## Research \& Development, Ltd.

## LATHROP ROAD TRAFFIC STUDY

## Prepared on behalf of:

The Town of Evansville, Wyoming,
Casper Area Metropolitan Planning Organization, and Wyoming Department of Transportation (WYDOT)

## Prepared by:

Western Research and Development, Ltd.,
Cheyenne, Wyoming
Y2 Consultants, LLC, Jackson, Wyoming

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## 1. DISCLAIMER

## Cover Image

Recommended Alternative for Curtis Street Corridor: The image on the cover is a sketch of the recommended alternative, approximately as it would appear from northbound travel lanes on I-25. This upscale modern highway corridor would be the first impression of Evansville for thousands of daily travelers on I-25.

## Study Budget

This $\$ 77,133.00$ study, Casper Area MPO Project ID MPO 20-04, was funded using $90.49 \%$ ( $\$ 69,798$ ) in federal/state Planning Funds, with the remainder $(\$ 7,335)$ using local government matching funds.

## Disclaimer

This study does not represent an official policy of the U.S. Department of Transportation, Federal Highway Administration (FHWA), or Wyoming Department of Transportation (WYDOT).

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## 3. EXECUTIVE SUMMARY

The Lathrop Road Traffic Study began on September 30, 2020 with a contract between Casper Area MPO and Western Research and Development of Cheyenne, Wyoming, a subsidiary of Y2 Consultants of Jackson, Wyoming.

Study Area - The study area encompassed the following geographic areas:

- Curtis Street (WYO 258) from south of the US-20/26 (Yellowstone Road) intersection to north of the I-25 Westbound Ramp intersection.
- Lathrop Road from Curtis Street to Miracle Street (for continuity, pedestrian needs were evaluated along the entire Lathrop Road Corridor)
- Lathrop Road / Blackmore Road intersection
- Blackmore Road (formerly called Lathrop Road) intersection with US-20/26 (Yellowstone Road)

Nature of the Problem - The main congestion issue reported in the study area is poor level of service " F " for the westbound left turn at the Lathrop Road / Curtis Street (WYO 258) TEE intersection. This problem has gradually become worse over time.

Historic Aerial imagery reveals the current two-lane-versus-five-lane geometry has been in place since prior to 1994. However, in the intervening 27 years, the developed land area served by that left turn has roughly quadrupled in size, with a commensurate increase in traffic volume (map below). With no other way to get back to l-25, drivers accessing Lathrop Road businesses have no other choice but to use the Lathrop Road/Curtis Street intersection. Alternative routes to l-25 require significantly more travel distance.

## Study Area Land Development History



Study Topics - Study elements included Public Involvement, Traffic Collection, Travel Time Study, Utility and Drainage Review, Access Management, Natural Assets Inventory, Land Use Evaluation, Press Release, Traffic and Capacity Analyses, NonMotorized Evaluation, Safety Audit, and regular Agency/Client Coordination Meetings.

Open House - A Public Open House was held Dec 3, 2020, to present findings and potential solutions. The public provided additional improvement concepts which were included in the alternative evaluation.

Alternative Evaluation and Design - With public input, Western/Y2 completed alternative evaluation using signal warrant studies, capacity analyses, and projected crash reductions and safety improvements. Output from these analyses were used to develop recommendations for network geometric and operational improvements, including motorized and non-motorized facilities. Design was completed to a $10 \%$ or better level of engineering, with a landscape plan included at the same level of design.

Study Recommendations - The following provides brief descriptions of the study recommendations. Details are provided in sections 14 and 15 .

- The Curtis Street corridor is recommended for access management improvements, including driveway consolidation, a raised median, and a modern roundabout serving the Curtis Street Lathrop Road intersection and the Luker Lane private driveway. Together, the access management and roundabout are projected to reduce injury crash probabilities by $70 \%$ to $80 \%$. The roundabout design operates at Level of Service "A" (less than five seconds delay). Independent operation does not require coordination, and the exceptionally low delays will not produce queues which could impact other intersections.

Curtis Street pavement is in good condition and will not need reconstruction for some years. As an interim, low-cost improvement, the Town of Evansville requested an alternative with two lanes westbound (right and left turn lanes) with storage for three vehicles in queue. Western/Y2 prepared this geometry by adding a new eastbound lane south of the existing roadway and converting the existing road surface to westbound lanes.
(See Section 14 Geometric Alternatives Evaluation for expanded description.)
This interim alternative can be built under traffic and eliminates the problem of 62 -foot tractor trailers overrunning the pedestrian area on the southeast corner of the intersection. While this is expected to improve conditions in the short term and off-peak periods, year 2040 peak period volumes are projected to overload capacity under stop control. Further improvement in peak hour level of service is expected to require signalization or a roundabout to create sufficient gaps for westbound left-turning vehicles.

- On Lathrop Road, a non-motorized path is recommended on the north side of Lathrop Road from Curtis Road to Craig Thomas Boulevard, with a crosswalk on the east leg of that intersection, and then along the south side of Lathrop Road to Blackmore Road. Pedestrian waysides will provide six resting viewpoints along the way. A speed study and sight distance analysis are recommended to determine if another crosswalk of Lathrop Road is advisable near Miracle Street.
- At the Blackmore Road/Lathrop Road Intersection, a centerline stripe and STOP bar are recommended on Lathrop Road to provide clear driver guidance. The STOP signs should be moved closer to eastbound drivers' field of vision. The appropriate agency should acquire rights-of-way for a future fourth (east) leg of the intersection. A route alignment study should be done to produce an official map for the future extension of Wildcat Road to this intersection. That study should include FEMA coordination and floodplain analysis.
- At the US-20/26 / Blackmore Road intersection, the study recommends improved signs, markings, and intersection lighting, and consideration of a speed reduction from 55 to 40 MPH and a pedestrian crossing. Long term, the corridor may be considered for signalization and retrofit as an "urban boulevard" using indirect left turns for access management and safety improvement.


## 4. TRAFFIC STUDY

Western/Y2 assembled and reviewed all available historic traffic counts for the study area and connecting roads between 2010 and 2019. IDAX Data Solutions also completed a series of new traffic counts on Tuesday, October 20, 2020, simultaneously capturing all weekday traffic movements classes and speeds at all key intersections and driveways in the study area.

2020 Counts - The study conducted the following counts:

- 24-hour directional speed and classification "hose" counts at nine locations depicted by red lines on the aerial below. These counts included 13 standard vehicle classes, as well as speed distribution.
- Eight-hour video counts of turn movements at all access points between US-20/26 and I-25, including Lathrop Road and all access drives.

All new traffic counts were provided to Casper Area MPO for use in their traffic count database.


Historic Counts and Traffic Trends: Combining and graphing weekday traffic counts from 2010 to 2020 yielded the following traffic trends. (Note: years without counts are interpolated between adjacent count years or extrapolated from trend lines.)


Lathrop Road traffic east of Curtis Street shows a marked effect of declining oilfield operations due to the global oil price slump from $\$ 115$ per barrel in 2014 to $\$ 40$ per barrel in 2020.


Lathrop Road west of Blackmore Road reflects a period of rapid growth and construction in that area during the recent oil boom, followed by the subsequent oil price slump.


The 10-year trend on US-20/26 East of Blackmore (blue) and west of Blackmore (red) shows a regional arterial reflecting the general economic trend in the Casper Region.


## Observation and Interpretation:

Several long-term trends influenced study area traffic counts:

1. The Casper metro area is known as "Oil City," because of oilfields in the surrounding region and active refineries in the area. Some sectors of the local economy are subject to boom-and-bust cycles resulting from fluctuating oil prices.
2. During the early-to-mid-2010's through 2015, world oil prices hit record highs and a number of new oilfield support businesses constructed facilities along Lathrop Road and Baker Lane. This caused a surge in traffic volumes on Lathrop Road.
3. Because of the extensive oilfield support industries now located in the corridor, Lathrop Road traffic volumes are strongly influenced by fluctuations in the oil market.
4. This traffic study was conducted in October 2020, during a period of low oil prices resulting in slow economic activity in the Casper area.
5. Beginning in early 2020, the Covid-19 pandemic caused intermittent shutdowns of schools, businesses, and public events across the U.S., including Wyoming. Closure of public events and reduced travel and dining out caused economic activity at hotels and restaurants along Lathrop to slow down. The exact effect is unknown.

Forecast Methodology - Key intersections included Curtis Street at Lathrop Road, Lathrop Road at Blackmore Road, and Blackmore Road at US-20/26. Forecast methodology was as follows:

1. Curtis Street / Lathrop Road Area - Areas served by this section of Curtis include the main body of Evansville and the interchange retail service area. These areas are largely built out, with some growth potential as nearby lots fill in or if oil prices rebound. Forecast 2040 volumes at this intersection were developed to replicate traffic conditions that existed during the mid-20-teens' oil boom. Volumes on Luker Lane assumed a new 40-room all-suites hotel was built in the vacant lot there. Future traffic at the Loaf-N-Jug was estimated using the ITE Trip Generation Manual for a gas station/convenience store with eight pumps. This forecast will accommodate traffic generated from the remaining $25 \%$ of corridor commercial acreage that is not yet developed.
2. Lathrop Road at Blackmore Road - Turn movements at this intersection were estimated using hourly hose counts of vehicles entering and exiting each leg of the intersection. 2040 Volumes were grown at a $3 \%$ annual rate to reflect a high growth rate typical of a fringe urban boundary area.
3. US-20/26 at Blackmore (Lathrop) Road - Turn movements at this intersection were estimated using hourly hose counts of vehicles entering and exiting each leg of the intersection. The north leg used 150 vehicles entering and exiting to approximate the reported shift change at Sinclair Oil refinery. Year 2040 volumes were grown to replicate volumes during the recent oil boom.

Note: 2020 Counts and 2040 turn movement diagrams and forecasts are provided in Appendix 2.

## 5: TRAVEL TIME DELAY STUDY

Per contract specifications, IDAX Data Solutions completed a Travel Time Delay Study using cell phone pings to determine the number of vehicles and average travel times among five points in the system (map). This data file was provided to Casper MPO for future use in regional travel demand modeling.


## Travel Time Study Results

The best measure of expected travel time between two points is the Median Travel Time, which reduces the outlying effects of speeders, extended stops for food, gas, work, etc. A portion of the Travel Time Delay Study is provided in the table below, illustrating some of the larger traffic counts among reciprocal origin-destination pairs.

| Start Location | End Location | Vehicle <br> Count <br> (Sample Size) | Median Travel <br> Time (Minutes) |
| :---: | :---: | :---: | :---: |
| Blackmore Road at Reserve Drive | Curtis Street at Lathrop Road | 479 | 1.35 |
| Curtis Street at Lathrop Road | Blackmore Rd at Reserve Drive | 128 | 3.4 |
|  | Curtis Street at US-26 | 57 |  |
| Blackmore Rd Reserve Drive | Blackmore Rd Reserve Drive | 65 | 2.88 |
| Curtis Street at US-26 |  |  | 2.87 |
|  | Blackmore/Lathrop at US-20/26 | 488 | 0.79 |
| Blackmore Road at Reserve Drive | Blackmore Road at Reserve Drive | 483 | 0.78 |
| Blackmore/Lathrop at US-20/26 | Curtis Street at US-26 | 1979 | 0.23 |
| Curtis Street at Lathrop Road | Curtis Street at Lathrop Road | 1473 | 0.22 |
| Curtis Street at US-26 |  |  |  |

## 6. EVALUATION OF UTILITIES \& STORMWATER MANAGEMENT

The study team conducted an evaluation of public utilities and stormwater systems to evaluate their sufficiency for ongoing development in the study area bounded by US-20/26, Blackmore Road, and I-25. The evaluation was completed by Mr. Louis Harmon PE, in consultation with Mr. Shane Porter, PE, Evansville Town Engineer.
A. Sanitary Sewer Collection System - Sanitary sewer service in Evansville is provided by the regional system which is well maintained. Because it is a regional system, the utility has adequate management and financial resources to deal with new development. Sewer lines are adequate in size and appear to have reserve capacity for expected future development.
B. Potable Water Supply and Distribution - The potable water system is operated by the Town of Evansville. The Lathrop Road study area is higher in elevation than the historic Town of Evansville north of US-20/26. Consequently, water must be pumped up hill from the storage tank adjacent to Texas Roadhouse (A) to the higher-level storage tank south of $\mathrm{I}-25(\mathrm{~B})$ to provide adequate pressure.

Finding: Two features of the water distribution system are vulnerable, the pumping station, and the single water main underneath I-25.

Recommendation: A standby cross connection to the Casper water system, if one does not already exist, would eliminate the risk of failure.


Finding: The water tank that located at the end of the system and being fed from the distribution system undoubtedly results in water age issues. The surface water source with dissolved carbon (TOC) results in unacceptably high levels of disinfection by-products with water age greater than 7 days.

Recommendation: The solution is to have a dedicated transmission line from the pumping station to the high-level water tower and a separate line to charge the distribution system.

Finding: The water distribution lines in the study area are poorly looped. The system has apparently been developed as the need arises without a great deal of attention to developing a robust looped system with future development in mind.

Recommendation: The Town of Evansville should require future developments to provide looped water lines, as needed.

## C. Stormwater Management

Finding: Blackmore Road is in the Elkhorn Creek floodplain. Portions of the road are within the 100-year flood zone. An unnamed drainage (A) of nearly a square mile area, which has a very high percentage of impermeable surfaces due to development, drains under I-25 into the Carroll Number 2 Reservoir (B) east of Aspens Mobile Home Park. Carroll Number 2 Reservoir then drains to a much smaller reservoir southwest of the Lathrop and Blackmore Road intersection (C). This exacerbates the flooding of Elkhorn Creek.

Recommendation: Any development in that area must be carefully evaluated for floodway impacts. An extension of Lathrop Road has been proposed from Blackmore Road to Hat Six Road. If an alignment study and right-of-way plan are completed for this connection, the study should include analysis of the floodway and appropriate right-of-way space reserved for the necessary floodway design. This will likely require coordination with the Federal Emergency Management Administration (FEMA) and a Letter of Map Review (LOMR).

Finding: There is a depression (D) along the south side of East Yellowstone Highway east of Craig Thomas Boulevard that is lower than the bed of Elkhorn Creek. This area drains northward under East Yellowstone Road and the railroad to a channel across the old Texaco refinery site now owned by Little America Refinery (Blue Line). Part of this area has been identified as stormwater detention.

Recommendation: The status of ownership and the strength of the protection from development should be evaluated. Although not identified on the FEMA mapping, this area is clearly subject to flooding from major precipitation events.


## 7. ACCESS MANAGEMENT EVALUATION

The segment of Curtis Street ("Wyoming 258" or "Wyoming Boulevard") from south of US-20/26 to north of the I-25 westbound ramp terminal intersection is a 700 -foot section of arterial with 6 driveways and one public Road TEE intersection (Lathrop Road).

The large number of access drives on Curtis is left over from interchange retail developments built four or five decades ago and now "grandfathered" in. Closely spaced driveways tend to increase driver confusion, as entering and exiting movements conflict with mainline through traffic movements, as well as other driveways. Driveways on both sides of Curtis are either too closely spaced or too close to public road intersections.


Roadways are classified according to their level of access and mobility. State highway arterials are intended to move traffic (mobility) whereas collectors and local streets are primarily to provide access to land parcels.

Study area collector roads (Lathrop and Blackmore) are intended more for access purposes, and driveways appear adequately spaced with no apparent problems. While the IHOP and Comfort Inn drives on Lathrop are only 85 feet from centerline to centerline, volumes are low, and these are also used as a pullout for CRTC Orange line Bus Stop \#2 (IHOP).

For these reasons, this Access Management evaluation will focus on Curtis Street issues and solutions.

## Access Management $=$ Reducing Traffic Conflicts $\boldsymbol{=}$ Reducing Crashes and Injuries

Traffic conflicts occur wherever vehicle flows merge, diverge, or cross paths. Where conflicts are most concentrated and numerous, more crashes occur. When collision speeds are higher, more of these crashes result in injury. That is why welldesigned arterials allow fewer access points and fewer conflicts. The essential principle of access management is to reduce the most dangerous types of conflicts - crossing (broadside) conflicts. Freeways, for example, allow only merge and diverge conflicts. Similar safety benefits can be achieved by applying these similar design principles to arterial roads.

## Medians and Roundabouts

Medians and roundabout intersections serve this purpose on urban arterials. At a typical driveway TEE intersection, four entry and exit movements are allowed, resulting in eleven conflict points, including five crossing conflicts. A median eliminates all crossing conflicts and reduces this to one 'merge' conflict and one 'diverge' conflict. Medians reduce crashes by $37 \%$ and injuries by $48 \%$ compared to two-way-left-turn lanes and may reduce pedestrian crashes by up to $46 \%{ }^{1}$


[^0]A roundabout can be thought of as a very short "intersection median." They perform a similar function, but typically replace higher volume cross type intersections with many more crossing conflicts and higher impact speeds.

Here, instead of allowing direct left turns and cross movements, all vehicles circulate around a central island. The 16 high-speed crossing conflicts at the crossroads are eliminated, reducing the total from 36 conflict points to just 8 merge and diverge conflicts.


Roundabouts reduce overall crashes by 40\%, and injury crashes by $82 \%$ and $78 \%$ compared to STOP-controlled and signalcontrolled intersections, respectively. ${ }^{2}$

Roundabouts and medians pair well together because roundabouts allow U-Turns, enabling easy business access from all directions.

## Applying Access Management to WYO 258 (Curtis Street)

Driveway Consolidation - Begin by combining excess, unneeded driveways:

- West Side: The northwest driveway on Curtis across from Lierd Lane, has ZERO traffic during peak hours. Merge the two northwest driveways and place one drive straddling the property line to serve both parcels. *Eliminates nine conflict points.
- East Side: Merge the two Loaf-N-Jug driveways into one driveway centered on the pump island. Traffic may exit via Lathrop Road. *Eliminates nine Conflict Points.
- Implementation: This may be implemented as new site plans are proposed for future redevelopment of these sites.

Raised Median: A raised median would serve well along this 700 -foot stretch of Curtis, as shown in the image on the following page. The section from Lathrop Road to I-25 already has a painted median.
*This modification eliminates 54 conflict points.


Administration: The center of the roadway is within the jurisdiction of the road agency (WYDOT) and the appropriate safety treatment is their responsibility and authority.

Issues: Many interchange area businesses depend on pass-by trips. Unless alternative access is provided, businesses may be impacted by restricting traffic access from the opposite side of the road. This impact can be mitigated by enabling U-Turns for business access.

Recommendation: A raised median should be provided on Curtis if a roundabout can be installed to enable U-Turns for commercial trucks, including fuel and merchandise delivery trucks serving Loaf-N-Jug.

## Roundabout serving Curtis/Lathrop/Luker:

Left turns from Lathrop Road are one of the main problems stated by the community. Installation of a roundabout of appropriate capacity facilitates those left turns with minimal delay. It also allows the medians to be installed without reducing access to adjacent commercial operations. The improved access facilitates redevelopment of parcels along Luker Lane.
*This modification eliminates 24 conflict points.
Combined Effect of Driveway Consolidation, Median, and Roundabout
By using all three of these techniques of access control, the number of conflict points on this corridor is reduced from the current 77 conflict points to 14, a total reduction of 63 conflict points ( $81.2 \%$ ). All crossing conflicts are eliminated, along with all resultant head-on, head-on-left-turn, and broadside crashes. Remaining conflicts are all merge-diverge types.



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## Combined Safety Effect

The combined effects of driveway closure, raised median, and roundabout construction is a $46 \%$, reduction in probability of crashes, a $65 \%$ reduction in probability of injury crashes, and $46 \%$ reduction in the probability of pedestrian crashes.


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## 8. NATURAL ASSETS INVENTORY

Western/Y2 planners and urban designers reviewed natural assets of the study area, to include viewsheds and terrain, and historic and architectural features. We toured the corridors by car and on foot to appreciate the various scales, gaps, and barriers for each travel mode. Findings are used in the Landscape Design element (Plan Section 16).

On Friday Oct 23, 2020, Y2 Landscape Architect Patricia Ehrman, PLA walked Lathrop Road from Curtis Street to Blackmore Road, photographing points of interest along the way. Western Urban Planner Ed Waddell and Road Design Engineer Gary Grigsby, PE also toured the area by car and foot. This commentary combines comments from these three disciplines.

Note: This inventory is a preliminary corridor evaluation. Final design will require survey, topographic mapping, utility location, property boundaries, and rights-of-way and easements along the subject roadways.

## Lathrop from Curtis Street to Outback Steakhouse (229 Miracle Street)

Lathrop Road rises steadily from IHOP to the top of the hill near Miracle St. (approx. 1/3 mile). On the south side of Lathrop through this section, the terrain slopes from the edge of the asphalt toward the boundary fence of the westbound I-25 off ramp. Lathrop Road is closest to the ramp and the side slopes are greatest opposite the west Miracle Street to Wyoming Downs drives. This is shown to the right, in photo 1.

Some drainage gullies between the pavement and the fence appear to be the result of concentrated runoff. There also is evidence of sloughing of soils that may undermine the existing roadway pavement. The slope and limits imposed by the fence render any pavement expansion impractical, therefore the south side of Lathrop is generally inhospitable to non-vehicular traffic throughout this stretch.

Whereas the north side of Lathrop through this section bore footprints in the fresh snow, indicating that pedestrians and wildlife regularly walk along the north side (photo 2 ).

All commerce and interest lie on the north side of Lathrop. This area is developed with privately-owned commercial properties and their associated access drives, utilities, signage, street lighting, drainage structures, and an Orange Route bus stop at IHOP. Groundcover (turf, native grasses) appears to be wellestablished throughout this area, controlling dust and erosion for the most part.

In summary, along the west $1 / 3$ mile of Lathrop Road, the north side of road has all the destinations and ample space for a


1 - South side of Lathrop Road facing westbound.


2- North side of Lathrop Road facing the Curtis Street intersection. shared-use path, including area for pavement, grading, plantings, street furnishings and other items of interest between existing driveways.

## Lathrop from Outback Steakhouse (229 Miracle St.) to Texas Roadhouse (210 Miracle Street)

The variety of commerce and activity north of Lathrop Road offers scenic resources and visual interest. For westbound non-vehicular traffic there is an exciting opportunity for a rest-and-view "waypoint" at the top of the hill, just west of the Comfort Inn driveway (photo 3) where the hill begins to slope down and an amazing view opens to the west.

Eastbound, just to the east of the Texas Roadhouse driveway, there is another such rest-and-view "waypoint" opportunity where the wide vista opens to the east (photo 4), offering a pleasant clearing between the restaurant's retaining wall and the edge of the Lathrop Road pavement.

Groundcover (turf or native grasses, cobble mulch, artificial turf) appear to be well established throughout this area (except at the vacant lot) presumably controlling dust and erosion.

Waypoints - The suggested "waypoints" are proposed to specifically benefit and encourage non-motorized traffic, providing places to rest, enjoy the day, gather and reorient. They would serve as minor goals and changes in pace to punctuate what could otherwise be a long and featureless journey the length of Lathrop Road. Finally, allowing pedestrians/cyclists the opportunity to rest alongside of the


3 - Vista to the west, near the top of the hill at Comfort Inn driveway


4 - Vista to the east, near the top of the hill at Texas Roadhouse driveway. Note: the streetlight opposite Casper C'mon Inn. main walkway will prevent other users from having to step into the road to go around them.

These enhancements to safety and the user experience could be as simple as a wide spot with a bench or bus shelter, or a parklet in a high-use area. Landscape enhancements would provide simple visual interest and shade.

The two waypoints bracketing the east- and west-bound crests of the hill would offer welcome resting spots and expansive views in either direction that might otherwise go unremarked (photos 3 and 4). If carefully and conservatively designed, waypoints along the road corridor (see map below) offer opportunities to safely break up the journey and provide safety, amenities, and identifiable destinations along the way.

## Miracle Street to Casper C'mon Inn (301 E. Lathrop Road)

On the south side of Lathrop, tracks in the snow suggest that guests or employees of the Casper C'mon Inn travel on foot (photo 5). Potential destinations include access to bus service, or meals at the nearby restaurants. All of these users require safe access from the Inn's driveway on the south side of Lathrop to the proposed multi-use pathway on the north side.

A short section of widened pavement between the C'mon Inn driveway and a designated crossing may be an efficient way to guide visitors safely to adjacent commerce.


## Lathrop from Texas Roadhouse to Blackmore Road - North Side

East of Texas Roadhouse, Lathrop Road continues to slope downhill to the east until it levels out near Jump Craze Trampoline Park (4720 E. Lathrop Road). The terrain appears relatively level from the bottom of the hill to the Lathrop / Blackmore intersection (photo 6).

The last streetlight on the north side of Lathrop occurs opposite the Casper C'mon Inn driveway. We observed no streetlights between the C'mon Inn/Texas Roadhouse and Blackmore Road.

