to construct and maintain. May increase accidents.
- A Roundabout
 - Pro—Statistically safest option for drivers and pedestrians. Operates at highest Level of Service.
 - Con—May require Right of Way acquisition to accommodate full design. Snow removal can be problematic.

All three options will provide a safe at-grade crossing for pedestrians.

Single Lane Roundabout



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E PERSHING BLVD CORRIDOR STUDY

CHEYENNE MPO

E PERSHING BOULEVARD

CHEYENNE, WY

PLAN OVER PLAN 1

C1.2



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NATURAL RESOURCE SERVICES

y2consultants.com

307.733.2595

DATE

3/24/2022

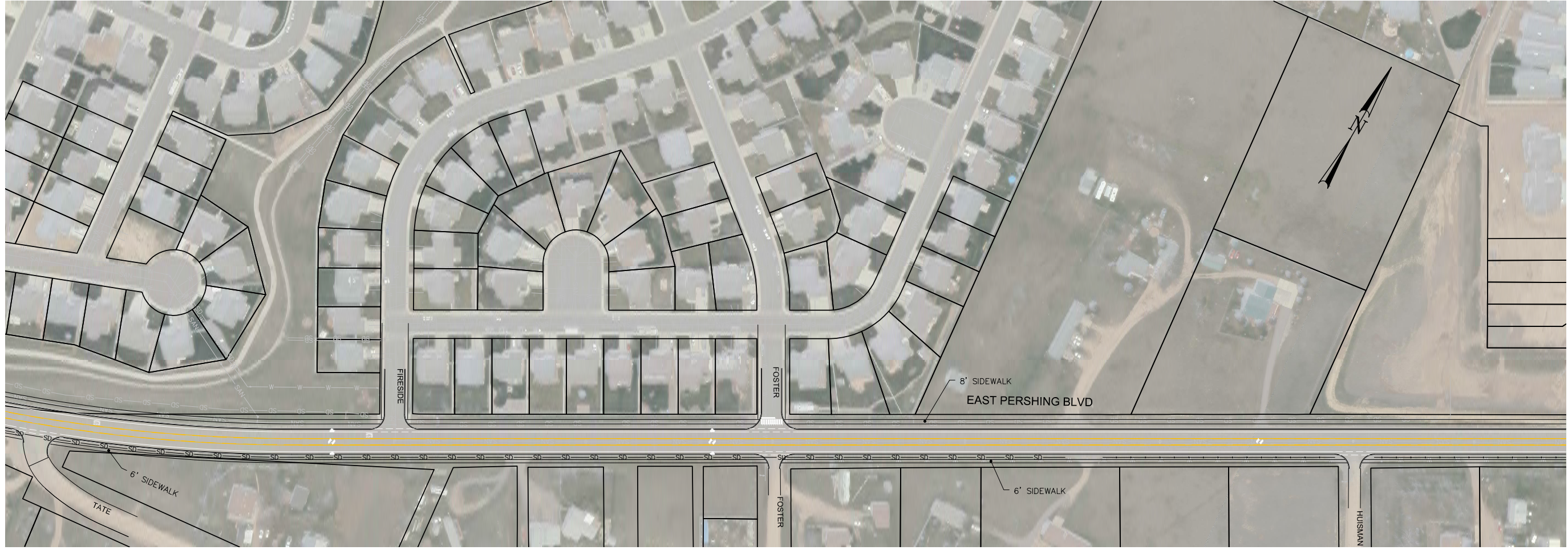
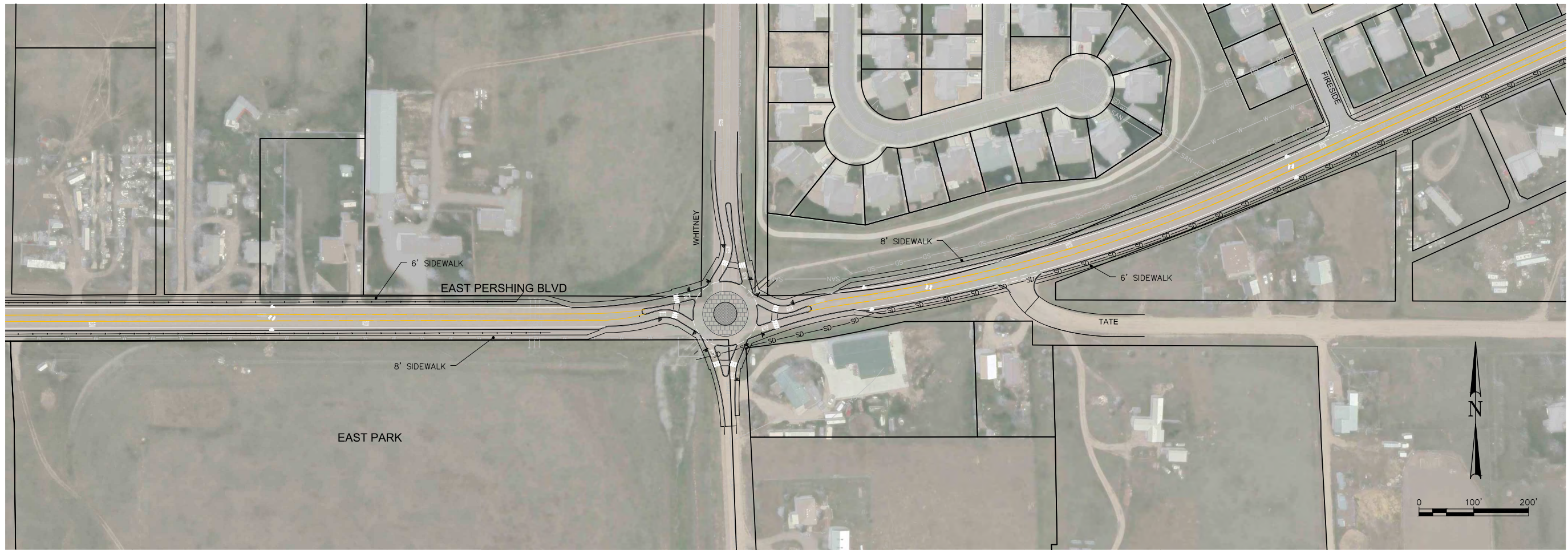
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PUBLIC MEETING

DRAWN BY: SAH

CHECKED BY: SAH JOB #: 21072

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E PERSHING BLVD CORRIDOR STUDY

CHEYENNE MPO

E PERSHING BOULEVARD

CHEYENNE, WY

PLAN OVER PLAN 2

C1.3

Y2

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307.733.2569

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PUBLIC MEETING

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JOB #: 21072



E PERSHING BLVD CORRIDOR STUDY

CHEYENNE MPO
E PERSHING BOULEVARD
CHEYENNE, WY

C1.4

PLAN OVER PLAN 3



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DRAWN BY: SAH
CHECKED BY: SAH
JOB #: 21072

C: SPEED STUDY

**MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Taft Ave/Polk Ave**

A study of vehicle traffic was conducted with the device having serial number 404091. The study was done in the Eastbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 05/24/2021 at 12:00 PM and concluded on 05/25/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4,781 vehicles passed through the location with a peak volume of 190 on 05/24/2021 at [05:15 PM-05:30 PM] and a minimum volume of 1 on 05/25/2021 at [01:15 AM-01:30 AM]. The AADT count for this study was 4,781.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 40 - 45 MPH range or lower. The average speed for all classified vehicles was 42 MPH with 87.80% vehicles exceeding the posted speed of 35 MPH. 4.85% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 40MPH and the 85th percentile was 48.75 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
2	10	11	30	108	413	1323	1507	794	279	93	55	24	21	35

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 1691 which represents 36 percent of the total classified vehicles. The number of Vans & Pickups in the study was 2656 which represents 56 percent of the total classified vehicles. The number of Busses & Trucks in the study was 233 which represents 5 percent of the total classified vehicles. The number of Tractor Trailers in the study was 125 which represents 3 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
1691	2147	509	85	90	69	56	58							

CHART 2

HEADWAY

During the peak traffic period, on 05/24/2021 at [05:15 PM-05:30 PM] the average headway between vehicles was 4.712 seconds. During the slowest traffic period, on 05/25/2021 at [01:15 AM-01:30 AM] the average headway between vehicles was 450 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 50.00 and 115.00 degrees F.

**MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Taft Ave/Polk Ave**

A study of vehicle traffic was conducted with the device having serial number 404061. The study was done in the Westbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 05/24/2021 at 12:00 PM and concluded on 05/25/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4,718 vehicles passed through the location with a peak volume of 157 on 05/25/2021 at [07:15 AM-07:30 AM] and a minimum volume of 0 on 05/25/2021 at [01:15 AM-01:30 AM]. The AADT count for this study was 4,718.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 35 - 40 MPH range or lower. The average speed for all classified vehicles was 38 MPH with 70.95% vehicles exceeding the posted speed of 35 MPH. 1.37% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 35MPH and the 85th percentile was 43.27 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
1	5	5	31	156	1162	1985	969	244	59	22	16	11	5	10

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 2890 which represents 62 percent of the total classified vehicles. The number of Vans & Pickups in the study was 1613 which represents 34 percent of the total classified vehicles. The number of Busses & Trucks in the study was 108 which represents 2 percent of the total classified vehicles. The number of Tractor Trailers in the study was 70 which represents 1 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
2890	1457	156	31	42	57	30	18							

CHART 2

HEADWAY

During the peak traffic period, on 05/25/2021 at [07:15 AM-07:30 AM] the average headway between vehicles was 5.696 seconds. During the slowest traffic period, on 05/25/2021 at [01:15 AM-01:30 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 50.00 and 115.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Hayes Ave

A study of vehicle traffic was conducted with the device having serial number 404055. The study was done in the Eastbound lane at Pershing Blvd in Cheyenne, Wy in Laramie county. The study began on 05/24/2021 at 12:00 PM and concluded on 05/25/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 2,579 vehicles passed through the location with a peak volume of 104 on 05/24/2021 at [05:15 PM-05:30 PM] and a minimum volume of 0 on 05/25/2021 at [01:15 AM-01:30 AM]. The AADT count for this study was 2,579.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 50 - 55 MPH range or lower. The average speed for all classified vehicles was 52 MPH with 86.59% vehicles exceeding the posted speed of 45 MPH. 26.46% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 50MPH and the 85th percentile was 58.86 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
1	4	1	3	1	12	64	253	665	855	374	172	55	27	41

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 1001 which represents 40 percent of the total classified vehicles. The number of Vans & Pickups in the study was 1354 which represents 54 percent of the total classified vehicles. The number of Busses & Trucks in the study was 108 which represents 4 percent of the total classified vehicles. The number of Tractor Trailers in the study was 65 which represents 3 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
1001	1141	213	37	39	40	22	35							

CHART 2

HEADWAY

During the peak traffic period, on 05/24/2021 at [05:15 PM-05:30 PM] the average headway between vehicles was 8.571 seconds. During the slowest traffic period, on 05/25/2021 at [01:15 AM-01:30 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 50.00 and 109.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Hayes Ave

A study of vehicle traffic was conducted with the device having serial number 404022. The study was done in the Westbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 05/24/2021 at 12:00 PM and concluded on 05/25/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 2,719 vehicles passed through the location with a peak volume of 100 on 05/25/2021 at [07:15 AM-07:30 AM] and a minimum volume of 0 on 05/25/2021 at [01:00 AM-01:15 AM]. The AADT count for this study was 2,719.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 50 - 55 MPH range or lower. The average speed for all classified vehicles was 54 MPH with 93.35% vehicles exceeding the posted speed of 45 MPH. 43.18% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 50MPH and the 85th percentile was 61.16 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
0	1	0	2	2	7	35	131	463	880	681	311	94	37	33

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 574 which represents 21 percent of the total classified vehicles. The number of Vans & Pickups in the study was 1815 which represents 68 percent of the total classified vehicles. The number of Busses & Trucks in the study was 211 which represents 8 percent of the total classified vehicles. The number of Tractor Trailers in the study was 76 which represents 3 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
574	1403	412	80	102	42	20	44							

CHART 2

HEADWAY

During the peak traffic period, on 05/25/2021 at [07:15 AM-07:30 AM] the average headway between vehicles was 8.911 seconds. During the slowest traffic period, on 05/25/2021 at [01:00 AM-01:15 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 50.00 and 109.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Whitney Rd

A study of vehicle traffic was conducted with the device having serial number 404055. The study was done in the Eastbound lane at Pershing Blvd in Cheyenne, Wy in Laramie county. The study began on 05/26/2021 at 12:00 PM and concluded on 05/27/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 2,394 vehicles passed through the location with a peak volume of 93 on 05/26/2021 at [05:15 PM-05:30 PM] and a minimum volume of 0 on 05/27/2021 at [12:00 AM-12:15 AM]. The AADT count for this study was 2,394.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 50 - 55 MPH range or lower. The average speed for all classified vehicles was 51 MPH with 82.74% vehicles exceeding the posted speed of 45 MPH. 25.72% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 50MPH and the 85th percentile was 58.80 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
1	3	2	2	5	27	78	288	615	726	329	154	56	33	33

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 950 which represents 40 percent of the total classified vehicles. The number of Vans & Pickups in the study was 1228 which represents 52 percent of the total classified vehicles. The number of Busses & Trucks in the study was 115 which represents 5 percent of the total classified vehicles. The number of Tractor Trailers in the study was 57 which represents 2 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
950	1033	195	44	45	38	18	29							

CHART 2

HEADWAY

During the peak traffic period, on 05/26/2021 at [05:15 PM-05:30 PM] the average headway between vehicles was 9.574 seconds. During the slowest traffic period, on 05/27/2021 at [12:00 AM-12:15 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 50.00 and 106.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Whitney Rd

A study of vehicle traffic was conducted with the device having serial number 404061. The study was done in the Westbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 05/26/2021 at 12:00 PM and concluded on 05/27/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 2,493 vehicles passed through the location with a peak volume of 78 on 05/27/2021 at [07:00 AM-07:15 AM] and a minimum volume of 0 on 05/27/2021 at [12:30 AM-12:45 AM]. The AADT count for this study was 2,493.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 45 - 50 MPH range or lower. The average speed for all classified vehicles was 46 MPH with 54.33% vehicles exceeding the posted speed of 45 MPH. 6.28% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 45MPH and the 85th percentile was 51.71 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
0	0	0	5	3	45	231	844	859	328	87	27	16	9	16

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 1480 which represents 60 percent of the total classified vehicles. The number of Vans & Pickups in the study was 868 which represents 35 percent of the total classified vehicles. The number of Busses & Trucks in the study was 65 which represents 3 percent of the total classified vehicles. The number of Tractor Trailers in the study was 57 which represents 2 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
1480	791	77	11	29	36	23	23							

CHART 2

HEADWAY

During the peak traffic period, on 05/27/2021 at [07:00 AM-07:15 AM] the average headway between vehicles was 11.392 seconds. During the slowest traffic period, on 05/27/2021 at [12:30 AM-12:45 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 50.00 and 102.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Fireside Dr

A study of vehicle traffic was conducted with the device having serial number 404022. The study was done in the Eastbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 05/26/2021 at 12:00 PM and concluded on 05/27/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 1,453 vehicles passed through the location with a peak volume of 43 on 05/26/2021 at [05:30 PM-05:45 PM] and a minimum volume of 0 on 05/27/2021 at [12:00 AM-12:15 AM]. The AADT count for this study was 1,453.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 50 - 55 MPH range or lower. The average speed for all classified vehicles was 57 MPH with 91.43% vehicles exceeding the posted speed of 45 MPH. 55.31% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 50MPH and the 85th percentile was 68.60 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
0	7	2	4	7	10	22	61	180	296	274	193	89	54	119

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 345 which represents 26 percent of the total classified vehicles. The number of Vans & Pickups in the study was 714 which represents 54 percent of the total classified vehicles. The number of Busses & Trucks in the study was 195 which represents 15 percent of the total classified vehicles. The number of Tractor Trailers in the study was 64 which represents 5 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
345	499	215	62	91	47	20	39							

CHART 2

HEADWAY

During the peak traffic period, on 05/26/2021 at [05:30 PM-05:45 PM] the average headway between vehicles was 20.455 seconds. During the slowest traffic period, on 05/27/2021 at [12:00 AM-12:15 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 52.00 and 106.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Fireside Dr

A study of vehicle traffic was conducted with the device having serial number 404091. The study was done in the Westbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 05/26/2021 at 12:00 PM and concluded on 05/27/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 1,452 vehicles passed through the location with a peak volume of 42 on 05/26/2021 at [04:30 PM-04:45 PM] and a minimum volume of 0 on 05/27/2021 at [12:30 AM-12:45 AM]. The AADT count for this study was 1,452.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 45 - 50 MPH range or lower. The average speed for all classified vehicles was 50 MPH with 73.77% vehicles exceeding the posted speed of 45 MPH. 24.05% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 45MPH and the 85th percentile was 58.66 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
0	1	0	3	3	19	97	251	367	342	175	79	32	23	34

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 429 which represents 30 percent of the total classified vehicles. The number of Vans & Pickups in the study was 823 which represents 58 percent of the total classified vehicles. The number of Busses & Trucks in the study was 118 which represents 8 percent of the total classified vehicles. The number of Tractor Trailers in the study was 55 which represents 4 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
429	625	198	42	51	34	17	30							

CHART 2

HEADWAY

During the peak traffic period, on 05/26/2021 at [04:30 PM-04:45 PM] the average headway between vehicles was 20.93 seconds. During the slowest traffic period, on 05/27/2021 at [12:30 AM-12:45 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 50.00 and 104.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Farthing Rd

A study of vehicle traffic was conducted with the device having serial number 404091. The study was done in the Eastbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 06/01/2021 at 12:00 PM and concluded on 06/02/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 1,148 vehicles passed through the location with a peak volume of 31 on 06/02/2021 at [06:30 AM-06:45 AM] and a minimum volume of 0 on 06/01/2021 at [10:00 PM-10:15 PM]. The AADT count for this study was 1,148.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 50 - 55 MPH range or lower. The average speed for all classified vehicles was 52 MPH with 79.45% vehicles exceeding the posted speed of 45 MPH. 28.38% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 50MPH and the 85th percentile was 59.84 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
0	2	2	0	8	13	62	144	265	309	152	89	38	17	23

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 292 which represents 26 percent of the total classified vehicles. The number of Vans & Pickups in the study was 666 which represents 59 percent of the total classified vehicles. The number of Busses & Trucks in the study was 120 which represents 11 percent of the total classified vehicles. The number of Tractor Trailers in the study was 43 which represents 4 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
292	469	197	32	65	30	15	24							

CHART 2

HEADWAY

During the peak traffic period, on 06/02/2021 at [06:30 AM-06:45 AM] the average headway between vehicles was 28.125 seconds. During the slowest traffic period, on 06/01/2021 at [10:00 PM-10:15 PM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 54.00 and 113.00 degrees F.

**MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Farthing Rd**

A study of vehicle traffic was conducted with the device having serial number 404061. The study was done in the Westbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 06/01/2021 at 12:00 PM and concluded on 06/02/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 1,113 vehicles passed through the location with a peak volume of 41 on 06/01/2021 at [05:00 PM-05:15 PM] and a minimum volume of 0 on 06/01/2021 at [09:15 PM-09:30 PM]. The AADT count for this study was 1,113.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 40 - 45 MPH range or lower. The average speed for all classified vehicles was 43 MPH with 35.61% vehicles exceeding the posted speed of 45 MPH. 7.47% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 40MPH and the 85th percentile was 49.98 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
1	5	3	3	15	103	251	326	227	82	43	11	5	9	14

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 601 which represents 55 percent of the total classified vehicles. The number of Vans & Pickups in the study was 404 which represents 37 percent of the total classified vehicles. The number of Busses & Trucks in the study was 48 which represents 4 percent of the total classified vehicles. The number of Tractor Trailers in the study was 45 which represents 4 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
601	361	43	13	19	22	16	23							

CHART 2

HEADWAY

During the peak traffic period, on 06/01/2021 at [05:00 PM-05:15 PM] the average headway between vehicles was 21.429 seconds. During the slowest traffic period, on 06/01/2021 at [09:15 PM-09:30 PM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 52.00 and 113.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Christensen Rd

A study of vehicle traffic was conducted with the device having serial number 404055. The study was done in the Eastbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 06/01/2021 at 12:00 PM and concluded on 06/02/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 838 vehicles passed through the location with a peak volume of 30 on 06/02/2021 at [06:30 AM-06:45 AM] and a minimum volume of 0 on 06/01/2021 at [10:00 PM-10:15 PM]. The AADT count for this study was 838.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 45 - 50 MPH range or lower. The average speed for all classified vehicles was 48 MPH with 64.31% vehicles exceeding the posted speed of 45 MPH. 14.25% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 45MPH and the 85th percentile was 54.80 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
0	1	0	3	10	28	81	175	239	179	81	21	7	3	7

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 315 which represents 38 percent of the total classified vehicles. The number of Vans & Pickups in the study was 447 which represents 54 percent of the total classified vehicles. The number of Busses & Trucks in the study was 43 which represents 5 percent of the total classified vehicles. The number of Tractor Trailers in the study was 30 which represents 4 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
315	368	79	12	25	10	12	14							

CHART 2

HEADWAY

During the peak traffic period, on 06/02/2021 at [06:30 AM-06:45 AM] the average headway between vehicles was 29.032 seconds. During the slowest traffic period, on 06/01/2021 at [10:00 PM-10:15 PM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 52.00 and 113.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Pershing Blvd
Location: West of Christensen Rd

A study of vehicle traffic was conducted with the device having serial number 404022. The study was done in the Westbound lane at Pershing Blvd in Cheyenne, WY in Laramie county. The study began on 06/01/2021 at 12:00 PM and concluded on 06/02/2021 at 12:00 PM, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 786 vehicles passed through the location with a peak volume of 32 on 06/01/2021 at [05:00 PM-05:15 PM] and a minimum volume of 0 on 06/01/2021 at [11:30 PM-11:45 PM]. The AADT count for this study was 786.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 45 - 50 MPH range or lower. The average speed for all classified vehicles was 50 MPH with 73.51% vehicles exceeding the posted speed of 45 MPH. 22.35% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 45MPH and the 85th percentile was 57.65 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
0	2	0	6	5	17	50	125	215	181	102	39	12	5	15

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 179 which represents 23 percent of the total classified vehicles. The number of Vans & Pickups in the study was 463 which represents 60 percent of the total classified vehicles. The number of Busses & Trucks in the study was 79 which represents 10 percent of the total classified vehicles. The number of Tractor Trailers in the study was 50 which represents 6 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
179	327	136	28	39	16	13	36							

CHART 2

HEADWAY

During the peak traffic period, on 06/01/2021 at [05:00 PM-05:15 PM] the average headway between vehicles was 27.273 seconds. During the slowest traffic period, on 06/01/2021 at [11:30 PM-11:45 PM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 54.00 and 109.00 degrees F.

D: HCS OUTPUTS

HCS 2010 Two-Way Stop-Control Report

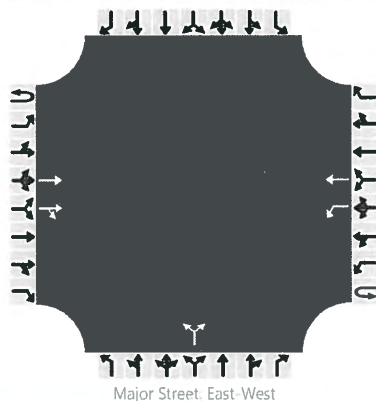
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/23/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Grasslands & E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Grasslands
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			452	48		22	303			34		39				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4.16				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						24					79					
Capacity, c (veh/h)						1015					407					
v/c Ratio						0.02					0.19					
95% Queue Length, Q ₉₅ (veh)						0.1					0.7					
Control Delay (s/veh)						8.6					16.0					
Level of Service, LOS						A					C					
Approach Delay (s/veh)					0.6				16.0							
Approach LOS									C							

HCS 2010 Two-Way Stop-Control Report

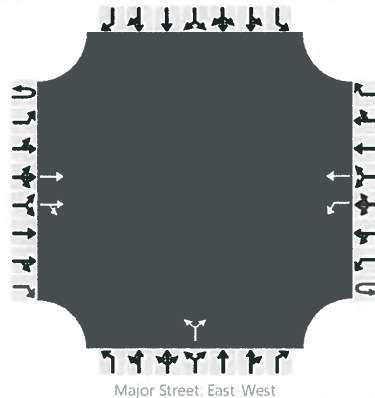
General Information

Analyst	G Grigsby
Firm/Co.	Western R&D, Ltd
Date Performed	8/23/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Grasslands & E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Grasslands
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



*HODGING 2021
CURRENT COUNTS
Northbound*

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			676	49		25	453			34		39				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						27					79					
Capacity, c (veh/h)						821					243					
v/c Ratio						0.03					0.33					
95% Queue Length, Q ₉₅ (veh)						0.1					1.4					
Control Delay (s/veh)						9.5					26.8					
Level of Service, LOS						A					D					
Approach Delay (s/veh)					0.5				26.8							
Approach LOS									D							

HCS 2010 Two-Way Stop-Control Report

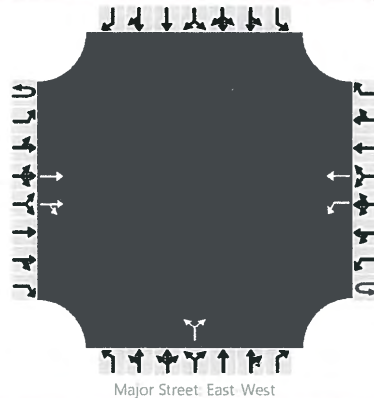
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/23/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Grasslands & E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Grasslands
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			676	49		25	453			34		43	29			
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4.16				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						27					84					
Capacity, c (veh/h)						821					252					
v/c Ratio						0.03					0.33					
95% Queue Length, Q ₉₅ (veh)						0.1					1.4					
Control Delay (s/veh)						9.5					26.3					
Level of Service, LOS						A					D					
Approach Delay (s/veh)					0.5				26.3							
Approach LOS									D							

HCS 2010 Two-Way Stop-Control Report

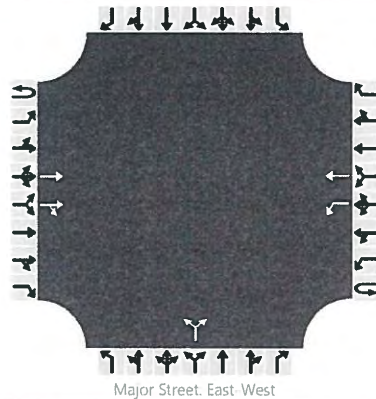
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/23/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Grasslands & E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Grasslands
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			286	38		35	823			63		12				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4.16				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						38					81					
Capacity, c (veh/h)						1196					169					
v/c Ratio						0.03					0.48					
95% Queue Length, Q ₉₅ (veh)						0.1					2.3					
Control Delay (s/veh)						8.1					44.7					
Level of Service, LOS						A					E					
Approach Delay (s/veh)					0.3				44.7							
Approach LOS									E							

HCS 2010 Two-Way Stop-Control Report

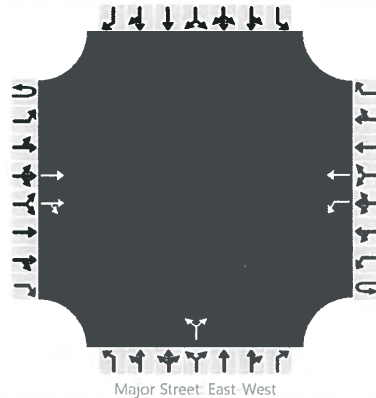
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/23/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Grasslands & E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Grasslands
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			189	38		35	546			63		12				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4.16				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

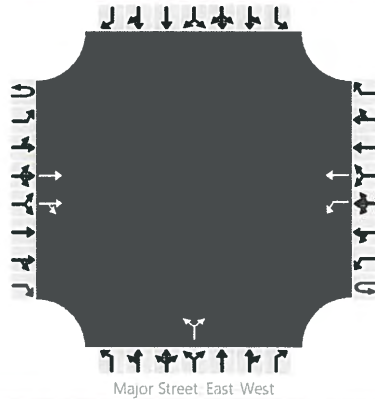
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						38					81					
Capacity, c (veh/h)						1310					305					
v/c Ratio						0.03					0.27					
95% Queue Length, Q ₉₅ (veh)						0.1					1.0					
Control Delay (s/veh)						7.8					21.0					
Level of Service, LOS						A					C					
Approach Delay (s/veh)					0.5				21.0							
Approach LOS									C							

HCS 2010 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	G Grigsby	Intersection	Grasslands & E. Pershing
Company/Co.	Western R&D, Ltd	Jurisdiction	
Date Performed	8/23/2021	East/West Street	E. Pershing
Analysis Year	2045	North/South Street	Grasslands
Time Analyzed	AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	East Pershing Blvd Plan		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			286	38		35	823			63		12				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked						0.000				0.250		0.000				
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4.16				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						38					81					
Capacity, c (veh/h)						1196					288					
v/c Ratio						0.03					0.28					
95% Queue Length, Q ₉₅ (veh)						0.1					1.1					
Control Delay (s/veh)						8.1					22.3					
Level of Service, LOS						A					C					
Approach Delay (s/veh)					0.3				22.3							
Approach LOS									C							

HCS 2010 Two-Way Stop-Control Report

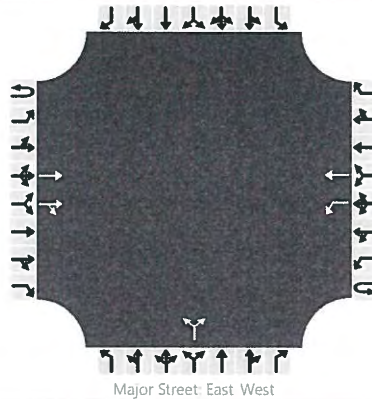
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/23/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Grasslands & E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Grasslands
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



*Hourly current 2021
Counts Northbound*

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			286	43		35	823			63		12				
Percent Heavy Vehicles (%)				50		3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						38					81					
Capacity, c (veh/h)						1190					168					
v/c Ratio						0.03					0.48					
95% Queue Length, Q ₉₅ (veh)						0.1					2.3					
Control Delay (s/veh)						8.1					45.1					
Level of Service, LOS						A					E					
Approach Delay (s/veh)					0.3				45.1							
Approach LOS									E							

HCS 2010 Two-Way Stop-Control Report

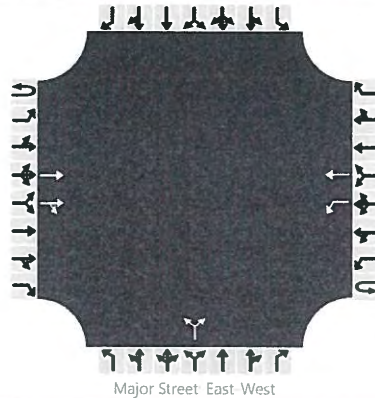
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/23/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Grasslands & E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Grasslands
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	1	0		0	0	0		0	0	0
Configuration			T	TR		L	T				LR					
Volume, V (veh/h)			286	43		35	823			68	13	12				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.5		6.9				
Critical Headway (sec)						4.16				6.86		6.96				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						38					87					
Capacity, c (veh/h)						1190					166					
v/c Ratio						0.03					0.52					
95% Queue Length, Q ₉₅ (veh)						0.1					2.6					
Control Delay (s/veh)						8.1					48.5					
Level of Service, LOS						A					E					
Approach Delay (s/veh)					0.3				48.5							
Approach LOS									E							

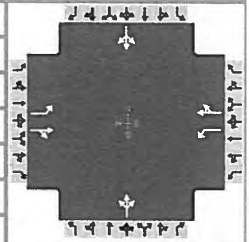
HCS 2010 Signalized Intersection Results Summary

General Information

Agency	Western R&D, Ltd.
Analyst	G Grigsby
Jurisdiction	
Urban Street	
Intersection	Polk-Taft @ East Pershing
Project Description	2021 PM Peak

Intersection Information




Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	Polk.Taft-E.Pershing 2021 PM Peak.xus



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	14	296	311	27	209	2	199	22	22	3	41	12

Signal Information

Cycle, s	60.0	Reference Phase	2																	
Offset, s	0	Reference Point	End		Green	39.3	12.7	0.0	0.0	0.0	0.0		1	2		3	4			
Uncoordinated	No	Simult. Gap E/W	On		Yellow	3.0	3.0	0.0	0.0	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On		Red	1.0	1.0	0.0	0.0	0.0	0.0		5	6		7	8			

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		8.0		8.0
Phase Duration, s		43.3		43.3		16.7		16.7
Change Period, (Y+R _c), s		4.0		4.0		4.0		4.0
Max Allow Headway (MAH), s		0.0		0.0		4.2		4.2
Queue Clearance Time (g _s), s						12.8		3.6
Green Extension Time (g _e), s		0.0		0.0		0.0		1.0
Use Call Probability						1.00		1.00
Max Out Probability						1.00		0.01

Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	15	660		29	229			264			61	
Adjusted Saturation Flow Rate (s), veh/h/ln	1169	1740		787	1897			1425			1828	
Queue Service Time (g _s), s	0.3	12.7		1.3	2.9			9.1			0.0	
Cycle Queue Clearance Time (g _c), s	3.2	12.7		14.0	2.9			10.8			1.6	
Green Ratio (g/C)	0.65	0.65		0.65	0.65			0.21			0.21	
Capacity (c), veh/h	830	1139		469	1241			411			451	
Volume-to-Capacity Ratio (X)	0.018	0.579		0.063	0.185			0.642			0.135	
Back of Queue (Q), ft/ln (50 th percentile)	1.6	87.6		5.5	20.2			90.6			16.2	
Back of Queue (Q), veh/ln (50 th percentile)	0.1	3.5		0.2	0.8			3.6			0.6	
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00		0.00	0.00			0.00			0.00	
Uniform Delay (d ₁), s/veh	4.7	5.8		9.7	4.1			22.8			19.3	
Incremental Delay (d ₂), s/veh	0.0	2.2		0.3	0.3			3.3			0.1	
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	4.7	7.9		9.9	4.4			26.1			19.4	
Level of Service (LOS)	A	A		A	A			C			B	
Approach Delay, s/veh / LOS	7.9	A		5.0	A		26.1	C		19.4	B	
Intersection Delay, s/veh / LOS	11.7						B					

Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.0	B		2.0	B		2.3	B		2.3	B	
Bicycle LOS Score / LOS	1.6	A		0.9	A		0.9	A		0.6	A	

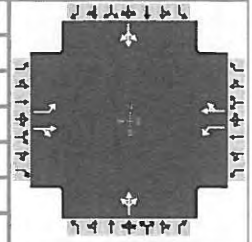
HCS 2010 Signalized Intersection Results Summary

General Information

Agency	Western R&D, Ltd.
Analyst	G Grigsby
Jurisdiction	
Urban Street	
Intersection	Polk-Taft @ East Pershing
Project Description	2045 PM Peak

Intersection Information











Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	Polk-Taft-E.Pershing 2045 PM Peak.xus



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	65	481	366	8	335	2	230	21	7	5	50	70

Signal Information

Cycle, s	60.0	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	39.0	13.0	0.0	0.0	0.0	0.0			
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.0	3.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.0	0.0	0.0	0.0	0.0			

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		8.0		8.0
Phase Duration, s		43.0		43.0		17.0		17.0
Change Period, (Y+R _c), s		4.0		4.0		4.0		4.0
Max Allow Headway (MAH), s		0.0		0.0		4.3		4.3
Queue Clearance Time (g _s), s						14.6		6.0
Green Extension Time (g _e), s		0.0		0.0		0.0		1.2
Lost Time Call Probability						1.00		1.00
Max Out Probability						1.00		0.06

Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	71	921		9	366			280			136	
Adjusted Saturation Flow Rate (s), veh/h/ln	1032	1763		617	1898			1323			1769	
Queue Service Time (g _s), s	1.9	23.0		0.6	5.0			8.6			0.0	
Cycle Queue Clearance Time (g _c), s	6.9	23.0		23.6	5.0			12.6			4.0	
Green Ratio (g/C)	0.65	0.65		0.65	0.65			0.22			0.22	
Capacity (c), veh/h	704	1146		285	1234			400			446	
Volume-to-Capacity Ratio (X)	0.100	0.803		0.031	0.297			0.701			0.305	
Back of Queue (Q), ft/ln (50 th percentile)	9.2	180.2		2.4	36.3			103.3			37.8	
Back of Queue (Q), veh/ln (50 th percentile)	0.4	7.2		0.1	1.5			4.1			1.5	
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00		0.00	0.00			0.00			0.00	
Uniform Delay (d ₁), s/veh	6.1	7.7		16.3	4.6			23.4			20.0	
Incremental Delay (d ₂), s/veh	0.3	6.0		0.2	0.6			5.4			0.4	
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	6.3	13.7		16.5	5.2			28.7			20.4	
Level of Service (LOS)	A	B		B	A			C			C	
Approach Delay, s/veh / LOS	13.2		B	5.4		A	28.7		C	20.4		C
Intersection Delay, s/veh / LOS	14.5						B					

Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.0		B	2.0		B	2.3		B	2.3		B
Bicycle LOS Score / LOS	2.1		B	1.1		A	1.0		A	0.7		A

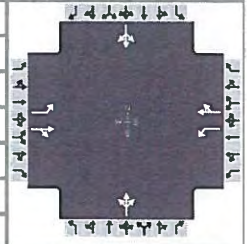
HCS 2010 Signalized Intersection Results Summary

General Information

Agency	Western R&D, Ltd.
Analyst	G Grigsby
Jurisdiction	
Urban Street	
Intersection	Polk-Taft @ East Pershing
Project Description	2021 AM Peak

Intersection Information

Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	Polk.Taft-E.Pershing 2021 AM Peak.xus



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	8	118	70	22	352	6	216	31	12	0	15	8

Signal Information

Cycle, s	60.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	No	Simult. Gap E/W	On	Green	38.0	14.0	0.0	0.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	3.0	0.0	0.0	0.0	0.0	0.0
				Red	1.0	1.0	0.0	0.0	0.0	0.0	0.0

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		8.0		8.0
Phase Duration, s		42.0		42.0		18.0		18.0
Change Period, (Y+R _c), s		4.0		4.0		4.0		4.0
Max Allow Headway (MAH), s		0.0		0.0		4.1		4.1
Queue Clearance Time (g _s), s						13.8		2.7
Green Extension Time (g _e), s		0.0		0.0		0.3		0.9
Queue Call Probability						0.99		0.99
Max Out Probability						1.00		0.00

Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	9	204		24	389			282			0	
Adjusted Saturation Flow Rate (s), veh/h/ln	1010	1781		1196	1705			1395			0	
Queue Service Time (g _s), s	0.2	2.9		0.5	6.5			11.1			0.0	
Cycle Queue Clearance Time (g _c), s	6.8	2.9		3.4	6.5			11.8			0.0	
Green Ratio (g/C)	0.63	0.63		0.63	0.63			0.23				
Capacity (c), veh/h	649	1127		820	1079			436				
Volume-to-Capacity Ratio (X)	0.013	0.181		0.029	0.361			0.645			0.000	
Back of Queue (Q), ft/ln (50 th percentile)	1.2	20.2		2.7	45.1			92.6			0	
Back of Queue (Q), veh/ln (50 th percentile)	0.0	0.8		0.1	1.8			3.7			0.0	
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00		0.00	0.00			0.00			0.00	
Uniform Delay (d ₁), s/veh	6.9	4.6		5.3	5.2			22.4				
Incremental Delay (d ₂), s/veh	0.0	0.4		0.1	0.9			2.2			0.0	
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	6.9	4.9		5.3	6.2			24.6				
Level of Service (LOS)	A	A		A	A			C				
Approach Delay, s/veh / LOS	5.0		A	6.1		A	24.6		C	17.9		B
Intersection Delay, s/veh / LOS	11.8						B					

Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.0		B	2.0		B	2.3		B	2.3		B
Bicycle LOS Score / LOS	0.8		A	1.2		A	1.0		A	0.5		A

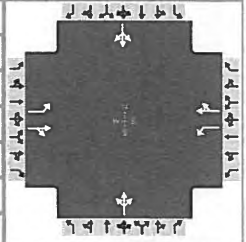
HCS 2010 Signalized Intersection Results Summary

General Information

Agency	Western R&D, Ltd.
Analyst	G Grigsby
Jurisdiction	
Urban Street	
Intersection	Polk-Taft @ East Pershing
Project Description	2045 AM Peak

Intersection Information


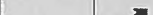


Duration, h	0.25
Area Type	Other
PHF	0.92
Analysis Period	1> 7:00
File Name	Polk.Taft-E.Pershing 2045 AM Peak.xus



Demand Information

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	38	173	78	10	530	12	226	44	5	0	19	32

Signal Information

Cycle, s	60.0	Reference Phase	2												
Offset, s	0	Reference Point	End		Green	39.0	13.0	0.0	0.0	0.0	0.0	1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On		Yellow	3.0	3.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On		Red	1.0	1.0	0.0	0.0	0.0	0.0	5	6	7	8

Timer Results

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		8.0		8.0
Phase Duration, s		43.0		43.0		17.0		17.0
Change Period, (Y+R _c), s		4.0		4.0		4.0		4.0
Max Allow Headway (MAH), s		0.0		0.0		4.2		4.2
Queue Clearance Time (g _s), s						15.0		3.6
Green Extension Time (g _e), s		0.0		0.0		0.0		1.1
Pass Call Probability						1.00		1.00
Max Out Probability						1.00		0.01

Movement Group Results

	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	41	273		11	589			299			0	
Adjusted Saturation Flow Rate (s), veh/h/ln	840	1799		1124	1892			1263			1704	
Queue Service Time (g _s), s	1.6	3.8		0.2	9.5			11.4			0.0	
Cycle Queue Clearance Time (g _c), s	11.1	3.8		4.0	9.5			13.0			0.0	
Green Ratio (g/C)	0.65	0.65		0.65	0.65			0.22			0.22	
Capacity (c), veh/h	533	1170		780	1230			383				
Volume-to-Capacity Ratio (X)	0.077	0.233		0.014	0.479			0.780			0.000	
Back of Queue (Q), ft/ln (50 th percentile)	6.8	25.8		1.2	69.9			124.4			0	
Back of Queue (Q), veh/ln (50 th percentile)	0.3	1.0		0.0	2.8			5.0			0.0	
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00		0.00	0.00			0.00			0.00	
Uniform Delay (d ₁), s/veh	8.2	4.3		5.2	5.3			24.8				
Incremental Delay (d ₂), s/veh	0.3	0.5		0.0	1.3			9.9			0.0	
Initial Queue Delay (d ₃), s/veh	0.0	0.0		0.0	0.0			0.0			0.0	
Control Delay (d), s/veh	8.4	4.8		5.2	6.7			34.7				
Level of Service (LOS)	A	A		A	A			C				
Approach Delay, s/veh / LOS	5.3		A	6.6		A	34.7		C	19.2		B
Intersection Delay, s/veh / LOS	13.5						B					

Multimodal Results

	EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.0		B	2.0		B	2.3		B	2.3		B
Bicycle LOS Score / LOS	1.0		A	1.5		A	1.0		A	0.6		A

HCS 2010 Two-Way Stop-Control Report

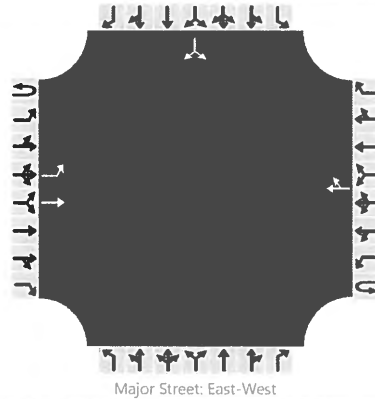
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Wenandy @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Wenandy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		7	265				214	1						1		4
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8													5	
Capacity, c (veh/h)		1326													715	
v/c Ratio		0.01													0.01	
95% Queue Length, Q ₉₅ (veh)		0.0													0.0	
Control Delay (s/veh)		7.7													10.1	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.2												10.1			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