Although there are above-ground utilities and access drives along the north side of the road, the wide and level corridor between the pavement edge and adjacent fencing or other improvements are consistent from the bottom of the hill (photo 6) until close to the Blackmore


6 - Wide and level corridor (Well Control Products toward Jump Craze). intersection, where the adjacent Phillips 66 and Stotz developments constrict the north roadside.

To accommodate truck access to industrial and trucking facilities north of Lathrop, side roads and driveways through this section tend to be unusually wide. Industrial land uses offer few attractions to pedestrians, there are few scenic opportunities, and wide driveways may present a safety concern for non-vehicular traffic.

Groundcover (turf or native grasses) is less well-established along this stretch presumably because of vacant lots and industrial uses. There are occasional expanses of exposed soil which may permit wind-born dust and wind or water erosion.

## Lathrop from Texas Roadhouse to Craig Thomas Blvd. - North Side

As depicted in photos 6 and 7, the roadside corridor is relatively level and wide through this section. Power poles, signposts, drainage structures, and utility pedestals occur with regularity. The currently vacant lot(s) between Jump Craze and Craig Thomas Boulevard are an unknown quality at this time, but it is likely that one or more access drives may be installed to serve the future land use.

Two potential crosswalk locations are available on this section of Lathrop, Craig Thomas Boulevard and the west Aspens Park entrance at Frost Drive, 380 feet east. Both locations have low traffic volumes of less than 400 vehicles per day (less than one per minute during the peak hour). Craig Thomas Boulevard has


7-Intersection of Lathrop Road and Craig Thomas Drive, facing east. Aspen Park residential area is on the right (south) side of Lathrop Road in the background (photo credit: Google Earth). a higher percentage of commercial trucks.

The Craig Thomas Boulevard intersection offers unobstructed visibility for 900 feet in all three directions. Visibility at Frost Drive is $1 / 3$ mile to the west and $1 / 2$ mile to the east, with residential access traffic arriving from the south.

## Lathrop from Aspen Park to Blackmore Road - South Side

As stated, the pedestrian/bicycle pathway might also continue across Craig Thomas Boulevard, following the north side of Lathrop to a new crosswalk at the west Aspen Park entrance at Frost Drive.

Co-locating a crosswalk with the transit stop and school bus stop at one location may have advantages and disadvantages for user convenience, safety, traffic operations, security, and visibility of signs, markings, and signals. A crosswalk at Frost Drive, for example, might encourage school children to enter the road while waiting at the bus stop. Conversely, locating the crosswalk at Craig Thomas may have advantages for safety but disadvantages for security or convenience.


8 - Eastbound city bus stopping at Frost Drive and Lathrop Road, photo facing west.

With either crosswalk location, a pathway along the south side of Lathrop is recommended east of this point. An alignment on the south side of Lathrop provides direct access for residents of Aspen Park and avoids the industrial access drives on the north side of Lathrop, which could pose a hazard to non-motorized users. It also better serves commercial destinations to the south on Blackmore. Trampled grass and footprints in the snow show that this alignment is already the preferred walking path, as shown below (photo 11).

The Frost Drive and East Hills Drive intersections coincide with Orange Route stops 3 and 4. Waypoints at these intersections, offering amenities and landscape enhancements, would be useful and appreciated by both transit riders and pathway users.

Side slopes and surface utilities may offer design challenges on the south side of Lathrop (photo 9) immediately east and west of Baker Lane. The parcel closely abutting the south side of Lathrop from Baker Lane to Blackmore Road is a townowned detention pond, with dikes close to the roadway (photo 10).

However, at the same time there still appears to be more available width on the south side than the north, especially near the Phillips 66 Pipeline property ( 5090 E. Lathrop Rd) and the Stotz Equipment property ( 352 Blackmore Rd.).


9 - Utilities on the south side of Lathrop, west of Baker Lane.

## Blackmore Road from Reserve Drive to US-20/26 (Yellowstone)

This section of Blackmore currently has little traffic and just a few hardy pedestrians. Space is available to provide a sidewalk or shared use path on either side, and this would provide a future non-motorized connection to the Casper Rail Trail near US20/26, and to the commercial area south of I-25. The east side of Blackmore appears to offer more right-of-way space and a better connection to the Rail Trail than does the west side.

The Rail Trail connection provides another location for a waypoint, allowing trail users a point of rest and orientation before continuing along the Rail Trail pathway to Edness Wilkins State Park.

Given the existing unmet needs along Lathrop Road west of Blackmore, the Blackmore corridor should be a lower priority for non-motorized improvements. Existing pedestrian destinations on Lathrop (mobile home park and retail businesses) warrant a sidewalk or non-motorized path in the near term.

## Potential for Landscape Improvements

There are two stormwater retention basins at the southwest corner of the E. Lathrop Road / Blackmore Road intersection (photo 10). This location has been suggested for additional plantings due to the availability of water. However, plantings in this vicinity would not be visible or useful to most users of Lathrop Road.

Carefully sited plantings would enhance users' overall experience. In addition to necessary shade, plantings spaced strategically along the sidewalk/pathway would serve to interrupt long stretches of unbroken pavement. They would also provide windbreaks and visual screening, provide seasonal interest, mark progress, and orient the user and highlight furnishings (benches, bus shelters), and create identifiable landmarks along the way.


10 - Retention basin impoundment dikes, looking westward along Lathrop near Blackmore Road.

Whether a sidewalk/pathway is on the north or south side of Lathrop, a band of screening trees or tall shrubs on the north side of Lathrop would provide valuable screening from the industrial area and enhance the user experience. Note the opportunities for screening along the north frontage (right side background, photo 10). Stormwater runoff directed to swales along the north side of Lathrop would provide supplemental moisture for screening plantings, in areas that would benefit all users of Lathrop Rd.

There are some nice, mature trees fronting the Aspen Park (photo 11). These trees should be protected, and additional plantings installed all along the Aspen Park frontage. Plantings here would take advantage of detained stormwater runoff coming down from the Park, provide needed screening between the residential and industrial areas, and provide interest


11 - Existing trees at Aspen Park, between Frost Drive and E. Hills Drive. Note the user-made pathway following the berm, lower left. to non-motorized sidewalk/pathway users.

Summary - Landscape plantings should be located where they will be most beneficial for the most users, and where they can holistically take advantage of directed stormwater runoff. Landscape plantings should be deliberately located to enhance the suggested waypoints. In addition, we recommend that plantings provide screening along the north side of Lathrop (as indicated by the green line in the map below).

Waypoints are suggested to enhance the user experience, provide "passing zones" around those resting, and highlight points of interest or high use; one waypoint near the Curtis Street intersection, one at either side of the hilltop, at either end of the Aspen Park, at the Blackmore/Lathrop intersection, and at the Blackmore/Rails-to-Trails intersection. Waypoints (perhaps in association with city bus stops), could provide enough goals and interest to create a pleasant rhythm for pedestrians, as well as drivers. These waypoint nodes (up to seven, marked by stars below), and screening along the north side of Lathrop (shown with a green line), will go a long way to improve the experience for all users.


Map - Suggested multi-use sidewalk/pathway (yellow line), "waypoints" (stars), and screening (green line).
With additional input from stakeholders and the public, Western/Y2 will expand these concepts.

## 9. LAND USE INVENTORY AND EVALUATION

The study evaluated existing and expected land use patterns in the area bounded by US-20/26 (Yellowstone), Blackmore Road, and Interstate 25 .

Current land uses in the study area west of Blackmore Road are as follows:

1. Retail services (Gasoline and other Retail):
7.7\% (19 Acres)
2. Hospitality (Hotel, Restaurant, Entertainment)
7.6\% (19 Acres
3. Office
4. Residential (Mobile Home Park)
5. Light Industrial / Warehousing
0.8\% (2 Acres)
6. Heavy Industrial (Refinery)
7. Vacant

## Land Use Evaluation

The study area naturally falls into four general sectors:
A. Curtis Interchange Service Area
B. The Central Section
C. Area west of Blackmore
D. Area East of Blackmore

Boundaries between these areas are indistinct (fuzzy) but have the following general characteristics.

Existing Land Use



Curtis Interchange Area - The land closest to the I-25 Interchange is most desirable for Land uses 1,2, and 3 above. For that reason, these parcels were developed first. The existing businesses along Curtis Street were built in the 1980s or before, so the structures are showing their age. Meanwhile, parcels suitable for interstate-oriented commercial services are now at a premium
as lots near the interchange are filling in. Consequently, some of the existing businesses parcels along Curtis Street will be prime redevelopment properties in coming years. Vacant parcels can be expected to infill with service and hospitality businesses.

Central Section - Lands in the center of the study area near Craig Thomas Boulevard are less competitive locations for retail and hospitality enterprises. Existing uses are mobile home park and light industrial. These parcels are more distant from the interchange, so any visitors will encounter closer, intervening business opportunities before they reach this section. The central area is therefore more suitable for residential uses or specialized businesses that local customer base will go out of their way to reach. This is also why the central area contains the bulk of vacant parcels. Vacant parcels can be expected to infill as industrial services and specialty sales enterprises.

Blackmore Road Area - East of the Aspens Mobile Home Park, all parcels approaching Blackmore Road and along Baker Lane are industrial, light industrial, and warehouse distribution facilities. These uses tend to generate more trucks. Access to both US-20/26 and to $2^{\text {nd }}$ Street retail areas are useful attributes of this area. Lots are built out and similar uses will likely spread into the central section of the study area near Craig Thomas Boulevard.

East of Blackmore Road - East of Blackmore Road, development is longer term and dependent on future regional real estate market trends. Immediately east of Blackmore Road is a flood zone that cannot be developed. From there east, future land use patterns will be less clear until development accelerates - in perhaps 10-20 years. Agriculture and vacant land are the dominant land uses currently, with some commercial activity in the Hat Six Interchange area. For those reasons, traffic flows are not yet possible to predict adequately for intersection design purposes. For example, residential traffic will flow out in the morning, while industrial traffic will flow in in the morning. The scale and mix of development types will control the volume and direction of traffic flows.

Note: A complete inventory of study area land uses is provided in Appendix A.

## 10. TRAFFIC AND CAPACITY ANALYSES

## 10A. Traffic Forecasts

Traffic movements were calculated for study area intersections and driveways under various scenarios:

- Base Year 2020 and Design Year 2040. (Note: For Curtis Street at Lathrop Road, 2040 volumes are identical to 2014 volumes. This capacity will accommodate another oil boom, or long-term traffic generated by complete buildout of remaining parcels on Lathrop Road and Luker Lane.)
- AM and PM peak periods
- Seven drives and intersections on the Curtis (WYO 258) corridor, each with four access movements
- The Lathrop Road / Blackmore Road intersection (six turn movements)
- The US-20/26 intersection with Blackmore Road (formerly Lathrop Road) - 12 movements

In total, 184 traffic movements were estimated and projected thought the year 2040. These volumes were used for signal warrant studies and capacity analyses for alternative evaluation.

Note: Traffic Forecast Diagrams are provided in Appendix C.

## 10B. Capacity Analyses

Roadway and Intersection Capacity Analysis are used to predict traffic queues and delays for various intersection lane layouts and control alternatives (stop, yield, signal). This helps determine whether a plan of action will meet capacity requirements and eliminate queues and delays.

Capacity analyses of crossroad and TEE intersection alternatives were completed using the software program Highway Capacity Software (HCS). Analyses of roundabout capacity and delay used the Roundabout Delay (RODEL) capacity and design program, version 1.9.1.

## Capacity Findings:

- HCS capacity analyses found that Stop-controlled TEE and CROSS intersection alternatives at the Curtis Street/Lathrop Road intersection operate at Level of Service C under 2020 volumes and " $F$ " under 2040 volumes.
- HCS capacity analyses find that signal-controlled TEE and CROSS intersection alternatives at the Curtis Street/Lathrop Road operate at Level of Service "A" under 2040 volumes. However, a signal at that location would be less than 350 feet from the nearest signal. Also, HCM analyzed as an isolated intersection, and it would require analysis of interaction with the Curtis corridor. Signalization is not recommended.
- A one-lane roundabout causes excessive queues on Curtis Street and is not recommended.
- A two-lane $X$ one-lane roundabout operates at an exceptional level of service "A" with $95 \%$ queues of less than two vehicles on Curtis Street. This is the recommended alternative.

Note: Plots of all capacity analyses are in Appendix D.

## 10C. Signal Warrant Studies

Signal Warrant Studies were accomplished for the Curtis/Lathrop intersection and US-20/26 Blackmore Road intersection. Neither of these intersections currently meet signal warrants.

> Note: Signal Warrant Studies are provided in Appendix E.

## 11. NON-MOTORIZED SYSTEM

The study area pedestrian / non-motorized system is still in its early development stages. Most area roads consist of former rural cross sections that only recently urbanized and are not yet equipped with sidewalks. As a result, the overall non-motorized system lacks connections among pedestrian neighborhoods and commercial destinations. Both Lathrop Road and Blackmore Road completely lack non-motorized facilities.

This section describes existing and planned non-motorized facilities and recommended system improvements.

## Curtis Street Pedestrian Corridor

The state-owned section of Curtis Street between the I-25 westbound ramp terminal intersection (left below) and US-20/26 (right below) complies with U.S. Access Board and AASHTO design recommendations. Sidewalks are at least five feet wide, and curb cuts are wheelchair accessible and equipped with tactile warning strips for the visually impaired.


Immediately outside the study area, sidewalks continue south of I-25. Pedestrian crossings of US-20/26 and the municipal section of Curtis north of US-20/26 do not meet ADA pedestrian standards.

Curtis Street Crosswalks - A marked "zebra" crosswalk with pedestrian actuated signal phase is provided across Curtis at the US-20/26 intersection. The pedestrian crossing is 93 feet long, requiring 26.6 seconds at normal walking pace. The crosswalk meets ADA requirements.

At Curtis / I-25, the unmarked crossing is provided with a pedestrian-actuated walking man signal head. The crossing distance is 108 feet or 31 seconds at normal walking speed.


## System Weaknesses

- Crosswalk Spacing - The two crossings on Curtis are at the ends of the corridor, 700 feet apart (3:20 walk + crossing time). However, the pedestrian destinations (hotels, restaurants, convenience store) are in the middle of the corridor along Lathrop Road. Pedestrians are routinely observed crossing at mid-block rather than walking the extra four+ minutes to use the crosswalks at US-20 and I-25. Similarly, there are no ADA compliant crossings of US-20 between Curtis Street and Hat Six Road (2.8 miles).
- Design Issue: The sidewalk in front of Loaf-N-Jug has a short section of five-foot sidewalk full of rocks (image above). This inconsistency presents a potential trip hazard for the visually impaired.


## Casper Rail Trail - Existing and Planned

The improved concrete section of Casper Rail Trail currently extends 2.7 miles from S. Ash Street to North Walsh Drive in Casper. From N. Walsh drive east through the Evansville study area, the trail is gravel and parallels the south side of US-20/26 (Yellowstone) for 3.2 miles, crossing both Curtis Street and Blackmore Road (formerly Lathrop Road), to a terminus at Hat Six Road (map). The planned future destination for the trail is Edness K. Wilkins State Park, 2.6 miles east of Hat Six Road, however the precise alignment of that connection has not yet been determined.


Approaching Blackmore Road from the west (below), Casper Rail Trail has a gravel/dirt surface with little indication that a trail is present. Rails, ties, and ballast have been removed. The trail crossing is unmarked and there are no signs on Blackmore Road indicating a trail crossing.


Looking east from Blackmore Road (below), the Rail Trail cross section continues arrow straight toward the horizon and Hat Six Road. Motor vehicles have apparently gone around the barrier posts on both sides of Blackmore to get onto the trail. The proposed Elkhorn Creek Trail along the east side of Blackmore Road would connect to the Casper Rail Trail here, and a pedestrian wayside is proposed in the vicinity.


## Elkhorn Valley Eastside Master Trail Plan ${ }^{3}$

The Elkhorn Valley Eastside Master Trail Plan was completed in 2010. One of the proposed improvements will intersect the Lathrop Road Traffic Study area at Blackmore Road.

A 10 -foot wide concrete shared-use trail is planned along the east side of Blackmore Road. The planned alignment fits behind the east bridge piers at l-25, as shown below, and then follows Blackmore Road to the Casper Rail Trail.

An at-grade street crossing is depicted where Wildcat Road intersects Blackmore Road.

## Recommendations:

- The Lathrop Road pathway is planned on the south side of Lathrop at this location. Pedestrians will wish to cross Blackmore Road to use the regional trail system, so some provision will be needed for this movement.
- Work and shopping destinations for Lathrop Road pedestrians lie to the south along $2^{\text {nd }}$ Street. A standard five-foot sidewalk is recommended on the west side of Blackmore from Lathrop Road to $2^{\text {nd }}$ Street so that pedestrians need not cross Blackmore Road.

${ }^{3}$ Images courtesy Elkhorn Valley / Eastside Master Trail Plan, Casper Metropolitan Planning Organization, The Platte River Parkway Trust, Inc., DHM Design Corporation and The Greenway Team, Inc. Spring, 2010.


## Lathrop Road Corridor

The Lathrop Road Corridor has no pedestrian / non-motorized facilities. Pedestrian trips are produced at the Aspens residential area and attracted to commercial and industrial sites along Lathrop, Curtis, Baker Lane, and 2 ${ }^{\text {nd }}$ Street.

## Recommendations:

After detailed field inspection and review of public comment, the study team has developed the following recommended nonmotorized improvements along Lathrop Road:

- Trail Cross Section - Right-of-way along Lathrop Road is sufficient for a 10 -foot-wide shared-use trail with waypoints and appropriate street furniture and landscaping. A 10 -foot concrete cross section is consistent with the proposed Elkhorn Creek Trail along Blackmore Road and allows space for a mixed of non-motorized users.
- Alignment - From Curtis Street to Miracle Street, all pedestrian attractors are on the north side of Lathrop Road, including CATC bus stop \#2 at the IHOP parking lot, the westernmost waypoint on Lathrop Road.

At Miracle Street, vehicle speeds and sight stopping distance on Lathrop are unknown. Those studies are not within the scope of the current analysis. While some pedestrians likely visit the C'mon Inn hotel on the south side of Lathrop, and streetlights are present at the hilltop, the location may not have sufficient stopping sight distance for a formal crosswalk. Such a crosswalk should be studied in the future as funds permit.

For the above reasons, the recommended pathway alignment follows the north side of Lathrop Road from Curtis to Craig Thomas Boulevard. There, the pathway would cross the west Lathrop Road leg. This location has clear sight stopping distance coupled with reduced speed limit entering the school zone.

From Craig Thomas Road to Blackmore Road, the pathway/trail will follow the south side of Lathrop Road, serving the Aspens Mobile Home Park and Baker Lane industrial facilities. Two CATC bus stops and two School bus stops are present on the south side of Lathrop at Frost Drive (CATC Stop \#3) and East Hills drive (CATC Stop \#4). Two pedestrian waypoints with benches and possibly shelters are associated with these bus stops. A final waypoint is located near the runoff detention pond east of Baker Lane, where shade trees will have available water.

- Waypoints - A series of six pedestrian waypoints are recommended along the Lathrop Road corridor to break up the 1.4 mile walk and provide resting places at key locations along the way. Waypoints are particularly important near the tops of the hill crest west of Miracle Street, where elderly pedestrians may need to rest before continuing their walk. These locations also offer views of surrounding terrain that provide an enjoyable pause along a stroll. These can also be used as wheelchair rest stops to meet ADA requirements.

Stars on the aerial image below illustrate locations where pedestrian waypoints should be provided.


## 12. SAFETY

The safety element of this study consisted of two components:
A. A proactive Road Safety Audit conducted in the field by an interdisciplinary team.
B. A retroactive review of historic crash records to check for existing crash patterns and high crash locations.

## 12A. Summary

Among many details described in the following sections, the following issues and locations stand out as safety concerns that are most significant:
A. The Blackmore Road (AKA Lathrop Road) intersection at US-20/26 is difficult to see from the side road and drivers make mistakes entering the 55 MPH main road. This location has the highest number and percentage of injury crashes in the study area.
B. Drivers become impatient waiting to make a westbound to southbound left turn at the Curtis Street - Lathrop Road intersection and accept gaps that are inadequate.
C. The Curtis Street (WYO 258) corridor has six closely spaced access drives that create confusion, conflicts, and crashes involving through vehicles and access movements.
D. Separate pedestrian facilities are minimal or non-existent along all study corridors. Pedestrian crossings are widely spaced.

## 12B. Road Safety Audit

In compliance with the requirements of the Request for Proposals for the Lathrop Road Traffic Study, Western/Y2 conducted a Road Safety Audit (RSA) following standard Federal Highway Administration (FHWA) guidelines. ${ }^{4}$ The effort included staff of Casper Metropolitan Planning Organization, the Wyoming Department of Transportation, the Town of Evansville, Evansville Police Department, and interested citizens.

The RSA process conformed with these features as recommended by the FHWA:

- Formal Examination - The Audit Team conducted a formal examination of design components and operational and safety effects of the corridor roadways, intersections, and non-motorized facilities.
- Team Review - Road Safety Auditors represented interdisciplinary expertise, including road design, traffic analysis, roadway safety, traffic engineering, urban planning, landscape architecture, elected officials, and law enforcement. The team composition was well suited to the project scale and scope.
- Independent RSA Team - The RSA team was independent of the designers of the original plans or the facility owner. A WYDOT representative participated and was aware of some prior decisions on the roadway.
- Qualified Team - All auditors had relevant qualifications specific to this RSA.
- Safety Focus - The RSA identified potential road safety issues caused by the design.
- All Road Users - Auditors considered all vehicle types and users (elderly drivers; pedestrians of different ages, children, physically challenged; bicyclists; commercial, recreational, agricultural, etc.).
- Proactive - The RSA was proactive, not reactive. Auditors considered not only crash patterns, but expectations from observations in the field, potential safety issues relating to time of day/year, weather, or situations that may occur because of road user expectations.
- Qualitative - The main products of an audit are qualitative rather than quantitative. They include lists of identified issues, assessments of relative risk, and suggested corrective measures.
- Field Review - The RSAs were conducted during a Friday afternoon on Oct. 23, 2020 and followed up with darkness observations on Dec. 3, 2020.


### 1.0 Introduction

1.1 Scope and Purpose of RSA - This Road Safety Audit is to identify specific safety concerns for all road users, and then list potential mitigation measures for planning level evaluation in the Lathrop Road Traffic Study (LRTS). The LRTS is a planning study to analyze traffic problems and evaluate and recommend solutions in a specific area of Evansville, Wyoming, within the Casper, Wyoming Metropolitan Area.
1.2 Project Stage - This RSA was done as part of Planning / Early Preliminary Engineering. No design work has taken place and the evaluation is of existing roadway corridors. The team reviewed existing roadways, intersections, driveways, and non-motorized facilities. RSA results will be used to inform planning and preliminary design of proposed improvements.
1.3 Project limits - As depicted on the following map, the project limits are:
1.3.1 Curtis Street (AKA Wyoming Boulevard) from north of the l-25 westbound off-ramp to south of the US-20/26 (Yellowstone Highway) intersection.
1.3.2 Lathrop Road from Curtis Street Intersection to Blackmore Road intersection.
1.3.3 Blackmore Road from north of Reserve Drive to the US-20/26 (Yellowstone Road) intersection.


### 2.0 Background

2.1 Audit Team Affiliations and Qualifications - Audit team members were selected due to specialized roadway and safety expertise and/or knowledge of the local area. Member qualifications are listed in the following table.

## Audit Team Affiliation and Oualifications

| Team Member | Role |  | Current Affiliation | Oualifications | Years of <br> Experience |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Ed Waddell, MUP | RSA Team Leader / <br> Transportation Planner | Western R\&D | MUP, Transportation <br> BS, Urban Planning | 40 |  |
| Gary Grigsby, PE/PLS | Road Design Engineer | Western R\&D | BS, Engineering <br> WY Licensed Engineer | 40 |  |
| Delbert McOmie, PE | Highway Safety Engineer | Western R\&D | BS, Civil Engineering <br> WY Licensed Engineer | 42 |  |
| Jerry Downs, PE | Signal Engineer | Western R\&D | BS, Elec. Engineering <br> WY Licensed Engineer | 43 |  |
| Chad Aagard, PE | District Traffic Engineer/ <br> Owner Representative | Wyoming DOT | BS, Civil Engineering <br> WY Licensed Engineer | 27 |  |
| Patricia Ehrman, PLA | Landscape Architect / <br> Pedestrian Analyst | Y2 Consultants | BA, Landscape Architecture | $30+$ |  |
| Jeremy Yates | MPO Supervisor / Project <br> Owner | Casper Metropolitan <br> Planning Organization | MA, History <br> Safety/Crime Analyst, <br> Casper Police Dept. | 6 |  |
| Hon. Chad Edwards | Elected Official | Mayor <br> Town of Evansville | NA | NA |  |
| Mike Thompson | Law Enforcement | Wyoming Law Enforcement <br> Chief of Police <br> Town of Evansville | Wyoming Professional <br> Peace Officer Certification. | 17 |  |
| Shane Porter, PE | Local Civil Engineer | Town Engineer <br> Town of Evansville | BS Civil Engineering <br> WY Licensed Engineer | 23 |  |
| Janelle Underwood | Elected Official | Clerk <br> Town of Evansville | NA | NA |  |

2.2 Commentary from Project Owner - Not applicable. No current project.
2.3 Pre-Inspection Data Review - A pre-inspection data review was conducted the morning of the field inspection. Data included existing and forecast traffic volumes, crash maps, and aerial imagery of the study corridors.
2.4 General Observations Regarding Site Visit - The Lathrop corridor has evolved from rural to urban in the past 25 years. Interchange service businesses and industrial development related to oil and gas production have spread east along Lathrop Road, increasing traffic. The roadways have retained their original rural design with no new pedestrian facilities. This has produced what has become known as an, "Incomplete Street."

The site visit was conducted during a sharp cold snap on Oct. 23rd, 2020. The afternoon high was 28 degrees. Nevertheless, many pedestrians were observed using the Curtis underpass beneath I-25, the west Curtis sidewalk, and grassy areas adjacent to Lathrop Road. Crossings were observed away from crosswalks. Observed operational problems include queues of up to six left-turning vehicles on westbound Lathrop Road at Curtis, blocking the southbound Loaf-N-Jug driveway.

### 3.0 Findings and Suggestions

Issues, risks, and suggested mitigation measures are listed below from west to east in the study corridors. There is no priority associated with the order of listing.

## Curtis Street from North of I-25 to South of US-20/26

3.1 Issue: Left turns from Lathrop and driveways on Curtis conflict with Curtis through movements.
3.1.1 Issue: Left turns onto Curtis are delayed at peak times due to the volume of opposing through-traffic on Curtis. There are too many access drives onto Curtis, and they are too close together.
3.1.2 Risk: Drivers may accept too-small gaps in traffic, resulting in angle crashes with injury potential. Crash records confirm this crash type is frequent and has caused serious injuries.
3.1.3 Suggested Mitigation:
3.1.3.1 Provide public education and enforcement.
3.1.3.2 Re-route traffic away from Curtis Street to other I-25 interchanges.
3.1.3.3 Allow left turns only at signalized intersections.
3.1.3.4 Reduce left turns by closing driveways on Curtis. Look for owners willing to combine drives.
3.1.3.5 Find ways to provide less access points onto Curtis and more internal circulation on adjoining property.
3.1.3.6 Close the south Loaf-N-Jug driveway on Curtis.
3.1.3.7 Eliminate driveway left turns by installing a median/traffic island along Curtis. (Suggested many times).
3.1.3.8 Figure out a way to have left turns at signalized intersections with an accompanying dedicated left turn lane while keeping a traffic island in the 12 -foot center turn lane.
3.1.3.9 Signalize the existing configuration of Lathrop, Luker, or both.
3.1.3.10 Reconstruct Luker Lane and/or Lathrop so that they line up with each other.
3.1.3.11 Consolidate left turns along Curtis at one location and signalize to create gaps for left turns.
3.1.3.12 Consolidate left turns along Curtis at one location and construct a roundabout to enable left turns and right-turn-U-Turns.
3.1.3.13 Construct dual left rurns from westbound Lathrop onto Southbound Curtis.
3.2 Issue: Pedestrian Crossings on Curtis Street
3.2.1 Issue: The cross section of Curtis is 85 feet from curb face to curb face and 135 feet from sidewalk to sidewalk. This requires approximately 24 seconds for pedestrians to walk across. Existing crosswalks at I-25 and US-20/26 are 700 feet apart (a 3 to 3.5 -minute walk / AKA pedestrian level of service " $F$ "). Without a convenient crossing opportunity people sprint across the wide roadway or become trapped in the center turn lane.
3.2.2 Risk: Pedestrian collision in a 40 MPH speed zone causing serious injury or death.
3.2.3 Suggested Mitigation:
3.2.3. Encourage pedestrians to cross only at signalized intersections at I-25 and US-20/26 where pedestrian buttons and protected pedestrian phases and tactile dome pedestrian crossings exist.
3.2.3.1.1 Only have one tactile dome / pedestrian crossing at Lathrop to encourage crossing of Lathrop and not Curtis Street.
3.2.3.1.2 Inform and warn pedestrians via signs and public education.
3.2.3.1.3 Increase police enforcement.
3.2.3.1.4 Install pedestrian fences between sidewalk and roadside along Curtis to force pedestrians to walk to signalized crossing locations.
3.2.3.2 Increase awareness of drivers of where pedestrians can and will cross.
3.2.3.2.1 Install crosswalks.
3.2.3.2.2 Install pedestrian crossing signs.
3.2.3.2.3 Illuminate crosswalks.
3.2.3.3 Provide a safer crossing of Curtis between I-25 and US-20/26.
3.2.3.3.1 Construct medians with pedestrian refuges to reduce the crossing distance.
3.2.3.3.2 Construct a roundabout at Luker/Lathrop to provide pedestrian refuge islands.
3.2.3.3.3 Provide Rectangular Rapid Flash Beacons (RRFB) at a new pedestrian crossing(s).
3.2.3.3.4 Other pedestrian crossing options including illuminated crossings, underpass, or overpass.
3.3 Issue: Semi trailer wheels overrun the Southeast corner of Lathrop/Curtis.
3.3.1 Issue: Wheel tracks show truck trailers have overrun the southeast corner of Lathrop/Curtis by more than 10 feet.
3.3.2 Risk: Injury or death of pedestrians and damage to landscaping and roadway infrastructure.
3.3.3 Suggested Mitigation:
3.3.3.1 Increase radius of intersection corners at Curtis/Lathrop.
3.3.3.2 Modify roadway or intersection geometrics.
3.4 Issue: Private Drives on Curtis appear to be local streets.
3.4.1 Issue: Private driveways are signed as city streets such as "Luker Lane" and "Leird Lane." Driveway owners then do things that are not normal on a city street; for example, the owner of Leird Lane wants traffic to drive on the left.
3.4.2 Risk: Collisions may occur due to unexpected vehicle movements. Interactions with Curtis would occur at higher speed with higher risk of injury. Off-road crashes would likely occur at low speed with low risk of injury.
3.4.3 Suggested mitigation:
3.4.3.1 Enforce local government site plan regulations.
3.4.3.2 Dedicate some driveways as public streets and design and regulate them accordingly.
3.4.3.3 Construct median on Curtis to reduce the potential for incorrect turns from Curtis Street.

## Lathrop Road from Curtis Street to Blackmore Road

3.5 Issue: Lack of non-motorized facilities along Lathrop and Blackmore Roads.
3.5.1 Issue: Commercial and residential land uses generate many non-motorized trips, but there are no sidewalks, trails, or crosswalks within a convenient distance. Texas Roadhouse and C'mon Inn are popular pedestrian attractions, and walkers and skateboarders are common on Lathrop. Nonmotorized users use the roadway surface and cross at random locations, including sites on Lathrop with limited sight distance. Absence of non-motorized travel facilities has encouraged persons to repeatedly cut the I-25 fence near Aspens Mobile Home Park and dash across I-25. During heavy snow, pedestrians walk along roadway edges on all roads.
3.5.2 Risk: Pedestrians at unexpected locations may be involved in fatal or serious crashes.
3.5.3 Suggested Mitigation:
3.5.3.1 Construct non-motorized trails/sidewalks along Lathrop and Blackmore at alignment(s) to be determined.
3.5.3.2 Lighting is needed, as well as sidewalks.
3.5.3.3 Install sidewalk on both sides of Lathrop from Curtis through the Motel area.
3.5.3.4 Encourage property owners to promptly clear snow from walks in front of their properties.
3.6 Issue: Steep Grade on Lathrop west of Miracle.
3.6.1 Issue: Lathrop west of Miracle is slick in winter and sometimes difficult for semis to climb
3.6.2 Risk: Loss of control crashes.
3.6.3 Suggested Mitigation:
3.6.3.1 Install steep grade warning sign.
3.6.3.2 Reconstruct Lathrop to reduce grade.
3.6.3.3 Increase the priority for sand and salt application.
3.7 Issue: Commercial Driveways on Lathrop
3.7.1 Issue: Drivers at Loaf-N-Jug, IHOP, Comfort Inn, and Murdoch's driveways often fail to come to a complete stop before entering Lathrop Road. Most traffic turns right (west).
3.7.2 Risk: Angle crash
3.7.3 Suggested Mitigation:
3.7.3.1 Install Stop signs at commercial driveways on Lathrop Road.
3.7.3.2 Install Yield signs at commercial driveways on Lathrop Road.
3.7.3.3 Paint white pavement edge lines along Lathrop.
3.7.3.4 Paint stop bars on all commercial driveways.
3.7.3.5 Increase police enforcement.
3.8 Issue: Lathrop Road / Miracle Drive Intersection
3.8.1 Issue: Lack of continuous sidewalks and no ADA ramps. Limited sight distance east and west of Miracle Intersection and on southbound Miracle.
3.8.2 Risk: Pedestrians in the roadway combined with limited sight distance create risk of pedestrian injury crashes.
3.8.3 Suggested Mitigation:
3.8.3.1 Construct ADA compliant non-motorized facilities along Lathrop Road.
3.8.3.2 Install street lighting.
3.9 Issue: Low Shoulder on Lathrop south of Miracle Drive / Texas Roadhouse
3.9.1 Issue: Low shoulder on south side of Lathrop Road.
3.9.2 Risk: Causes bottoming out and potential loss-of-control crash.
3.9.3 Suggested Mitigation:
3.9.3.1 Fill south side shoulder area and surface with gravel or asphalt.
3.10 Issue: Poor visibility during darkness and bad weather on Lathrop Road.
3.10.1 Issue: Most of Lathrop Road has no streetlights.
3.10.2 Risk: Fatal or serious injury crash as drivers may fail to see pedestrians crossing or walking along the road.
3.10.3 Suggested Mitigation:
3.10.3.1 Install streetlights along Lathrop.
3.10.3.2 Provide parallel non-motorized path and/or sidewalk along Lathrop and illuminate intended crossing locations.
3.10.3.3 Construct a median divider on Lathrop.
3.10.3.4 Relocate Lathrop to north, possibly behind Murdoch's.
3.11 Issue: Speeding on Lathrop
3.11.1 Speeding is a problem on downhill and flat section of Lathrop Road east of C'mon Inn hotel.
3.11.2 Risk: Increased crash probability and severity
3.11.3 Suggested Mitigation:
3.11.3.1 Increase speed enforcement.
3.11.3.2 Install Flashing yellow lights on 20 MPH School Speed signs.
3.11.3.3 Install "Your Speed" feedback signs.
3.12Issue: Lathrop Road / Craig Thomas Intersection
3.12.1 Issue: Attached sidewalks are discontinuous and lack ADA ramps.
3.12.2 Risk: Pedestrians in roadway risk crash with motor vehicles.
3.12.3 Suggested Mitigation:
3.12.3.1 Provide continuous parallel non-motorized path and/or sidewalk along Lathrop.
3.13 Issue: The Aspens Mobile Home Park Drives
3.13.1 Issue: West Aspens entrance road lacks Stop control.
3.13.2 Risk: Drivers may enter Lathrop without stopping and crash with Lathrop through traffic.
3.13.3 Suggested Mitigation:
3.13.3.1 Install a Stop sign on the west Aspens entrance.
3.14Issue: Transit drop-offs on Lathrop at the Aspen Trailer Court.
3.14.1 Issue: Bus stops at Aspens Mobile Home Park are just alongside the roadway and not protected.
3.14.2 Risk: Pedestrians / children may wander into road and buses may be hit by other vehicles.
3.14.3 Suggested Mitigation:
3.14.3.1 Create paved pull-outs for transit buses and school buses.
3.14.3.2 Provide improved bus shelters well off the roadway.

## Blackmore Road from Reserve Lane to US-20/26 (Yellowstone)

3.15Issue: Unclear guidance for eastbound drivers at the Blackmore/Lathrop intersection.
3.15.1 Issue: Widening of intersection turn radii to accommodate semis has moved the stop sign out of the drivers' field of view. It is also unclear where drivers are supposed to stop for cross traffic on Blackmore. Eastbound Lathrop vehicles must encroach well beyond the Stop sign to see north along Blackmore, and it is unclear where to stop. In poor visibility, the absence of a double arrow sign could cause drivers not to perceive it is a TEE intersection.
3.15.2 Risk: 40 MPH Angle crash
3.15.3 Suggested Mitigation:
3.15.3.1 Relocate Stop sign to a site in eastbound drivers' field of view.
3.15.3.2 Paint a centerline on the west intersection leg.
3.15.3.3 Paint a Stop Bar on the eastbound approach.
3.15.3.4 Paint a pavement edge line along Blackmore.
3.15.3.5 Paint a dashed Limit Line across the eastbound entry.
3.15.3.6 Review and revise the sign and marking plan for this intersection.
3.16Issue: Width of US-20/26 at Blackmore Road
3.16.1 Issue: US 26 is unusually wide because it was formerly a divided highway. During peak times entering drivers may have a long wait for a gap in both directions. Drivers may misjudge the large gap needed for the distance they need to travel. The crowned roadway makes far side travel lanes difficult to see and distinguish.
3.16.2 Risk: Severe angle crash on a 40 to 55 MPH roadway
3.16.3 Suggested Mitigation:
3.16.3.1 Re-stripe US-20/26 to reduce the width of the center turn lane. Pull center turn lanes left and provide positive offset left turns and shorten length between left turn lane and destination lane.
3.16.3.2 Provide dashed left turn lane to direct drivers to the correct lane. (Line extensions could help through the intersection but the times when people are missing the lane is due to road visibility issues and more paint may not help that.)
3.16.3.3 Install lighting at the intersection.
3.16.3.4 Reconstruct a new median with improved intersection geometry.
3.16.3.5 Indirect Left Turn: Assign drivers turning left from Blackmore to turn right only and then use a median crossover to U-Turn (AKA Indirect left turn). This enables drivers to A: choose a safe gap in eastbound traffic, $B$ : wait in the median, and then C : select a safe gap in westbound traffic (Path B below) to complete their turn. Although, these are common in some states, Wyoming does not currently have any indirect left turns and may wish to install a map sign on Blackmore to instruct drivers how to use this intersection type.

3.17 Issue: Visibility at Blackmore/US-20/26, especially during darkness and bad weather.
3.17.1 Issue: During reduced visibility, drivers turning left cannot see their intended destination lane. Drivers on westbound US-20/26 may not perceive they are entering an urban area.
3.17.2 Risk: High speed angle crash.
3.17.3 Suggested Mitigation:
3.17.3.1 Install lighting at Blackmore /US-20/26.
3.17.3.2 Stripe and hatch median "traffic island" areas.
3.17.3.3 Provide dashed guidelines for drivers turning left from Blackmore.
3.18 Issue: Confusing Signs and marking at Blackmore/US-20/26.
3.18.1 Issue: One-Way and Wrong Way signs were left in place after the US-20/26 median was removed in 2003.
3.18.2 Risk: Incorrect guidance may confuse drivers on Blackmore and contribute to a crash.
3.18.3 Suggested Mitigation:
3.18.3.1 Install a white-on-green map sign on the northbound Blackmore Road approach depicting the intersection configuration.
3.18.3.2 Review and revise the sign and marking plan for the US-20/26 / Blackmore Intersection.
3.19Issue: Pedestrian Safety at US-20/26 and Black More Road Intersection
3.19.1 Issue 1 : US-20/26 at Blackmore is a 55 MPH arterial 126 feet wide from pavement edge to pavement edge. If a pedestrian would attempt to cross at normal walking speed, it would take approximately 36 second to cross the highway - much too long to judge a gap in traffic. Some pedestrians may attempt to sprint across or become trapped in the center turn lane.
3.19.2 Risk: High speed fatal pedestrian crash.
3.19.3 Issue 2: There are no signs indicating the presence of the Rail Trail south of US-20/26.
3.19.4 Risk: Drivers on Blackmore may not expect a pedestrian or bicycle.
3.19.5 Suggested Mitigation:
3.19.5.1 Install sign directing pedestrians to a safer crossing location.
3.19.5.2 Install sign prohibiting pedestrians from crossing US-20/26.
3.19.5.3 Install MUTCD W-11-15 and W11-15P TRAIL CROSSING sign and symbol on Blackmore in advance of Casper Rail Trail.
3.19.5.4 Review and revise the sign and marking plan for the US-20/26 / Blackmore Intersection.

## General Comments, Non-Safety and Maintenance Issues in the Study Area

3.20 Snowplows leave deep cuts in the pavement.
3.21 Homeless people and panhandlers are common at Curtis/l-25.
3.22 Traffic congestion is common at the I-25/Curtis interchange.
3.23 During events, hotels fill up, traffic increases, and misbehavior is more common.
3.24 Evansville has passed a 'hands-free" cell phone ordinance. Crashes have since declined.
3.25 I-25 highway noise is a problem.
3.26 Create a more welcoming landscape.
3.27 Drainage is limited to swales along Lathrop.

## Safety Issues Mentioned Outside the Study Area

The following issues were raised by team members. However, they are outside the geographic limits (scope) of the Lathrop Road Traffic Study.
3.28Issue: Pedestrian crossings of Highway 20-26 and E. Yellowstone Highway
3.28.1 Issue: The crowned roadway is very wide (165 feet across all three roadways). The only crossing is at Curtis Street.
3.28.2 Risk: US-20/26 is signed at 40 MPH with high risk of injury or death should a pedestrian crash occur.
3.28.3 Suggested Mitigation:
3.28.3.1 Median refuge to reduce crossing distance and provide a mid-crossing refuge.
3.28.3.2 Other treatments (illuminated crossings, RRFB, underpass, or overpass.)
3.29Issue: Proximity of old US 26 Service Road to US 26 .
3.29.1 Issue: This makes for a very wide crossing.
3.29.2 Risk: The excess width increases the risk of injury crashes.
3.29.3 Suggested Mitigation:
3.29.3.1 Close the service road or make it discontinuous.
3.29.3.2 Solicit buy in and solutions from those using the service road.
3.29.3.3 Remove old US-20/26 access road and allow direct access to US-20/26.
3.30Issue: Wrong Way eastbound turn movements into the westbound I-25 off-ramp.
3.30.1 Issue: Drivers mistake the westbound I-25 off ramp for Lathrop Road and turn the wrong way into the off-ramp. People do not look at existing signs.
3.30.2 Risk: High speed head-on collision on westbound I-25.
3.30.3 Suggested Mitigation:
3.30.3.1 Paint or thermoplastic lane usage arrow markings on north and south approach lanes at Curtis/l-25 intersection.
3.30.3.2 Emphasize One Way indications on north and south approaches to the ramp terminal intersection.
3.30.3.3 Increase visibility of Wrong Way warning signs on the westbound off ramp.
3.30.3.4 Construct a roundabout at I-25 westbound ramp terminal and channelize all turn movements.
3.30.3.5 Install fence or plant shrubbery / foliage to block sight lines from I-25 to Lathrop Road.
3.31 Issue: South of $\mathrm{I}-25$ there is a striped island that is driven through regularly.
3.31.1 Suggested Mitigation: Construct a raised median all the way to $2^{\text {nd }}$ Street.

## Summary

Each member of the Safety Audit team received a copy of the draft Road Safety Audit document. The above narrative represents the team's consensus on findings, and the complete list of safety improvement alternatives recommended for consideration during the Lathrop Road Traffic Study.

The preceding sections identify each safety issue and briefly describe why it poses a risk. We believe improvement suggestions are constructive and realistic, offering both shortterm and long-term improvement options for evaluation. It will be up to the MPO and appropriate road agencies to review these safety issues and determine how best to implement these suggestions.

These suggestions are appropriate to the project planning stage. With a blank slate and long term perspective, many more options are available, from low to high cost and short to long term.

## 12C. Historic Records

The following crash diagrams were developed from five years of WYDOT crash records from January 2015 through December 2019.

Curtis Street (WYO 258) Corridor (Right) - The adjacent diagram illustrates crashes recorded on this segment during the five-year period. Green represents property damage crashes, yellow represents injury crashes, and red represents severe injuries. There were no fatalities during the study period.

Lathrop Road Crashes (Below) - Lathrop Road during the same period again shows a cluster of crashes at the Curtis Street intersection, including, angle crashes, left-turn crashes, and a few others. Further east on Lathrop Road, a few crashes occur at driveways and others are single vehicles run off the road with no apparent correctable pattern.

Lathrop Road / Blackmore Road Intersection - There were no recorded crashes at the at Lathrop/Blackmore intersection during the study period.


## Blackmore Road (Lathrop Road) Intersection with US-20/26 (Yellowstone Highway)

This intersection experienced eight crashes during the study period revealing the pattern depicted in the diagram below.

- Two were angle crashes involving eastbound vehicles on US-20, colliding with northbound entering vehicles.
- Three were rear-end crashes on the northbound approach.
- Three were loss of control crashes on (ice).
- Three were injury crashes resulting in four injuries.


## Postulated Reasons

- As discussed previously, the study team noted that the intersection is unusually wide, with a crowned cross section that is difficult to see across. Northbound drivers turning left cannot see their destination lane on the far side.
- The intersection is unlighted, and numerous lights from the nearby refinery impact night vision, making the intersection appear darker. The lights may also obscure oncoming headlights from the east.
- The speed limit through the area is 55 MPH. Drivers entering from the side road may have a hard time judging a gap in both approaching directions on US-20/26. They may misjudge and enter - causing a crash - or start out and then surprisingly hesitate - being rear-ended from another entering driver.
- The higher percentage of injury crashes is apparently due to higher travel speeds on US-20/26.



## 13. PUBLIC AND STAKEHOLDER INVOLVEMENT

A previous transportation study of Evansville ${ }^{5}$ conducted public involvement and set a course for community objectives, priorities, and plans for the study area. Public involvement for that study included citizen surveys, and a public meeting,

The following Community Goals, Objectives and Proposals in the Evansville 2017 Transportation Plan relate to the Lathrop Road study corridor:

1. Mobility, Connectivity and Access for All Modes - Address Congestion.
2. Quality of Life - Multimodal safety, cleanliness, good repair, health, aesthetics, and character.
3. Economic Vitality - Consider economic development impacts and opportunities.
4. Implementation - Stress maintenance and affordability, openness, and community engagement.
5. Safety - In all plan elements, for all users, context sensitivity, intersection safety, and efficiency.

The 2017 study recommended engineering design alternatives which were evaluated during the current study. The 2017 plan recommendations included:

1. Short Term - Realign the Curtis/Lathrop/Luker intersection to eliminate the existing 100 -foot offset. Widen Curtis Street. Evaluate adequacy of Lathrop lane widths to accommodate expected truck volumes.
2. Long Term - Signalize Lathrop/Curtis. Upgrade Wildcat from Blackmore to Hat Six. Construct new road between Wildcat and I-25 to serve projected development in that area. Develop gateway theme at Curtis.

## Stakeholder Agency Assistance

The following individuals and agencies provided valuable information and assistance on behalf of local landowners and stakeholder agencies:

- Mr. Chad Aagard, WYDOT District 2
- Mr. Bryan Cawley, FHWA Wyoming Division
- Ms. Angela Emery, Executive Director, Platte River Trails Trust
- Mr. John Jones, Executive Director, Casper Area Transportation Coalition (CATC)
- Mr. Scott Radden, Evansville Town Planner
- Mr. Jim Ruble, Refinery Manager, Sinclair Casper Refinery
- Mr. Mark Stiles, Project Manager, The Aspens Mobile Home Park
- Mr. Gene Williams, President, Alpine Landscape, Inc.
- Ms. Dianna Wipf, Manager, The Aspens Mobile Home Park
- Kid's Campus Day Care
- Super 8 Motel
- HOBBO
- IHOP
- Baymont Inn
- Texas Roadhouse
- Wyoming Downs
- Comfort Inn
- Outback Steak House
- C'mon Inn
- Moser Engine Services
- Jump Craze Trampoline Park
- D\&C Rodgers Well Control Products
- National Oilwell Varco (NOV)
- John Deere / Stotz Equipment
- Northern Lights Energy Company
- FedEx Freight Transfer


## Public Involvement in the Current Study

Continuing the 2017 planning effort, the Lathrop Road Traffic Study provided additional opportunities for public involvement via a project Facebook page, press releases, a dedicated telephone hotline, and a dedicated email. A press release announced the study and public open house and provided contact information for the study.

## Press Release, October 28, 2020

Casper Area MPO issued the following press release as the study began.