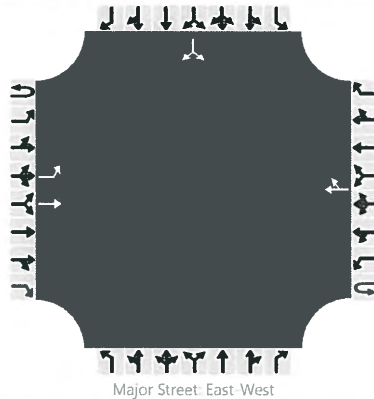
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Wenandy @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Wenandy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		15	485				393	2						2		9
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		16													12	
Capacity, c (veh/h)		1124													512	
v/c Ratio		0.01													0.02	
95% Queue Length, Q ₉₅ (veh)		0.0													0.1	
Control Delay (s/veh)		8.2													12.2	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.2												12.2			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

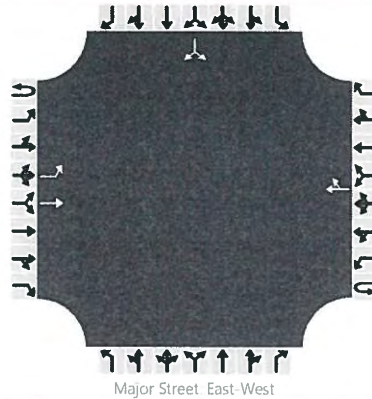
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Wenandy @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Wenandy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		2	133				311	0						2		16
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2													19	
Capacity, c (veh/h)		1214													680	
v/c Ratio		0.00													0.03	
95% Queue Length, Q ₉₅ (veh)		0.0													0.1	
Control Delay (s/veh)		8.0													10.5	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.1												10.5			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

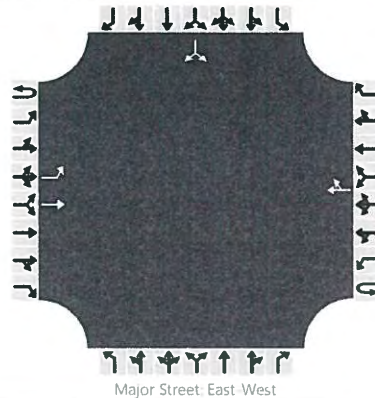
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Wenandy @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Wenandy
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		4	244				572	0						5		35
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4													43	
Capacity, c (veh/h)		953													454	
v/c Ratio		0.00													0.09	
95% Queue Length, Q ₉₅ (veh)		0.0													0.3	
Control Delay (s/veh)		8.8													13.7	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.1												13.7			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

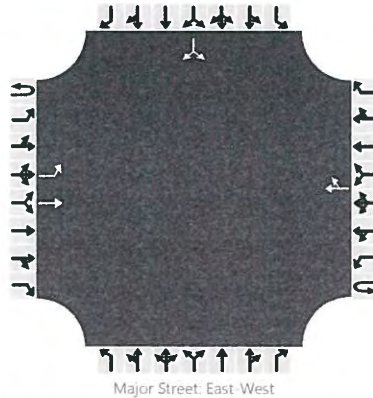
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	McKinley @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	McKinley
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		23	285				220	0						1		19
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		25													22	
Capacity, c (veh/h)		1320													770	
v/c Ratio		0.02													0.03	
95% Queue Length, Q ₉₅ (veh)		0.1													0.1	
Control Delay (s/veh)		7.8													9.8	
Level of Service, LOS		A													A	
Approach Delay (s/veh)	0.6												9.8			
Approach LOS													A			

HCS 2010 Two-Way Stop-Control Report

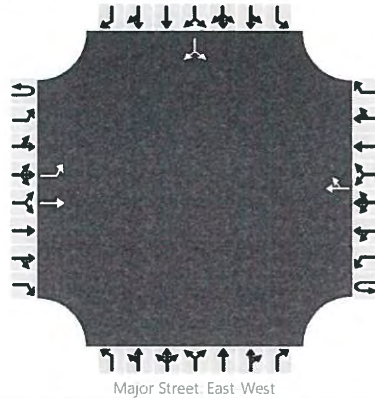
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	McKinley @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	McKinley
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Quantity	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		50	477				376	0						4		41
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		54													49	
Capacity, c (veh/h)		1143													565	
v/c Ratio		0.05													0.09	
95% Queue Length, Q ₉₅ (veh)		0.1													0.3	
Control Delay (s/veh)		8.3													12.0	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.8												12.0			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

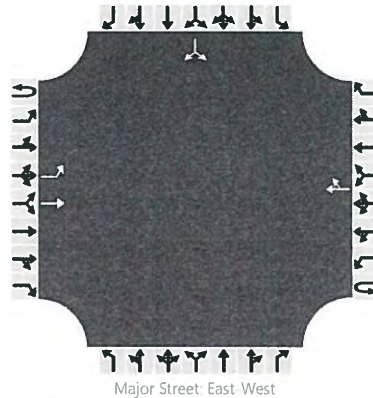
General Information

Analyst	G Grigsby
Company/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	McKinley @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	McKinley
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		6	128				336	1						6		38
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7													48	
Capacity, c (veh/h)		1186													646	
v/c Ratio		0.01													0.07	
95% Queue Length, Q ₉₅ (veh)		0.0													0.2	
Control Delay (s/veh)		8.1													11.0	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.4												11.0			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

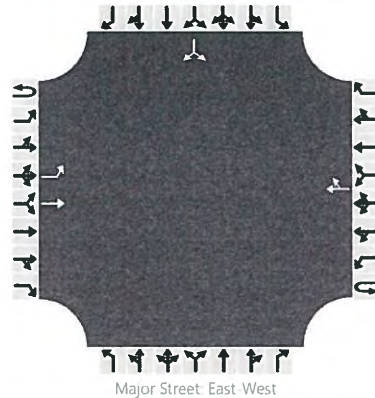
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	8/27/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	McKinley @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	McKinley
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		13	216				574	3						16		82
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

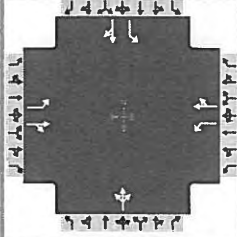
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

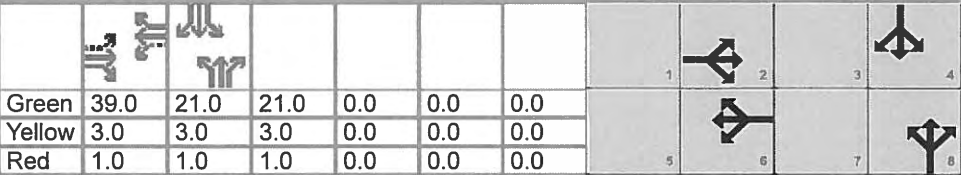
Flow Rate, v (veh/h)		14													106	
Capacity, c (veh/h)		949													442	
v/c Ratio		0.01													0.24	
95% Queue Length, Q ₉₅ (veh)		0.0													0.9	
Control Delay (s/veh)		8.9													15.7	
Level of Service, LOS		A													C	
Approach Delay (s/veh)	0.5												15.7			
Approach LOS													C			

HCS 2010 Signalized Intersection Results Summary

General Information						Intersection Information							
Agency		Western R&D, Ltd.				Duration, h		0.25					
Analyst		G Grigsby		Analysis Date		9/15/2021		Area Type		Other			
Jurisdiction				Time Period				PHF		0.92			
Urban Street				Analysis Year		2045		Analysis Period		1> 7:00			
Intersection		Whitney Rd @ East Per...				File Name		Whitney - East.Pershing 2045 PM.xus					
Project Description		2045 PM Peak											



Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				149	308	14	6	280	12	14	6	5	4	7	103

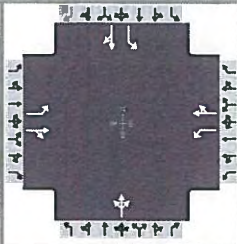
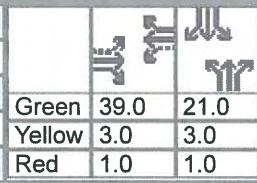

Signal Information																								
Cycle, s	93.0	Reference Phase	2																					
Offset, s	0	Reference Point	End																					
Uncoordinated	Yes	Simult. Gap E/W	On																					
Force Mode	Fixed	Simult. Gap N/S	On	Green	39.0	21.0	21.0	0.0	0.0	0.0	Yellow	3.0	3.0	3.0	0.0	0.0	0.0	Red	1.0	1.0	1.0	0.0	0.0	0.0

Timer Results		EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase			2		6		8		4
Case Number			6.0		6.0		12.0		10.0
Phase Duration, s			43.0		43.0		25.0		25.0
Change Period, (Y+R _c), s			4.0		4.0		4.0		4.0
Max Allow Headway (MAH), s			4.2		4.2		4.1		4.3
Queue Clearance Time (g _s), s			24.4		14.7		3.1		7.7
Green Extension Time (g _e), s			2.9		3.3		0.0		0.3
Pedestrian Call Probability			1.00		1.00		1.00		1.00
Max Out Probability			0.09		0.01		0.00		0.00

Movement Group Results		EB			WB			NB			SB		
Approach Movement		L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h		162	350		7	317			27		4	120	
Adjusted Saturation Flow Rate (s), veh/h/ln		1079	1885		1047	1886			1786		1810	1626	
Queue Service Time (g _s), s		11.5	12.3		0.4	10.9			1.1		0.2	5.7	
Cycle Queue Clearance Time (g _c), s		22.4	12.3		12.7	10.9			1.1		0.2	5.7	
Green Ratio (g/C)		0.42	0.42		0.42	0.42			0.23		0.23	0.23	
Capacity (c), veh/h		403	791		378	791			403		409	367	
Volume-to-Capacity Ratio (X)		0.402	0.443		0.017	0.401			0.067		0.011	0.326	
Back of Queue (Q), ft/ln (50 th percentile)		73	129.7		2.6	115.1			11.8		1.9	55.8	
Back of Queue (Q), veh/ln (50 th percentile)		2.9	5.2		0.1	4.6			0.5		0.1	2.2	
Queue Storage Ratio (RQ) (50 th percentile)		0.00	0.00		0.00	0.00			0.00		0.00	0.00	
Uniform Delay (d ₁), s/veh		26.7	19.3		23.8	18.8			28.3		27.9	30.1	
Incremental Delay (d ₂), s/veh		0.6	0.4		0.0	0.3			0.1		0.0	0.5	
Initial Queue Delay (d ₃), s/veh		0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Control Delay (d), s/veh		27.3	19.6		23.8	19.2			28.4		27.9	30.6	
Level of Service (LOS)		C	B		C	B			C		C	C	
Approach Delay, s/veh / LOS		22.1	C		19.3	B		28.4	C		30.5	C	
Intersection Delay, s/veh / LOS		22.4						C					

Multimodal Results		EB		WB		NB		SB	
Pedestrian LOS Score / LOS		2.1	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS		1.3	A	1.0	A	0.5	A	0.7	A

HCS 2010 Signalized Intersection Results Summary

General Information						Intersection Information															
Agency		Western R&D, Ltd.				Duration, h		0.25													
Analyst		G Grigsby		Analysis Date		9/15/2021		Area Type		Other											
Jurisdiction				Time Period				PHF		0.92											
Urban Street				Analysis Year		2045		Analysis Period		1> 7:00											
Intersection		Whitney Rd @ East Per...				File Name		Whitney - East.Pershing 2045 AM.xus													
Project Description		2045 AM Peak																			
Demand Information						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h						71	148	10	13	243	5	9	7	6	5	8	215				
Signal Information																					
Cycle, s		93.0	Reference Phase		2																
Offset, s		0	Reference Point		End																
Uncoordinated		Yes	Simult. Gap E/W		On																
Force Mode		Fixed	Simult. Gap N/S		On																
Green						39.0	21.0	21.0	0.0	0.0	0.0										
Yellow						3.0	3.0	3.0	0.0	0.0	0.0										
Red						1.0	1.0	1.0	0.0	0.0	0.0										
Timer Results						EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase								2				6				8				4	
Case Number								6.0				6.0				12.0				10.0	
Phase Duration, s								43.0				43.0				25.0				25.0	
Change Period, (Y+R c), s								4.0				4.0				4.0				4.0	
Max Allow Headway (MAH), s								4.1				4.1				4.2				4.4	
Queue Clearance Time (g s), s								15.6				11.0				3.0				14.7	
Green Extension Time (g e), s								1.9				2.0				0.0				0.5	
Red Call Probability								1.00				1.00				1.00				1.00	
Max Out Probability								0.00				0.00				0.00				0.32	
Movement Group Results						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement						5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate (v), veh/h						77	172		14	270			24		5	242					
Adjusted Saturation Flow Rate (s), veh/h/ln						1127	1879		1232	1893			1776		1810	1619					
Queue Service Time (g s), s						4.6	5.4		0.7	9.0			1.0		0.2	12.7					
Cycle Queue Clearance Time (g c), s						13.6	5.4		6.1	9.0			1.0		0.2	12.7					
Green Ratio (g/C)						0.42	0.42		0.42	0.42			0.23		0.23	0.23					
Capacity (c), veh/h						441	788		522	794			401		409	366					
Volume-to-Capacity Ratio (X)						0.175	0.218		0.027	0.340			0.060		0.013	0.663					
Back of Queue (Q), ft/ln (50 th percentile)						30.4	56.9		4.9	94.8			10.4		2.3	131.6					
Back of Queue (Q), veh/ln (50 th percentile)						1.2	2.3		0.2	3.8			0.4		0.1	5.3					
Queue Storage Ratio (RQ) (50 th percentile)						0.00	0.00		0.00	0.00			0.00		0.00	0.00					
Uniform Delay (d 1), s/veh						22.9	17.3		19.2	18.3			28.3		28.0	32.8					
Incremental Delay (d 2), s/veh						0.2	0.1		0.0	0.3			0.1		0.0	4.4					
Initial Queue Delay (d 3), s/veh						0.0	0.0		0.0	0.0			0.0		0.0	0.0					
Control Delay (d), s/veh						23.1	17.4		19.2	18.5			28.3		28.0	37.2					
Level of Service (LOS)						C	B		B	B			C		C	D					
Approach Delay, s/veh / LOS						19.2		B		18.6		B		28.3		C		37.0		D	
Intersection Delay, s/veh / LOS						24.7						C									
Multimodal Results						EB			WB			NB			SB						
Pedestrian LOS Score / LOS						2.1		B		2.3		B		2.3		B		2.3		B	
Bicycle LOS Score / LOS						0.9		A		1.0		A		0.5		A		0.9		A	

HCS 2010 Two-Way Stop-Control Report

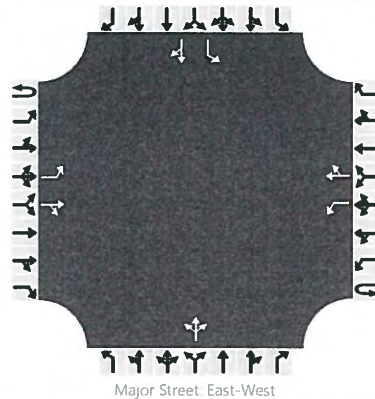
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Whitney @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Whitney Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		112	156	2		0	142	12		3	0	0		4	0	81
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

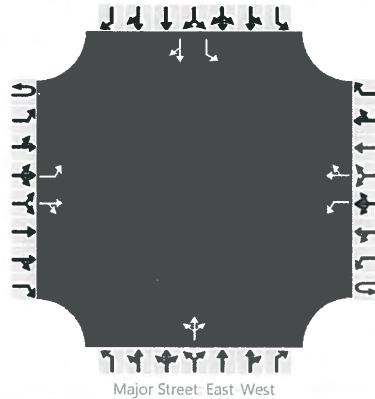
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		122				0					3			4		88
Capacity, c (veh/h)		1403				1397					335			398		882
v/c Ratio		0.09				0.00					0.01			0.01		0.10
95% Queue Length, Q ₉₅ (veh)		0.3				0.0					0.0			0.0		0.3
Control Delay (s/veh)		7.8				7.6					15.8			14.1		9.5
Level of Service, LOS		A				A					C			B		A
Approach Delay (s/veh)	3.2				0.0				15.8				9.7			
Approach LOS									C				A			

HCS 2010 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	G Grigsby	Intersection	Whitney @ E. Pershing
Agency/Co.	Western R&D, Ltd	Jurisdiction	
Date Performed	9/10/2021	East/West Street	E. Pershing
Analysis Year	2045	North/South Street	Whitney Rd
Time Analyzed	PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	East Pershing Blvd Plan		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		149	308	5		0	280	12		7	0	0		4	0	103
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		162				0					8			4		112
Capacity, c (veh/h)		1236				1212					161			208		727
v/c Ratio		0.13				0.00					0.05			0.02		0.15
95% Queue Length, Q ₉₅ (veh)		0.5				0.0					0.2			0.1		0.5
Control Delay (s/veh)		8.4				8.0					28.5			22.7		10.9
Level of Service, LOS		A				A					D			C		B
Approach Delay (s/veh)	2.7				0.0				28.5				11.3			
Approach LOS									D				B			

HCS 2010 Two-Way Stop-Control Report

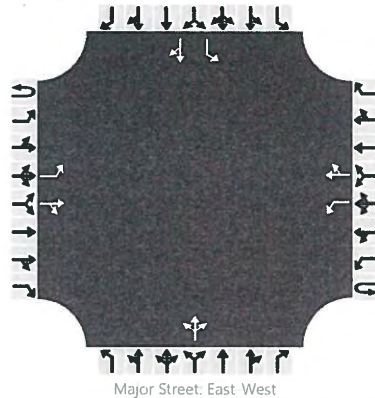
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Whitney @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Whitney Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		54	75	2		0	126	3		2	0	0		3	0	168
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		59				0					2			3		183
Capacity, c (veh/h)		1435				1505					412			592		907
v/c Ratio		0.04				0.00					0.00			0.01		0.20
95% Queue Length, Q ₉₅ (veh)		0.1				0.0					0.0			0.0		0.8
Control Delay (s/veh)		7.6				7.4					13.8			11.1		10.0
Level of Service, LOS		A				A					B			B		A
Approach Delay (s/veh)	3.1				0.0				13.8				10.0			
Approach LOS									B				A			

HCS 2010 Two-Way Stop-Control Report

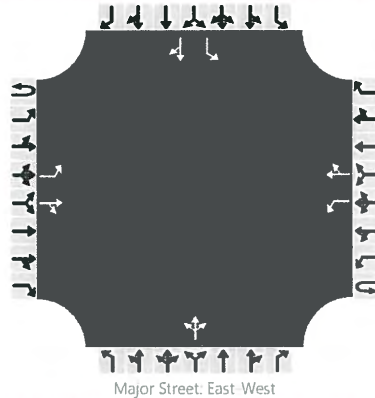
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Whitney @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Whitney Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		71	148	5		0	243	1		5	0	0		1	0	215
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		77				0					5			1		234
Capacity, c (veh/h)		1292				1404					235			403		772
v/c Ratio		0.06				0.00					0.02			0.00		0.30
95% Queue Length, Q ₉₅ (veh)		0.2				0.0					0.1			0.0		1.3
Control Delay (s/veh)		8.0				7.6					20.7			13.9		11.7
Level of Service, LOS		A				A					C			B		B
Approach Delay (s/veh)	2.5				0.0				20.7				11.7			
Approach LOS									C				B			

HCS 2010 Two-Way Stop-Control Report

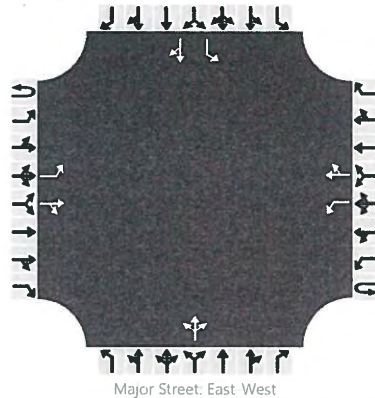
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Whitney @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Whitney Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		54	75	2		0	126	3		2	0	0		3	0	168
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		59				0					2			3		183
Capacity, c (veh/h)		1435				1505					412			592		907
v/c Ratio		0.04				0.00					0.00			0.01		0.20
95% Queue Length, Q ₉₅ (veh)		0.1				0.0					0.0			0.0		0.8
Control Delay (s/veh)		7.6				7.4					13.8			11.1		10.0
Level of Service, LOS		A				A					B			B		A
Approach Delay (s/veh)	3.1				0.0				13.8				10.0			
Approach LOS									B				A			

HCS 2010 Two-Way Stop-Control Report

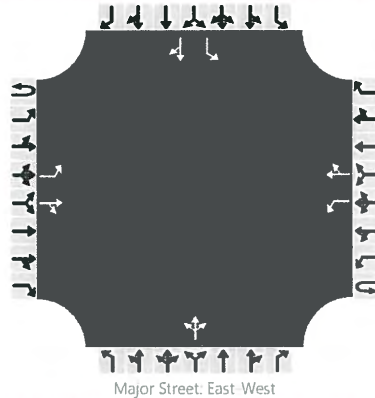
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Whitney @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Whitney Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		71	148	5		0	243	1		5	0	0		1	0	215
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		77				0					5			1		234
Capacity, c (veh/h)		1292				1404					235			403		772
v/c Ratio		0.06				0.00					0.02			0.00		0.30
95% Queue Length, Q ₉₅ (veh)		0.2				0.0					0.1			0.0		1.3
Control Delay (s/veh)		8.0				7.6					20.7			13.9		11.7
Level of Service, LOS		A				A					C			B		B
Approach Delay (s/veh)	2.5				0.0				20.7				11.7			
Approach LOS									C				B			

HCS 2010 Two-Way Stop-Control Report

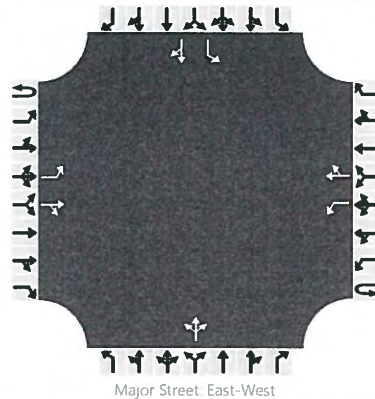
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Whitney @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Whitney Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		112	156	2		0	142	12		3	0	0		4	0	81
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