## "Lathrop Road Traffic Study Begins

Casper MPO and the Town of Evansville have begun a study of traffic issues in the vicinity of Lathrop Road and Curtis Street, as well as the Lathrop Road corridor and the Lathrop/Blackmore and Blackmore/Yellowstone intersections. (See map.)

Officially called the Lathrop Road Traffic Study, the \$80,000 planning and engineering study will be conducted by Western Research \& Development of Cheyenne and Y2 Consultants of Jackson. The study will evaluate existing and forecast traffic and safety issues along the corridors, including needs for motor vehicles non-motorized bicycles and pedestrians, and persons with disabilities. With the problems identified, the study team will evaluate alternative design solutions and recommend specific road improvements.

All options are on the table at this point, so let the team know what you'd like to see.
Interested citizens are very welcome and encouraged to offer comments, complaints, or suggestions for the study corridors. The traffic study has its own Facebook page "Lathrop Road Traffic Study" where findings and materials will be posted, and Facebook users are welcome to offer comments and ask questions there. The study also has a dedicated phone line 307.733.2999 and email address lathrop@y2consutlants.com where anyone can offer comments privately if they prefer.

A public Design Charrette is planned for Thursday, December $3^{r d}$ from 5-8 p.m. at Evansville Community Center, 71 N. Curtis Street, Evansville. For safety, masks will be worn and participants will follow social distancing guidelines. Proceedings will also be taped for social media so that interested individuals may participate and comment on-line if desired. Participants are very welcome and encouraged to describe concerns and offer suggestions for improvements. "


## Emails from the Public

- Nick and Stevie McNamee emailed in favor of a non-motorized trail along the east side of Blackmore Road and a pedestrian crossing of US-20/26. These were included in the evaluation.
- Mr. Gene Williams, President of Alpine Landscape Inc., has lived at the corner of US-20/26 and Blackmore Road for 33 years. He noted concerns about difficulty entering US-20/26 from Blackmore/Lathrop Road, including some who use the Rail Trail right-of-way to reach the 40 MPH section of US-20/26 at Craig Thomas Blvd. He stated that it is difficult to discern what lane oncoming US-20/26 traffic is in. He noted that a dip is present in the road surface leaving eastbound US-20/26 to enter southbound Blackmore Road.
- Stypa Cathleen liked the proposed trail and pedestrian waysides/waypoints along Lathrop Road.


## Fliers

Handbills were hand delivered on Friday October $23^{\text {rd }}, 2020$ to all businesses adjacent to Curtis Street, and along Lathrop Road west of Comfort Inn. Fliers announced the study was underway and provided contact information listing where interested parties could provide comments. An IHOP employee requested that all driveways along Lathrop Road should have Stop of Yield signs.

## Public Open House

A public open house was held at Evansville Community Center on December 3, 2020. Due to the Covid pandemic, attendees wore masks and audience chairs were placed six feet apart. It is not known how many people may have stayed away due to the pandemic. Per FHWA recommendations, the meeting presentation was simulcast and recorded on Zoom. Casper MPO posted the recording on the Casper MPO Facebook page.

The following individuals signed in at the meeting; Honorable Chad Edwards (Mayor of Evansville), Chief Mike Thompson (Evansville Police Department), Mr. Shane Porter (Evansville Town Engineer), Mr. Jeremy Yates (Casper MPO Supervisor), Ms. Renee Hardy (Casper MPO), Ms. Penny VanHolland, Mr. Jim Ruble (Sinclair Oil), Ms. Sue Hendrickson, Mr. Keith Tyler, Mr. Paul Hanson, Mr. David Hough, Edmund Waddell (Y2 Consultants -Presenter).

Mr. Waddell presented recent land use changes, road conditions, traffic and crash trends, access management principles concerning driveway spacing, medians and roundabouts, non-motorized system and plans, natural site assets, drainage, and utilities.

At Curtis Street, alternatives included no action, signalization of Lathrop Road and/or Luker Lane, realignment and signalization of Lathrop with Luker, driveway consolidation, raised median, and a roundabout. Additional suggestions from attendees included
an added right turn lane on westbound Lathrop, and a right turn bypass lane from northbound Curtis Street to eastbound Lathrop Road. These alternatives were added to the list for evaluation.

Mr. Waddell presented alternatives on Lathrop Road, including sidewalk following the north side of Lathrop Road from Curtis Street to Craig Thomas Blvd, then along the south side of Lathrop Road from Craig Thomas Blvd to Blackmore Road. He stated that a crosswalk at Frost Drive was not recommended due to the presence of a school bus stop. It was suggested to build a pedestrian way along the south side of Lathrop Road from Miracle Street to Blackmore Road, with a crosswalk at Miracle Street. This was included in the evaluation.

Short-and-long-term concepts were presented for Blackmore Road at Lathrop Road. Signs and marking were depicted, with a potential future crosswalk across Blackmore when the proposed non-motorized trail is built on the east side. Mr. Waddell stated the team's recommendation that right-of-way be reserved for a future intersection expansion and connection to Wildcat Road. The public did not offer additional suggestions for this site.

Short-term alternatives at US-20/26 at Blackmore Road included improved signs, marking, and speed reduction to 40 MPH due to recent urbanization. Long-term improvements included possible conversion to an urban boulevard with indirect left turns. Suggestions from the public included a traffic signal at Blackmore/US-20/26. A signal warrant study was added to the evaluation.

## Public Opinion Survey

A survey was distributed at the Open House. Three surveys were returned with the following suggestions:

| Problem: | Suggestion |
| :--- | :--- |
| We have approx. 200 Employees and <br> contractors entering the Sinclair refinery <br> at 7 AM and exiting at 3-4 PM | Traffic Control at the Blackmore and US-20/26 Intersection would allow easier <br> entrance and exit to/from the Refinery. It would also make the intersection safer. <br> A pedestrian crosswalk at Blackmore and US-20/26 would cause a security <br> concern for the refinery. Our security systems are designed to deal with <br> automobile traffic only. We would need to upgrade our security systems to deal <br> with potential pedestrians. |
| Hard to get across US-20/26 | (Install a) stop light |
| During rush hour, turning left onto <br> Yellowstone from Blackmore. | Unsure, but possible lights or median merge. |

## Facebook

The following 21 individuals "liked" the Lathrop Road Traffic Study Facebook page during the study:

- Cauline Peden 01/16/21
- Dacia Edwards 01/10/21
- Jusby Matumueni Babingi 11/30/20
- MPO Staff 11/25/20
- Amanda Lowndes 10/27/20
- Sheila Riggs $10 / 27 / 20$
- Mike Meyer 10/27/20
- Kayla Page 10/27/20
- Mike Davenport 10/27/20
- Eileen Garbutt Tilton 10/27/20
- Crystal Lybbert 10/27/20
- Cynthia Oedekoven 10/27/20
- La Shawn Weir 10/27/20
- Robert Lewallen 10/27/20
- William Shawna Longtine-Narragon 10/27/20
- Tonya Bloom 10/27/20
- Janelle Underwood 10/27/20
- Stefanie Jo Woinarowicz-Washbur 10/27/20
- Dalene Smith-Asmus 10/26/20
- Linda Rone Humes 10/26/20
- Pamela Roth Jones


## 14. GEOMETRIC AND OPERATIONAL ALTERNATIVES EVALUATION

## Curtis Street / Lathrop Road Area

The study area includes Curtis Street (AKA "Wyoming 258" or "Wyoming Boulevard") from south of US-20/26 to north of the I25 westbound ramp terminal intersection. Curtis is a 30 MPH State Principal Arterial carrying 12,000 ADT (2020), including 27\% commercial trucks. Curtis previously carried as much as 19,000 ADT in 2014, during the oil boom. Year 2040 forecasts are designed to accommodate that level of traffic should it recur.

North of Lathrop, the 150-foot right-of-way on Curtis includes a roadway cross section with 78 feet of pavement, including two nine-foot breakdown or parking lanes, four 12 feet travel lanes, and a 12-foot center left turn lane.

Outside the roadway are 30 -inch curb and gutter, grass strips 27 feet wide on the west and 23 feet wide on the east, and six foot sidewalks on each side abutting the right-of-way lines.

South of Lathrop, the 88 -foot roadway consists of two seven-foot parking lanes, four 12 -foot travel lanes, and a 26 -foot painted median (there is no southbound left turn). The remaining row includes two 30 -inch curb and gutter, six-foot sidewalks adjacent to the row lines, a 12 -foot grass strip on the east, and a 28 -foot grass strip on the west.

Of the seven access points along this stretch of WYO 258, all but Lathrop Road are private driveways. Lathrop Road is a municipal Collector Road signed at 30 MPH. The 2020 average daily traffic (ADT) is about 3,300 vehicles, including $34 \%$ commercial trucks. In 2012, at the height of the most recent "oil boom," the Lathrop corridor experienced construction and expansion of oilfield support industries and 5,285 vehicles were counted on Lathrop during a day. Year 2040 forecasts are designed to accommodate that traffic level should it recur.

Noted problems in the corridor include difficult left turns from westbound Lathrop to southbound Curtis, conflicts from numerous driveways, and inconvenient pedestrian crossings.

## I. "No Action" Alternative

The no action alternative leaves everything as it is now, with no change in geometry or traffic controls. Under this condition, westbound left turns remain a problem, and northbound to eastbound right-turning trucks will continue to overrun the southeast corner sidewalk. Crash patterns will remain the same, and if traffic re-grows, crashes will resume their previous higher level.

## Capacity and Delay (Lathrop Approach)

October 2020 Level of Service / Delay per Vehicle: AM Peak D/26.3 seconds PM Peak LOS D / 26.1 seconds 2040 level of Service / Delay per Vehicle AM Peak F / >8 Minutes PM Peak F / >8 Minutes

Luker Lane operates adequately in 2020 and 2040 because most traffic turns right.

Safety - Crashes will continue as they have in the past.


Pedestrians - Pedestrians will continue to cross mid-block without a suitable facility. Trucks continue to overrun sidewalk southeast corner.

## Cost Estimate - \$0

Recommendation - The existing condition has a fatal flaw due to truck trailers overrunning pedestrian space. It also does not address the problem of excessive access drives along this segment. This alternative is not recommended.

## II. Westbound Right Turn Lane with Northbound Right-Turn Bypass Lane

Under this scenario, the existing cross section of Lathrop Road becomes the westbound intersection approach. A new lane is built for eastbound Lathrop Road. This configuration enables construction under existing traffic with no traffic disruption.

A northbound to eastbound right-turn bypass lane is added to facilitate truck right turns. This design resolves the problem of truck trailers overrunning the pedestrian space. It also increases the left-turn storage space between the centerlines of Lathrop and Luker. It does not address the problem of excess access driveways along this segment.

Safety - Separation of right and left turning vehicles into dedicated approach lanes on Lathrop will reduce delay for all vehicles and reduce the chance of drivers accepting inadequate gaps in traffic.

Operations - This configuration does not significantly change operations along the Curtis Street corridor. Left turn queues on westbound Lathrop are separated from right turn queues, allowing the queue to advance more efficiently. The existing condition is improved; however, the option fails under forecast traffic loads. Luker Lane operates adequately in 2020 and 2040 because most traffic turns right.


## Capacity and Delay (Lathrop Approach)

October 2020 Level of Service / Delay per Vehicle:
AM Peak: B / 14.6 secondsPM Peak: D / 27.2 seconds
2040 level of Service / Delay per Vehicle
AM Peak D / 28 seconds PM Peak: F / 8.7 MINUTES

Access - Access drives remain as they are, and access patterns are not affected. Driveways can be combined independently of this modification. A raised median on Curtis is not practical because there is no place to U -turn and businesses will be impacted.

Pedestrians - This configuration does not alter or improve conditions for pedestrians crossing Curtis Street. Correct design would eliminate the problem of semi-trailers overrunning the pedestrian area on the southeast corner. This wider geometry will make the Lathrop Road pedestrian crossing longer, however the design could include a pedestrian refuge on the Lathrop leg of the intersection, enabling a two-stage crossing of that unsignalized approach. Available space for pedestrians along the north side of Lathrop Road is not affected.

Cost Estimate - \$350,000

Recommendation - This alternative fails under 2014 and 2040 traffic loads and is not recommended.


## III. Signalization Options

The study has reviewed options for signalization of the existing geometry, including one or both existing intersections at Luker Lane and Lathrop Road.

## Signal Warrants

Neither the Lathrop nor Luker intersections meet MUTCD warrants for signalization. Luker Lane traffic is not projected to meet volume warrants at full buildout (2040). The westbound (Lathrop Road) approach is closer to meeting warrants and may meet some volume warrants by 2040. However, Lathrop's proximity to nearby signals would make signal progression difficult to achieve.

## Geometry

The Lathrop and Luker intersections are 100 feet apart from centerline to centerline. Queue storage space for northbound and southbound left turns would accommodate only one or two vehicles and these movements would conflict.

## Operations

Signalization of the Lathrop approach would create gaps for westbound left turning vehicles. This is one of the principal complaints of area citizens. However, MUTCD signal warrants strongly discourage signals
 spaced less than 1,000 feet apart, and analysis would require a corridor analysis and synchronization plan using SYNCHRO and Sim Traffic software programs.

## Pedestrians

This intersection configuration requires a center left-turn lane, so the intersection could not provide a median pedestrian refuge. With signalization, a pedestrian signal head and pedestrian-actuated crossing phase would be included. This alignment would not impinge on the available pedestrian and landscaping space along the north side of Lathrop Road.

## Capacity and Delay (Lathrop Approach)

October 2020 Level of Service / Delay per Vehicle:
Not Applicable: Intersection does not meet MUTCD signal warrants.
2040 level of Service / Delay per Vehicle
AM Peak: B / 10.9 seconds PM Peak: B / 15.2 Seconds

## Access

Access drives remain as they are, and access patterns are not affected. Driveways can be combined or closed independently of this modification. A raised median on Curtis is impractical because there is no place to allow U-turns for commercial access.

Cost Estimate - \$150,000 to \$300,000
Recommendation - Signalization is not recommended at this time for either Lathrop Road or Luker Lane.

## IV. Realignment of Lathrop Road North to Intersect at Luker Lane

Realigning Lathrop north to intersect the 'Luker Lane' commercial driveway would create a cross type intersection. This configuration would enable use of one signal for both the Luker and Lathrop approaches. This location is approximately equidistant between the Yellowstone/Curtis and I-25/Curtis intersections ( 360 feet and 378 feet, respectively). The intersection design could include a northbound-to-eastbound right turn bypass lane for truck turning radii.

Signal Warrants - Review of current traffic volumes and crash records indicate that this intersection does not meet MUTCD warrants for signalization. Its proximity to nearby signals would make signal progression difficult to achieve. Several warrants are close, however, and this may change in the future.

Geometric Effects - This configuration requires closure of the south Loaf-nJug driveway on Curtis and impinges on the parking area. The realignment also uses all right-of-way along the north side of Lathrop Road, leaving little space for pedestrian or transit improvements or landscaping. It also eliminates the queuing space on the Loaf-N-Jug south driveway on Lathrop Road. This could create internal circulation problems in the Loaf-n-Jug parking
 lot. The remaining Loaf-N-Jug driveway on Curtis would need to be re-aligned with the gas pump area.

## Capacity and Delay (Lathrop Approach)

October 2020 Level of Service / Delay per Vehicle:
NA: Intersection does not meet MUTCD signal warrants. (See note 1.)
2040 level of Service / Delay per Vehicle
AM Peak: B / 10.9 seconds PM Peak: B / 15.2 Seconds (See note 2.)

Note 1 - Warrant studies are done based on current or near-term traffic flows and crash patterns.

Note 2 - This capacity analysis used Highway Capacity Software and evaluated an isolated intersection with two westbound entry lanes. A signal at this location would have to be coordinated with other signals and evaluated by WYDOT as part of the WYO 258 corridor progression using SYNCHRO or other network analysis software.

Pedestrians - The intersection requires a center left-turn lane, so the intersection could not provide a median pedestrian refuge. With signalization, a pedestrian signal head and pedestrian-actuated crosswalk phase would provide pedestrian LOS B. Pedestrians along the north side of Lathrop Road would be impacted because this alignment would impinge on the available pedestrian and landscaping space along the north side of Lathrop Road.

Safety - Crossroads intersections have 32 conflict points and create the potential for broadside and left turn crashes. This layout would be expected to increase the speed of westbound through vehicles entering Luker Lane, potentially increasing crashes in the west parking area.

Access - The realignment improves access to Luker Lane and increases the capacity of that driveway. This in turn would increase the development potential in that leg of the intersection, including the vacant triangular lot owned by the hotel. A raised median on Curtis is not practical because there is no place to U-turn.

Gateway - This configuration is ordinary and does not create a unique or interesting gateway feature.

Cost - $\$ 1.2$ million plus. This alignment would require extensive reconstruction of the Lathrop alignment, and utility and pedestrian space would require a total take of the Loaf-N-Jug gas station lot. (See engineering plan sheet.)

Recommendation - This alternative is not recommended due to signal warrants, right of way impacts, and cost.
(

## V. Access Management Alternatives:

One of the main safety concerns on Curtis Street is the large number of access drives left over from developments that were built decades ago. These access drives increase driver confusion and conflict with through traffic movements and other driveways.

Raised Median - Raised medians eliminate left turns and the associated left turn crossing conflicts and crashes, which tend to be more severe than right turn collisions. A median reduces the number of conflict points at each driveway from eight to two (right in, right out).

Safety - National safety data shows medians reduce overall crash probability $37 \%$ and reduce injuries $48 \%$ compared to center left turn lanes.

Pedestrians - A median may be provided with a protected pedestrian refuge and possibly a Hawk or RRFB crosswalk signal.

Administration - The center of the roadway is within the jurisdiction of the road agency (WYDOT) and the appropriate safety treatment is their responsibility and authority.

Issues - Many interchange area businesses depend on pass-by trips. Unless alternative access is provided, businesses may be impacted by restricting traffic access from the opposite side of the road. This impact can be mitigated by enabling U-turns for business access.

Recommendation - A raised median should be provided on Curtis if a roundabout can be installed to enable U-turns for commercial trucks, including fuel and merchandise delivery trucks serving Loaf-N-Jug.

## Driveway Consolidation

Each driveway along a corridor contributes eleven conflict points, accompanied by increased crash potential. The northwest driveway on Curtis, across from Lierd Lane, had no observed traffic during peak hours. Driveways on both sides are either too closely spaced or too close to public road intersections.

Safety - Consolidation of four driveways into two eliminates 22 conflict points from the system, along with their crash potential.

## Recommendation

- Merge the two northwest driveways and place one drive straddling the property line to serve both parcels.
- Merge the two driveways in front of the Loaf-N-Jug pump islands into one driveway centered on the pump islands.

Implementation - This proposal may be implemented when site plans are proposed for future redevelopment of these sites.

## VI. Roundabout with Raised Center Median

This alternative consists of a modern roundabout and raised center median extending from north of Lierd Lane to north of the l-25 westbound ramp terminal intersection.Two roundabout configurations were evaluated:

- A one-lane roundabout with right turn bypass lanes
- A 2X1-lane roundabout with two lanes for north-south movements and one lane east-west.

One Lane N-S Alternative - Not recommended. The single-lane roundabout had very low stopped delay, but $95^{\text {th }}$ percentile queues extended up to 150 feet - halfway to nearby signalized intersections. Also, dropping the outer lane would force northbound through vehicles to merge into the left lane before entering the roundabout. This abrupt maneuver could cause Side-Swipe-Same-Direction crashes on the northbound approach. It would also alter lane utilization and operations at the I-25 Interchange, as drivers familiar with the configuration anticipate the imminent need to merge left and overcrowd the northbound left lane at the interchange. A single lane roundabout is not recommended.


Two Lane N-S Alternative - Recommended. Capacity analyses reveal the 2X1 lane roundabout is the correct design. (A 150foot diameter 2X1-lane concept is depicted here.)

Capacity Analysis - The 2X1 lane configuration operates with less than five seconds stopped delay per vehicle during forecast 2040 peak hours. The $95^{\text {th }}$ percentile queues are less than two vehicles.

Operations - Low delay and queuing would enable the Curtis/Lathrop intersection to operate independently of signal progression on Wyoming Boulevard (WYO 258) and would not interfere with operation of the nearby signalized intersection at US-20/25. The roundabout capacity self-adjusts to changing arrival patterns. The northbound to eastbound right turn radius is sufficient for a WB-62 design vehicle staying in lane. Larger vehicles (WB-67, Mobile Home, etc.) may straddle lane lines. They are useful "calming" features at rural-urban speed transitions, as well as at or near freeway ramp termini because they process random traffic arrivals and efficiently distribute traffic in all directions.

Access - The U-turn ability allows a center median for access management while retaining full access to all adjacent land uses. (U-turn volumes were included in the capacity calculation.) As with realignment of Lathrop to meet Luker, the south Loaf-N-Jug driveway on Curtis must be merged with the north driveway and aligned to serve the pump stations. Traffic flow through the pump islands would become clockwise; traffic coming off Curtis and re-entering the system via Lathrop. Lathrop traffic entering the roundabout can then proceed in any desired direction with little delay.

Safety - Roundabout safety performance is well documented, with more than $75 \%$ fewer injuries and less than $1 / 10^{\text {th }}$ as many fatalities as typical crossroads type intersections of the same volume.

Pedestrians - The roundabout alternative provides pedestrian refuges at the north, south, and east splitter islands. These crossing locations may eliminate the need for pedestrian crossings at the I-25 westbound ramps.

Gateway and Community Development - The Town of Evansville has planned gateways at main entrances to the community, such as the I-25/Curtis Street intersection. Roundabouts provide locations for landscaping in the center island and around the periphery, as well as wayfinding signage on the exit side of splitter islands. Roundabouts provide outstanding commercial access and often result in redevelopment of surrounding parcels.

Recommendation - The roundabout alternative operates at LOS A under all traffic scenarios, maximizes safety, and accomplishes all community and highway agency objectives. A 2X1-Lane roundabout is the recommended solution for the Curtis (WYO 258) Lathrop/Luker Intersection.


## VII. Interim Low-Cost TEE Improvements

This alternative consists of low-cost interim improvements to reduce queuing of westbound vehicles and eliminate the problem of trucks overrunning the pedestrian area on the southeast corner.

Description - In this alternative, the west 100 feet of existing Lathrop Road becomes westbound left-turn and right-turn lanes with storage space for three to four vehicles per lane. To enable this, a new eastbound lane is constructed 90 degrees perpendicular to Curtis Street (WYO 258), with sufficient width and turning radius to accommodate a rightturning semi-tractor-trailer with a 62-foot wheelbase (WB-62). Lathrop Road remains under Stop control. The remaining space is used for a pedestrian refuge area.

Capacity and Delay Analysis - In the 2020 AM peak, the westbound left turn would
 operate at 14.6 seconds of delay (LOS B) and the westbound right-turn operates with an average of 9.6 seconds of delay.

During the 2020 PM Peak, the westbound approach operated at 26.1 seconds of delay (LOS " D "). After construction, the leftturn movement operates with 27.2 seconds of delay (LOS " D ") and the right turn operates with 10.7 seconds of delay per vehicle (LOS "B").

In the 2040 AM Peak, the "No-Action" alternative is projected to operate at LOS "D" with an average of 26.3 seconds of delay. Adding another approach lane results in an average 28.0 seconds of delay (LOS "D") for the left turn lane and 10.8 seconds delay (LOS "B") for the westbound right turn lane.

In the 2040 PM Peak, the No-Action alternative operates at LOS "F" with calculated delays of more than nine minutes. A twolane approach results in 13.7 seconds delay (LOS "B") for the right turn lane, however the left turn lane still operates with almost nine minutes of delay (LOS " $F$ ") and resulting queues will block the right approach lane.

Operations - Vehicles entering and exiting the Loaf-N-Jug driveway on Lathrop Road will encounter queued vehicles waiting at the westbound intersection approach.

Access - Per WYDOT request, access drives on Curtis have been consolidated to two driveways on each side, instead of the existing three per side.

Safety - Lack of safe gaps in traffic on Curtis (WYO 258) may cause left-turning Lathrop Road drivers to accept gaps that are not safe to enter.

Pedestrians - This alternative provides a pedestrian refuge between eastbound and westbound lanes and places the crosswalk behind the first vehicle in queue. Pedestrian crossings of Curtis Street are not changed.

Cost Estimate - \$300,000

Recommendation - If no other alternative is affordable, this offers some improvement over the no-action alternative during off-peak periods. With signalization, this alternative may perform acceptably in 2040.


## Lathrop Road Corridor

While the original study area did not include the entire Lathrop Road corridor, non-motorized deficiencies required examination of the entire corridor to assess needs and recommend the appropriate trail/sidewalk alignment.
i. Lathrop Road Interchange Commercial District, Curtis Street to Miracle Street - This 1,836-foot (0.35mile) section ranges from 5,145' elevation at Curtis Street to $5,204^{\prime}$ elevation west of Miracle Street. It has seven existing access driveways and one public road (Miracle), but no formal pedestrian facilities. One bus transit stop is located between the closely spaced IHOP and Baymont Inn Driveways (yellow circle). Buses use these two driveways to exit and re-enter Lathrop Road, letting passengers board safely in the Baymont Inn parking lot.