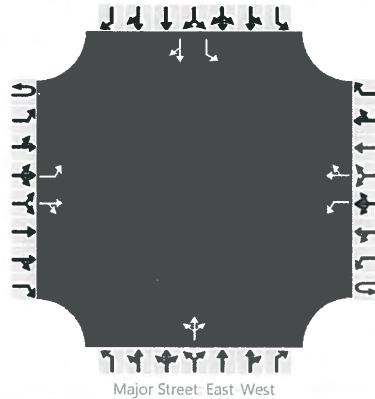
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		122				0					3			4		88
Capacity, c (veh/h)		1403				1397					335			398		882
v/c Ratio		0.09				0.00					0.01			0.01		0.10
95% Queue Length, Q ₉₅ (veh)		0.3				0.0					0.0			0.0		0.3
Control Delay (s/veh)		7.8				7.6					15.8			14.1		9.5
Level of Service, LOS		A				A					C			B		A
Approach Delay (s/veh)	3.2				0.0				15.8				9.7			
Approach LOS									C				A			

HCS 2010 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	G Grigsby	Intersection	Whitney @ E. Pershing
Agency/Co.	Western R&D, Ltd	Jurisdiction	
Date Performed	9/10/2021	East/West Street	E. Pershing
Analysis Year	2045	North/South Street	Whitney Rd
Time Analyzed	PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	East Pershing Blvd Plan		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		1	1	0
Configuration		L		TR		L		TR			LTR			L		TR
Volume, V (veh/h)		149	308	5		0	280	12		7	0	0		4	0	103
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

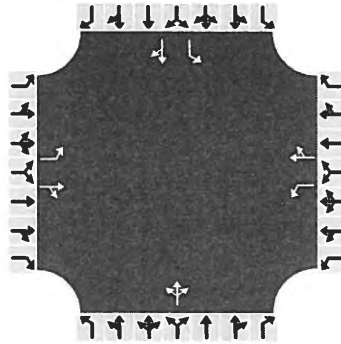
Flow Rate, v (veh/h)		162				0					8			4		112
Capacity, c (veh/h)		1236				1212					161			208		727
v/c Ratio		0.13				0.00					0.05			0.02		0.15
95% Queue Length, Q ₉₅ (veh)		0.5				0.0					0.2			0.1		0.5
Control Delay (s/veh)		8.4				8.0					28.5			22.7		10.9
Level of Service, LOS		A				A					D			C		B
Approach Delay (s/veh)	2.7				0.0				28.5				11.3			
Approach LOS									D				B			

HCS 2010 All-Way Stop-Control Summary Report

General Information

Analyst	G Grigsby	Intersection	
Agency/Co.	Western R & D, Ltd.	Jurisdiction	
Date Performed	10/20/2021	East/West Street	East Pershing Blvd
Analysis Year	2045	North/South Street	Whitney Road
Time Analyzed	1.00	Peak Hour Factor	0.92
Analysis Time Period (hrs)	AM Peak - 1 Hour		
Project Description	New City Park		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	71	148	10	13	243	5	9	7	6	5	8	215
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LTR			L	TR	
Flow Rate, v (veh/h)	77	172		14	270		24			5	242	
Percent Heavy Vehicles	2	2		2	2		2			2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20			3.20	3.20	
Initial Degree of Utilization, x	0.069	0.153		0.013	0.240		0.021			0.005	0.215	
Final Departure Headway, hd (s)	6.12	5.57		6.09	5.57		5.95			6.43	5.26	
Final Degree of Utilization, x	0.131	0.266		0.024	0.417		0.040			0.010	0.354	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.0			2.3	2.3	
Service Time, ts (s)	3.82	3.27		3.79	3.27		3.95			4.13	2.96	

Capacity, Delay and Level of Service

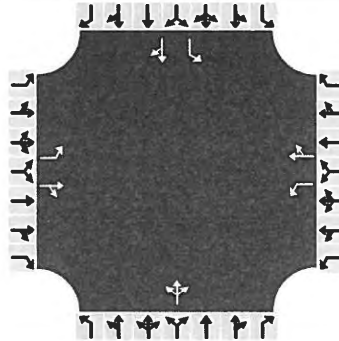
Flow Rate, v (veh/h)	77	172		14	270		24			5	242	
Capacity	588	646		591	646		605			560	685	
95% Queue Length, Q ₉₅ (veh)	0.5	1.1		0.1	2.1		0.1			0.0	1.6	
Control Delay (s/veh)	9.7	10.3		8.9	12.2		9.2			9.2	10.8	
Level of Service, LOS	A	B		A	B		A			A	B	
Approach Delay (s/veh)	10.1			12.1			9.2			10.8		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh LOS	11.0						B					

HCS 2010 All-Way Stop-Control Summary Report

General Information

Analyst	G Grigsby	Intersection	
Agency/Co.	Western R & D, Ltd.	Jurisdiction	
Date Performed	10/20/2021	East/West Street	East Pershing Blvd
Analysis Year	2045	North/South Street	Whitney Road
Time Analyzed	1.00	Peak Hour Factor	0.92
Analysis Time Period (hrs)	PM Peak - 1 Hour		
Project Description	New City Park		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	149	308	14	6	280	12	14	6	5	4	7	103
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LTR			L	TR	
Flow Rate, v (veh/h)	162	350		7	317		27			4	120	
Percent Heavy Vehicles	2	2		2	2		2			2	2	

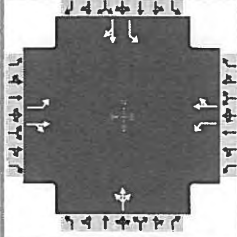
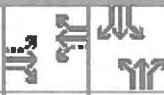
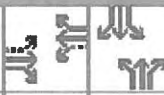
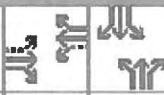
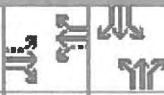
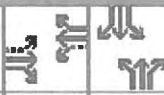
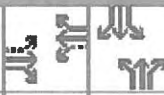
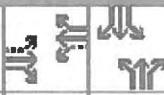
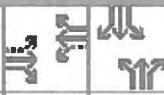
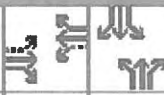
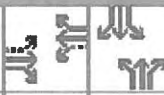
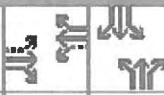
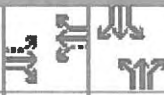
Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20			3.20	3.20	
Initial Degree of Utilization, x	0.144	0.311		0.006	0.282		0.024			0.004	0.106	
Final Departure Headway, hd (s)	5.83	5.30		6.05	5.52		5.76			7.02	5.86	
Final Degree of Utilization, x	0.262	0.515		0.011	0.487		0.043			0.008	0.195	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.0			2.3	2.3	
Service Time, ts (s)	3.53	3.00		3.75	3.22		3.76			4.72	3.56	

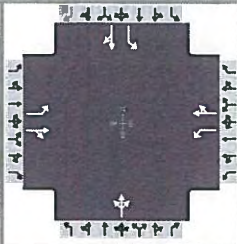
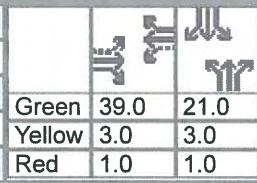


Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	162	350		7	317		27			4	120	
Capacity	618	680		595	652		625			513	614	
95% Queue Length, Q ₉₅ (veh)	1.1	3.1		0.0	2.8		0.1			0.0	0.7	
Control Delay (s/veh)	10.6	13.6		8.8	13.4		9.0			9.8	10.0	
Level of Service, LOS	B	B		A	B		A			A	A	
Approach Delay (s/veh)	12.6			13.3			9.0			10.0		
Approach LOS	B			B			A			A		
Intersection Delay, s/veh LOS	12.4						B					

HCS 2010 Signalized Intersection Results Summary

General Information						Intersection Information									
Agency		Western R&D, Ltd.				Duration, h		0.25							
Analyst		G Grigsby		Analysis Date		9/15/2021		Area Type		Other					
Jurisdiction				Time Period				PHF		0.92					
Urban Street				Analysis Year		2045		Analysis Period		1> 7:00					
Intersection		Whitney Rd @ East Per...		File Name		Whitney - East.Pershing 2045 PM.xus									
Project Description		2045 PM Peak													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				149	308	14	6	280	12	14	6	5	4	7	103
Signal Information															
Cycle, s	93.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
				Green	39.0	21.0	21.0	0.0	0.0	0.0					
				Yellow	3.0	3.0	3.0	0.0	0.0	0.0					
				Red	1.0	1.0	1.0	0.0	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					2		6		8		4				
Case Number					6.0		6.0		12.0		10.0				
Phase Duration, s					43.0		43.0		25.0		25.0				
Change Period, (Y+R c), s					4.0		4.0		4.0		4.0				
Max Allow Headway (MAH), s					4.2		4.2		4.1		4.3				
Queue Clearance Time (g s), s					24.4		14.7		3.1		7.7				
Green Extension Time (g e), s					2.9		3.3		0.0		0.3				
Pedestrian Call Probability					1.00		1.00		1.00		1.00				
Max Out Probability					0.09		0.01		0.00		0.00				
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h				162	350		7	317		27		4	120		
Adjusted Saturation Flow Rate (s), veh/h/ln				1079	1885		1047	1886		1786		1810	1626		
Queue Service Time (g s), s				11.5	12.3		0.4	10.9		1.1		0.2	5.7		
Cycle Queue Clearance Time (g c), s				22.4	12.3		12.7	10.9		1.1		0.2	5.7		
Green Ratio (g/C)				0.42	0.42		0.42	0.42		0.23		0.23	0.23		
Capacity (c), veh/h				403	791		378	791		403		409	367		
Volume-to-Capacity Ratio (X)				0.402	0.443		0.017	0.401		0.067		0.011	0.326		
Back of Queue (Q), ft/ln (50 th percentile)				73	129.7		2.6	115.1		11.8		1.9	55.8		
Back of Queue (Q), veh/ln (50 th percentile)				2.9	5.2		0.1	4.6		0.5		0.1	2.2		
Queue Storage Ratio (RQ) (50 th percentile)				0.00	0.00		0.00	0.00		0.00		0.00	0.00		
Uniform Delay (d 1), s/veh				26.7	19.3		23.8	18.8		28.3		27.9	30.1		
Incremental Delay (d 2), s/veh				0.6	0.4		0.0	0.3		0.1		0.0	0.5		
Initial Queue Delay (d 3), s/veh				0.0	0.0		0.0	0.0		0.0		0.0	0.0		
Control Delay (d), s/veh				27.3	19.6		23.8	19.2		28.4		27.9	30.6		
Level of Service (LOS)				C	B		C	B		C		C	C		
Approach Delay, s/veh / LOS				22.1	C		19.3	B		28.4	C	30.5	C		
Intersection Delay, s/veh / LOS				22.4						C					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				2.1	B		2.3	B		2.3	B	2.3	B		
Bicycle LOS Score / LOS				1.3	A		1.0	A		0.5	A	0.7	A		

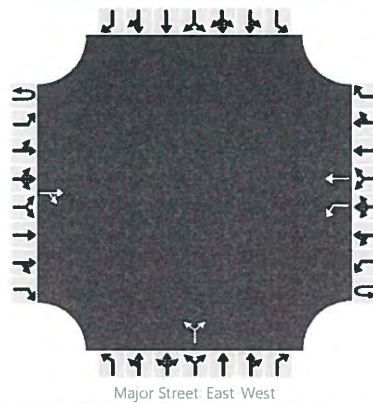
HCS 2010 Signalized Intersection Results Summary

General Information						Intersection Information											
Agency		Western R&D, Ltd.				Duration, h		0.25									
Analyst		G Grigsby		Analysis Date		9/15/2021		Area Type		Other							
Jurisdiction				Time Period				PHF		0.92							
Urban Street				Analysis Year		2045		Analysis Period		1> 7:00							
Intersection		Whitney Rd @ East Per...				File Name		Whitney - East.Pershing 2045 AM.xus									
Project Description		2045 AM Peak															
Demand Information						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h						71	148	10	13	243	5	9	7	6	5	8	215
Signal Information																	
Cycle, s	93.0	Reference Phase	2														
Offset, s	0	Reference Point	End														
Uncoordinated	Yes	Simult. Gap E/W	On														
Force Mode	Fixed	Simult. Gap N/S	On														
Green	39.0	21.0	21.0	0.0	0.0	0.0											
Yellow	3.0	3.0	3.0	0.0	0.0	0.0											
Red	1.0	1.0	1.0	0.0	0.0	0.0											
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase							2		6		8		4				
Case Number							6.0		6.0		12.0		10.0				
Phase Duration, s							43.0		43.0		25.0		25.0				
Change Period, (Y+R c), s							4.0		4.0		4.0		4.0				
Max Allow Headway (MAH), s							4.1		4.1		4.2		4.4				
Queue Clearance Time (g s), s							15.6		11.0		3.0		14.7				
Green Extension Time (g e), s							1.9		2.0		0.0		0.5				
Red Call Probability							1.00		1.00		1.00		1.00				
Max Out Probability							0.00		0.00		0.00		0.32				
Movement Group Results						EB			WB			NB			SB		
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement						5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h						77	172		14	270		24		5	242		
Adjusted Saturation Flow Rate (s), veh/h/ln						1127	1879		1232	1893		1776		1810	1619		
Queue Service Time (g s), s						4.6	5.4		0.7	9.0		1.0		0.2	12.7		
Cycle Queue Clearance Time (g c), s						13.6	5.4		6.1	9.0		1.0		0.2	12.7		
Green Ratio (g/C)						0.42	0.42		0.42	0.42		0.23		0.23	0.23		
Capacity (c), veh/h						441	788		522	794		401		409	366		
Volume-to-Capacity Ratio (X)						0.175	0.218		0.027	0.340		0.060		0.013	0.663		
Back of Queue (Q), ft/ln (50 th percentile)						30.4	56.9		4.9	94.8		10.4		2.3	131.6		
Back of Queue (Q), veh/ln (50 th percentile)						1.2	2.3		0.2	3.8		0.4		0.1	5.3		
Queue Storage Ratio (RQ) (50 th percentile)						0.00	0.00		0.00	0.00		0.00		0.00	0.00		
Uniform Delay (d 1), s/veh						22.9	17.3		19.2	18.3		28.3		28.0	32.8		
Incremental Delay (d 2), s/veh						0.2	0.1		0.0	0.3		0.1		0.0	4.4		
Initial Queue Delay (d 3), s/veh						0.0	0.0		0.0	0.0		0.0		0.0	0.0		
Control Delay (d), s/veh						23.1	17.4		19.2	18.5		28.3		28.0	37.2		
Level of Service (LOS)						C	B		B	B		C		C	D		
Approach Delay, s/veh / LOS						19.2		B	18.6		B	28.3		C	37.0		D
Intersection Delay, s/veh / LOS						24.7						C					
Multimodal Results						EB			WB			NB			SB		
Pedestrian LOS Score / LOS						2.1		B	2.3		B	2.3		B	2.3		B
Bicycle LOS Score / LOS						0.9		A	1.0		A	0.5		A	0.9		A

HCS 2010 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	G Grigsby	Intersection	Tate @ E. Pershing
Agency/Co.	Western R&D, Ltd	Jurisdiction	
Date Performed	9/10/2021	East/West Street	E. Pershing
Analysis Year	2021	North/South Street	Tate Rd
Time Analyzed	PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	East Pershing Blvd Plan		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			154	5		0	153			6		0				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						0					7					
Capacity, c (veh/h)						1397					657					
v/c Ratio						0.00					0.01					
95% Queue Length, Q ₉₅ (veh)						0.0					0.0					
Control Delay (s/veh)						7.6					10.5					
Level of Service, LOS						A					B					
Approach Delay (s/veh)					0.0				10.5							
Approach LOS									B							

HCS 2010 Two-Way Stop-Control Report

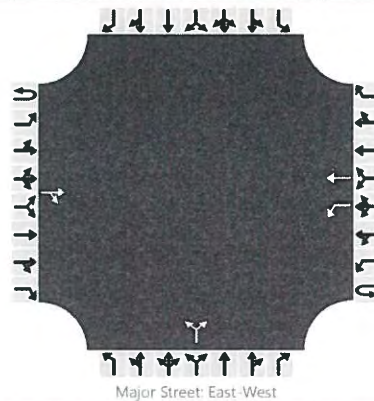
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Tate @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Tate Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			289	11		0	289			13		0				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						0					14					
Capacity, c (veh/h)						1227					441					
v/c Ratio						0.00					0.03					
95% Queue Length, Q ₉₅ (veh)						0.0					0.1					
Control Delay (s/veh)						7.9					13.4					
Level of Service, LOS						A					B					
Approach Delay (s/veh)					0.0				13.4							
Approach LOS									B							

HCS 2010 Two-Way Stop-Control Report

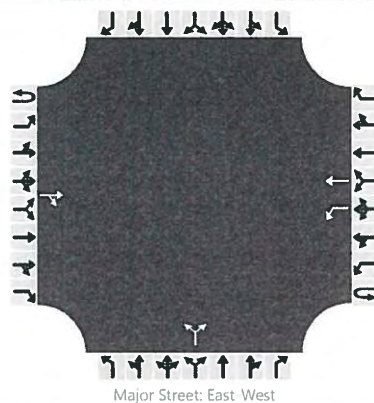
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Tate @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Tate Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Capacity	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			87	1		0	144			4		0				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						0					4					
Capacity, c (veh/h)						1490					734					
v/c Ratio						0.00					0.01					
95% Queue Length, Q ₉₅ (veh)						0.0					0.0					
Control Delay (s/veh)						7.4					9.9					
Level of Service, LOS						A					A					
Approach Delay (s/veh)					0.0				9.9							
Approach LOS									A							

HCS 2010 Two-Way Stop-Control Report

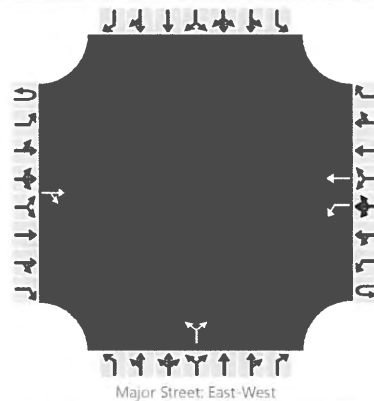
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/10/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Tate @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Tate Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			164	2		0	272			9		0				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						0					10					
Capacity, c (veh/h)						1388					546					
v/c Ratio						0.00					0.02					
95% Queue Length, Q ₉₅ (veh)						0.0					0.1					
Control Delay (s/veh)						7.6					11.7					
Level of Service, LOS						A					B					
Approach Delay (s/veh)					0.0				11.7							
Approach LOS									B							

HCS 2010 Two-Way Stop-Control Report

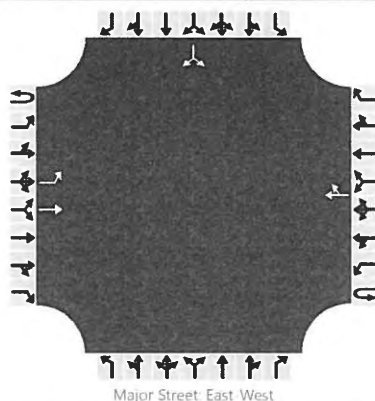
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Fireside @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Fireside Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		21	136				141	1						1		12
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		23													14	
Capacity, c (veh/h)		1419													864	
v/c Ratio		0.02													0.02	
95% Queue Length, Q ₉₅ (veh)		0.0													0.0	
Control Delay (s/veh)		7.6													9.2	
Level of Service, LOS		A													A	
Approach Delay (s/veh)	1.0												9.2			
Approach LOS													A			

HCS 2010 Two-Way Stop-Control Report

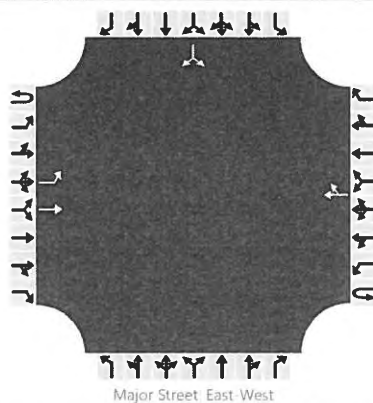
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Fireside @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Fireside Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Quantity	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		24	273				268	0						0		13
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		26													14	
Capacity, c (veh/h)		1264													745	
v/c Ratio		0.02													0.02	
95% Queue Length, Q ₉₅ (veh)		0.1													0.1	
Control Delay (s/veh)		7.9													9.9	
Level of Service, LOS		A													A	
Approach Delay (s/veh)	0.6												9.9			
Approach LOS													A			

HCS 2010 Two-Way Stop-Control Report

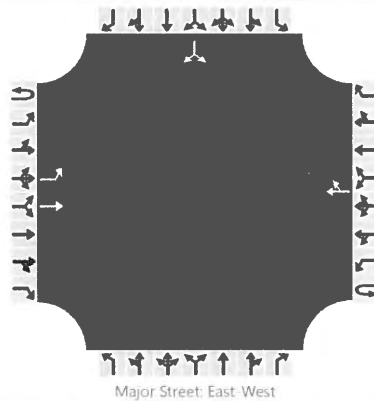
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Fireside @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Fireside Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		6	82				125	0						2		20
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		7													24	
Capacity, c (veh/h)		1440													893	
v/c Ratio		0.00													0.03	
95% Queue Length, Q ₉₅ (veh)		0.0													0.1	
Control Delay (s/veh)		7.5													9.1	
Level of Service, LOS		A													A	
Approach Delay (s/veh)	0.5												9.1			
Approach LOS													A			

HCS 2010 Two-Way Stop-Control Report

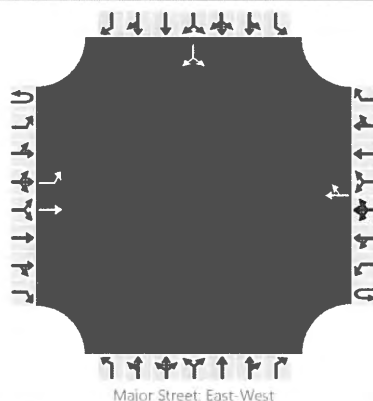
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Fireside @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Fireside Rd
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		7	160				236	0						1		22
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8													25	
Capacity, c (veh/h)		1301													767	
v/c Ratio		0.01													0.03	
95% Queue Length, Q ₉₅ (veh)		0.0													0.1	
Control Delay (s/veh)		7.8													9.9	
Level of Service, LOS		A													A	
Approach Delay (s/veh)	0.3												9.9			
Approach LOS													A			

HCS 2010 Two-Way Stop-Control Report

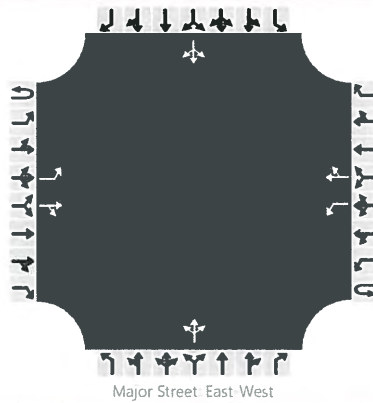
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Foster Ave @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Foster Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)		27	106	3		0	120	11		0	1	2		5	0	25
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

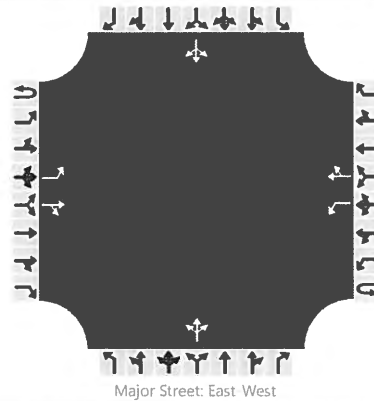
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		29				0					3				32	
Capacity, c (veh/h)		1433				1462					779				849	
v/c Ratio		0.02				0.00					0.00				0.04	
95% Queue Length, Q ₉₅ (veh)		0.1				0.0					0.0				0.1	
Control Delay (s/veh)		7.6				7.5					9.6				9.4	
Level of Service, LOS		A				A					A				A	
Approach Delay (s/veh)	1.5				0.0				9.6				9.4			
Approach LOS									A				A			

HCS 2010 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	G Grigsby	Intersection	Foster Ave @ E. Pershing
Agency/Co.	Western R&D, Ltd	Jurisdiction	
Date Performed	9/13/2021	East/West Street	E. Pershing
Analysis Year	2045	North/South Street	Foster Avenue
Time Analyzed	PM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	East Pershing Blvd Plan		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Capacity	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)		37	243	7		0	272	5		0	1	5		2	0	30
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		40				0					6				35	
Capacity, c (veh/h)		1253				1284					654				699	
v/c Ratio		0.03				0.00					0.01				0.05	
95% Queue Length, Q ₉₅ (veh)		0.1				0.0					0.0				0.2	
Control Delay (s/veh)		8.0				7.8					10.6				10.4	
Level of Service, LOS		A				A					B				B	
Approach Delay (s/veh)	1.0				0.0				10.6				10.4			
Approach LOS									B				B			

HCS 2010 Two-Way Stop-Control Report

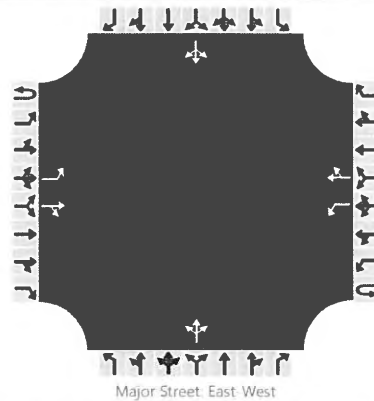
General Information

Analyst	G Grigsby
Company/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Foster Ave @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Foster Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)		9	72	0		0	84	2		0	1	1		11	1	38
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		10				0					2				54	
Capacity, c (veh/h)		1493				1512					814				902	
v/c Ratio		0.01				0.00					0.00				0.06	
95% Queue Length, Q ₉₅ (veh)		0.0				0.0					0.0				0.2	
Control Delay (s/veh)		7.4				7.4					9.4				9.2	
Level of Service, LOS		A				A					A				A	
Approach Delay (s/veh)	0.8				0.0				9.4				9.2			
Approach LOS									A				A			

HCS 2010 Two-Way Stop-Control Report

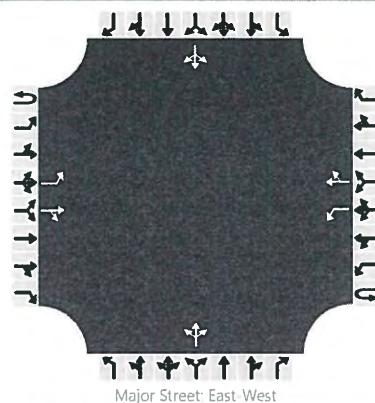
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Foster Ave @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Foster Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)		10	161	0		0	181	1		0	1	3		4	2	47
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		11				0					4				57	
Capacity, c (veh/h)		1367				1394					750				796	
v/c Ratio		0.01				0.00					0.01				0.07	
95% Queue Length, Q ₉₅ (veh)		0.0				0.0					0.0				0.2	
Control Delay (s/veh)		7.7				7.6					9.8				9.9	
Level of Service, LOS		A				A					A				A	
Approach Delay (s/veh)	0.5				0.0				9.8				9.9			
Approach LOS									A				A			

HCS 2010 Two-Way Stop-Control Report

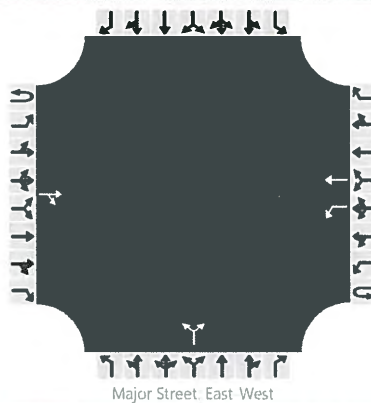
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Huisman Rd @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Huisman Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Capacity	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			112	0		0	130			5		1				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						0					6					
Capacity, c (veh/h)						1457					751					
v/c Ratio						0.00					0.01					
95% Queue Length, Q ₉₅ (veh)						0.0					0.0					
Control Delay (s/veh)						7.5					9.8					
Level of Service, LOS						A					A					
Approach Delay (s/veh)					0.0				9.8							
Approach LOS									A							

HCS 2010 Two-Way Stop-Control Report

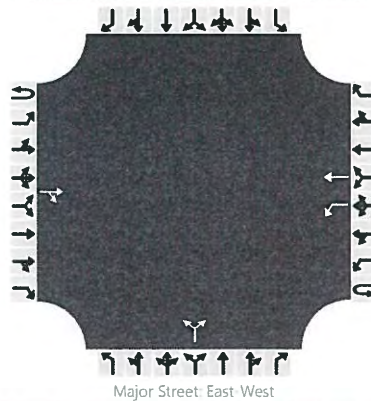
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Huisman Rd @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Huisman Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			282	0		0	328			11		2				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						0					14					
Capacity, c (veh/h)						1247					451					
v/c Ratio						0.00					0.03					
95% Queue Length, Q ₉₅ (veh)						0.0					0.1					
Control Delay (s/veh)						7.9					13.2					
Level of Service, LOS						A					B					
Approach Delay (s/veh)					0.0				13.2							
Approach LOS									B							

HCS 2010 Two-Way Stop-Control Report

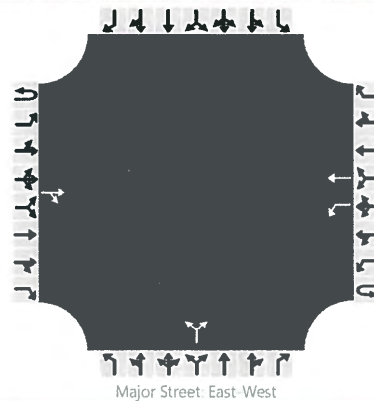
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Huisman Rd @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Huisman Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			93	0		1	100			2		0				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						1					2					
Capacity, c (veh/h)						1483					773					
v/c Ratio						0.00					0.00					
95% Queue Length, Q ₉₅ (veh)						0.0					0.0					
Control Delay (s/veh)						7.4					9.7					
Level of Service, LOS						A					A					
Approach Delay (s/veh)					0.1				9.7							
Approach LOS									A							

HCS 2010 Two-Way Stop-Control Report

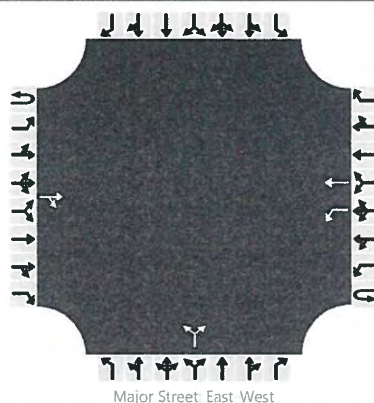
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Huisman Rd @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Huisman Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	0	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			234	0		2	252			4		0				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)					2					4						
Capacity, c (veh/h)					1304					505						
v/c Ratio					0.00					0.01						
95% Queue Length, Q ₉₅ (veh)					0.0					0.0						
Control Delay (s/veh)					7.8					12.2						
Level of Service, LOS					A					B						
Approach Delay (s/veh)					0.1				12.2							
Approach LOS									B							

HCS 2010 Two-Way Stop-Control Report

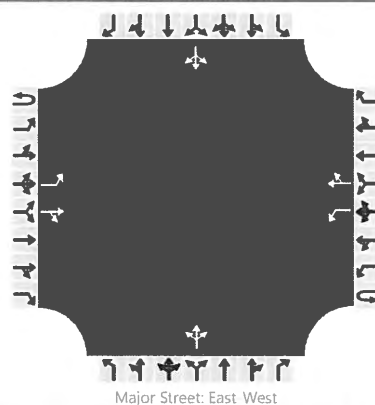
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Farthing Tr @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Farthing Trail
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Quantity	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)		51	56	6		1	87	14		7	0	0		9	0	29
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		55				1					8				42	
Capacity, c (veh/h)		1472				1525					614				856	
v/c Ratio		0.04				0.00					0.01				0.05	
95% Queue Length, Q ₉₅ (veh)		0.1				0.0					0.0				0.2	
Control Delay (s/veh)		7.5				7.4					10.9				9.4	
Level of Service, LOS		A				A					B				A	
Approach Delay (s/veh)	3.4				0.1				10.9				9.4			
Approach LOS									B				A			

HCS 2010 Two-Way Stop-Control Report

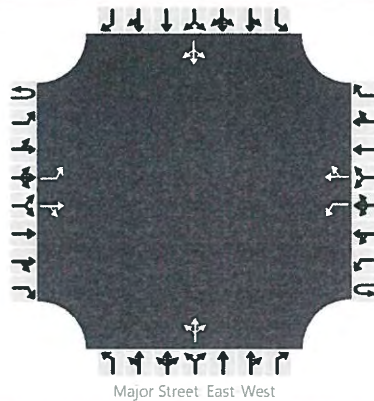
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Farthing Tr @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Farthing Trail
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)		130	142	13		2	221	34		15	0	0		22	0	74
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		141				2					16					104
Capacity, c (veh/h)		1279				1402					269					584
v/c Ratio		0.11				0.00					0.06					0.18
95% Queue Length, Q ₉₅ (veh)		0.4				0.0					0.2					0.6
Control Delay (s/veh)		8.2				7.6					19.2					12.5
Level of Service, LOS		A				A					C					B
Approach Delay (s/veh)	3.7				0.1				19.2				12.5			
Approach LOS									C				B			

HCS 2010 Two-Way Stop-Control Report

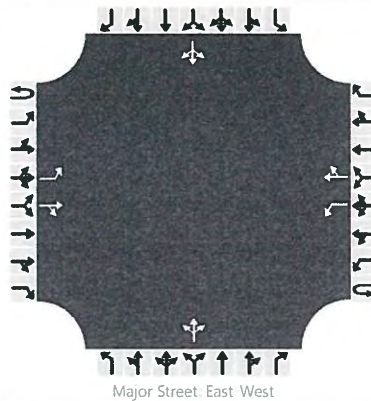
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2021
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Farthing Tr @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Farthing Trail
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)	0130	33	47	2		0	47	10		6	0	1		15	2	55
Percent Heavy Vehicles (%)	3	3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

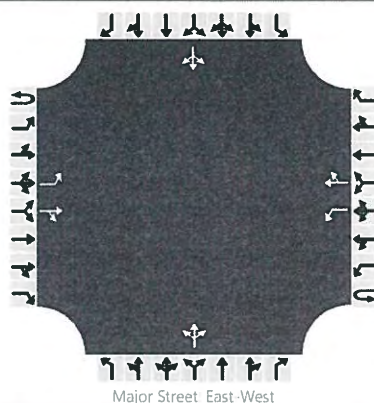
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		177				0					8					78
Capacity, c (veh/h)		1638				1544					669					901
v/c Ratio		0.11				0.00					0.01					0.09
95% Queue Length, Q ₉₅ (veh)		0.4				0.0					0.0					0.3
Control Delay (s/veh)		7.5				7.3					10.4					9.4
Level of Service, LOS		A				A					B					A
Approach Delay (s/veh)	5.7				0.0				10.4				9.4			
Approach LOS									B				A			

HCS 2010 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	G Grigsby	Intersection	Farthing Tr @ E. Pershing
Agency/Co.	Western R&D, Ltd	Jurisdiction	
Date Performed	9/13/2021	East/West Street	E. Pershing
Analysis Year	2045	North/South Street	Farthing Trail
Time Analyzed	AM Peak	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	East Pershing Blvd Plan		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume, V (veh/h)		83	119	4		0	119	25		13	0	2		37	4	140
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		90				0					16					196
Capacity, c (veh/h)		1416				1444					388					757
v/c Ratio		0.06				0.00					0.04					0.26
95% Queue Length, Q ₉₅ (veh)		0.2				0.0					0.1					1.0
Control Delay (s/veh)		7.7				7.5					14.7					11.4
Level of Service, LOS		A				A					B					B
Approach Delay (s/veh)	3.1				0.0				14.7				11.4			
Approach LOS									B				B			

HCS 2010 Two-Way Stop-Control Report

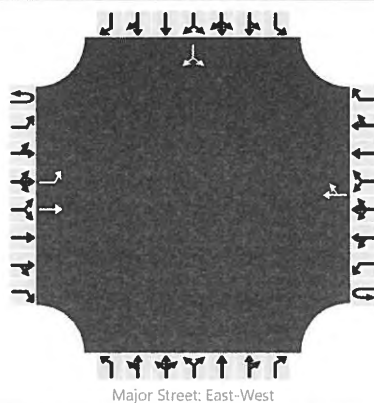
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Dickson Dr @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Dickson Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		23	135				123	21						30		28
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		25													63	
Capacity, c (veh/h)		1415													742	
v/c Ratio		0.02													0.08	
95% Queue Length, Q ₉₅ (veh)		0.1													0.3	
Control Delay (s/veh)		7.6													10.3	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	1.1												10.3			
Approach LOS													B			

HCS 2010 Two-Way Stop-Control Report

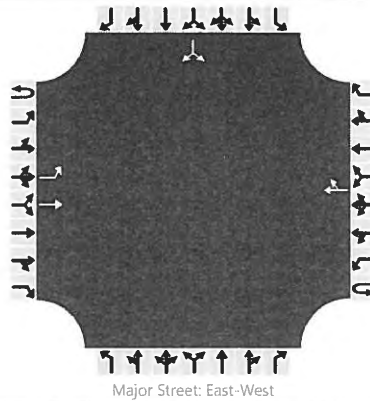
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Dickson Dr @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Dickson Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Capacity	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume, V (veh/h)		17	147				231	26						13		18
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

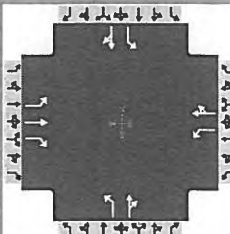
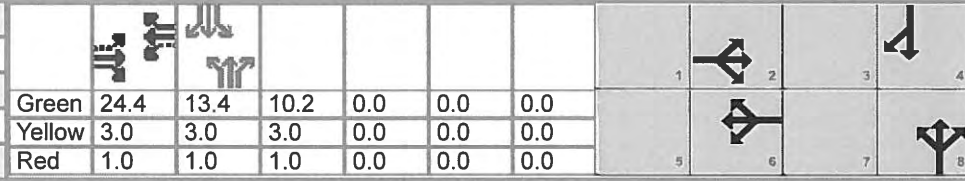
Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

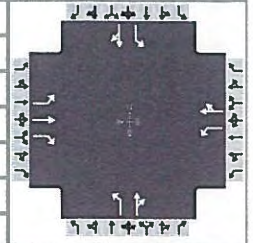
Flow Rate, v (veh/h)		18													34	
Capacity, c (veh/h)		1277													661	
v/c Ratio		0.01													0.05	
95% Queue Length, Q ₉₅ (veh)		0.0													0.2	
Control Delay (s/veh)		7.9													10.7	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.8												10.7			
Approach LOS													B			

HCS 2010 Signalized Intersection Results Summary

General Information						Intersection Information													
Agency		Western R&D, Ltd.				Duration, h		0.25											
Analyst		G Grigsby		Analysis Date		9/15/2021		Area Type			Other								
Jurisdiction				Time Period				PHF			0.92								
Urban Street				Analysis Year		2045		Analysis Period			1> 7:00								
Intersection		Christensen Rd @ East...		File Name		Christiansen Rd.East.Pershing 2045 AM.xus													
Project Description		2045 AM Peak																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				26	9	181	39	25	3	207	161	18	12	277	45				
Signal Information					Cycle, s		60.0	Reference Phase		2									
Offset, s		0	Reference Point		End														
Uncoordinated		No	Simult. Gap E/W		On														
Force Mode		Fixed	Simult. Gap N/S		On														
			Green		24.4	13.4	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
			Yellow	3.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
			Red	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase						2				6				8				4	
Case Number						5.0				6.0				10.0				10.0	
Phase Duration, s						28.4				28.4				14.2				17.4	
Change Period, (Y+R _c), s						4.0				4.0				4.0				4.0	
Max Allow Headway (MAH), s						0.0				0.0				4.1				4.1	
Queue Clearance Time (g _s), s														9.1				12.9	
Green Extension Time (g _e), s						0.0				0.0				1.2				0.5	
Red Call Probability														1.00				1.00	
Max Out Probability														0.03				0.97	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate (v), veh/h				28	10	197	42	30		225	195		13	350					
Adjusted Saturation Flow Rate (s), veh/h/ln				1401	1900	1610	1427	1864		1810	1866		1810	1853					
Queue Service Time (g _s), s				0.7	0.2	5.0	1.1	0.6		7.1	5.8		0.3	10.9					
Cycle Queue Clearance Time (g _c), s				1.3	0.2	5.0	1.3	0.6		7.1	5.8		0.3	10.9					
Green Ratio (g/C)				0.41	0.41	0.41	0.41	0.41		0.17	0.17		0.22	0.22					
Capacity (c), veh/h				676	773	655	696	759		308	318		403	413					
Volume-to-Capacity Ratio (X)				0.042	0.013	0.300	0.061	0.040		0.729	0.612		0.032	0.848					
Back of Queue (Q), ft/ln (50 th percentile)				5.5	1.8	43.2	8.3	5.8		75.8	62.3		3.3	135.2					
Back of Queue (Q), veh/ln (50 th percentile)				0.2	0.1	1.7	0.3	0.2		3.0	2.5		0.1	5.4					
Queue Storage Ratio (RQ) (50 th percentile)				0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00					
Uniform Delay (d ₁), s/veh				11.1	10.6	12.0	11.0	10.7		23.6	23.0		18.3	22.4					
Incremental Delay (d ₂), s/veh				0.1	0.0	1.2	0.2	0.1		3.3	1.9		0.0	10.1					
Initial Queue Delay (d ₃), s/veh				0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0					
Control Delay (d), s/veh				11.2	10.6	13.2	11.2	10.8		26.9	25.0		18.3	32.5					
Level of Service (LOS)				B	B	B	B	B		C	C		B	C					
Approach Delay, s/veh / LOS				12.9		B		11.0		B		26.0		C		32.0		C	
Intersection Delay, s/veh / LOS				24.2										C					
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				2.3		B		2.3		B		2.3		B		2.4		B	
Bicycle LOS Score / LOS				0.9		A		0.6		A		1.2		A		1.1		A	

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Western R&D, Ltd.			Duration, h	0.25
Analyst	G Grigsby	Analysis Date	9/15/2021	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street		Analysis Year	2045	Analysis Period	1> 7:00
Intersection	Christensen Rd @ East...	File Name	Christiansen Rd.East.Pershing 2045 PM.xus		
Project Description	2045 PM Peak				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	72	27	296	33	18	5	259	399	51	18	223	31

Signal Information											
Cycle, s	68.0	Reference Phase	2								
Offset, s	0	Reference Point	End								
Uncoordinated	Yes	Simult. Gap E/W	On								
Force Mode	Fixed	Simult. Gap N/S	On								

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		6.0		6.0
Phase Duration, s		43.0		43.0		25.0		25.0
Change Period, (Y+R _c), s		4.0		4.0		4.0		4.0
Max Allow Headway (MAH), s		4.3		4.3		4.3		4.3
Queue Clearance Time (g _s), s		9.2		3.2		23.0		20.1
Green Extension Time (g _e), s		2.0		2.0		0.0		0.5
Queue Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.00		1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	78	29	322	36	25		282	489		20	276	
Adjusted Saturation Flow Rate (s), veh/h/ln	1408	1900	1610	1402	1828		1121	1862		922	1859	
Queue Service Time (g_s), s	1.7	0.5	7.2	0.8	0.4		12.8	16.7		1.4	8.2	
Cycle Queue Clearance Time (g_c), s	2.1	0.5	7.2	1.2	0.4		21.0	16.7		18.1	8.2	
Green Ratio (g/C)	0.57	0.57	0.57	0.57	0.57		0.31	0.31		0.31	0.31	
Capacity (c), veh/h	905	1090	923	901	1049		317	575		164	574	
Volume-to-Capacity Ratio (X)	0.086	0.027	0.348	0.040	0.024		0.888	0.851		0.120	0.481	
Back of Queue (Q), ft/ln (50 th percentile)	10.7	3.7	51	4.8	3.2		165.7	211.2		7.7	83	
Back of Queue (Q), veh/ln (50 th percentile)	0.4	0.1	2.0	0.2	0.1		6.6	8.4		0.3	3.3	
Queue Storage Ratio (RQ) (50 th percentile)	0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	6.7	6.3	7.7	6.5	6.3		29.2	22.0		30.5	19.1	
Incremental Delay (d_2), s/veh	0.0	0.0	0.2	0.0	0.0		24.9	11.6		0.3	0.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (d), s/veh	6.8	6.3	8.0	6.6	6.3		54.1	33.7		30.8	19.7	
Level of Service (LOS)	A	A	A	A	A		D	C		C	B	
Approach Delay, s/veh / LOS	7.6	A		6.4	A		41.1	D		20.4	C	
Intersection Delay, s/veh / LOS	26.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.2	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	1.2	A	0.6	A	1.8	A	1.0	A