Stop or Yield signs at all Commercial Driveways - Driveways along Lathrop are not signed, and many drivers currently make a "rolling stop" when entering Lathrop Road. Several crashes have occurred at these driveways. The study team recommends installing Stop or Yield signs at all driveway termini (red circles) to consistently remind drivers they are entering a roadway and should use appropriate caution. It appears likely that drivers will continue to yield rather than come to a complete stop.

Enable Internal Circulation Between Parking Lots - There is no connection between the IHOP/Baymont parking lot and the Loaf-N-Jug parking lot. Vehicles currently use Lathrop Road to drive between these facilities, creating conflicts on Lathrop. A simple connection between these parking areas would reduce this conflict potential (yellow circle).

Pedestrian Walkway along the North Side of Lathrop Road - All pedestrian destinations and transit are along the north side of Lathrop Road through this segment, and space is also available for a pedestrian facility along that side (yellow line). The facility would be a minimum of five feet wide for ADA requirements, but adequate space is available for a 10 -foot wide shared-use path.

Snow and Ice - Eastbound tractor-trailer semis have previously had difficulty climbing the hill on Lathrop west of Miracle Street. Realignment or reducing the grade on Lathrop Road does not appear cost effective. This location should receive higher priority for plowing and application of road salt.
ii. Commercial - Industrial Transition Area, Miracle Street to Craig Thomas Boulevard - This 1,794-foot segment ranges from 5,196-foot elevation at Miracle Street to 5,141-foot elevation at Craig Thomas Boulevard.


Pedestrian Path and Crosswalks - A crosswalk is needed somewhere along this segment to allow residents of Aspens Mobile Home Park on the southeast to reach the previously described commercial facilities to the northwest. Several crossing locations have been proposed:

1. East leg of Lathrop/Miracle Street Intersection
2. West leg of Lathrop/Craig Thomas Intersection
3. West Leg of Lathrop/Frost Drive Intersection
4. It would be possible to extend a sidewalk along the south side of Lathrop Road to Miracle Street. However, the Miracle Street crossing location would be immediately east of the crest of a hill on Lathrop Road, with limited sight distance. Before recommending a formal crosswalk at this location, an engineering study should be made to determine traffic speeds in that vicinity as well as stopping sight distance to ascertain whether and where drivers can see pedestrians in time to stop. That analysis is outside the scope of this Lathrop Road Traffic Study.
5. The west leg of the Lathrop/Craig Thomas intersection is an acceptable location for a crosswalk. Sight distance is open in all directions and the crosswalk site has no other activities taking place to distract drivers. The location also serves pedestrian destinations to the north on the Craig Thomas corridor.
6. The Lathrop Road / Frost Drive intersection has transit and school bus stops. A crosswalk at this location would serve no pedestrian destinations on the north side of the road, and it could attract school children to walk into the road while waiting at the bus stop. This could present a safety hazard during bus pick up and drop off.
iii. Residential/Industrial Area: Lathrop Road from Craig Thomas Boulevard to Blackmore Road - This twolane 3,465 -foot ( 0.66 mile) collector segment serves the Aspens Mobile Home Park on the south and industrial areas on the north side of Lathrop Road and along Baker Lane. Elevation varies by only eight feet, ranging from 5,141 feet at Craig Thomas Blvd to a minimum of 5,134 feet west of Blackmore Road. Right of way is 80 feet wide. As with the rest of Lathrop Road, the asphalt surface is 26 feet wide with no shoulder, curb, gutter, or sidewalk.

a. Traffic - Daily volumes are less than 1,000 vehicles per day and are not projected to require widening.
b. Transit and Non-Motorized - CATC orange line bus stops \#3 and \#4 are located at Frost Drive and East Hills Drive (red circles). Some trees are present along the south side of Lathrop near the Aspens residential area and the detention pond between Baker Lane and Blackmore Road. Pedestrians are observed walking in the grass alongside the road.
c. Recommendation - Construct an ADA compliant 10 -foot shared use trail along the south side of Lathrop Road from west of Craig Thomas Boulevard to Blackmore Road. Provide shaded waypoint pedestrian rests at bus stops \#3 and \#4, and at the detention pond east of Baker Lane. (See non-motorized section 11 for details.)
iv. Intersection of Lathrop Road and Blackmore Road -_This intersection was realigned when Blackmore Road was extended beneath I-25 in 2005, and Lathrop Road became the stem of the TEE intersection (inset). The intersection was recently widened to allow more room for truck turn movements, leaving a wide pavement with inadequate visual indications for drivers. In the medium term, development will continue and could potentially block future road alignments. In the long term ( $20+$ years), more growth will occur to the east across Blackmore after development fills in vacant study area lots.

The Stop sign on Lathrop appears to have been moved to enable widening of the intersection for trucks. The fence on the John Deere parcel obstructs the view to the left, forcing drivers on the Lathrop approach to inch forward and peer left to look for a gap in traffic. They cannot see approaching traffic from the Stop sign.

a. Short Term Recommendations- Several low-cost improvements should be made in the near term to improve safety and operations at this location.

## Signs and Markings:

i. Stop Sign Relocation - Relocate the Stop sign where it is more visible to approaching drivers.
ii. Centerline Marking - Paint a Double-Yellow Centerline Marking to delineate travel lanes on Lathrop near Blackmore Road.
iii. Stop Bar - Provide a painted or thermoplastic Stop Bar
 where drivers on Lathrop Road can see approaching traffic on Blackmore Road.
iv. MUTCD Warning Sign W1-7 - The road agency should install warning sign W17 on the east side of Blackmore Road opposite the terminus of Lathrop Road.

v. Signalization: Signalization is not warranted.
b. Medium Term Recommendations: In the medium term, the community should prepare for expected changes in the network:
i. Pedestrian Crossing - Current area trail plans call for a 10 -foot-wide shared use path along the east side of Blackmore Road (sketch). This study recommends a path along the south side of Lathrop. The community should plan for a pedestrian crossing (marked or unmarked) connecting these two facilities.

ii. Blackmore Sidewalk - A standard ADA-compliant 5 -foot sidewalk should be planned on the west side of Blackmore from Lathrop Road to East 2 ${ }^{\text {nd }}$ Street, behind the bridge columns under I-25. This is the most direct route from Lathrop Road to the $2^{\text {nd }}$ Street commercial area, and it would not require Lathrop Road pedestrians to cross the roadway to proceed south.
iii. Alignment Study and Official Map - At some point in the future, a connection will be needed between Blackmore Road and Hat Six Road, on some alignment between I-25 and US-20/26. Possible termini of such a roadway could be Wildcat Road and the Blackmore/Lathrop intersection, or some other alignment.
The Town of Evansville and/or Casper MPO should commission a route alignment study to determine the most appropriate alignment for this roadway, and develop an official map showing that new right of way reservation.
iv. Right-of-Way Reservation - With an alignment study and official map, rights-of-way can be reserved, and segments of the roadway constructed as each new development takes place in the area east of Blackmore Road. If the community determines that the new roadway should align with Lathrop, then right-of-way should be reserved at the intersection soon to enable construction of any potential intersection geometry, including a crossroads or modern roundabout. A 200 -foot diameter right of way reservation at the intersection would be adequate for any future contingency.
c. Long Term Recommendations - In the 20+ year timeframe, development is expected to begin in the area between I-25 and US-20/26 east of Blackmore Road, warranting construction of an east leg of the Lathrop/Blackmore intersection.
i. Design of a Four-leg Intersection - The future mix of development types (residential, industrial, etc.) east of Blackmore Road is yet unknown, so any estimate of future turning movements and geometric requirements would be conjecture. Right-of-way space should be reserved at the intersection soon to address any contingency, such as a future free right turn lane, roundabout, or crossroads.
ii. FEMA Coordination - The Blackmore/Lathrop intersection lies in the Elkhorn Creek 100-year floodplain, immediately adjacent to the floodway. (See FEMA Map). The design of that intersection and roadway will need to be such that it does not increase impedance of the flow during floods. As part of the road design, engineering analyses will need to include that consideration and mitigate impacts of roadway fill. The engineer will provide a Letter of Map revision (LOMAR) to the Federal Emergency management Agency (FEMA). This coordination will need to be part of the road design contract.
iii. FEMA Floodplain Map - The existing floodway is depicted with red and blue stripes and the 100year floodplain is depicted in blue. The roadway alignment study and official mapping east of Blackmore Road should reserve adequate right-of-way for necessary detention and channel(s). Future road design will need to evaluate floodway impacts and assure the floodway is not impacted. A Letter of Map revision (LOMAR) will be required along with the road design.

v. Intersection of US-20/26 (Yellowstone) with Blackmore Road (formerly called Lathrop Road) - The study area includes the intersection of US-20/26 and Blackmore Road. US-20/26 is a principal arterial signed at 55 MPH through the intersection, dropping to 40 MPH at the intersection of Craig Thomas Boulevard .75 miles west. Blackmore-Lathrop is an arterial signed at 40 MPH .

The intersection was re-designed in about 2003 to eliminate the central median and install "headed up" left turn lanes (aerials below). The resulting cross section is unusually wide, and the crowned cross section makes lanes on the far side of the road difficult to see.


The two-way Average Daily Traffic (ADT) on US-20/26 in the year 2020 is 5,300 ADT, down from a peak of 6,000 ADT in 2015. The current Blackmore Road traffic volume is about 900 vehicles. Crash records from 2015 to 2019 show a pattern of two angle crashes, three rear end crashes, and three loss of control crashes; all involving the south leg of the intersection. There were three injury crashes resulting in four injuries during the study period.

a. No Action - Under this option, crash patterns and operational problems will remain the same.
b. Demand Management - Management of Sinclair Refinery has expressed concern about delays for their employees' and contractors' vehicles entering the intersection from the north during their shift changes at 7 a.m. and 3 p.m. They suggested a signal would mitigate this problem, but the intersection does not meet MUTCD signal warrants.

Recommendation - It is within the refinery's authority to control their shift times. The refinery may wish to stagger their shift changes on 10-or-15-minute intervals so that previous departing queues can disperse before the next group arrives at intersection. This would spread their shift change over an entire hour (say 3 to 4 p.m.) instead of all employees arriving at the intersection simultaneously.
c. Low-Cost Measures - Signs, Markings, and Lighting - Inspection of the intersection reveals that it is difficult for drivers turning left from Blackmore-Lathrop to see their destination lane on the far side of US-20/26. Illumination at the nearby refinery impacts drivers' night vision, making it difficult to see the intersection layout at night. The intersection layout is difficult to see.

## Recommended improvements

The study team recommends the following improvements at the intersection:
i. Signs
a. Remove 'One Way' and 'Do Not Enter' signs remaining from the previous divided highway cross section.
b. Install combined MUTCD bicycle-pedestrian sign W11-15 and "Trail Crossing" plaque W11-15P at the Casper Rail Trail.
ii. Markings
a. Paint and maintain reflective lane and median markings on US-20/26.
b. Provide dashed turn lanes 'Turkey Tracks' to guide left-turning drivers to their correct lane.
c. Paint a centerline marking and STOP bar on Blackmore/Lathrop Road.
iii. Street Lighting - Provide overhead street lighting on all four corners of the intersection.

d. Speed Limit Reduction - The urban 40 MPH zone currently begins .75 miles west of Blackmore/Lathrop. Since the Blackmore-US-20/26 intersection was rebuilt in 2003, the surrounding area has experienced significant new development, transforming both sides of the US-20/26 corridor from "rural" to "urban."

WYDOT should consider extending the 40 MPH zone east of Blackmore/Lathrop to reduce the probability and severity of crashes.
e. Signalization - As stated above, current traffic patterns and crashes do not yet meet MUTCD signal warrants. Warrants may be met eventually as development continues in the surrounding area. With a speed reduction to 40 MPH, the intersection should be safer for future addition of a signal. At present, the nearest signals are at Curtis Street, 1.4 miles west, and at Hat Six Road, 1.4 miles east.
f. Pedestrians - The nearest pedestrian crossing to this intersection is at Curtis Street, a mile and a half west. Current plans call for pedestrian/non-motorized trails along the east side of Blackmore Road, connecting to the existing Casper Rail Trail following the south side of USD-20/26. A non-motorized "Wayside" (bench and sign/kiosk) is proposed near the southeast corner of the intersection. It is likely that non-motorized users will increase in number and wish to cross US-20/26. The current condition is not conducive to pedestrian crossings.
The study team recommends evaluation of a pedestrian "Hawk" signal in a nearby 40 MPH zone where a median refuge is available. If the 55 MPH speed limit is not reduced, then the nearest location is the Craig Thomas Boulevard intersection 0.75 miles west. If the speed limit is reduced to 40 MPH , a similar facility could be provided near the US-20/26 intersection with Blackmore (Lathrop).
g. Long Term improvements - US-20/26 is like many older divided highways around the U.S. that have experienced urbanization, and their functions gradually evolve from rural, controlled-access highways to urban divided boulevards. A useful design solution for this is the median U-turn or an indirect left turn. Variations of this concept include signalized or unsignalized, with geometry that may or may not allow direct crossings of through movements. A simple version of this concept is depicted below. Here, all movements from the side road must turn right and then execute a U -turn if they wish to go left or through. This improves safety by simplifying the drivers' gap acceptance problem and eliminating left turn and crossing conflicts.

Recommendation - The study recommends WYDOT reserve this as a possible future solution when the roadway is reconstructed. For now, road agencies should wait and see how traffic volumes develop and whether low-cost recommendations sufficiently improve safety at this intersection.

vi. Alternative Evaluation Matrix - The foldout on the following page compares alternative treatments as to their effect on community objectives stated in the 2017 Evansville Transportation Plan.

| LATHROP ROAD TRAFFIC STUDY |  |  |  | GOALS > | 0: Meet Standards |  |  | 1: Improve Mobility, Connectivity, and Access for All People |  |  |  |  |  |  |  |  |  |  |  |  | 2: Enhance Quality of Life |  |  |  |  |  |  | 3: Improve Economic Vitality |  |  |  |  |  |  | 4: Implementation |  |  |  |  |  | 5. Promote Improved Safety |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ALTERNATIVE EVALUATION MATRIX |  |  |  | сомmunity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | OBJECTIVE <br> NUMBER | 0a | ob | 0 | 1 a | 1b | ${ }_{1 c}$ | 1d | 1 e | ${ }^{1 f}$ | 1 g | 1h | ${ }_{1 i}$ | ${ }_{1}{ }^{\text {j }}$ | 1 k | 11 | 1 m | 2a | 2b | 2 c | 2d | 2 e | $2 f$ | 2 g | 3а | 3b | 3c | 3d | зe | 37 | 3 g | 4a | 4b | 4 c | 4d | 4 e | 4 f | 5 a | 5b | 5c | 5d |  |
| PROJECT | component | cost | $\left.\begin{array}{\|c} \text { GRADE } \\ (A-E) \end{array}\right)$ | SCORE |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  | 250,000 | E | 117 | 3 | 5 | 0 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 4 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | - | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | $\pm$ |
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|  |  | 400,000 | E | 117 | 3 | 5 | 0 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 4 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 5 | ${ }^{3}$ | 3 | 3 | ${ }^{3}$ | 3 | 3 | 3 | 4 | + |
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|  |  | 250,000 | A | 170 | 3 | 3 | , | 5 | 5 | 5 | 3 | 4 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 5 | 4 |  | 4 | 0 |
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|  |  | 5,000 | в | 149 | 5 | 3 | 3 | 5 | 5 | 4 | 3 | 4 | 5 | 4 | 5 | 4 | 4 | 3 | 3 | 3 | 5 | 3 | 5 | 4 | 4 | 3 | 3 | 3 | 4 | 3 | 4 |  | 3 | 3 |  | 4 | 3 | 3 | 3 | 3 | 5 | 4 | 4 | 4 | $\because$ |
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|  | Stredestara woprsies | 15,000 | A | 163 | 3 | 3 | 3 | 5 | 5 | 5 | 3 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 3 | 5 | 5 | 5 | 5 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | ² |
| Lathrop Road / Blackmore Road Intersection | Sesmond amatios | 5,000 | c | 142 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 4 |  | 3 | 4 |  | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | $\stackrel{\sim}{*}$ |
|  | cosment | 5,000 | c | 140 | 5 | 4 | 4 | 5 | 5 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | - |
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|  |  | 45,000 | B | 148 | 5 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 5 | 3 | 4 | 3 | 5 | 5 | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | T |
|  |  | 100,000 | c | 147 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | ${ }^{3}$ | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 5 | 3 | 4 | 3 | 5 | 5 | 4 | 3 | 4 | 3 | 4 | 3 | ${ }^{3}$ | 4 | 4 | 4 | 4 |  |
| US-20/26 (Yellowstone) intersection with Blackmore(Lathrop Road | Sesmand maximes | 10,000 | c | 142 | 5 | 5 | 5 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 5 | 5 | 4 | 4 |  |
|  | Sreetumbins | 100,000 | c | 144 | 5 | 5 | 5 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 5 | 5 | 4 | 4 | 0 |
|  | Speed tininesacition | 10,000 | c | 145 | 3 | 5 | 5 | 4 | 5 | 3 | 4 | 3 | 5 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 4 | , | 4 | 3 | 3 | 3 | 3 | 4 | 3 | , | 3 | 3 | 3 | 3 | 5 | 4 | , | 3 | $\bigcirc$ |
|  | Semalasion | 500,000 | D | 122 | 0 | 3 | 3 | 2 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 4 | 4 | 3 | 3 | 3 | 3 | - | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 응 |
|  | Ubinomeouerancomesion | 15,00,000 | c | 143 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 은 |
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| 5 | Solves Objective | Best | A | 162 20175 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Improves Objective |  | B | ${ }^{148} 8161$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | No Effect |  | c | 13440147 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Makes Worse |  | D | 12000133 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 | Fails objective | Worst | E | 10660119 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0 | Fatal Flaw |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## 15. STUDY RECOMMENDATIONS \& FOLLOW-ON STUDIES

## Curtis Street Corridor Recommendations

The Curtis Street corridor is recommended for access management improvements, including driveway consolidation, raised median, and a modern roundabout serving the Curtis Street Lathrop Road intersection and the Luker Lane driveway.

- Safety - Together, the access management and roundabout are projected to reduce injury crash probabilities by $70 \%$ to $80 \%$.
- Operations - The roundabout design operates at Level of Service "A" (less than 5 seconds delay). Independent operation does not require coordination, and the exceptionally low delays will not produce queues which could impact other intersections. While trucks use the roundabout to U-turn, the median will allow small northbound vehicles to Uturn south of the US-20/26 intersection.
- Trucks - The roundabout geometry is designed to accommodate a tractor-trailer combination with a 62 -foot wheelbase (WB-62). In addition, the geometry accommodates oversize vehicles such as mobile homes and oilfield machinery by straddling lane lines. Trucks no longer overrun pedestrian area.
- Commercial Access - Access to adjacent commercial properties will be available from all directions, with right-in-right-out using the roundabout to accommodate U-turns and access movements. The roundabout provides superior access to the Luker Lane commercial area and enables development of the undeveloped parcels along Lathrop Road. Shortened queues on Lathrop simplify access to the Loaf-N-Jug driveway on Lathrop Road.
- Development Effects - Roundabouts often catalyze new development. Easier, faster access from I-25 to Lathrop Road and Luker Lane will make parcels more desirable and accelerate infill development. A brand-new, high-capacity road facility, combined with the highly visible location adjacent to I-25, superior access, eye-catching layout and attractive landscaping, all cause investors and developers to take a second look. Land uses immediately surrounding this location are aging and will be prime for redevelopment roughly within the next 10 years. Lands next to roundabouts elsewhere have redeveloped with banks, hotels, and office buildings characteristic of a central business district.
- Pedestrians - The roundabout and median provide pedestrian safety refuges for improved pedestrian access among all commercial parcels near Curtis Street / Lathrop Road. This improved pedestrian access adds to market value of nearby parcels.
- Gateway Element - As a community gateway element, the roundabout offers an interesting and attractive view from both I25 and the northbound WYO 258 approach to Evansville. The central island provides a highly visible site for attractive landscaping and welcome signage. The high visibility will attract attention of investors and developers. The concept on the cover displays the name "Evansville" with an illustration of Reshaw's Bridge, the historic origin of Evansville on the banks of the North Platte. The gateway element depicted is a large version of the same design element used at other Evansville community gateways. This would be the first impression of Evansville for thousands of Interstate travelers.
- Community Wayfinding - Attractive wayfinding signs may be
 placed on each splitter island directing drivers to major destinations out each exit. Wayfinding signs need not be elevated and are often four feet high or less to avoid excess sign clutter. Roundabout splitter islands provide a convenient location for wayfinding.

The recommended Curtis Street improvement is depicted on the following page.
(

## Lathrop Road Recommendations

On Lathrop Road, a non-motorized path is recommended on the north side from Curtis Road to Craig Thomas Boulevard, with a crosswalk on the east leg of that intersection, and then along the south side of Lathrop to Blackmore Road. A series of six pedestrian waysides will break up the 1.4 mile walk and provide resting places and viewpoints at key locations along the way. Stars on the aerial image below illustrate locations where pedestrian waypoints should be provided.


A speed study and sight distance analysis are recommended to determine if another crosswalk of Lathrop Road is advisable near Miracle Street.

All driveways along Lathrop Road should be provided with Yield or Stop Signs.

- At the Blackmore Road/Lathrop Road intersection, a centerline stripe and Stop bar are recommended on Lathrop Road to provide clear driver guidance. The stop signs should be moved closer to eastbound drivers' field of vision. The appropriate agency should acquire rights-of-way for a future fourth (east) leg of the intersection.

A route alignment study should be done to produce an official map for the future extension of Wildcat Road to this intersection. That study should include FEMA coordination and floodplain analysis.


- At the US-20/26 / Blackmore Road intersection, the study recommends improved signs, markings, and intersection lighting, and consideration of a speed reduction from 55 to 40 MPH and a pedestrian crossing. Long term, the corridor may be considered for signalization and retrofit as an "urban boulevard" using indirect left turns for access management and safety improvement.

Low-Cost Measures - Signs, Markings, and Lighting - Inspection of the intersection reveals that it is difficult for drivers turning left from Blackmore-Lathrop to see their destination lane on the far side of US-20/26. Illumination at the nearby refinery also impacts drivers' night vision, making it difficult to see the intersection layout at night.

## Recommended Improvements

The study team recommends the following improvements at the US-20/26 / Blackmore Road intersection:
I. Signs
i. Remove 'One Way' and 'Do Not Enter' signs remaining from the previous divided highway cross section.
ii. Install combined MUTCD bicycle-pedestrian sign W11-15 and "Trail Crossing" plaque W11-15P at the Casper Rail Trail.
II. Markings
i. Paint and maintain reflective lane and median markings on US-20/26.
ii. Provide dashed turn lanes 'Turkey Tracks'to guide left-turning drivers to their correct lane.
iii. Paint a centerline marking and STOP bar on Blackmore/Lathrop Road.
III. Street Lighting - Provide overhead street lighting on all four corners of the intersection.


## a. Speed Limit Reduction

The urban ( 40 MPH ) zone currently begins .75 miles west of Blackmore/Lathrop. Since the Blackmore-US-20/26 intersection was rebuilt in 2003, the surrounding area has experienced significant new development, transforming both sides of the US-20/26 corridor from "rural" to "urban." WYDOT should consider extending the 40 MPH zone east of its intersection with Blackmore (Lathrop) to reduce the probability and severity of crashes.
b. Pedestrians

The nearest pedestrian crossing to this intersection is at Curtis Street - a mile and a half west. Current plans call for pedestrian/non-motorized trails along the east side of Blackmore Road, connecting to the existing Casper Rail Trail following the south side of USD-20/26. A non-motorized "Wayside" (bench and sign/kiosk) is proposed near the southeast corner of the intersection. It is likely that non-motorized users will increase in number and wish to cross US$20 / 26$. The current condition is not conducive to pedestrian crossings.

The study team recommends evaluation of a pedestrian "Hawk" signal in a nearby 40 MPH zone where a median refuge is available. If the 55 MPH speed limit is not reduced, then the nearest location is the Craig Thomas Boulevard intersection 0.75 miles west. If the speed limit is reduced to 40 MPH , a similar facility could be provided near the US20/26 intersection with Blackmore (Lathrop).

## Other Area Issues and Recommended Follow-On Studies

Discussions with stakeholder agencies revealed additional issues that are outside the Lathrop Road Traffic Study geographic area. The following issues may be packaged and addressed in future system studies or pursued as individual projects:

1. Evaluate development effects of a toxic area located in Evansville west of the Sinclair Refinery.
2. WYDOT is abandoning the US-20/26 Access Drive in front of Smith's RV east of Western Ave (west of Curtis Street) and allowing direct access to US-20/26. WYDOT would like to release more of the access road to local governments or private agencies. Evaluate potential for closure of US-20/26 Access Drive (Old Glenrock Highway) from Curtis Street to Craig Thomas Boulevard.
3. Evaluate operational problems at the Intersection of US-20/26, Curtis Street (Wyoming Blvd) and US-20/26 Access Road (Old Glenrock Highway).
4. Safety audit of US-20/26.
5. Business friendly transportation initiatives.
6. Potential for south extension of Texas St. to Miracle Street, including a US-20/26 intersection.
7. Potential for south extension of Evans Street to Miracle Street including a US-20/26 intersection.
8. Alignment study for extension of Lathrop Road east to Wildcat Road.
9. Rationalize area functional classes.
10. Evaluate entire network from Curtis to Hat Six, US-20/26 to I-25.
11. Extend traffic study north to railroad.
12. Speed study of US-20/26 in the vicinity of the Lathrop Road (AKA Blackmore Road) intersection
13. Speed study and Sight Stopping Distance study for potential crosswalk of Lathrop Road near Miracle Street.

## 16. LANDSCAPE PLAN

This discussion begins with the general Landscape Concept, including the proposed pedestrian Waypoints. It discusses and illustrates landscape furnishings and improvements, discusses plant selection, and project maintenance.

## Landscape Concept

These suggestions are intended to provide a framework for further development of the design ideas, as deemed appropriate by Evansville's elected officials, agency directors, residents, and other stakeholders.

These landscape concepts further develop the overarching ideas presented in the Natural Assets Inventory, specifically addressing the proposed sidewalk and its suggested Waypoints.

On Lathrop Road, a non-motorized path is recommended, relieved with a series of six pedestrian Waypoints. Stars on the aerial image below illustrate locations where pedestrian waypoints should be provided.


To further the overall intent to provide resting places, visual relief, human scale, points of interest, and respite from the intensive traffic, the Waypoints should offer human scale and interest. Suggestions include:

- Paving Pattern - Concrete scoring on a tight grid provides a sense of scale, creating a plaza effect.
- Bus Shelters - At Waypoint \#1 near I-HOP and at Waypoint \#4 to serve the residents of Aspen Park.
- Benches - At all Waypoints, facing the street and the predominant views as appropriate.
- Bike Parking - For all-day parking at bus shelters, and for short term parking at other Waypoints.
- Plantings - Provide visual interest, shade, softening of pavements, seasonal interest, and aesthetic improvement.

All furnishings and plantings should be sturdy and low maintenance, selected for their ability to withstand public use and intense weather.

## Bus Shelter

It is anticipated that standard bus shelters could be provided at the existing bus stops along Lathrop, particularly at I-HOP and Aspen Park. However, additional shelters may be necessary, if so determined by the transportation department.


The intention of the bus shelters is to provide protection from wind and precipitation, therefore a semi-enclosed shelter, such as that existing at I-HOP (right), are recommended so long as
 visibility is maintained for safety. Bus shelters may also provide an opportunity for signage and shade (left). Shelters could be standardized pre-assembled structures or could be custom designs fabricated by local craftsmen.

## Benches

Benches should be in keeping with the aesthetics of the City and should above all be sturdy and easy to maintain. Examples of easy-care benches are provided. We recommend that the City's Parks \& Recreation Department be tasked with selecting the final product.

Benches may be cast-in-place or bolted to the cured surface.


## Bike Parking

For public use, the inverted "U" model is recommended, as it supports adult-sized and technical road bikes (as opposed to the "toaster/slot" racks, which are difficult to lock to and allow bikes to domino causing damage to frames and warping wheel rims). Post-and-circle racks are also acceptable. Either of these models will support the frame of the bike, protect the bike from damage, and allow ample places to attach a lock.
"U" posts can be cast into the sidewalk pour or bolted to the surface. Racks should be spaced parallel at 3 feet apart, allowing 18 inches per bicycle, double loaded.

An example installation for illustrating cast-in-place posts detail is provided for reference only. All fixtures shall be installed per manufacturers' recommendations.


## Additional Furnishings

Additional furnishings may include trash receptacles, recycle bins, and so forth as desired by the City.

## Plant Selection and Placement

For continuity and to develop a "sense of place", the plant palette should be limited (except for potential annuals at the roundabout) and should be repeated at all planting locations throughout the project corridor. This will help residents and visitors recognize the corridor as a distinct destination and will set the tone for additional improvements.

Plants should be selected specifically for hardiness and low maintenance. It is critical that plants appear healthy and vigorous, and do not impose undue burden on the City staff which may result in neglect. Plants that require undue attention such as constant pruning, deadheading, or weeding should be avoided.

This report references the "Recommended Tree Species for the Casper Area", duplicated below and also available on the City of Casper's webpages:
(https://www.casperwy.gov/UserFiles/Servers/Server 62983/File/Government/Departments/Community\%20Development/Pla nning/Recommended\%20Tree\%20Species\%20Guide.pdf).

City Parks \& Recreation staff have been contacted for their contributions to the discussion about low-maintenance, site-specific, hardy plants, and staff's suggestions should be implemented whenever possible.

## Recommended Tree Species for the Casper Area

Large Trees ( 50 feet + in height and spread at maturity)

| Green Ash | White Ash | Marshall Seedless Ash | Autumn Purple Ash | Patmore Ash |
| :--- | :--- | :--- | :--- | :--- |
| Fall Gold Ash | Cimarron Ash | Paper Bark Birch | Weeping Birch | $\Delta$ Whitespire Birch |
| Colorado Blue Spruce | + Sensation Boxelder | $\star$ Yellow Buckeye | Northern Catalpa | Kentucky Coffeetree |
| Seedless Kentucky Coffeetree | $+\star$ Narrowleaf Cottonwood | $+\bullet$ Native Cottonwood | Accolade Elm | White Fir |
| Subalpine Fir | $\star$ Douglas Fir | Hackberry | Honeylocust | Shademaster Honeylocust |
| Imperial Honeylocust | Skyline Honeylocust | American Linden | $\star$ Black Hills Spruce | Bur Oak |
| Swamp White Oak | Ponderosa Pine | Scotch Pine | Limber Pine | Austrian Pine |
| $\star$ Northem Red Maple | Norway Maple | Autumn Blaze Maple | Black Walnut |  |

Medium Trees ( 30 feet - 50 feet in height and spread at maturity)

| $\star$ Quaking Aspen | $+\bullet$ Lanceleaf Cottonwood | Ohio Buckeye | Black Locust | $+\boldsymbol{+}$ Highland Cottonwood |
| :--- | :--- | :--- | :--- | :--- |
| Purple Robe Honeylocust | Peking Lilac Tree | Little Leaf Linden | Redmond Linden | Amur Maple |
| Oakleaf Mountain Ash | $\boldsymbol{\text { European Mountain Ash }}$ | Tower Poplar | Fat Albert Spruce | $+\boldsymbol{+}$ Laurel Leaf Willow |
| + Black Willow |  |  |  |  |

Small Trees (less than 30 feet in height and spread at maturity)

| Tatarian Maple | Amur Chokecherry | Amur Maakia | Thunderchild Crabapple | Dolgo Crabapple |
| :--- | :--- | :--- | :--- | :--- |
| Spring Snow Crabapple | Gambel Oak | Princess Kay Plum | Shubert Chokecherry | Hawthorn |
| Ivory Silk Japanese Lilac Tree | Evans Bali Cherry | Sungold Apricot | Moongold Apricot | Scout Apricot |
| Montmorency Cherry | Golden Jubilee Peach | Reliance Peach | Bristlecone Pine | Pinion Pine |
| Mugo Pine | $\Delta$ Prairie Gem Pear | Mayday Tree | Thinleaf Alder | Serviceberry |
| $\Delta$ Arborvitae |  |  |  |  |

© Species indicated may require special care or maintenance, specific planting conditions, and/or site conditions for survival.

+ It is against City of Casper ordinance to plant any willow, cotton-bearing cottonwood trees, and/or any female boxelder tree in public places, such as Boulevards.
- Cottonwoods, Aspens and Willows should be planted no closer than 50 ft . to underground water and sewer lines.

City of Casper
Public Services Department
(307)235-8281

Recyclable in the white paper bin at your
http://www.casperwy.gov community recycling depot

## Landscape Maintenance

Steps to reduce maintenance of plantings in the public realm include, but are not limited to, the following:

- Plant Selection - Plants should be hardy to the Casper area, and more specifically to Lathrop Road microclimates. Wind tolerance, drought tolerance, controlled growth habit, non-invasive, and non-nuisance plants should be selected. The "Recommended Tree Species for the Casper Area" is a good place to start.
- Pressurized Underground Irrigation - Sleeves should be installed during construction of the roundabout to convey irrigation pipes to the central and splitter island plantings.
- Mulch - Medium chipped bark mulch should be applied to a depth of 3 inces and renewed annually.
- Edging - To keep shrub beds looking tidy and eliminate the need for edging while mowing, all shrub beds located within a lawn or native grass area should be isolated from grasses with edging.

The simplest edging is steel $\left(1 / 8^{\prime \prime} \times 4^{\prime \prime}\right.$ or $1 / 8^{\prime \prime} \times 6^{\prime \prime}$, installed with its top edge flush with finished grade, anchored with 24 -inch rebar spot-welded at 4-inch o.c. and at all joints and angles) or prefabricated aluminum.

Plastic or PVC edging is not recommended due to its propensity to break and lift.
The Metal Edging Detail is provided for reference only.


## NOTES:

1. COMPACT GRADES ADJACENT TO EDGING TO AVOID SETTLING. FINISH GRADE TO BE 1" BELOW TOP OF EDGING.
2. CORNERS - CUT BASE OF EDGING UP HALF WAY AND FORM A CONTINUOUS CORNER.

5
Metal Edging Detail
Scale: Not to Scale

## Roundabout and Waypoints

Refer to the snips below, and illustrative sketches on the following pages.

## Roundabout - Intersection of Curtis and Lathrop

- Plantings at a Roundabout serve two important objectives:
a. To provide an attractive entry to Evansville.
b. To sequentially channel drivers' views and attention toward upcoming traffic conflicts, such as pedestrian crossings, Yield controls, oncoming traffic, and the path forward. Viewsheds to be opened or blocked are precisely calculated during final design engineering.
- Located at the intersection of Curtis and Lathrop, the roundabout will be visible from the interstate overpass, as well as to those traveling north on Curtis.
- The attached "Landscape Concept, Roundabout - Curtis \& Lathrop" illustrates a proposed entry sign, and plantings to highlight the intersection and sign.
- Low-growing perennials and groundcovers would be appropriate in the foreground of the sign. Such plants should be drought-tolerant and low-maintenance.
- Medium-height shrubs are recommended behind the sign for scale.
- Low-growing shrubs are suggested on the far side of the roundabout planting area, and in the planting medians in the north and south approaches to the roundabout.



## Roundabout - Curtis \& Lathrop

## Waypoint \#1 - I-HOP \& Baymont

- This is the first Waypoint as one proceeds east along Lathrop from Curtis.
- The Waypoint enhances and embellishes the existing bus shelter at the parking lot of the two businesses. The Waypoint seating area and its bus shelter may be reoriented depending upon bus access.
- As indicated on the sketch, the waypoint provides seating and bicycle parking accessible from the proposed sidewalk.
- The relocated bus shelter also provides seating, and respite from wind and precipitation.
- Plantings create a sense of place and respite.
- The plaza proposes a reduced scoring pattern in the concrete (for example, 4 inch o.c. rather than 6 or 8 inch) to create a more intimate sense of human scale along this otherwise exposed trafficintensive roadway.
- Bike parking is provided for those desiring a rest or desiring to leave their bikes secured as they use the city transportation.
- Trees are proposed for shade and visual interest, and low shrubs provide a gentle transition from the surrounding grassed areas.


Waypoint \#1-I-HOP \& Baymont

## Waypoints \#2 and \#3 - Outback Steakhouse and Texas Roadhouse (mirrored - North is Up)

- This is the second and third Waypoints proceeding east along Lathrop from Curtis.
- The Waypoint features a seating area directed toward the expansive views which open to the west from this hilltop oasis.
- Seating and bicycle parking are accessible from the proposed sidewalk.
- Trees are proposed for shade and visual interest, and low shrubs provide a gentle transition from the surrounding grassed areas.
- This layout should be mirrored on Waypoint \#3 - Texas Roadhouse, featuring expansive views to the east.


Waypoint \#2 - Outback Steakhouse

## 187100

- This layout is proposed for the eastern section of Lathrop, due to the presumed narrower buildable area, restricted as it may be by topography and existing improvements.
- The Waypoint features a seating area directed toward the road, with shade trees and bicycle parking provided.
- The scale is in this area is more intimate, negating the need for surrounding shrubs.
- Waypoint \#4, at the west entry to Aspen Park, may benefit from a bus shelter, in addition to the bench and bicycle parking indicated.
- Trees are proposed for shade and visual interest.
- This layout would be repeated at waypoints along the remaining length of Lathrop to Blackmore.


Waypoint \#4, \#5, \#6 - East Lathrop

## Landscape Concept Sketches



## LATHROP ROAD TRAFFIC STUDY APPENDICES


prepared on behalf of
The Town of Evansville, Wyoming, Casper Area Metropolitan Planning Organization, and Wyoming Department of Transportation (WYDOT) by
Western Research and Development, Ltd., Cheyenne, Wyoming, and Y2 Consultants, LLC, Jackson, Wyoming

May 2021


CASPER AREA

## METROPOLITAN PLANNING ORGANIZATION

Bar Nunn | Casper | Evansville | Mills | Natrona County | WYDOT


## vansuille



# Lathrop Road Traffic Study 

## Appendices:

Appendix A: Land Use Inventory
Appendix B: Turn Movement Counts
Appendix C: Traffic Diagrams and Forecasts
Appendix D: Intersection Capacity Analyses
Appendix E: Signal Warrant Studies
Appendix F: Landscape Renderings
Appendix G: Alternative Plan Sheets
Appendix H: Final Public Comments and Responses

## APPENDIX A: LAND USE INVENTORY FROM WEST TO EAST:

The following section lists existing land uses by parcel as they existed on December 31, 2020. Data is from Natrona County Assessor records (GIS), field inspection and telephone interviews. Maps are provided at the end of each section showing lots numbered according to this list: Trip generation characteristics are estimated for parcels near the Curtis Street interchange.

## 1. VACANT LOT

L\&L Lat 3\&4. Ownership: 33790130200400 Parcel \#: 33790130200400 Account Type: Com Vacant Land Legal
Desc: L \& L\#3 LOT 4 COMMERCIAL Acres: 2.34 Account \#: R0009231 Tax Year: 2020
Market Value Land: $\$ 93,924.00 \quad$ Market Value Building: $\$ 0.00$ Market Value Total: $\$ 93,924.00$
Owner: CASPER MOTEL LLC, 10 E 120TH AVE, NORTHGLENN, CO 80233-
Sketch: R0009231
Assumed Future Land Use: 40-room All-Suites Hotel

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 249 | 18 | 20 |  | 9 | 9 | 0 | 10 | 10 |

2. Self Help Center (former drive-through bank) 10,000 ft2 307-235-2814

Ownership: 33790130200300 Parcel \#: 33790130200300740 LUKER LN Account Type: Exempt
Legal Desc: L \& L \#3 LOT 3 COMMERCIAL Acres: 1.49 9,200 FT2 Account \#: R0009230
Tax Year: 2020 Market Value Land: $\$ 29,746.00 \quad$ Market Value Building: $\$ 685,535.00$
Market Value Total: \$715,281.00 General Tax: \$0.00 Special Purpose Tax: \$0.00 Total Tax:
\$0.00 Owner: SELF HELP CENTER INC, 740 LUKER LN, EVANSVILLE, WY 82636- Sketch: R0009230
Land Use: 9200 FT2 Office:

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 101 | 14 | 14 | 13 | 2 | 0 | 2 | 11 | 0 |

3. KID'S CAMPUS DAY CARE (SMALL COMMERCIAL BUILDING (7000 ft2) 13 employees

Ownership: 33790130200100 Parcel \#: 33790130200100 Property Address: 12 S CURTIS ST
Account Type: Exempt Legal Desc: L \& L\#3 LOT 2 EXEMPT Acres: 0.50 Account \#: R0009228
Tax Year: 2020 Market Value Land: $\$ 65,832.00 \quad$ Building: $\$ 303,205.00$ Total: $\$ 369,037.00$
General Tax: $\$ 0.00 \quad$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 0.00 \quad$ PLANS TO MOVE CLOSER TO TOWN
Owner: CASPER HOUSING AUTHORITY, 145 N DURBIN ST., CASPER, WY 82601- Phone: (307) 266-1388
Sketch: R0009228
Land Use: 13 Employee Day Care Center

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 347 | 63 | 61 | 3 | 30 | 0 | 29 | 33 | 0 |

4. PARKING LOT

Ownership: 33790130200200 Parcel \#: 33790130200200 Property Address: 40 S CURTIS ST

Account Type: Com Vacant Land Legal Desc: L \& L \#3 LOT 1 COMMERCIAL
Account \#: R0009229 Tax Year: 2020 Market Value Land: \$90,520.00
Market Value Total: $\$ 90,520.00$ General Tax: $\$ 626.78$ Special Purpose Tax: $\$ 0.00$

Acres: 0.57
Market Value Building: $\$ 0.00$
Total Tax: \$626.78

Owner: BOMBEL, STUART B., 605 S GILPIN ST., DENVER, CO 80209- Sketch: R0009229
5. SUPER 8 MOTEL 40 ROOMS 2 Stories

Ownership: 33790130200700 Parcel \#: 33790130200700
Property Address: 739 LUKER LN
Commercial Legal Desc: L \& L \#2 LOT TR IN SLY 175' COMMERCIAL Acres: 2.00 Account \#: R0009234 Tax Year: 2020 Market Value Land: \$88,259.00 Market Value Building: \$2,091,060.00 Market Value Total: \$2,179,319.00 General Tax: $\$ 15,090.85 \quad$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 15,090.85$
Owner: CASPER MOTEL LLC., 10 E 120TH AVE, NORTHGLENN, CO 80233- Sketch: R0009234
Land Use: 40-room Motel

| 225 | 18 | 19 |  | 12 | 0 | 10 | 9 |  |
| :--- | :--- | :--- | :---: | :---: | :---: | ---: | ---: | ---: |
| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |

6. HQ BBQ - (FORMER GAS STATION), 2500 FT2, SEATS: 105, EMPLOYEES: 20 Hours 11AM - 8pm (307) 315-6947 Ownership: 33790130200600 Parcel \#: 33790130200600 Property Address: 70 S CURTIS ST Account Type: Commercial Legal Desc: LIERD \& MIRACLE BLK 1 LOT ALL \& L \& L \#2 S E CORNER Acres: 0.64 Account \#: R0009233 Tax Year: 2020 Market Value Land: \$56,245.00 Market Value Building: \$128,357.00 Market Value Total: $\$ 184,602.00 \quad$ General Tax: $\$ 1,278.27$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 1,278.27$ Owner: BOMBEL, STUART B., 605 S GILPIN ST., DENVER, CO 80209- Sketch: R0009233 Land Use: High Turnover Sit-Down Restaurant

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 413 | 38 | 34 | 12 | 10 | 16 | 11 | 8 | 15 |



|  | Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Future 40-Room All Su | 196 | 15 | 16 | 8 | 7 | 0 | 7 | 9 | 0 |
| Ex. 40-Room Motel | 225 | 18 | 19 | 6 | 12 | 0 | 10 | 9 | 0 |
| 8000 FT2 Office | 88 | 12 | 12 | 11 | 1 | 0 | 2 | 10 | 0 |
| 13-Employee Day Care | 347 | 63 | 61 | 33 | 30 | 0 | 29 | 33 | 0 |
| 105 Seat, 2.5K Rest. | 413 | 38 | 34 | 12 | 10 | 16 | 11 | 8 | 15 |
| TOTAL W OF CURTIS | 1269 | 147 | 142 | 71 | 60 | 16 | 59 | 68 | 15 |
|  | Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| 9 Stall Self Serv Car W | 972 | 72 | 50 | 36 | 36 | 0 | 25 | 24 | 0 |
| 8-Pump Gas Sta/Store | 1302 | 81 | 108 | 18 | 18 | 46 | 24 | 24 | 61 |
| 180-Seat, 4.7K Rest | 734 | 68 | 60 | 21 | 18 | 29 | 20 | 14 | 26 |
| 56 Room Motel | 315 | 25 | 26 | 9 | 16 | 0 | 14 | 12 | 0 |
| TOTAL E OF CURTIS | 3323 | 246 | 244 | 83 | 88 | 75 | 83 | 75 | 86 |

## 7. BLDG 1: 5 STALL CAR WASH ( $2900 \mathrm{ft2}$ ) 4 VACUUMS ( $1700 \mathrm{ft2}$ ) BLDG $\mathbf{2 :} \mathbf{4}$ STALL CAR WASH + 4860 ft 2 DOG WASH

Ownership: 33790130100300 Parcel \#: 33790130100300 Property Address: 480 LIERD LN Commercial Legal Desc: LIERD \& MIRACLE BLK 2 LOT 3 NW PT COMMERCIAL Acres: 0.48 Account \#: R0009224
Tax Year: 2020 Land: $\$ 76,532.00 \quad$ Building: $\$ 247,214.00$ Total: $\$ 323,746.00$
General Tax: $\$ 2,241.80$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 2,241.80$
Owner: CARRELL PROPERTIES INC., 4437 E 18TH ST., CASPER, WY 82609- Sketch: R0009224
Land Use: 9 Stall Self-Serve Car Wash

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 972 | 72 | 50 | 36 | 36 | 0 | 25 | 24 | 0 |

8. LOAF N JUG $\mathbf{8}$ Pump Gas Station, $\mathbf{3 0 0 0} \mathbf{f t 2}$ Convenience Store

Ownership: 33790130100200 Parcel \#: 33790130100200 Property Address: 59 S CURTIS ST Commercial Legal Desc: LIERD \& MIRACLE BLK 2 LOT 2 COMMERCIAL Acres: 0.81 Account \#: R0009223 Tax Year: 2020 Market Value Land: $\$ 61,608.00 \quad$ Market Value Building: $\$ 219,265.00 \quad$ Market Value Total: \$280,873.00 General Tax: \$1,944.92 Special Purpose Tax: \$0.00 Total Tax: \$1,944.92
Owner: HODDER, EDWIN C ET AL., BOX 411,. CASPER, WY 82602-0411 Sketch: R0009223
Land Use: 8 Pump Gas Station with Convenience Store

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 1302 | 81 | 108 | 18 | 18 | 46 | 24 | 24 | 61 |

9. IHOP 4700 ft 2

Ownership: 33790130100400 Parcel \#: 33790130100400 Address: 510 LATHROPRD Commercial Legal Desc: LIERD \& MIRACLE BLK 2 LOT 3 SWLY PT COMMERCIAL Acres: 1.18 Account \#: R0009225 Tax Year: 2020 Land: $\$ 71,610.00 \quad$ Building: $\$ 610,296.00$ Total: $\$ 681,906.00$ General Tax: \$4,721.89 Special Purpose Tax: \$0.00 Total Tax: \$4,721.89

Owner: BALDI, VICTOR D ET AL TRUSTEES, ATTN: ENLOW REAL ESTATE SERVICES, 409 E WISE ST., BOWIE, TX 76230Sketch: R0009225
Land Use: High Turnover Sit-Down Restaurant

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 734 | 68 | 60 | 21 | 18 | 29 | 20 | 14 | 26 |


10. BAYMONT INN 56 ROOMS (307) 215-9986

Ownership: 33790130100500 Parcel \#: 33790130100500 Property Address: 480 LATHROP RD Commercial Legal Desc: LIERD \& MIRACLE BLK 2 LOT 3 SE PT COMMERCIAL Acres: 1.45 Account \#: R0009226
Tax Year: 2020 Land: $\$ 77,703.00 \quad$ Building: $\$ 1,387,401.00 \quad$ Total: $\$ 1,465,104.00$
General Tax: $\$ 10,145.19 \quad$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 10,145.19$
Owner: MIDWEST HOTELS LLC., 1345 MULLOWNEY LN., BILLINGS, MT 59101- Sketch: R0009226
Land Use: 56-room Motel

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 315 | 25 | 26 |  | 9 | 16 | 0 | 14 | 12 |

Ownership: 33790140200100 Parcel \#: 33790140200100
Property Address: 370 MIRACLE ST Commercial
Legal Desc: LIERD \& MIRACLE \#2 LOT 4-8 INCL COMMERCIAL Acres: 5.21 Account \#: R0009280
Tax Year: 2020 Land: \$128,913.00 Building: \$1,210,231.00 Total: \$1,339,144.00
General Tax: \$9,272.99 Special Purpose Tax: \$0.00 Total Tax: \$9,272.99
Owner: ROCKY MOUNTAIN RETAIL LLC., 2311 N 7TH AVE., BOZEMAN, MT 59715- Sketch: R0009280
Land Use: 47500 ft 2 retail

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 2028 | 82 | 177 | 44 | 37 | 11 | 72 | 78 | 40 |

## 12. VACANT NORTH PARCEL

Ownership: 33790140000100 Parcel \#: 33790140000100 Legal Desc: PT NW SE: 1-33-79 COMMERCIAL Acres: 6.76 Account \#: R0009273 Co Zone Urban Agric. (UA)
Tax Year: 2020 Market Value Land: $\$ 136,446.00 \quad$ Market Value Total: $\$ 136,446.00$
General Tax: $\$ 944.80$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 944.80$
Owner: HODDER, EDWIN C., BOX 411., CASPER, WY 82602-0411
Sketch: R0009273
Assumed Land Use: 6.7 Acre Garden Center

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out |
| ---: | ---: | ---: | :---: | :---: | :---: | :---: | :---: |
| 724 | 19 | 54 | NA | NA | 0 NA | NA | 0 |

## 13. VACANT NE PARCEL

Ownership: 33790140402100 Parcel \#: 33790140402100 Com Vacant Land Legal Desc: EVANSVILLE BUS PK II (RPLT) LOT 31A COMMERCIAL Acres: 7.05 Account \#: R0053987
Tax Year: $2020 \quad$ Market Value Land: \$41,241.00 Zoning: Highway Business (EV C4)
General Tax: \$285.58 Special Purpose Tax: \$0.00 Total Tax: \$285.58
Owner: SOUTH SOUTH PROPERTY LLC., 421 S CENTER ST STE 201., CASPER, WY 82601- Sketch: R0053987
Assumed Land Use: 7 Acre commercial businesses which generate higher traffic volumes.