HCS 2010 Two-Way Stop-Control Report

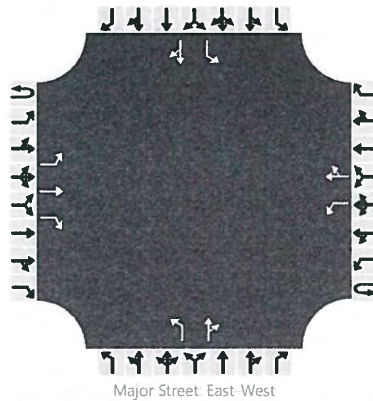
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	AM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Christensen @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Christensen Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		1	1	0		1	1	0
Configuration		L	T	R		L		TR		L		TR		L		TR
Volume, V (veh/h)		26	9	181		39	25	3		207	161	18		12	277	45
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		28				42				225		195		13		350
Capacity, c (veh/h)		1574				1357				360		704		511		714
v/c Ratio		0.02				0.03				0.62		0.28		0.03		0.49
95% Queue Length, Q ₉₅ (veh)		0.1				0.1				4.7		1.1		0.1		2.8
Control Delay (s/veh)		7.3				7.7				31.2		12.1		12.2		14.9
Level of Service, LOS		A				A				D		B		B		B
Approach Delay (s/veh)	0.9				4.5				22.3				14.8			
Approach LOS									C				B			

HCS 2010 Two-Way Stop-Control Report

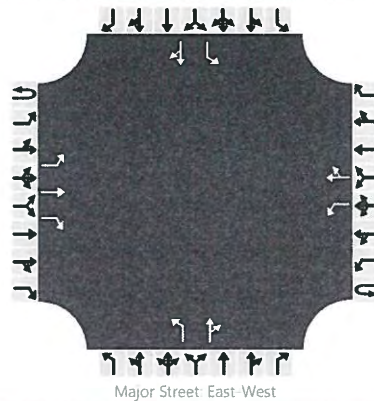
General Information

Analyst	G Grigsby
Agency/Co.	Western R&D, Ltd
Date Performed	9/13/2021
Analysis Year	2045
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	East Pershing Blvd Plan

Site Information

Intersection	Christensen @ E. Pershing
Jurisdiction	
East/West Street	E. Pershing
North/South Street	Christensen Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		1	1	0		1	1	0
Configuration		L	T	R		L		TR		L		TR		L		TR
Volume, V (veh/h)		72	27	296		33	18	5		259	399	51		18	223	31
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		78				36				282		489		20		276
Capacity, c (veh/h)		1581				1201				334		607		159		611
v/c Ratio		0.05				0.03				0.84		0.81		0.13		0.45
95% Queue Length, Q ₉₅ (veh)		0.2				0.1				11.3		10.6		0.4		2.4
Control Delay (s/veh)		7.4				8.1				65.2		34.1		30.9		15.7
Level of Service, LOS		A				A				F		D		D		C
Approach Delay (s/veh)	1.3				4.8				45.5				16.7			
Approach LOS									E				C			

E: DRAINAGE CALCULATIONS

Rational Formula Calculations - US 30 to Dry Creek

Calculation of Peak Runoff using Rational Method

Designer:	Adrienne Lemmers
Company:	Y2 Consultants
Date:	2/23/2022
Project:	East Pershing Corridor Study
Location:	West of Dry Creek

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_f$

$t_{\text{minimum}} = 5$ (urban)
 $t_{\text{minimum}} = 10$ (non-urban)

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$$\text{Selected } t_c = \max\{t_{\text{minimum}}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website ([click this link](#)).

1-hour rainfall depth, P1 (in)

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
=	0.71	1.10	1.40	1.87	2.28	2.72	3.14
	a	b	c	$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$			
=	28.50	10.00	0.786				

$$I(\text{in/hr}) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

[illegible]

Rational Formula Calculations - 6221 East Pershing to Christensen Upgrade

Calculation of Peak Runoff using Rational Method

Designer: Adrienne Lemmers
Company: Western Research & Development, Ltd
Date: 4/18/2022
Project: East Pershing Corridor Study
Location: Cheyenne, WY

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_r$

$t_{\text{minimum}} = 5$ (urban)
 $t_{\text{minimum}} = 10$ (non-urban)

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$$\text{Selected } t_c = \max\{t_{\text{minimum}}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website ([click this link](#)).

1-hour rainfall depth, P1 (in)

2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
0.71	1.10	1.40	1.87	2.28	2.72	3.14
a	b	c	$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$			
28.50	10.00	0.786				

$$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

[illegible]

Rational Formula Calculations - East of Dry Creek to Low Point (Hess Property)

Calculation of Peak Runoff using Rational Method

Designer:	Adrienne Lemmers
Company:	Western Research & Development, Ltd
Date:	4/18/2022
Project:	East Pershing Corridor Study
Location:	Cheyenne, WY

Version 2.00 released May 2017

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_t$

$$t_{\text{minimum}} = 5 \text{ (urban)}$$

$$t_{\text{minimum}} = 10 \text{ (non-urban)}$$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website ([click this link](#)).

1-hour rainfall depth, P1 (in) =	2-yr 0.71	5-yr 1.10	10-yr 1.40	25-yr 1.87	50-yr 2.28	100-yr 2.72	500-yr 3.14
Intensity Equation Coefficients =	a 28.50	b 10.00	c 0.786	$I(in/hr) = \frac{a \cdot P_1}{(b + t_c)^c}$			

$$\text{Selected } t_c = \max\{t_{\text{minimum}}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

Rainfall Intensity Equation Coefficients =

28.50	10.00	0.786
-------	-------	-------

 $I(in/hr) = \frac{28.50}{(b + t_c)^c}$

$$Q(cfs) = CIA$$
[illegible]

Rational Formula Calculations - Low Point (Hess Property) to 6221 East Pershing

[illegible]

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: East Pershing Corridor Study

Basin ID: Pre-Development, West of Dry Creek

Watershed Information

Flood Control Only

Selected BMP Type =	No BMP	
Watershed Area =	3.69	acres
Watershed Length =	1,650	ft
Watershed Length to Centroid =	825	ft
Watershed Slope =	0.007	ft/ft
Watershed Imperviousness =	2.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =		hours
Location for 1-hr Rainfall Depths =	User Input	

Note: L / W Ratio > 8

L / W Ratio = 16.94

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Optional User Overrides

Water Quality Capture Volume (WQCV) =		acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =		acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.71 in.) =	0.002	acre-feet	0.71	inches
5-yr Runoff Volume (P1 = 1.1 in.) =	0.026	acre-feet	1.10	inches
10-yr Runoff Volume (P1 = 1.4 in.) =	0.092	acre-feet	1.40	inches
25-yr Runoff Volume (P1 = 1.87 in.) =	0.252	acre-feet	1.87	inches
50-yr Runoff Volume (P1 = 2.28 in.) =	0.374	acre-feet	2.28	inches
100-yr Runoff Volume (P1 = 2.72 in.) =	0.534	acre-feet	2.72	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.665	acre-feet	3.14	inches

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: East Pershing Corridor Study

Basin ID: Post-Development Conditions, West of Dry Creek, North Side

Watershed Information

Flood Control Only

Note: L / W Ratio > 8

L / W Ratio = 29.49

Selected BMP Type =	No BMP	
Watershed Area =	1.87	acres
Watershed Length =	1,550	ft
Watershed Length to Centroid =	775	ft
Watershed Slope =	0.013	ft/ft
Watershed Imperviousness =	63.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	N/A	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Optional User Overrides

Water Quality Capture Volume (WQCV) =	0.038	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.114	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.71 in.) =	0.062	acre-feet	0.71	inches
5-yr Runoff Volume (P1 = 1.1 in.) =	0.110	acre-feet	1.10	inches
10-yr Runoff Volume (P1 = 1.4 in.) =	0.155	acre-feet	1.40	inches
25-yr Runoff Volume (P1 = 1.87 in.) =	0.236	acre-feet	1.87	inches
50-yr Runoff Volume (P1 = 2.28 in.) =	0.303	acre-feet	2.28	inches
100-yr Runoff Volume (P1 = 2.72 in.) =	0.380	acre-feet	2.72	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.450	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	0.061	acre-feet		
Approximate 5-yr Detention Volume =	0.106	acre-feet		
Approximate 10-yr Detention Volume =	0.132	acre-feet		
Approximate 25-yr Detention Volume =	0.165	acre-feet		
Approximate 50-yr Detention Volume =	0.184	acre-feet		
Approximate 100-yr Detention Volume =	0.215	acre-feet		

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: East Pershing Corridor Study

Basin ID: Post-Development Conditions, West of Dry Creek, South Side

Watershed Information

Flood Control Only

Selected BMP Type =	No BMP	
Watershed Area =	1.82	acres
Watershed Length =	1,530	ft
Watershed Length to Centroid =	765	ft
Watershed Slope =	0.014	ft/ft
Watershed Imperviousness =	63.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	N/A	hours
Location for 1-hr Rainfall Depths =	User Input	

Note: L / W Ratio > 8

L / W Ratio = 29.53

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Optional User Overrides

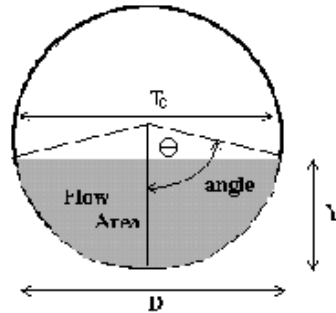
Water Quality Capture Volume (WQCV) =	0.037	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	0.110	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.71 in.) =	0.061	acre-feet	0.71	inches
5-yr Runoff Volume (P1 = 1.1 in.) =	0.107	acre-feet	1.10	inches
10-yr Runoff Volume (P1 = 1.4 in.) =	0.151	acre-feet	1.40	inches
25-yr Runoff Volume (P1 = 1.87 in.) =	0.229	acre-feet	1.87	inches
50-yr Runoff Volume (P1 = 2.28 in.) =	0.295	acre-feet	2.28	inches
100-yr Runoff Volume (P1 = 2.72 in.) =	0.370	acre-feet	2.72	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	0.438	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	0.059	acre-feet		
Approximate 5-yr Detention Volume =	0.103	acre-feet		
Approximate 10-yr Detention Volume =	0.128	acre-feet		
Approximate 25-yr Detention Volume =	0.160	acre-feet		
Approximate 50-yr Detention Volume =	0.179	acre-feet		
Approximate 100-yr Detention Volume =	0.209	acre-feet		

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Planning Study

Pipe ID: Culvert under Grasslands Parkway



Design Information (Input)

Pipe Invert Slope	So =	0.0558	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	42.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	9.62	sq ft
Full-flow wetted perimeter	Pf =	11.00	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	238.30	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	0.77	radians
Flow area	An =	0.82	sq ft
Top width	Tn =	2.43	ft
Wetted perimeter	Pn =	2.68	ft
Flow depth	Yn =	0.49	ft
Flow velocity	Vn =	12.25	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	4.2%	of full flow
Normal Depth Froude Number	Fr _n =	3.72	supercritical

Calculation of Critical Flow Condition

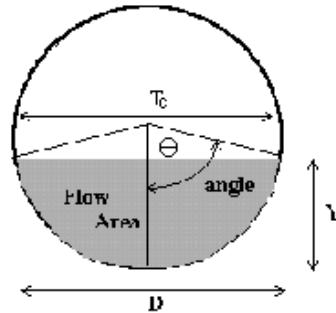
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.10	radians
Critical flow area	Ac =	2.13	sq ft
Critical top width	Tc =	3.12	ft
Critical flow depth	Yc =	0.96	ft
Critical flow velocity	Vc =	4.69	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Planning Study

Pipe ID: Culvert from Cheyenne Ranch Detention



Design Information (Input)

Pipe Invert Slope	So =	0.0174	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	42.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	9.62	sq ft
Full-flow wetted perimeter	Pf =	11.00	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	133.07	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	0.89	radians
Flow area	An =	1.23	sq ft
Top width	Tn =	2.72	ft
Wetted perimeter	Pn =	3.12	ft
Flow depth	Yn =	0.65	ft
Flow velocity	Vn =	8.13	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	7.5%	of full flow
Normal Depth Froude Number	Fr _n =	2.13	supercritical

Calculation of Critical Flow Condition

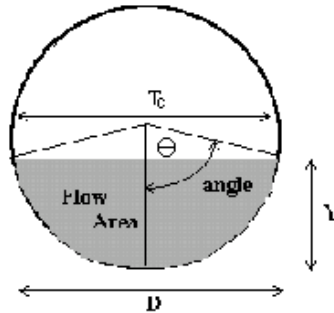
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.10	radians
Critical flow area	Ac =	2.13	sq ft
Critical top width	Tc =	3.12	ft
Critical flow depth	Yc =	0.96	ft
Critical flow velocity	Vc =	4.69	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Planning Study

Pipe ID: Culvert from Pershing Pointe Detention



Design Information (Input)

Pipe Invert Slope	So =	0.0175	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	30.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	4.91	sq ft
Full-flow wetted perimeter	Pf =	7.85	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	54.41	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.14	radians
Flow area	An =	1.18	sq ft
Top width	Tn =	2.27	ft
Wetted perimeter	Pn =	2.85	ft
Flow depth	Yn =	0.73	ft
Flow velocity	Vn =	8.45	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	18.4%	of full flow
Normal Depth Froude Number	Fr _n =	2.06	supercritical

Calculation of Critical Flow Condition

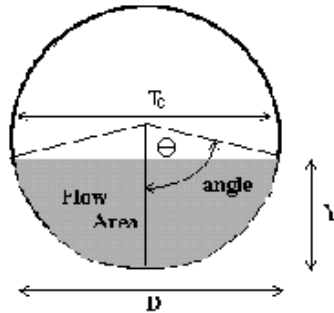
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.42	radians
Critical flow area	Ac =	1.97	sq ft
Critical top width	Tc =	2.47	ft
Critical flow depth	Yc =	1.06	ft
Critical flow velocity	Vc =	5.07	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Corridor Study

Pipe ID: RCP running West to East under Taft Ave



Design Information (Input)

Pipe Invert Slope	So =	0.0593	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	30.00	inches
Design discharge	Q =	5.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	4.91	sq ft
Full-flow wetted perimeter	Pf =	7.85	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	100.15	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	0.80	radians
Flow area	An =	0.47	sq ft
Top width	Tn =	1.79	ft
Wetted perimeter	Pn =	2.00	ft
Flow depth	Yn =	0.38	ft
Flow velocity	Vn =	10.63	fps
Discharge	Qn =	5.00	cfs
Percent of Full Flow	Flow =	5.0%	of full flow
Normal Depth Froude Number	Fr _n =	3.66	supercritical

Calculation of Critical Flow Condition

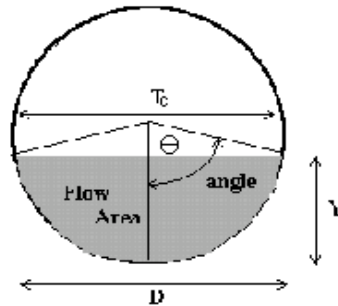
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.15	radians
Critical flow area	Ac =	1.21	sq ft
Critical top width	Tc =	2.28	ft
Critical flow depth	Yc =	0.74	ft
Critical flow velocity	Vc =	4.13	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: **East Pershing Planning Study**

Pipe ID: **Culvert outlet into Dry Creek, from West, South Side of Creek**



Design Information (Input)

Pipe Invert Slope	So =	0.0018	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	24.00	inches
Design discharge	Q =	5.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	3.14	sq ft
Full-flow wetted perimeter	Pf =	6.28	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	9.49	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \text{Theta} < 3.14$)	Theta =	1.60	radians
Flow area	An =	1.63	sq ft
Top width	Tn =	2.00	ft
Wetted perimeter	Pn =	3.20	ft
Flow depth	Yn =	1.03	ft
Flow velocity	Vn =	3.06	fps
Discharge	Qn =	5.00	cfs
Percent of Full Flow	Flow =	52.7%	of full flow
Normal Depth Froude Number	Fr _n =	0.60	subcritical

Calculation of Critical Flow Condition

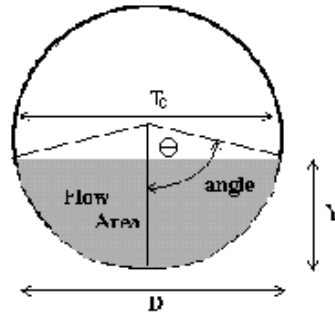
Half Central Angle ($0 < \text{Theta-c} < 3.14$)	Theta-c =	1.36	radians
Critical flow area	Ac =	1.15	sq ft
Critical top width	Tc =	1.95	ft
Critical flow depth	Yc =	0.79	ft
Critical flow velocity	Vc =	4.35	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Planning Study

Pipe ID: North to South Culverts, East of Dry Creek



Design Information (Input)

Pipe Invert Slope	So =	0.0035	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	24.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	3.14	sq ft
Full-flow wetted perimeter	Pf =	6.28	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	13.42	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.86	radians
Flow area	An =	2.14	sq ft
Top width	Tn =	1.92	ft
Wetted perimeter	Pn =	3.72	ft
Flow depth	Yn =	1.29	ft
Flow velocity	Vn =	4.68	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	74.5%	of full flow
Normal Depth Froude Number	Fr _n =	0.78	subcritical

Calculation of Critical Flow Condition

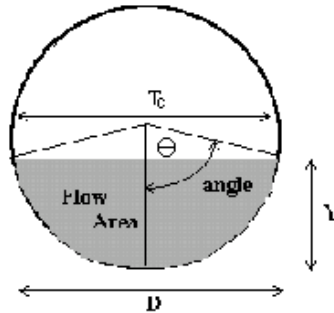
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.70	radians
Critical flow area	Ac =	1.83	sq ft
Critical top width	Tc =	1.98	ft
Critical flow depth	Yc =	1.13	ft
Critical flow velocity	Vc =	5.46	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Planning Study

Pipe ID: Three RCP Culverts under Road, 5320 East Pershing



Design Information (Input)

Pipe Invert Slope	So =	0.0279	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	30.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	4.91	sq ft
Full-flow wetted perimeter	Pf =	7.85	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	68.70	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \text{Theta} < 3.14$)	Theta =	1.07	radians
Flow area	An =	1.00	sq ft
Top width	Tn =	2.19	ft
Wetted perimeter	Pn =	2.66	ft
Flow depth	Yn =	0.64	ft
Flow velocity	Vn =	9.98	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	14.6%	of full flow
Normal Depth Froude Number	Fr _n =	2.60	supercritical

Calculation of Critical Flow Condition

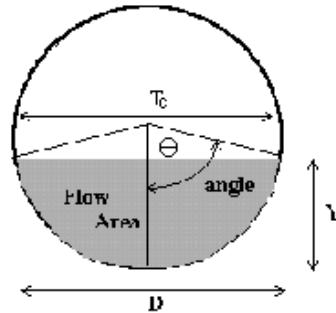
Half Central Angle ($0 < \text{Theta-c} < 3.14$)	Theta-c =	1.42	radians
Critical flow area	Ac =	1.97	sq ft
Critical top width	Tc =	2.47	ft
Critical flow depth	Yc =	1.06	ft
Critical flow velocity	Vc =	5.07	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Planning Study

Pipe ID: RCP Culvert on the West side of Wenandy



Design Information (Input)

Pipe Invert Slope	So =	0.0105	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	36.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	7.07	sq ft
Full-flow wetted perimeter	Pf =	9.42	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	68.53	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.07	radians
Flow area	An =	1.45	sq ft
Top width	Tn =	2.63	ft
Wetted perimeter	Pn =	3.20	ft
Flow depth	Yn =	0.77	ft
Flow velocity	Vn =	6.92	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	14.6%	of full flow
Normal Depth Froude Number	Fr _n =	1.64	supercritical

Calculation of Critical Flow Condition

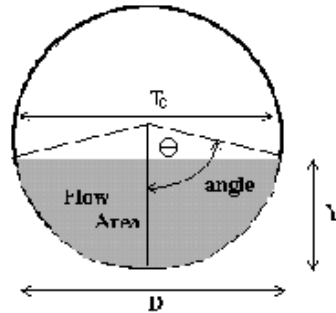
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.23	radians
Critical flow area	Ac =	2.06	sq ft
Critical top width	Tc =	2.83	ft
Critical flow depth	Yc =	1.00	ft
Critical flow velocity	Vc =	4.85	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: East Pershing Planning Study

Pipe ID: Culvert Under Pershing, East Side of Wenandy



Design Information (Input)

Pipe Invert Slope	So =	0.0052	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	36.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	7.07	sq ft
Full-flow wetted perimeter	Pf =	9.42	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	48.23	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.18	radians
Flow area	An =	1.86	sq ft
Top width	Tn =	2.77	ft
Wetted perimeter	Pn =	3.54	ft
Flow depth	Yn =	0.93	ft
Flow velocity	Vn =	5.38	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	20.7%	of full flow
Normal Depth Froude Number	Fr _n =	1.16	supercritical

Calculation of Critical Flow Condition

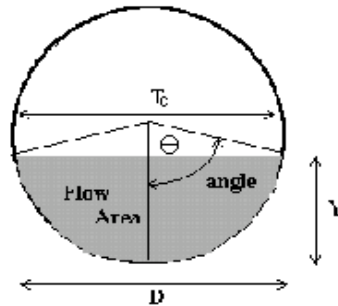
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.23	radians
Critical flow area	Ac =	2.06	sq ft
Critical top width	Tc =	2.83	ft
Critical flow depth	Yc =	1.00	ft
Critical flow velocity	Vc =	4.85	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: **East Pershing Planning Study**