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 1666 | 112 | 185 | 108 | 15 | 5 | 22 | 103 | 24 |

14. CASPER STORAGE 25,300 $+8000+6000 \times 3=51,000 \mathrm{ft2}$

Ownership: 33790140402000 Parcel \#: 33790140402000 MIRACLE ST Commercial
Legal Desc: EVANSVILLE BUS PK II (RPLT) LOT 30A COMMERCIAL Acres: 3.95
Tax Year: 2020 Market Value Land: \$115,567.00 Building: \$2,099,283.00
Account \#: R0053986
Total: \$2,214,850.00
General Tax: \$15,336.86 Special Purpose Tax: \$0.00 Total Tax: \$15,336.86
Owner: CASPER STORAGE LLC., 1307 2ND AVE N., MINNEAPOLIS, MN 55405-1803 Sketch: R0053986
Assumed Land Use: 51,000 FT2 Self Storage

| 17 |  | 3.519 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |

## 15. VACANT LOT EAST SIDE OF MIRACLE

Ownership: 33790140401900 Parcel \#: 33790140401900 Com Vacant Land
Legal Desc: EVANSVILLE BUS PK II LOT 29 COMMERCIAL Acres: 2.62 Account \#: R0053985
Tax Year: 2020 Land: $\$ 98,148.00$ Building: $\$ 0.00$ Total: $\$ 98,148.00 \quad$ Zoning: EV C4
General Tax: $\$ 679.63$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 679.63$
Owner: SOUTH PROPERTY LLC., 421 S CENTER ST STE 201., CASPER, WY 82601- Sketch: R0053985

Assumed Land Use: 2.6 Acre commercial businesses which generate higher traffic volumes.

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 613 | 41 | 68 | 40 | 5 | 2 | 8 | 37 | 9 |

## 16. WATER TOWER

Ownership: 33790140402300 Parcel \#: 33790140402300 Property Address: Account Type: Exempt Legal Desc: EVANSVILLE BUS PK II LOT WATER TANK TRACT COMMERCIAL EXEMPT Acres: 0.92 Account \#: R0053989
Tax Year: 2020 Market Value Land: $\$ 100,870.00 \quad$ Value Building: $\$ 0.00$ Total: $\$ 100,870.00$
General Tax: $\$ 0.00$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 0.00$
Owner: EVANSVILLE, TOWN OF DRAWER 158, EVANSVILLE, WY 82636- Sketch: R0053989
No Traffic
17. TEXAS ROADHOUSE 7500 ft2 SEATS: $250 \quad$ (307) 265-0801

Ownership: 33790140401700 Parcel \#: 33790140401700 Address: 210 MIRACLE ST Commercial Legal Desc: EVANSVILLE BUS PK II LOT 27 COMMERCIAL Acres: 1.69 Account \#: R0053983
Tax Year: 2020 Market Value Land: $\$ 82,563.00 \quad$ Building: $\$ 895,204.00$ Total: $\$ 977,767.00$
General Tax: $\$ 6,770.53$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 6,770.53$
Owner: TEXAS ROADHOUSE HOLDINGS LLC, ATTN: LEGAL DEPT., 6040 DUTCHMANS LN., LOUISVILLE, KY 40205-3305
Sketch: R0053983
Land Use: 7500 ft2, 250-seat Quality Restaurant

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 695 | 7 | 61 |  |  | 3 | 23 | 11 | 27 |

## 18. ROADHOUSE NORTH PARKING LOT

Ownership: 33790140401800 Parcel \#: 33790140401800
Legal Desc: EVANSVILLE BUS PK II LOT 28 COMMERCIAL
Type: Commercial
Acres: 0.80 Account \#: R0053984
Tax Year: 2020 Market Value Land: $\$ 61,486.00 \quad$ Building: $\$ 64,868.00$ Total: $\$ 126,354.00$
General Tax: \$874.90 Special Purpose Tax: \$0.00 Total Tax: \$874.90
Owner: TEXAS ROADHOUSE HOLDINGS LLC., ATTN: LEGAL DEPT., 6040 DUTCHMANS LN., LOUISVILLE, KY 40205-3305 Sketch: R0053984
19. ROADHOUSE PARKING B (PART OF 17)
20. WYOMING DOWNS (Former APPLEBEES) 4600 ft2, Casino, 9 employees

Ownership: 33790140200600 Parcel \#: 33790140200600 Property Address: 359 MIRACLE ST
(307) 472-6555

Legal Desc: LIERD \& MIRACLE \#2 LOT 3 COMMERCIAL Acres: 1.49 Account \#: R0009281
Tax Year: 2020 Market Value Land: $\$ 78,540.00$ Building: $\$ 479,005.00 \quad$ Total: $\$ 557,545.00$
General Tax: $\$ 3,860.69$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 3,860.69$
Owner: KEN \& LYNN MUNDEE FAMILY TRUST, 930 TAHOE BLVD STE 802-366, INCLINE VILLAGE, NV 89451-9451
SketchR0009281
Land Use: 4600 FT2 Casino/Lottery Establishment

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0 |  | 63 |  |  |  | $35 \quad 28$ |  | 28 |

21. COMFORT INN

Ownership: 33790140200700

ROOMS: 57
(307) 237-8100

Legal Desc: LIERD \& MIRACLE \#2 LOT 2 COMMERCIAL Acres: 1.50 Account \#: R0009282
Tax Year: 2020 Market Value Land: \$78,754.00
Building: \$3,009,187.00
Total: \$3,087,941.00
General Tax: $\$ 21,382.65 \quad$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 21,382.65$
Owner: TIMBERLINE HOSPITALITIES LLC., 269 MIRACLE ST., EVANSVILLE, WY 82636- Sketch: R0009282
Land Use: 57-room Motel

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 321 | 26 | 27 |  | 9 | 16 | 0 | 14 | 12 |

22. OUTBACK STEAK HOUSE

6500 ft2
Ownership: 33790140200800 Parcel \#: 33790140200800 Legal Desc: LIERD \& MIRACLE \#2 LOT 1 COMMERCIAL

SEATS: 248
(307) 235-0391 OPEN 11AM

Tax Year: 2020 Market Value Land: \$81,187.00 Building: \$462,131.00 Total: \$543,318.00
General Tax: \$3,762.22 Special Purpose Tax: \$0.00 Total Tax: \$3,762.22
Owner: NEW PRIVATE RESTAURANT PROP LLC., 2202 N WESTSHORE BLVD 5TH FL., TAMPA, FL 33607- Sketch: R0009283
Land Use: 6500 ft2, 248-seat Quality Restaurant

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 647 | 6 | 57 |  |  | 3 | 21 | 10 | 25 |

## 23. VACANT MIRACLE STREET PARCEL

Ownership: 33790140402200 Parcel \#: 33790140402200 Legal Desc: EVANSVILLE BUS PK II LOT 32 COMMERCIAL Tax Year: 2020 Market Value Land: \$89,777.00 General Tax: \$621.68 Special Purpose Tax: \$0.00

Account Type: Com Vacant, Land Non-Frontage
Acres: 2.09 Account \#: R0053988
Building: \$0.00 Total: \$89,777.00
Total Tax: $\$ 621.68$
Owner: SOUTH SOUTH PROPERTY LLC., 421 S CENTER ST STE 201., CASPER, WY 82601- Sketch: R0053988 Assumed Land Use: 2.1-Acre Office/Business Park

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 362 | 47 | 47 | 42 | 5 | 0 | 8 | 39 | 0 |

## 24. VACANT MIRACLE/LATHROP CORNER PARCEL

Ownership: 33790140402400 Parcel \#: 33790140402400 Legal Desc: EVANSVILLE BUS PK II LOT 33 COMMERCIAL Tax Year: 2020 Market Value Land: \$76,522.00 General Tax: \$529.91 Special Purpose Tax: \$0.00

Type: Com Vacant Land
Acres: 1.40
Account \#: R0054118
Building: \$0.00
Total Tax: \$529.91

Owner: SOUTH SOUTH PROPERTY LLC., 421 S CENTER ST STE 201., CASPER, WY 82601- Sketch: R0054118
Assumed Land Use: Coffee and Donut or bagel Shop with or without drive thru

| Daily | AM Hour | PM Hour | AM In | AM Out | Pass-By | PM In | PM Out | Pass-By |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 3928 | 385 | 124 | 90 | 92 | 810 | 37 | 37 | 200 |



## 25. C'MON INN HOTEL \& SUITES ROOMS: 125

Ownership: 33790140300200 Parcel \#: 33790140300200 Legal Desc: LOWELL BLK 1 LOT 1 SW PT COMMERCIAL Tax Year: 2020 General Tax: \$94,308.58 Special Purpose Tax: \$0.00 Owner: SPERCO LLC., 4324 UNIVERSITY AVE., GRAND FORKS, ND 58203-1938
(307) 472-6300

Property Address: 301 LATHROP RD Commercial Acres: 4.80 Account \#: R0046954
Building: \$13,494,554.00
Total: \$13,619,448.00 Total Tax: \$94,308.58

Sketch: R0046954

## 26. VACANT HOTEL OUTLOT

Ownership: 33790140300100 Parcel \#: 33790140300100 Legal Desc: LOWELL BLK 1 LOT 1 NE PT COMMERCIAL

Property Address: N/A Com Vacant Land Acres: 11.82

Account \#: R0009284

Owner: LOWELL A INNES IRREVOCABLE TRUST DTD 12/31/2012,. 4324 UNIVERSITY AVE STE A., GRAND FORKS, ND 58203-1938 Sketch: R0009284

## 27. VACANT EQUIPMENT STORAGE LOT A

Ownership: 33790140400500 Parcel \#: 33790140400500 Legal Desc: EVANSVILLE BUS PK II LOT 15 COMMERCIAL
Tax Year: 2020 Market Value Land: \$151,161.00
General Tax: \$1,046.70 Special Purpose Tax: \$0.00

4751 SUSAN CT Type: Com Vacant Land
Acres: 7.78 Account \#: R0053971
Building: \$0.00 Total: \$151,161.00
Total Tax: \$1,046.70

Owner: REBEL RANCH LAND HOLDINGS LLC., 260 CRAIG THOMAS BLVD., EVANSVILLE, WY 82636- Sketch: R0053971 Registered Agent: Randall J Moser 260 Craig Thomas Blvd Evansville, WY 82636 USA

## 28. NEW WAREHOUSE BUILDING $15,800 \mathrm{ft2}$

Ownership: 33790140400400 Parcel \#: 33790140400400 Legal Desc: EVANSVILLE BUS PK II LOT 14 COMMERCIAL Tax Year: 2020 Market Value Land: \$88,954.00 General Tax: \$7,176.02 Special Purpose Tax: \$0.00

Property Address: 4760 SUSAN CT Commercial Acres: 2.04 Account \#: R0053970
Building: \$947,362.00 Total: \$1,036,316.00
Total Tax: \$7,176.02

Owner: REBEL RANCH LAND HOLDINGS LLC., 260 CRAIG THOMAS BLVD., EVANSVILLE, WY 82636- Sketch: R0053970
29. MOSER ENGINE SERVICES /ENERGY SYSTEMS 30,000 ft2, Build \& rent generators $\mathbf{3 0}$ employees (307) 234-7833 Ownership: 33790140400100 Parcel \#: 33790140400100 Address: 260 CRAIG THOMAS BLVD Commercial Legal Desc: EVANSVILLE BUS PK IV LOT 1 COMMERCIAL Acres: 5.11 Account \#: R0053967
Tax Year: 2020 Market Value Land: \$127,956.00 Building: \$2,402,008.00 Total: \$2,529,964.00
General Tax: $\$ 17,518.89 \quad$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 17,518.89$
Owner: REBEL RANCH LAND HOLDINGS LLC., 260 CRAIG THOMAS BLVD., EVANSVILLE, WY 82636- R0053967

## 30. EQUIPMENT STORAGE YARD

Ownership: 33790140400600 Parcel \#: 33790140400600 Property Address: Type: Com Vacant Land
Legal Desc: EVANSVILLE BUS PK II LOT 16 COMMERCIAL Acres: 5.58 Account \#: R0053972
Tax Year: 2020 Market Value Land: \$132,477.00 Building: \$0.00 Total: \$132,477.00
General Tax: $\$ 917.32$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 917.32$
Owner: REBEL RANCH LAND HOLDINGS LLC., 260 CRAIG THOMAS BLVD., EVANSVILLE, WY 82636-9415 R0053972

## 31. WAREHOUSE BUILDING 14,500 ft2

Ownership: 33790140400700 Parcel \#: 33790140400700 Legal Desc: EVANSVILLE BUS PK II LOT 17 COMMERCIAL Tax Year: 2020 Market Value Land: \$79,559.00 General Tax: \$7,342.94 Special Purpose Tax: \$0.00

Property Address: 4761 Susan CT Commercial Acres: 1.54 Account \#: R0053973
Building: \$980,860.00 Total: \$1,060,419.00 Total Tax: \$7,342.94

Owner: REBEL RANCH LAND HOLDINGS LLC., 260 CRAIG THOMAS BLVD., EVANSVILLE, WY 82636- Sketch: R0053973

## 32. EQUIPMENT STORAGE LOT

Ownership: 33790140400800 Parcel \#: 33790140400800 Legal Desc: EVANSVILLE BUS PK II LOT 18 COMMERCIAL
Tax Year: 2020 Market Value Land: \$85,502.00
General Tax: \$592.09 Special Purpose Tax: \$0.00

Property Address: Com Vacant Land
Acres: 1.85 Account \#: R0053974
Building: \$0.00 Total: \$85,502.00
Total Tax: \$592.09

## 33. VACANT ONCOLOGY PROPERTY SUSAN COURT/CRAIG THOMAS CORNER

Ownership: 33790140400900 Parcel \#: 33790140400900 Legal Desc: EVANSVILLE BUS PK II LOT 19 COMMERCIAL Tax Year: 2020 Market Value Land: \$75,712.00 General Tax: \$524.30 Special Purpose Tax: \$0.00 Total Tax: \$524.30
34. VACANT MIDBLOCK CRAIG THOMAS PARCEL

EVANSVILLE BUSINESS PARK II SUBDIVISION \# 3701 LOT \# 20 BLOCK \# TRACK \# 301265
Ownership: 33790140401000 Parcel \#: 33790140401000 Legal Desc: EVANSVILLE BUS PK II LOT 20 COMMERCIAL Tax Year: 2020 Market Value Land: \$76,086.00 General Tax: \$526.85 Special Purpose Tax: \$0.00

Account Type: Com Vacant Land
Acres: 1.36 Account \#: R0053975
Building: \$0.00 Total: \$75,712.00

Owner: ROCKY MOUNTAIN ONCOLOGY PROPERTIES LLC., 1190 STAFFORD ST., CASPER, WY 82609- Sketch: R0053975

Owner: SOUTH SOUTH PROPERTY LLC., Address: 421 S CENTER ST STE 201, CASPER, WY 82601- Sketch: R0053976
35. VACANT CORNER LATHROP/C.T PARCEL

Ownership: 33790140401100 Parcel \#: 33790140401100 Legal Desc: EVANSVILLE BUS PK II LOT 21 COMMERCIAL Tax Year: 2020 Market Value Land: \$91,787.00 General Tax: \$635.60 Special Purpose Tax: \$0.00

Com Vacant Land
Acres: 2.21 Account \#: R0053977
Building: \$0.00 Total: \$91,787.00
Total Tax: \$635.60
Owner: SOUTH SOUTH PROPERTY LLC., 421 S CENTER ST STE 201., CASPER, WY 82601-Sketch: R0053977
36. VACANT LATHROP COMMERCIAL PARCEL

Ownership: 33790140401200 Parcel \#: 33790140401200 Legal Desc: EVANSVILLE BUS PK II LOT 22 COMMERCIAL
Tax Year: 2020 Market Value Land: \$76,435.00
General Tax: \$529.25 Special Purpose Tax: \$0.00

Address: Account Type: Com Vacant Land
Acres: 1.39 Account \#: R0053978
Building: \$0.00 Total: \$76,435.00
Total Tax: \$529.25

Owner: SOUTH SOUTH PROPERTY LLC., 421 S CENTER ST STE 201., CASPER, WY 82601-Sketch: R0053978

## 37. VACANT LATHROP COMMERCIAL PARCEL

Ownership: 33790140401300 Parcel \#: 33790140401300
Legal Desc: EVANSVILLE BUS PK II LOT 23 COMMERCIAL
Tax Year: 2020 Market Value Land: \$77,298.00
General Tax: \$535.23 Special Purpose Tax: \$0.00
Owner: SOUTH SOUTH PROPERTY LLC, 421 S CENTER ST STE 201, CASPER, WY 826

Owner: SOUTH SOUTH PROPERTY LLC., 421 S CENTER ST STE 201., CASPER, WY 82601- Sketch: R0053979
38. VACANT LATHROP COMMERCIAL PARCEL COPPERLEAF BUILDERS

Ownership: 33790140401400 Parcel \#: 33790140401400 Legal Desc: EVANSVILLE BUS PK II LOT 24 COMMERCIAL Tax Year: 2020 Market Value Land: \$79,946.00 General Tax: \$553.60

Special Purpose Tax: \$0.00

Address: Account Type: Com Vacant Land
Acres: 1.43 Account \#: R0053979
Building: \$0.00 Total: \$77,298.00
Total Tax: \$535.23

Owner: COPPERLEAF CUSTOM BUILDERS OF WYOMING INC., 3743 W 38TH ST., CASPER, WY 82604- Sketch: R0053980

Ownership: 33790140401500 Parcel \#: 33790140401500 Legal Desc: EVANSVILLE BUS PK II LOT 25 COMMERCIAL Tax Year: 2020 Market Value Land: \$84,052.00 General Tax: \$4,507.88 Special Purpose Tax: \$0.00

Address: 4720 LATHROP RD Type: Commercial Acres: 1.77 Account \#: R0053981
Building: \$566,950.00
Total: \$651,002.00
Total Tax: \$4,507.88
Owner: UPWARD HOLDINGS LLC., 6381 STAGHORN RIDGE RD., CASPER, WY 82601-

Sketch: R0053981

40. D\&C RODGERS, INC. WELL CONTROL PRODUCTS (RETAIL NEXT TO WATER TANK)

Ownership: 33790140401600 Parcel \#: 33790140401600 Legal Desc: EVANSVILLE BUS PK II LOT 26 COMMERCIAL Tax Year: 2020 General Tax: \$3,645.74

Owner: D \& C RODGERS INC., PO BOX 51550., CASPER, WY 82605-1550
Sketch: R0053982


## 41. VACANT PARCEL

Ownership: 33780630400600 Parcel \#: 33780630400600 Legal Desc: EVANSVILLE BUS PK III LOT 5 COMMERCIAL
Tax Year: 2020 Market Value Land: \$136,433.00
Building: \$0.00
Property Address:
Type: Com Vacant Land Acres: 6.01 Account \#: R0053961

General Tax: \$944.73
Special Purpose Tax: \$0.00 Total: \$136,433.00
Total Tax: \$944.73
42. NATIONAL OILWELL VARCO (N.O.V.), 66,000 ft2, Industrial, Employees: 26 now, over 100 at times, (307) 2618200, + semis deliveries Service tool.
Ownership: 33780630400500 Parcel \#: 33780630400500 Legal Desc: EVANSVILLE BUS PK III LOT 4 COMMERCIAL
Tax Year: 2020 Market Value Land: \$188,094.00
General Tax: \$71,186.12 Special Purpose Tax: \$0.00
Address: 201 CRAIG THOMAS BLVD Type: Industrial
Acres: 13.51 Account \#: R0053960
Building: \$8,304,284.00 Total: \$8,492,378.00
Total Tax: \$71,186.12
Owner: NATIONAL OILWELL DHT LP., C/O INDUSTRIAL VALUATION SERVICES, 1500 S DAIRY ASHFORD RD STE 190, HOUSTON, TX 77077-3861 Sketch: R0053960
43. THE ASPENS MOBILE HOME PARK 198 Dwelling Units - 73 occupied, (307) 333-6366, 307-234-5308 Ownership: 33780630200100 Parcel \#: 33780630200100 Address: 229 E LATHROP RD \#1 Commercial Legal Desc: INTERSTATE EAST LOT ALL COMMERCIAL Acres: 39.49 Account \#: R0007641
Tax Year: 2020 Market Value Land: \$287,667.00 Building: \$158,700.00 Total: \$446,367.00
General Tax: $\$ 3,090.90 \quad$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 3,090.90$
Owner: SN PROPERTIES FUNDING V-ASPEN LLC., 229 E LATHROP RD \#67, CASPER, WY 82609- Sketch: R0007641
COLONY FINANCIAL selling to ARC (Atlantic Realty Company)

## 44. VACANT FLAG LOT 4.91 ACRES

Ownership: 33780630401300 Parcel \#: 33780630401300 Property Address: Account Type: Legal Desc: Acres: Account \#:
Tax Year: Market Value Land: \$ Market Value Building: \$ Market Value Total: \$
General Tax: \$ Special Purpose Tax: \$ Total Tax: \$
Owner:

## 45. VACANT LOT 4.87 ACRES

Ownership: 33780630401400 Parcel \#: 33780630401400 Account Type:
Legal Desc: Acres: Account \#: Tax Year: Market Value Land: \$ Market Value Building: \$
Market Value Total: \$ General Tax: \$ Special Purpose Tax: \$ Total Tax: \$ Owner:
46. MIDWEST MOTOR EXPRESS (MME) : 42-BAY TRUCKING TRANSFER WAREHOUSE, 20,000 ft2

Ownership: 33780630400300 Parcel \#: 33780630400300 Property Address: 5000 E LATHROP RD Commercial Legal Desc: EVANSVILLE BUS PK III (RPLT L 2) LOT 2A COMMERCIAL Acres: 3.06 Account \#: R0053958 Tax Year: 2020 Market Value Land: $\$ 104,384.00$ Building: $\$ 2,270,265.00 \quad$ Total: $\$ 2,374,649.00$ General Tax: \$16,443.33 Special Purpose Tax: \$0.00 Total Tax: \$16,443.33
Owner: STORE CAPITAL ACQUISITIONS LLC., 8377 E HARTFORD DR STE 100., SCOTTSDALE, AZ 85255-5686 Sketch: R0053958
47. PART OF 46

Ownership: 33780630400200 Parcel \#: 33780630400200 Property Address: 5000 LATHROP RD


Legal Desc: CHEVRON SIMPLE LOT 1 COMMERCIAL EXEMPT STATE ASSESSED PROPERTY Acres: 21.98 Acct:
R0047915Tax Year: $2020 \quad$ Market Value Land: $\$ 228,090.00 \quad$ Building: $\$ 0.00 \quad$ Total: $\$ 228,090.00$
General Tax: $\$ 0.00$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 0.00$
Owner: CONOCO PHILLIPS PIPELINE CO., ATTN: PROPERTY TAX DEPT., 3300 NORTH A STREET BLDG 6., MIDLAND, TX 79705- Sketch: R0047915