Pipe ID: **Culvert Under Pershing, East Side of McKinley**



Design Information (Input)

Pipe Invert Slope	So =	0.0087	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	24.00	inches
Design discharge	Q =	10.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	Af =	3.14	sq ft
Full-flow wetted perimeter	Pf =	6.28	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	21.16	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	Theta =	1.54	radians
Flow area	An =	1.51	sq ft
Top width	Tn =	2.00	ft
Wetted perimeter	Pn =	3.08	ft
Flow depth	Yn =	0.97	ft
Flow velocity	Vn =	6.64	fps
Discharge	Qn =	10.00	cfs
Percent of Full Flow	Flow =	47.3%	of full flow
Normal Depth Froude Number	Fr _n =	1.35	supercritical

Calculation of Critical Flow Condition

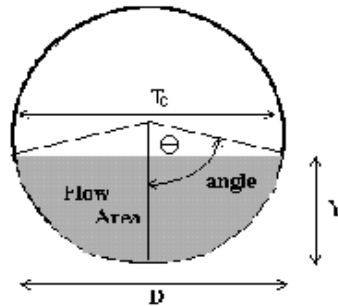
Half Central Angle ($0 < \theta_c < 3.14$)	Theta-c =	1.70	radians
Critical flow area	Ac =	1.83	sq ft
Critical top width	Tc =	1.98	ft
Critical flow depth	Yc =	1.13	ft
Critical flow velocity	Vc =	5.46	fps
Critical Depth Froude Number	Fr _c =	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: **East Pershing Planning Study**

Pipe ID: **Culverts 300 feet West of Whitney, Elliptical**



Design Information (Input)

Pipe Invert Slope	$S_o =$	0.0017	ft/ft
Pipe Manning's n-value	$n =$	0.0130	
Pipe Diameter	$D =$	48.00	inches
Design discharge	$Q =$	5.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	$A_f =$	12.57	sq ft
Full-flow wetted perimeter	$P_f =$	12.57	ft
Half Central Angle	$\text{Theta} =$	3.14	radians
Full-flow capacity	$Q_f =$	59.39	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \text{Theta} < 3.14$)	$\text{Theta} =$	0.92	radians
Flow area	$A_n =$	1.74	sq ft
Top width	$T_n =$	3.18	ft
Wetted perimeter	$P_n =$	3.67	ft
Flow depth	$Y_n =$	0.78	ft
Flow velocity	$V_n =$	2.87	fps
Discharge	$Q_n =$	5.00	cfs
Percent of Full Flow	$\text{Flow} =$	8.4%	of full flow
Normal Depth Froude Number	$Fr_n =$	0.68	subcritical

Calculation of Critical Flow Condition

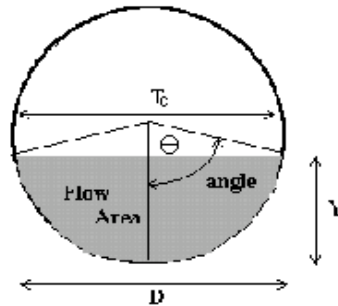
Half Central Angle ($0 < \text{Theta-c} < 3.14$)	$\text{Theta-c} =$	0.83	radians
Critical flow area	$A_c =$	1.32	sq ft
Critical top width	$T_c =$	2.95	ft
Critical flow depth	$Y_c =$	0.65	ft
Critical flow velocity	$V_c =$	3.80	fps
Critical Depth Froude Number	$Fr_c =$	1.00	

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

MHFD-Culvert, Version 4.00 (May 2020)

Project: **East Pershing Planning Study**

Pipe ID: **RCP Culverts under Whitney/Pershing Intersection**



Design Information (Input)

Pipe Invert Slope	$S_o =$	0.0105	ft/ft
Pipe Manning's n-value	$n =$	0.0130	
Pipe Diameter	$D =$	48.00	inches
Design discharge	$Q =$	5.00	cfs

Full-Flow Capacity (Calculated)

Full-flow area	$A_f =$	12.57	sq ft
Full-flow wetted perimeter	$P_f =$	12.57	ft
Half Central Angle	$\theta =$	3.14	radians
Full-flow capacity	$Q_f =$	147.59	cfs

Calculation of Normal Flow Condition

Half Central Angle ($0 < \theta < 3.14$)	$\theta =$	0.73	radians
Flow area	$A_n =$	0.92	sq ft
Top width	$T_n =$	2.66	ft
Wetted perimeter	$P_n =$	2.90	ft
Flow depth	$Y_n =$	0.50	ft
Flow velocity	$V_n =$	5.45	fps
Discharge	$Q_n =$	5.00	cfs
Percent of Full Flow	$\text{Flow} =$	3.4%	of full flow
Normal Depth Froude Number	$Fr_n =$	1.63	supercritical

Calculation of Critical Flow Condition

Half Central Angle ($0 < \theta_c < 3.14$)	$\theta_c =$	0.83	radians
Critical flow area	$A_c =$	1.32	sq ft
Critical top width	$T_c =$	2.95	ft
Critical flow depth	$Y_c =$	0.65	ft
Critical flow velocity	$V_c =$	3.80	fps
Critical Depth Froude Number	$Fr_c =$	1.00	

Open Ditch Calculations West of Dry Creek

Outlet into Dry Creek Maintain existing pipe size and slope to not increase outlet rate
Have 13.8 ft distance between - use 12 ft

Desired Acre-ft= 0.284344
Attained Acre-ft= 0.872 South 1.070082645 North

Ditch, south side upgradient of outlet into Dry Creek - 455' $Q = \frac{1.49 AR^{2/3} S^{1/2}}{n}$

Q= 121.0 Flow Rate, CFS
Slope= 0.01
Top Width= 12
Height= 3
z= 2 width of channel slope (for a rise of 1 ft)
rh= 1.34 Hydraulic Radius (ft)
Pw= 13.4 Wetted perimeter (ft)
n= 0.027 Manning's n value
A= 18 Flow Area (ft2)

Ditch Length= 70 ft
Ditch volume= 1260 ft3 0.029 acre-ft

North side ditch - typical culverts have a capacity of 30 CFS

Q= 215.2 Flow Rate, CFS	Q= 286.2 Flow Rate, CFS
Slope= 0.013	Slope= 0.013
Top Width= 18	Top Width= 23.6
Height= 3	Height= 3
z= 3 width of channel slope (for a rise of 1 ft)	z= 3.933333 width of channel slope (for a rise of 1 ft)
rh= 1.42 Hydraulic Radius (ft)	rh= 1.45 Hydraulic Radius (ft)
Pw= 19.0 Wetted perimeter (ft)	Pw= 24.4 Wetted perimeter (ft)
n= 0.027 Manning's n value	n= 0.027 Manning's n value
A= 27 Flow Area (ft2)	A= 35.4 Flow Area (ft2)

Length of ditch section= 2490 ft
Ditch volume= 77688 ft3 1.783471 acre-ft
Reduce by 40%= 46612.8 ft3 1.070083 acre-ft To allow for accesses, road crossings, and other impediments on ditch volume

South side ditch, from Taft/Polk to last access upgradient of Dry Creek outlet

Q= 72.9 Flow Rate, CFS	Q= 80.5 Flow Rate, CFS	Q= 106.8 Flow Rate, CFS
Slope= 0.0064	Slope= 0.0078	Slope= 0.0078
Top Width= 12	Top Width= 12	Top Width= 12
Height= 2.5	Height= 2.5	Height= 3
z= 2.4 width of channel slope (for a rise of 1 ft)	z= 2.4 width of channel slope (for a rise of 1 ft)	z= 2 width of channel slope (for a rise of 1 ft)
rh= 1.15 Hydraulic Radius (ft)	rh= 1.15 Hydraulic Radius (ft)	rh= 1.34 Hydraulic Radius (ft)
Pw= 13.0 Wetted perimeter (ft)	Pw= 13.0 Wetted perimeter (ft)	Pw= 13.4 Wetted perimeter (ft)
n= 0.027 Manning's n value	n= 0.027 Manning's n value	n= 0.027 Manning's n value
A= 15 Flow Area (ft2)	A= 15 Flow Area (ft2)	A= 18 Flow Area (ft2)
Length= 460 ft	Length= 357 ft	
Volume= 6900 ft3	Volume= 5890.5 ft3 0.293629 acre-ft	

Open Ditch Calculations West of Dry Creek

South Ditch along Pershing Pointe Apartments

Section 1				Section 2				Section 3				Section 4			
Q=	476.1	Flow Rate, CFS		Q=	476.1	Flow Rate, CFS		Q=	263.2	Flow Rate, CFS		Q=	243.5	Flow Rate, CFS	
Slope=	0.0178			Slope=	0.0178			Slope=	0.0178			Slope=	0.0178		
Top Width=	26			Top Width=	26			Top Width=	15			Top Width=	14		
Height=	3.5			Height=	3.5			Height=	3.5			Height=	3.5		
z=	3.714286	width of channel slope (for a rise of 1 ft)		z=	3.714286	width of channel slope (for a rise of 1 ft)		z=	2.142857	width of channel slope (for a rise of 1 ft)		z=	2	width of channel slope (for a rise of 1 ft)	
rh=	1.69	Hydraulic Radius (ft)		rh=	1.69	Hydraulic Radius (ft)		rh=	1.59	Hydraulic Radius (ft)		rh=	1.57	Hydraulic Radius (ft)	
Pw=	26.9	Wetted perimeter (ft)		Pw=	26.9	Wetted perimeter (ft)		Pw=	16.6	Wetted perimeter (ft)		Pw=	15.7	Wetted perimeter (ft)	
n=	0.027	Manning's n value		n=	0.027	Manning's n value		n=	0.027	Manning's n value		n=	0.027	Manning's n value	
A=	45.5	Flow Area (ft2)		A=	45.5	Flow Area (ft2)		A=	26.25	Flow Area (ft2)		A=	24.5	Flow Area (ft2)	
Length= 197 ft				Length= 110.5 ft				Length= 110.6 ft				Length= 288 ft			
Volume= 8963.5 ft3				Volume= 5027.75 ft3				Volume= 2903.25 ft3				Volume= 7056 ft3			

South Ditch - Grasslands Parkway to Pershing Pointe
Street slope at 1005+00 is 0.64%, vertical curve to increase slope to 1.78% at station 1010+00

Section 1 (Sections go from west to east) Sta 1007+25				Section 2 - matches section 1 above, Sta 1011+50			
Q=	530.6	Flow Rate, CFS		Q=	476.1	Flow Rate, CFS	
Slope=	0.014118			Slope=	0.0178		
Top Width=	22			Top Width=	26		
Height=	4.5			Height=	3.5		
z=	2.444444	width of channel slope (for a rise of 1 ft)		z=	3.714286	width of channel slope (for a rise of 1 ft)	
rh=	2.08	Hydraulic Radius (ft)		rh=	1.69	Hydraulic Radius (ft)	
Pw=	23.8	Wetted perimeter (ft)		Pw=	26.9	Wetted perimeter (ft)	
n=	0.027	Manning's n value		n=	0.027	Manning's n value	
A=	49.5	Flow Area (ft2)		A=	45.5	Flow Area (ft2)	
Length= 444 ft							
Volume= 21090 ft3							
0.48416 acre-ft							

Road Capacity Calculations and Inlet/Curb Cut Placement

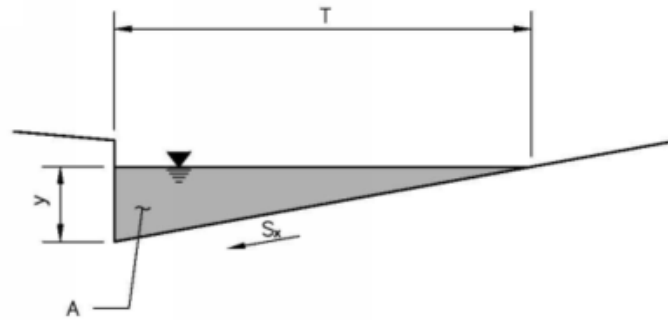


Figure 7-1. Gutter section with uniform cross slope

For a triangular cross section as shown in Figure 7-1, Manning's equation for gutter flow is written as:

$$Q = \frac{1.486}{n} A R^{2/3} S_o^{1/2} = \frac{0.56}{n} S_x^{5/3} S_o^{1/2} T^{8/3} \quad \text{Equation 7-1}$$

Where:

Q = calculated flow rate for the half-street (cfs)

n = Manning's roughness coefficient (0.016 for asphalt street with concrete gutter, 0.013 for concrete street and gutter)

R = hydraulic radius of wetted cross section = A/P (ft)

A = cross-sectional area (ft²)

P = wetted perimeter of cross section (ft)

S_x = street cross slope (ft/ft)

S_o = longitudinal slope (ft/ft)

T = top width of flow spread (ft).

The flow depth can be found using:

$$y = TS_x \quad \text{Equation 7-2}$$

Where:

y = flow depth at the gutter flowline (ft).

Note that the flow depth generally should not exceed the curb height during the minor storm based on Table 7-2. Manning's equation can be written in terms of the flow depth, as:

$$Q = \frac{0.56}{n S_x} S_o^{1/2} y^{8/3} \quad \text{Equation 7-3}$$

The cross-sectional flow area, A , can be expressed as:

$$A = \frac{S_x T^2}{2} \quad \text{Equation 7-4}$$

The gutter velocity at peak capacity may be found from continuity ($V = Q/A$).

Road Capacity Calculations and Inlet/Curb Cut Placement

y= 0.016 for asphalt with concrete curb and gutter 0.5 curb height (ft)		A1 north= Q1 minor north= Q1 major north= A2 north= Q2 minor north= Q2 major north= A3 north= Q3 minor north= Q3 major north= A4 north= Q4 minor north= Q4 major north=										A1 south= Q1 minor south= Q1 major south= A2 south= Q2 minor south= Q2 major south= A3 south= Q3 minor south= Q3 major south= A4 south= Q4 minor south= Q4 major south=											
		1.54 acres, from sta 1002+71.35 to 1029+62.56 3.38 cfs 6.76 cfs 0.88 2.01 4.02 0.79 1.79 3.58 3.39 4.83 9.68										1.72 acres, from sta 1002+71.35 to 1029+62.56 3.77 cfs 7.55 cfs 0.88 acres, from sta 1002+71.35 to 1029+62.56 2.07 cfs 4.15 cfs 0.79 acres, from sta 1002+71.35 to 1029+62.56 1.79 cfs 3.58 cfs 3.25 acres, from sta 1002+71.35 to 1029+62.56 4.63 cfs 9.28 cfs											
STA	Roadway Slope (%)	Minor Storm Reduction Factor for Gutter Flow	Major Storm Reduction Factor for Gutter Flow	North Road Width (ft)	North Road Cross Slope (%)	Calculated Area for subcatchment (ft2)	North Side Top width of flow Spread (ft)	Peak Flow rate for North side (cfs)	Allowable Flow rate for North side, Minor Storm (cfs)	Calculated Runoff for Major Storm, 100 year (cfs)	Runoff with Inlets (cfs)	South Road Width (ft)	South Road Cross Slope (%)	Calculated Area for subcatchment (ft2)	South Side Top width of flow Spread (ft)	Peak Flow rate for South side (cfs)	Calculated Runoff for Major Storm, 100 year (cfs)	Flow with Inlets (cfs)	Allowable Flow rate for South side, Major Storm (cfs)	Calculated Runoff for Minor Storm, 10 year (cfs)	Allowable Flow rate for South side, Minor Storm (cfs)	Notes	
100271.75	-0.64	1		1	30.58	2	-	43.16	17.6	17.6	-	24.58	2	-	0	0	-	0	0.0	-	0.0	Begin new alignment, all flow is going towards the north	
100503.76	-1.21	1		1	25.46	1.9	6501	19.46	35.1	35.1	0.66	36.58	1.9	7095	30.58	35.1	0.72	0.72	35.1	0.36	35.1	Begin vertical curve	
100600	-1.21	1		1	25.46	1.9	8951	19.46	35.1	35.1	0.45	36.58	1.9	10615	30.58	35.1	1.07	0.79	35.1	0.79	35.1	Curb cut on south side, intersection with Grasslands Parkway	
100753.76	-1.50	1		1	24.58	3.22	12793	18.58	25.6	25.6	1.29	24.58	3.34	14740	18.58	24.7	1.49	1.20	24.7	0.74	24.7	VPI	
101003.76	-1.78	1	0.9	1	24.58	4.03	18938	18.58	24.3	21.9	0.95	24.58	3.45	20885	18.58	28.4	2.11	1.82	25.6	1.05	28.4	End vertical curve	
101723.06	-1.21	1		1	24.58	3.78	36618	18.58	17.6	17.6	1.84	36	2.76	42672	30	24.2	4.30	2.75	24.2	2.15	24.2	Begin vertical curve, curb cut on north and south side just west of Taft/Polk intersection	
102023.06	-0.93	1		1	24.58	3.76	43992	18.58	13.6	13.6	2.22	24.58	3.27	51759	18.58	15.6	5.22	3.66	15.6	2.61	15.6	VPI	
102323.05	-0.64	1		1	24.58	3.76	51366	18.58	9.4	9.4	5.18	24.58	3.76	59133	18.58	9.4	5.96	4.41	9.4	2.98	9.4	End vertical curve	
102800	-0.64	1		1	24.58	3.56	63089	18.58	9.9	9.9	3.18	24.58	3.56	70857	18.58	9.9	7.15	5.59	9.9	3.57	9.9		
102862.56	-0.71	1		1	24.58	3.56	64627	18.58	11.0	11.0	3.26	24.58	3.56	72394	18.58	11.0	7.30	4.83	11.0	3.65	11.0		
102962.56	-0.61	1		1	24.58	3.56	67085	18.58	9.4	9.4	3.38	24.58	3.56	74852	18.58	9.4	7.55	5.07	9.4	3.77	9.4		
103300	-0.87	1		1	24.58	2	8294	18.58	24.0	24.0	0.87	24.58	2	8729	18.58	24.0	0.90	5.97	24.0	0.45	24.0		
103399.06	-0.42	1		1	24.58	3.45	10729	18.58	6.7	6.7	0.56	24.58	3.43	10729	18.58	6.7	1.16	6.24	6.7	0.58	6.7		
104221.44	-0.21	1		1	24.58	2.67	30943	18.58	4.3	4.3	1.62	24.58	2.67	30943	18.58	4.3	3.35	6.08	4.3	1.67	4.3	Begin vertical curve, took average of two	
104521.44	0	1		1	24.58	0.6	38317	18.58	0.0	0.0	2.01	24.58	0.5	38317	18.58	0.0	4.15	6.88	0.0	2.07	0.0	0.0	VPI (Low point), need inlet
104821.44	0.32	1		1	24.58	2.57	7374	18.58	6.9	6.9	0.38	24.58	2.57	7374	18.58	6.9	0.76	6.9	0.38	6.9	6.9	End Vertical curve	
105927	0.32	1		1	24.58	2.57	34549	18.58	6.9	6.9	1.79	24.58	2.57	34549	18.58	6.9	3.58	6.9	1.79	6.9	6.9		
106177.69	0.76	1		1	18.58	1.93	5410	12.58	21.6	21.6	0.18	21.6	1.3	6162	18.58	32.0	0.40	32.0	0.20	32.0	32.0	Begin vertical curve, took average of two	
106677.69	1.19	1		1	24.58	3.3	16200	31.29	19.9	19.9	0.53	18.71	-3.3	16984	0	0.0	1.11	0.0	0.0	0.00	0.00	0.0	End Vertical curve
106847.62	0.60	1		1	24.58	3.17	20377	37.16	10.3	10.3	0.67	24.58	-3.17	20663	0	0.0	1.36	0.0	0.0	0.00	0.00	0.0	Begin vertical curve, took average of two
107047.62	0	1		1	24.58	2.38	25293	37.16	0.0	0.0	0.83	24.58	-2.38	25579	0	0.0	1.68	Flows west to inle	0.0	0.00	0.00	0.0	VPI, High Point
107247.62	-0.85	1		1	24.58	2.63	30209	37.16	17.8	17.8	0.99	24.58	-2.63	30495	0	0.0	2.00	0.32	0.0	0.00	0.00	0.0	End Vertical curve
107406.99	-0.43	1		1	24.58	3.65	34126	37.16	6.4	6.4	1.11	24.58	-3.65	34412	0	0.0	2.26	0.58	0.0	0.00	0.00	0.0	Begin vertical curve, took average of two
107600	0	1		1	24.58	2.62	38870	37.16	0.0	0.0	1.27	24.58	-0.5	39156	0	0.0	2.57	0.89	0.0	0.00	0.00	0.0	Flat spot on curve, but top of curve so no inlet
108006.99	2.18	0.94	0.76	1	24.58	1.9	48874	18.58	63.2	48.1	1.60	24.58	3	49160	18.58	40.1	3.23	1.55	30.4	1.61	37.7	VPI	
108652.22	1.14	1		1	24.58	4.13	64734	18.58	15.2	15.2	2.11	24.58	3.98	65020	18.58	15.8	4.27	2.59	15.8	2.13	15.8	End Vertical curve	
109152.22	-0.27	1		1	24.58	1	77024	18.58	14.9	14.9	2.52	24.58	1	77310	18.58	14.9	5.08	0.81	14.9	2.53	14.9	Begin vertical curve, took average of two	
109248.7	0	1		1	24.58	0.5	79395	18.58	0.0	0.0	2.59	24.58	0.5	79681	18.58	0.0	5.23	0.96	0.0	2.61	0.0	0.0	End Vertical curve
109623.7	1.84	1	0.88	1	24.58	0.66	88613	18.58	153.3	134.9	2.89	24.58	0.7	88899	18.58	144.5	5.84	1.57	127.2	2.91	144.5	Begin vertical curve, took average of two, low spot, need inlet	
109998.7	3.67	0.64	0.5	1	24.58	1.95	97830	18.58	103.7	51.9	3.20	24.58	1.05	98116	18.58	192.7	6.44	2.17	96.3	3.21	123.3	VPI	
110325	1.88	1	0.86	1	24.58	1.76	105851	18.58	58.7	50.5	3.46	24.58	1.69	106137	18.58	61.2	6.97	2.70	52.6	3.48	61.2	End Vertical curve	
110625	0.98	1		1	36.58	1.7	115025	30.58	31.7	31.7	3.76	24.58	2.07	113511	18.58	26.0	7.45	3.18	26.0	3.72	26.0	Begin vertical curve	
110925	0.08	1		1	24.58	1.3	124199	18.58	3.4	3.4	4.06	24.58	1.25	120885	18.58	3.5	7.94	0.49	3.5	3.96	3.5	VPI	
111008.45	1.07	1		1	24.58	2.62	126250	18.58	22.4	22.4	4.12	24.58	2.56	122936	18.58	22.9	8.07	0.62	22.9	4.03	22.9	End Vertical curve	
111158.45	1.56	1	0.99	1	24.58	1.53	129937	18.58	56.1	55.6	4.24	24.58	1.38	126623	18.58	62.2	8.31	0.86	61.6	4.15	62.2	Begin vertical curve	
111308.45	2.05	0.99	0.81	1	24.58	2.95	133624	18.58	38.3	31.0	4.36	24.58	2.45	130310	18.58	46.1	8.55	1.11	37.4	4.27	45.7	VPI	
111324.56	1.36	1		1	24.58	2.95	134020	18.58	25.4	25.4	4.38	24.58	2.45	130706	18.58	30.6	8.58	1.13	30.6	4.28	30.6	End Vertical curve	
111424.56	1.02	1		1	36.58	1.82	137078	30.58	30.7	30.7	4.48	24.58	2.15	133164	18.58	26.0	8.74	1.29	26.0	4.36	26.0	Begin vertical curve	
111524.56	0.67	1		1	36.58	1.62	140736	30.58	22.8	22.8	4.60	24.58	1.8	135622	18.58	20.5	8.90	1.45	20.5	4.44	20.5	VPI	
111758.02	0.016	1		1	24.58	0.5	147875	18.58	1.8	1.8	4.83	24.58	0.5	141360	18.58	1.8	9.28	1.83	1.8	4.63	1.8	End Vertical curve	
111807.63																						Begin vertical curve End new alignment	

Curb Cut Capacity Checks

n=		0.016 for asphalt with concrete curb and gutter										
Station with Inlet	Sump	Continuous Grade	Total Flow (CFS)	Longitudinal Street Slope, S _l (ft/ft)	Street Cross Slope, S _x (ft/ft)	Curb Opening Length for 100% Capture (ft)	Curb Opening Efficiency	Flow after Inlet (CFS)	Reduction in Flow (CFS)	Cumulative Reduction in Flow (CFS)	Inlet Location	Inlet Type
1006+00.00	No	Yes	1.07	0.0121	0.019	12.6	0.27	0.78	0.29	0.29	SW	2' curb cut, southwest corner of intersection with Grasslands Parkway
1017+23.06	No	Yes	4.01	0.0121	0.0276	20.9	0.17	3.35	0.67	0.95	SW	
	No	Yes	3.35	0.0121	0.0276	19.0	0.18	2.74	0.61	1.56	SE	
1028+24.00	No	Yes	5.64	0.0064	0.0356	21.3	0.16	4.72	0.92	2.48	South	2' curb cut on the south side, just before release into Dry Cree!
Station with Inlet	Sump	Continuous Grade	Total Flow (CFS)	Longitudinal Street Slope, S _l (ft/ft)	Street Cross Slope, S _x (ft/ft)	Curb Opening Length for 100% Capture (ft)	Curb Opening Efficiency	Flow after Inlet (CFS)	Reduction in Flow (CFS)	Cumulative Reduction in Flow (CFS)	Inlet Location	Inlet Type
1017+23.06	No	Yes	3.69	0.0121	0.0387	17.1	0.20	2.95	0.74	0.74	NW	2' curb cut at all four corners of the intersection with Taft/Poll
	No	Yes	2.95	0.0121	0.0387	15.3	0.22	2.29	0.66	1.40	NE	
1027+41.06	No	Yes	4.96	0.0064	0.0356	19.9	0.17	4.10	0.86	2.26	North	2' curb cut on the north side, just before culverts that cut south to eventually release into Dry Cree

Inlet Capacity Checks

n= 0.016 for asphalt with concrete curb and gutter
L= 3 ft, grate length for Type A inlet
W= 2.5 ft, grate width for Type A inlet
 α = 0
 β = 0.68
 γ = 0.06
 η = 0.0023
 V_0 = 1.56 ft/sec Splash Over Velocity

N_W = 0.7
 C_W = 3.3
 N_O = 0.43
 C_O = 0.6
 C_m = 0.93
 Q_W = 6.53 Wier Flow, CFS
 Q_O = 10.98 Orifice Flow, CFS
 Q_M = 7.88 Mixed Flow, CFS
 Q_i = 6.53 Interception Capacity (cfs)

Station with Inlet Sump	Continuous Grade	Total Flow (CFS)	Longitudinal Street Slope, S_L (ft/ft)	Street Cross Slope, S_x (ft/ft)	Total Spread of Water in half-Street (ft)	Full Gutter Flow Area (ft ²)	Velocity of Flow in Gutter (ft/sec)	More than Splash Velocity?	Ratio of flow intercepted by Grate	Frontal Discharge Flow (CFS)	Flow Intercepted by Grate (CFS)	Flow After Grate (CFS)	Inlet Location	Inlet Type
1042+21.44	No Yes	7.35	0.0021	0.0267	18.58	4.61	1.59	yes	0.997	2.35	2.35	5.00	North	New Type A inlets on north and south side of road
1045+21.44	Yes No	11.01											North	New Type A inlets on north and south side of road
1076+00	Yes No	2.58											North	New Type A inlets on north and south side of road
1092+48.7	Yes No	3.29											North	New Type A inlets on north and south side of road
1109+25	Yes No	2.15											North	New Type A inlets on north and south side of road

Station with Inlet Sump	Continuous Grade	Total Flow (CFS)	Longitudinal Street Slope, S_L (ft/ft)	Street Cross Slope, S_x (ft/ft)	Total Spread of Water in half-Street (ft)	Full Gutter Flow Area (ft ²)	Velocity of Flow in Gutter (ft/sec)	More than Splash Velocity?	Ratio of flow intercepted by Grate	Frontal Discharge Flow (CFS)	Flow Intercepted by Grate (CFS)	Flow After Grate (CFS)	Inlet Location	Inlet Type
1042+21.44	No Yes	7.35	0.0021	0.0267	18.58	4.61	1.59	yes	0.997	2.35	2.35	5.00	South	New Type A inlets on north and south side of road
1045+21.44	Yes No	12.14											South	New Type A inlets on north and south side of road
1076+00	Yes No	2.59											South	New Type A inlets on north and south side of road
1092+48.7	Yes No	3.18											South	New Type A inlets on north and south side of road
1109+25	Yes No	1.83											South	New Type A inlets on north and south side of road

n= 0.016 for asphalt with concrete curb and gutter
L= 2 ft, grate length for Type B inlet
W= 2 ft, grate width for Type B inlet
 α = 0
 β = 0.68
 γ = 0.06
 η = 0.0023
 V_0 = 1.14 ft/sec Splash Over Velocity

N_W = 0.7
 C_W = 3.3
 N_O = 0.43
 C_O = 0.6
 C_m = 0.93
 Q_W = 4.90 Wier Flow, CFS
 Q_O = 5.86 Orifice Flow, CFS
 Q_M = 4.98 Mixed Flow, CFS
 Q_i = 4.90 Interception Capacity (cfs)

F: COST ESTIMATES

East Pershing Boulevard - US 30 to Taft / Polk Avenue

Length LF 1775

Item	Description	Unit	Estimated Quantity	Unit Price	Total Price
201.03201	CLEARING AND GRUBBING	ACRE	2	\$12,077.29	\$23,622.25
202.03260	REMOVAL OF PIPE	FT	500	\$19.57	\$9,785.00
202.03305	MILLING PLANT MIX	SY	10257	\$1.21	\$12,411.35
202.03400	REMOVAL OF SURFACING	SY	1578	\$19.46	\$30,703.56
202.03430	REMOVAL OF SIDEWALK	SY	267	\$17.11	\$4,562.67
202.03600	CUTTING BIT PVMT	FT	4001	\$2.25	\$9,002.54
202.03500	RESET MAILBOX (SINGLE)	EA	5	\$390.17	\$1,950.85
203.02500	UNCLASSIFIED EXCAVATION	CY	997	\$12.30	\$12,259.33
207.03100	TOPSOIL STORING	CY	750	\$3.20	\$2,400.00
207.03200	TOPSOIL PLACING	CY	750	\$3.60	\$2,700.00
216.03105	SEEDING	SY	4500	\$0.81	\$3,645.00
301.01010	PIT RUN SUBBASE	CY	223	\$22.31	\$4,976.93
301.01085	CRUSHED BASE	CY	604	\$47.73	\$28,852.20
401.02000	HOT PLANT MIX	TON	1892	\$51.31	\$97,056.18
401.02055	HOT PLANT MIX APPROACHES	TON	27	\$98.52	\$2,699.58
407.01000	TACK COAT	TON	6	\$598.71	\$3,838.22
414.01050	CONCRETE PVMT (10 in)	SY	291	\$75.00	\$21,805.17
603.20024	RCP 24 in	FT	634	\$111.44	\$70,652.96
603.20030	RCP 30 in	FT	240	\$121.15	\$29,076.00
608.10200	SIDEWALK (CONC)	SY	2387	\$60.97	\$145,531.33
609.10200	CURB AND GUTTER TYPE A	FT	3627	\$44.49	\$161,378.58
701.17120	CONDUIT-RIGID PVC 2 in	FT	3550	\$10.04	\$35,642.00
701.20100	PULL BOX TYPE A	EA	18	\$616.22	\$11,091.96
701.21100	SERVICE POINT LIGHTING	EA	1	\$6,060.00	\$6,060.00
701.29070	SINGLE CONDUCTOR WIRE #8 AWG	FT	3550	\$1.37	\$4,863.50
701.62100	ROADWAY LUMINAIRE	EA	18	\$1,011.33	\$18,203.94
799.60300	PAVEMENT LINE 4 in	FT	9198	\$0.16	\$1,471.68
799.70105	THERMOPLASTIC PAVEMENT MARKINGS	SF	1368	\$29.09	\$39,795.12
	#N/A	#N/A		#N/A	#N/A

Subtotal \$796,037.89

Design	12.00%	\$95,524.55
Mobilization	10.00%	\$79,603.79
Traffic Control	15.00%	\$119,405.68
Construction Engineering	10.00%	\$79,603.79
Force account	5.00%	\$39,801.89

Subtotal \$1,209,977.59

Contingency 15.00% \$181,496.64

Total \$1,391,474.22

East Pershing Boulevard - Taft / Polk Avenue to Hayes Avenue

Length LF		1950			
Item	Description	Unit	Estimated Quantity	Unit Price	Total Price
201.03201	CLEARING AND GRUBBING	ACRE	2	\$12,077.29	\$23,289.54
202.03170	REMOVAL OF GUARDRAIL	FT	400	\$2.37	\$948.00
202.03260	REMOVAL OF PIPE	FT	125	\$19.57	\$2,446.25
202.03305	MILLING PLANT MIX	SY	9653	\$1.21	\$11,679.71
202.03400	REMOVAL OF SURFACING	SY	1733	\$19.46	\$33,730.67
202.03430	REMOVAL OF SIDEWALK	SY	222	\$17.11	\$3,802.22
202.03600	CUTTING BIT PVMT	FT	3847	\$2.25	\$8,655.46
202.03500	RESET MAILBOX (SINGLE)	EA	1	\$390.17	\$390.17
203.02500	UNCLASSIFIED EXCAVATION	CY	1445	\$12.30	\$17,768.42
207.03100	TOPSOIL STORING	CY	820	\$3.20	\$2,625.54
207.03200	TOPSOIL PLACING	CY	820	\$3.60	\$2,953.73
216.03105	SEEDING	SY	4920	\$0.81	\$3,985.20
301.01085	CRUSHED BASE	CY	548	\$47.73	\$26,162.65
401.02000	HOT PLANT MIX	TON	1575	\$51.31	\$80,792.19
407.01000	TACK COAT	TON	6	\$598.71	\$3,611.96
414.01050	CONCRETE PVMT (10 in)	SY	72	\$75.00	\$5,390.50
603.20024	RCP 24 in	FT	285	\$111.44	\$31,796.06
606.01020	MGS GUARDRAIL	FT	200	\$33.93	\$6,786.00
608.10200	SIDEWALK (CONC)	SY	3255	\$60.97	\$198,465.28
609.10200	CURB AND GUTTER TYPE A	FT	3847	\$44.49	\$171,146.80
701.17120	CONDUIT-RIGID PVC 2 in	FT	3900	\$10.04	\$39,156.00
701.20100	PULL BOX TYPE A	EA	20	\$616.22	\$12,324.40
701.21100	SERVICE POINT LIGHTING	EA	1	\$6,060.00	\$6,060.00
701.29070	SINGLE CONDUCTOR WIRE #8 AWG	FT	3900	\$1.37	\$5,343.00
701.62100	ROADWAY LUMINAIRE	EA	20	\$1,011.33	\$20,226.60
799.60300	PAVEMENT LINE 4 in	FT	10965	\$0.16	\$1,754.33
799.70105	THERMOPLASTIC PAVEMENT MARKINGS	SF	200	\$29.09	\$5,818.00
	BRIDGE WIDENING	LS	1	\$450,000.00	\$450,000.00
	#N/A	#N/A		#N/A	#N/A
	#N/A	#N/A		#N/A	#N/A
	#N/A	#N/A		#N/A	#N/A
	#N/A	#N/A		#N/A	#N/A
	#N/A	#N/A		#N/A	#N/A
Subtotal				\$1,177,108.69	
Design				12.00%	\$141,253.04
Mobilization				10.00%	\$117,710.87
Traffic Control				15.00%	\$176,566.30
Construction Engineering				10.00%	\$117,710.87
Force account				5.00%	\$58,855.43
Subtotal				\$1,789,205.21	
Contingency				15.00%	\$268,380.78
Total				\$2,057,585.99	

East Pershing Boulevard - Hayes Avenue to Fireside Drive

Length LF 3900

Item	Description	Unit	Estimated Quantity	Unit Price	Total Price
201.03201	CLEARING AND GRUBBING	ACRE	4	\$12,077.29	\$51,902.40
202.03260	REMOVAL OF PIPE	FT	550	\$19.57	\$10,763.50
202.03261	ABANDON PIPE IN PLACE-FLOWABLE FILL	FT	595	\$30.00	\$17,850.00
202.03305	MILLING PLANT MIX	SY	17490	\$1.21	\$21,163.18
202.03400	REMOVAL OF SURFACING	SY	3467	\$19.46	\$67,461.33
202.03430	REMOVAL OF SIDEWALK	SY	100	\$17.11	\$1,711.00
202.03600	CUTTING BIT PVT	FT	7041	\$2.25	\$15,842.90
202.03500	RESET MAILBOX (SINGLE)	EA	11	\$390.17	\$4,291.87
203.02500	UNCLASSIFIED EXCAVATION	CY	1129	\$12.30	\$13,888.10
207.03100	TOPSOIL STORING	CY	841	\$3.20	\$2,691.70
207.03200	TOPSOIL PLACING	CY	841	\$3.60	\$3,028.16
216.03105	SEEDING	SY	5047	\$0.81	\$4,088.02
301.01010	PIT RUN SUBBASE	CY	3165	\$22.31	\$70,619.71
301.01085	CRUSHED BASE	CY	2054	\$47.73	\$98,039.25
401.02000	HOT PLANT MIX	TON	1549	\$51.31	\$79,482.25
407.01000	TACK COAT	TON	14	\$598.71	\$8,321.43
414.01050	CONCRETE PVT (10 in)	SY	649	\$75.00	\$48,704.17
603.20012	RCP 12 in	FT	583	\$149.73	\$87,220.72
603.20015	RCP 15 in	FT	549	\$95.00	\$52,200.60
603.20018	RCP 18 in	FT	563	\$97.02	\$54,576.66
603.20024	RCP 24 in	FT	3500	\$111.44	\$390,040.00
625.10200	MANHOLE TYPE B	EA	14	\$7,300.00	\$102,200.00
625.20100	INLET TYPE A	EA	12	\$4,376.52	\$52,518.24
625.20200	INLET TYPE B	EA	19	\$4,376.52	\$83,153.88
608.10200	SIDEWALK (CONC)	SY	6441	\$60.97	\$392,725.79
609.10200	CURB AND GUTTER TYPE A	FT	9632	\$44.49	\$428,520.56
701.17120	CONDUIT-RIGID PVC 2 in	FT	7800	\$10.04	\$78,312.00
701.20100	PULL BOX TYPE A	EA	40	\$616.22	\$24,648.80
701.21100	SERVICE POINT LIGHTING	EA	1	\$6,060.00	\$6,060.00
701.29070	SINGLE CONDUCTOR WIRE #8 AWG	FT	7800	\$1.37	\$10,686.00
701.62100	ROADWAY LUMINAIRE	EA	40	\$1,011.33	\$40,453.20
799.60300	PAVEMENT LINE 4 in	FT	22000	\$0.16	\$3,520.00
799.70105	THERMOPLASTIC PAVEMENT MARKINGS	SF	600	\$29.09	\$17,454.00
Subtotal					\$2,344,139.43
Design				15.00%	\$351,620.91
Mobilization				10.00%	\$234,413.94
Traffic Control				15.00%	\$351,620.91
Construction Engineering				10.00%	\$234,413.94
Force account				5.00%	\$117,206.97
Subtotal					\$3,633,416.12
Right of Way Acquisition -AR	SF	7272	\$8.50		\$61,812.00
Subtotal					\$3,695,228.12
Contingency				15.00%	\$554,284.22
Total					\$4,187,700.34

East Pershing Boulevard - Fireside Drive to Christensen Road

		Length LF		4150	
Item	Description	Unit	Estimated Quantity	Unit Price	Total Price
201.03201	CLEARING AND GRUBBING	ACRE	5	\$12,077.29	\$57,530.71
202.03260	REMOVAL OF PIPE	FT	350	\$19.57	\$6,849.50
202.03305	MILLING PLANT MIX	SY	21973	\$1.21	\$26,587.79
202.03400	REMOVAL OF SURFACING	SY	2767	\$19.46	\$53,839.33
202.03430	REMOVAL OF SIDEWALK	SY	133	\$17.11	\$2,281.33
202.03600	CUTTING BIT PVMT	FT	8472	\$2.25	\$19,061.73
202.03500	RESET MAILBOX (SINGLE)	EA	16	\$390.17	\$6,242.72
203.02500	UNCLASSIFIED EXCAVATION	CY	889	\$12.30	\$10,933.33
207.03100	TOPSOIL STORING	CY	1921	\$3.20	\$6,148.15
207.03200	TOPSOIL PLACING	CY	1050	\$3.60	\$3,779.15
216.03105	SEEDING	SY	6299	\$0.81	\$5,101.86
301.01010	PIT RUN SUBBASE	CY	167	\$22.31	\$3,720.56
301.01085	CRUSHED BASE	CY	1267	\$47.73	\$60,459.92
401.02000	HOT PLANT MIX	TON	3748	\$51.31	\$192,290.89
401.02055	HOT PLANT MIX APPROACHES	TON	30	\$98.52	\$2,966.47
407.01000	TACK COAT	TON	14	\$598.71	\$8,256.84
414.01050	CONCRETE PVMT (10 in)	SY	941	\$75.00	\$70,599.00
603.20012	RCP 12 in	FT	4230	\$149.73	\$633,315.98
603.20018	RCP 18 in	FT	683	\$97.02	\$66,224.88
625.10200	MANHOLE TYPE B	EA	13	\$7,300.00	\$94,900.00
625.20100	INLET TYPE A	EA	6	\$4,376.52	\$26,259.12
608.10200	SIDEWALK (CONC)	SY	6440	\$60.97	\$392,620.99
609.10200	CURB AND GUTTER TYPE A	FT	8406	\$44.49	\$373,985.61
701.17120	CONDUIT-RIGID PVC 2 in	FT	8300	\$10.04	\$83,332.00
701.20100	PULL BOX TYPE A	EA	42	\$616.22	\$25,881.24
701.21100	SERVICE POINT LIGHTING	EA	1	\$6,060.00	\$6,060.00
701.29070	SINGLE CONDUCTOR WIRE #8 AWG	FT	8300	\$1.37	\$11,371.00
701.62100	ROADWAY LUMINAIRE	EA	42	\$1,011.33	\$42,475.86
799.60300	PAVEMENT LINE 4 in	FT	26000	\$0.16	\$4,160.00
799.70105	THERMOPLASTIC PAVEMENT MARKINGS	SF	648	\$29.09	\$18,850.32
	#N/A	#N/A		#N/A	#N/A
	#N/A	#N/A		#N/A	#N/A
Subtotal				\$2,297,235.96	
Design				12.00%	\$275,668.32
Mobilization				10.00%	\$229,723.60
Traffic Control				15.00%	\$344,585.39
Construction Engineering				10.00%	\$229,723.60
Force account				5.00%	\$114,861.80
Subtotal				\$3,491,798.66	
Contingency				15.00%	\$523,769.80
Total				\$4,015,568.46	

**G: ADD ALTERNATE FOR
BIKE LANE AT US 30**

APPENDIX G

During the MPO Technical Committee on October 12, 2022, a motion was made to “Recommend this plan’s adoption to the MPO Policy Committee” with this comment and amendment. The comment was to continue the On-Street Bike Lane west to the U.S. 30 Intersection. To do so would change the curb-line and sidewalk placement and move the curb-line of the southern side of the triangle island; shown in red. When this planning effort began, the intersection of East Pershing and U.S. 30 was not included in the work of the consultant. The MPO had already included this intersection in a previous planning effort; The 2019 “*East Dell Range Boulevard / U.S. 30 Corridor Study*”. It is understood that when WYDOT and the City work to do any redesign of this intersection that all elements of traffic operations and Complete Streets designs will need to be considered. Given this proposed Bike-Lane extending west to the intersection, it would be expected that the Bike-Lane would be continued west of this intersection.