49. JOHN DEERE / STOTZ EQUIPMENT (307) 265-1870

20 EMPLOYEES RETAIL SALES / SERVICE18 Ownership: 33780640000500 Parcel \#: 33780640000500 Address: 352 BLACKMORE RD Commercial Legal Desc: PT NE SE: PT E1/2 NW SE: 6-33-78 COMMERCIAL Tax Year: $2020 \quad$ Market Value Land: $\$ 157,996.00$ Acres: 8.70 Account \#: R0007644 General Tax: $\$ 9,011.31$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 9,011.31$
Owner: ARIZONA MACHINERY GROUP INC., 11111 W MCDOWELL RD., AVONDALE, AZ 85392-5000 Sketch: R0007644

## 50. DETENTION POND

Ownership: 33780630301300 Parcel \#: 33780630301300 Legal Desc: EAST LATHROP \#2 LOT 25 COMMERCIAL EXEMPT Tax Year: 2020 General Tax: \$0.00

Market Value Land: \$234,300.00 Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 0.00$

Property Address:
Acres: 2.13
Building: $\$ 0.00$

Account Type: Exempt Account \#: R0048842
Total: \$234,300.00
51. NORTHERN LIGHTS ENERGY COMPANY 282 BLACKMORE, LIGHT INDUSTRIAL, 11,000 ft2, (307) 237-3994

Ownership: 33780630301500 Parcel \#: 33780630301500 Legal Desc: EAST LATHROP \#2 LOT 15 COMMERCIAL Tax Year: 2020 Market Value Land: \$78,754.00 General Tax: $\$ 7,111.88$ Special Purpose Tax: $\$ 0.00$

Property Address: 282 BLACKMORE RD Commercial
Acres: 1.50 Account \#: R0048844
Building: \$948,298.00 Total: \$1,027,052.00
Total Tax: \$7,111.88

Owner: BUTCHER PROPERTIES LLC., BOX 83, CASPER, WY 82602-
Sketch: R0048844
52. Archrock LIGHT INDUSTRIAL 10,800 ft2

Ownership: 33780630301600 Parcel \#: 33780630301600 Legal Desc: EAST LATHROP \#2 LOT 16 COMMERCIAL Tax Year: 2020 Market Value Land: \$65,720.00 General Tax: $\$ 4,878.60$ Special Purpose Tax: $\$ 0.00$
natural gas contract compression services
Property Address: 275 BAKER DR Commercial
Acres: 0.95 Account \#: R0048845
Building: \$638,824.00 Total: \$704,544.00
Total Tax: \$4,878.60

Owner: BAKER STREET PROPERTIES LLC., BOX 2706, CASPER, WY 82602-
Sketch: R0048845
53. RED ROOF INDUSTRIAL BUILDING, 11,000 ft2

Ownership: 33780630302400 Parcel \#: 33780630302400 Property Address: 245 BAKER DR Commercial Legal Desc: EAST LATHROP \#2 (RPLT L 26) LOT 28 COMMERCIAL Acres: 2.07 Account \#: R0054364
Tax Year: 2020 Market Value Land: \$89,453.00 Building: \$819,422.00 Total: \$908,875.00
General Tax: $\$ 6,293.54 \quad$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 6,293.54$
Owner: LZN INVESTMENTS LP, 500 W 5TH ST STE 750, AUSTIN, TX 78701- Sketch: R0054364
54. FOOD BANK OF THE ROCKIES (307) 265-2172

Ownership: 33780630301800 Parcel \#: 337806303018005150 RESERVE DR
Legal Desc: EAST LATHROP \#2 (RPLT L 26) LOT 27 COMMERCIAL Tax Year: 2020 Market Value Land: \$91,655.00
General Tax: \$13,397.62 Special Purpose Tax: \$0.00 Total Tax: \$13,397.62
Owner: FOOD BANK OF THE ROCKIES INC., 10700 E 45TH AVE., DENVER, CO 80239- Sketch: R0048847

Ownership: 33780630302100 Parcel \#: 33780630302100 Property Address: 252 BLACKMORE RD Commercial Legal Desc: EAST LATHROP \#2 (RPLT L 21 \& 23) LOT 29 COMMERCIAL Acres: 1.95 Account \#: R0048850 Tax Year: 2020 Market Value Land: \$87,378.00 Building: \$752,230.00 Total: \$839,608.00
General Tax: $\$ 5,813.93 \quad$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 5,813.93$
Owner: BUTCHER VENTURES LLC., BOX 83, CASPER, WY 82602- Sketch: R0048850
56. BAKER HUGHES 36,000 ft2 (OIL DRILLING COMPANY)

Ownership: 33780630300100 Parcel \#: 33780630300100 Address: 5151 RESERVE DR Type: Industrial Legal Desc: EAST LATHROP \#2 LOT 24 COMMERCIAL Tax Year: 2020 Market Value Land: \$126,575.00
General Tax: \$19,333.12 Special Purpose Tax: \$0.00
Acres: 4.97 Account \#: R0048830
Building: \$2,179,832.00 Total: \$2,306,407.00
Total Tax: \$19,333.12
Owner: POOR BOYS HOLDINGS LLC., BOX 2825, CASPER, WY 82602- Sketch: R0048830
57. MESA SOLUTIONS INDUSTRIAL BUILDING 31,000 ft2 Nat Gas Powered Elec. Generators

Ownership: 33780630300300 Parcel \#: 33780630300300 Property Address: 5141 RESERVE DR Commercial

Legal Desc: EAST LATHROP \#2 LOT 3 COMMERCIAL
Acres: 8.57 Account \#: R0048832
Tax Year: 2020 Market Value Land: \$157,064.00
Building: \$2,164,134.00 Total: \$2,321,198.00
General Tax: \$16,073.27 Special Purpose Tax: \$0.00 Total Tax: \$16,073.27
Owner: EAST LATHROP PROPERTIES LLC., BOX 3003, CASPER, WY 82602- Sketch: R0048832
58. B\&C PROPERTY CARE / FENCING SUPPLY, (307) 277-5937 307-655-7817

Ownership: 33780630300600 Parcel \#: 33780630300600 Property Address: 5142 RESERVE DR Commercial Legal Desc: EAST LATHROP \#2 LOT 6 COMMERCIAL

Acres: 1.33 Account \#: R0048835
Tax Year: 2020 Market Value Land: \$75,090.00
Building: \$297,388.00
Total: \$372,478.00
General Tax: \$2,579.29 Special Purpose Tax: \$0.00 Total Tax: \$2,579.29
Owner: BRENTON PROPERTIES LLC., 1320 LUKER DR., CASPER, WY 82609-4647 Sketch: R0048835
59. JOHNSON CONTROLS, PROFESSIONAL DIRECTIONAL LTD., 21,000 ft2 INDUSTRIAL/OFFICE

Ownership: 33780630300500 Parcel \#: 33780630300500 Property Address: 5125 CARROLL CT Commercial
Legal Desc: EAST LATHROP \#2 LOT 5 COMMERCIAL
Tax Year: 2020 Market Value Land: \$90,991.00
Special Purpose Tax: \$0.00 Total Tax: \$7,440.83
Owner: POOR BOYS HOLDINGS LLC., BOX 2825 CASPER, WY 82602- Sketch: R0048834
60. INTERSTATE STORAGE $\mathbf{1 2 , 0 0 0} \boldsymbol{+ 1 5 , 0 0 0}+\mathbf{8 0 0 0}+\mathbf{5 0 0 0} \mathbf{f t 2}=\mathbf{4 0 , 0 0 0} \mathbf{f t} \mathbf{2}$

Ownership: 33780630300400 Parcel \#: 33780630300400 Property Address: 5105 CARROLL CT Commercial Legal Desc: EAST LATHROP \#2 LOT 4 COMMERCIAL Acres: 6.84 Account \#: R0048833
Tax Year: $2020 \quad$ Market Value Land: $\$ 143,644.00 \quad$ Building: \$1,543,118.00 Total: \$1,686,762.00
General Tax: \$11,680.04 Special Purpose Tax: \$0.00 Total Tax: \$11,680.04
Owner: INTERSTATE STORAGE SOLUTIONS LLC., 1964 E 1ST ST., CASPER, WY 82601Sketch: R0048833
61. BEACON BUILDING MATERIALS Building Materials / ROOFING 16,000 ft2, 9 employees Ownership: 33780630300900 Parcel \#: 33780630300900 Property Address: 5100 CARROLL CT
(307) 234-7306

Commercial Legal Desc: EAST LATHROP \#2 LOT 9 COMMERCIAL Acres: 2.40 Account \#: R0048838
Tax Year: $2020 \quad$ Market Value Land: \$94,869.00 Building: \$439,790.00 Total: \$534,659.00
General Tax: $\$ 3,702.30 \quad$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 3,702.30$
Owner: PETH HOLDINGS LLC., 1610 W POWELL RD., CHEYENNE, WY 82009-
Sketch: R0048838
62. DODGE MACHINING 9000 ft2 industrial Ownership: 33780630300800 Parcel \#: 33780630300800 Address: 5120 CARROLL CT Commercial Legal Desc: EAST LATHROP \#2 LOT 8 COMMERCIAL Tax Year: 2020 Market Value Land: \$100,125.00 General Tax: \$4,861.40 Special Purpose Tax: \$0.00 Total Tax: \$4,861.40 Owner: YUKON HOLDINGS LLC., BOX 1090, EVANSVILLE, WY 82636- Sketch: R0048837
63. ENDEAVOR ENTERPRISES 15,000 ft2 Multi-Use Bldg

Ownership: 33780630300700 Parcel \#: 33780630300700 Property Address: 5140 CARROLL CT Commercial Legal Desc: EAST LATHROP \#2 LOT 7 COMMERCIAL Acres: 2.76 Account \#: R0048836
Tax Year: 2020 Market Value Land: \$430,780.00 Building: \$625,909.00 Total: \$1,056,689.00
General Tax: $\$ 7,317.06$ Special Purpose Tax: $\$ 0.00 \quad$ Total Tax: $\$ 7,317.06$
Owner: ENDEAVOR ENTERPRISES LLC., BOX 532, MILLS, WY 82644-
Sketch: R0048836
64. FEDEX FREIGHT TRANSFER TERMINAL 28 Bays• 25 employees (866) 600-2394

Ownership: 33780630301200 Parcel \#: 33780630301200 Property Address: 280 BAKER DR 200 Commercial Legal Desc: EAST LATHROP \#2 LOT 12 COMMERCIAL Tax Year: $2020 \quad$ Market Value Land: \$104,452.00
General Tax: \$4,752.94 Special Purpose Tax: \$0.00 Total Tax: \$4,752.94
Owner: GRANITE PEAK PROPERTIES LLC., BOX 51568, CASPER, WY 82605- Sketch: R0048841

Ownership: 33780630301100 Parcel \#: 33780630301100
Ownership: 33780630301000 Parcel \#: 33780630301000 Legal Desc: EAST LATHROP \#2 LOT 10 COMMERCIAL

Property Address: 280 BAKER DR 100
Type: Com Vacant Land
Acres: 2.11
65. RV PARK AND POTTERY SHOP (307) 577-0075

Ownership: 33780640000600 Parcel \#: 33780640000600 Address: 353 BLACKMORERD Commercial Legal Desc: PT E1/2 SE: 6-33-78 COMMERCIAL Acres: 3.26 Account \#: R0058889
Tax Year: $2020 \quad$ Market Value Land: $\$ 107,104.00 \quad$ Building: $\$ 250,367.00 \quad$ Total: $\$ 357,471.00$
General Tax: $\$ 2,475.34 \quad$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 2,475.34$
Owner: WILLIAMS, GENE, ATTN: ALPINE LANDSCAPING INC., PO BOX 499, 4925 E LATHROP RD., EVANSVILLE, WY 826360499 Sk: R0058889

## 66. NEUMILLER FARM (RURAL RESIDENTIAL / FLOODWAY)

Ownership: 33780640000300 Parcel \#: 33780640000300 Property Address: 293 BLACKMORE RD Residential Legal Desc: PT S1/2: 6-33-78 25.03 PT N1/2: NE: 7-33-78 21.43-. 46 TO HWY Acres: 46.46 Account \#: R0007643
Tax Year: $2020 \quad$ Market Value Land: $\$ 61,198.00 \quad$ Building: $\$ 305,263.80 \quad$ Total: $\$ 366,461.80$
General Tax: $\$ 2,363.52 \quad$ Special Purpose Tax: $\$ 0.00$ Total Tax: $\$ 2,363.52$
Owner: JOAN NEUMILLER LIVING TRUST 12/13/2012, BOX 660, EVANSVILLE, WY 82636-
Sketch: R0007643

## APPENDIX B: 2020 Turn Movement Counts




Two-Hour Count Summaries

| Interval Start | DRIVEWAY |  |  |  | LIERD LN |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | 15-min Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 11:30 AM | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 0 | 95 | 1 | 0 | 0 | 82 | 0 | 183 | 0 |
| 11:45 AM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 100 | 1 | 0 | 2 | 105 | 0 | 212 | 0 |
| 12:00 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 6 | 0 | 0 | 85 | 2 | 0 | 2 | 99 | 0 | 195 | 0 |
| 12:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 95 | 2 | 0 | 1 | 91 | 0 | 190 | 780 |
| 12:30 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 86 | 1 | 0 | 2 | 94 | 0 | 187 | 784 |
| 12:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 99 | 0 | 0 | 3 | 93 | 0 | 198 | 770 |
| 1:00 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 73 | 0 | 0 | 0 | 77 | 0 | 152 | 727 |
| 1:15 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 64 | 0 | 0 | 1 | 60 | 0 | 126 | 663 |
| Count Total | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 17 | 0 | 0 | 697 | 7 | 0 | 11 | 701 | 0 | 1,443 | 0 |
| Peak Hour | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 12 | 0 | 0 | 366 | 6 | 0 | 7 | 389 | 0 | 784 | 0 |

Fote: Two-hour count summery voimmes include heavy wahicles but exclude bitycles in overal count.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Leg) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | SB | Total | EB | WE | NB | SB | Tatal | East | West | Narth | South | Total |
| 11:30 AM | 0 | 0 | 11 | 6 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| 11:45 AM | 0 | 0 | 9 | 8 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:00 PM | 0 | 1 | 9 | 8 | 18 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 12:15 PM | 0 | 0 | 5 | 9 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:30 PM | 0 | 0 | 7 | 3 | 10 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 12:45 PM | 0 | 0 | 9 | 7 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1:00 PM | 0 | 1 | 3 | 5 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1:15 PM | 0 | 0 | 4 | 6 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Count Total | 0 | 2 | 67 | 52 | 111 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 4 |
| Peak Hour | 0 | 1 | 30 | 28 | 59 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |



Three-Hour Count Summaries

| Interval Start | DRIVEWAY |  |  |  | LIERD LN |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | $15-\mathrm{min}$ <br> Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Easlbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 4:45 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 8 | 0 | 0 | 117 | 2 | 0 | 2 | 104 | 0 | 235 | 0 |
| 5:00 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 136 | 2 | 0 | 3 | 125 | 0 | 270 | 0 |
| 5:15 PM | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 6 | 0 | 0 | 104 | 3 | 0 | 2 | 105 | 0 | 225 | 0 |
| 5:30 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 6 | 0 | 0 | 109 | 2 | 0 | 2 | 84 | 1 | 206 | 936 |
| Peak Hour | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 23 | 0 | 0 | 466 | 9 | 0 | 9 | 418 | 1 | 936 | 0 |

Mote: For all three-hour count summary, see next poge.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Les]) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | S8 | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:45 PM | 0 | 0 | 5 | 4 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 0 | 10 | 3 | 13 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 2 |
| 5:15 PM | 0 | 0 | 4 | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 0 | 4 | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour | 0 | 0 | 23 | 12 | 35 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 2 |

## CURTIS ST <br> LOAF N JUG DRIVEWAY (NORTH)



Three-Hour Count Summaries

| Interval Start | DRIVEWAY |  |  |  | LOAF N JUC Dinmeway (worth] |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | $15-\mathrm{min}$ Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Easibound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 7:15 AM | 0 | 2 | 0 | 2 | 0 | 1 | 0 | 3 | 0 | 4 | 66 | 0 | 0 | 5 | 76 | 2 | 161 | 0 |
| 7:30 AM | 0 | 0 | 2 | 4 | 0 | 5 | 0 | 2 | 0 | 2 | 68 | 0 | 0 | 2 | 81 | 3 | 169 | 0 |
| 7:45 AM | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 3 | 0 | 4 | 111 | 2 | 0 | 3 | 85 | 3 | 217 | 0 |
| 8:00 AM | 0 | 1 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 1 | 65 | 2 | 0 | 6 | 74 | 0 | 155 | 702 |
| Peak Hour | 0 | 3 | 2 | 14 | 0 | 10 | 0 | 8 | 0 | 11 | 310 | 4 | 0 | 16 | 316 | 8 | 702 | 0 |

Vote: For all three-hour count summary, see next page.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Leg) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | S8 | Total | EB | WB | NB | S8 | Total | East | West | North | South | Total |
| 7:15 AM | 0 | 0 | 5 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:30 AM | 0 | 0 | 3 | 4 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:45 AM | 0 | 1 | 5 | 4 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8:00 AM | 0 | 0 | 5 | 7 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour | 0 | 1 | 18 | 18 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |



## CURTIS ST LOAF N JUG DRIVEWAY (NORTH)



Three-Hour Count Summaries

| Interval Start | DRIVEWAY |  |  |  | LOAF N JUE DRINEWAY (NORTH] |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | 15-min Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 4:45 PM | 0 | 0 | 1 | 4 | 0 | 2 | 1 | 2 | 0 | 5 | 116 | 0 | 0 | 3 | 102 | 1 | 237 | 0 |
| 5:00 PM | 0 | 2 | 0 | 3 | 0 | 4 | 0 | 5 | 0 | 2 | 128 | 1 | 0 | 3 | 119 | 2 | 269 | 0 |
| 5:15 PM | 0 | 3 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 2 | 108 | 3 | 0 | 2 | 107 | 1 | 229 | 0 |
| 5:30 PM | 0 | 2 | 0 | 4 | 0 | 3 | 0 | 8 | 0 | 4 | 100 | 3 | 0 | 0 | 87 | 1 | 212 | 947 |
| Peak Hour | 0 | 7 | 1 | 12 | 0 | 11 | 1 | 15 | 0 | 13 | 452 | 7 | 0 | 8 | 415 | 5 | 947 | 0 |

Wote: For al three-hour count summary, see next poge.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Leg) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | SB | Total | EB | WB | NB | S8 | Total | East | West | North | South | Total |
| 4:45 PM | 0 | 0 | 10 | 5 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 0 | 12 | 3 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:15 PM | 0 | 0 | 4 | 2 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 1 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour | 0 | 1 | 29 | 13 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## CURTIS ST <br> LOAF N JUG DRIVEWAY (SOUTH)

Date: Tue, Oct 20, 2020
Count Period: 6:00 AM to 9:00 AM
Peak Hour: 7:15 AM to 8:15 AM


Three-Hour Count Summaries

| Interval Start | 0 |  |  |  | LOAF N JUC ORIVEWAY (SOUTH) |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | 15-min <br> Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 7:15 AM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 69 | 6 | 0 | 1 | 78 | 0 | 157 | 0 |
| 7:30 AM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 70 | 5 | 0 | 3 | 87 | 0 | 167 | 0 |
| 7:45 AM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 115 | 2 | 0 | 0 | 91 | 0 | 212 | 0 |
| 8:00 AM | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 68 | 2 | 0 | 2 | 78 | 0 | 154 | 690 |
| Peak Hour | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 3 | 0 | 0 | 322 | 15 | 0 | 6 | 334 | 0 | 690 | 0 |

Vote: For al three-hour count summary, see next poge.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Leg) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | S8 | Total | EB | WB | NB | S8 | Total | East | West | North | South | Total |
| 7:15 AM | 0 | 0 | 5 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| 7:30 AM | 0 | 0 | 3 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7:45 AM | 0 | 0 | 5 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 8:00 AM | 0 | 0 | 5 | 5 | 10 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| Peak Hour | 0 | 0 | 18 | 14 | 32 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 7 |


| LO |  |  |  | Pe <br> 夺 <br> 훈 <br> $\downarrow$ <br> TE |  | our <br> \# <br> 1 <br> 99 <br> 92 <br> 高 <br> ఱ |  | OU | H) <br> N J WA <br> HI) <br> $\leftarrow$ <br> - <br> N <br> TO |  | HV \%: <br> - <br> $0.0 \%$ <br> $8.6 \%$ <br> 6.9\% <br> $7.6 \%$ | ount Peak <br> PHF <br> 0.75 <br> 0.89 <br> 0.94 <br> 0.92 | Dat <br> rio Hou | $\begin{aligned} & T \\ & 1 \\ & 1 \end{aligned}$ |  | 20, <br> to <br> to <br> N <br> 0 1 0 <br> ib | 1:30 P 1:15 P $\square$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Two-Hour Count Summaries |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Interval Start | 0 |  |  |  | LOAF NJUO ORNEWAY CSOUTH\| |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | $15-$ min Total | Rolling One Hour |
|  | Eastbound |  |  |  | UT | Westbound |  | RT | Narthbound |  |  |  | Southbound |  |  |  |  |  |
| 11:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:45 AM |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 |
| 12:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 93 | 3 | - | 2 | 84 | 0 | 183 | 0 |
| 12:15 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 101 | 7 | 0 | 1 | 106 | 0 | 217 | 400 |
| 12:30 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |  | 0 | 83 | 5 | 0 | 0 | 103 | 0 | 193 | 593 |
| 12:45 PM |  | 0 |  | 0 | 0 |  | 0 | 2 |  | 0 | 94 | 4 |  | 1 | 93 | 0 | 197 | 790 |
| 1:00 PM | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 86 | 2 | 0 | 1 | 99 | 0 | 192 | 799 |
| 1:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 96 | 4 | 0 | 2 | 91 | 0 | 194 | 776 |
| Count Total | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 6 | 1 | 0 | 553 | 25 | 0 | 7 | 576 | 0 | 1,176 | 0 |
| Peak Hour | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 4 | 1 | 0 | 364 | 18 | 0 | 3 | 401 | 0 | 799 | 0 |
| Whete: Two-hour count summery voitmes hatude heary vehicles but exclude bicycles in oversil coumt. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Interval Start | Heavy Vehicle Totals |  |  |  |  |  | Bicycles |  |  |  |  |  | Pedestrians (Crossing Leg) |  |  |  |  |  |
|  | EB | WE |  | B | SB | Total | E | WE |  |  | S8 | Total | East |  | est | Nort | Sou | Total |
| 11:30 AM | 0 | 0 |  | ) | 0 | 0 | 0 | 0 |  |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 11:45 AM | 0 | 0 |  | ) | 0 | 0 | 0 | 0 |  |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 12:00 PM | 0 | 0 |  | 0 | 6 | 16 | 0 | 0 |  |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 12:15 PM | 0 | 0 |  | 1 | 7 | 18 | 0 | 0 |  |  | 0 | 0 | 1 |  | 0 | 0 | 0 | 1 |
| 12:30 PM | 0 | 0 |  | 9 | 9 | 18 | 0 | 0 |  |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 12:45 PM | 0 | 0 |  | 5 | 9 | 14 | 0 | 0 |  |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| 1:00 PM | 0 | 0 |  |  | 3 | 11 | 0 | 0 |  |  | 0 | 0 | 1 |  | 0 | 0 | 0 | 1 |
| 1:15 PM | 0 | 0 |  |  | 6 | 15 | 0 | 0 |  |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 |
| Count Total | 0 | 0 |  | 2 | 40 | 92 | 0 | 0 |  |  | 0 | 0 | 2 |  | 0 | 0 | 0 | 2 |
| Peak Hr | 0 | 0 |  | 3 | 28 | 61 | 0 | 0 |  |  | 0 | 0 | 2 |  | 0 | 0 | 0 | 2 |

## CURTIS ST <br> LOAF N JUG DRIVEWAY (SOUTH)

Peak Hour

 $\pm 6$

TEV: 936
PHF: 0.88



Date: Tue, Oct 20, 2020
Count Period: 4:00 PM to 7:00 PM
Peak Hour: $\mathbf{4 : 4 5}$ PM to 5:45 PM


Three-Hour Count Summaries

| Interval Start | 0 |  |  |  | LOAF N JUE ORINEWAY (SOUTH) |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | $15-\mathrm{min}$ <br> Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 4:45 PM | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 119 | 3 | 0 | 1 | 107 | 0 | 234 | 0 |
| 5:00 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 129 | 9 | 0 | 2 | 124 | 0 | 267 | 0 |
| 5:15 PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 112 | 6 | 0 | 0 | 110 | 0 | 230 | 0 |
| 5:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 106 | 4 | 0 | 1 | 93 | 0 | 205 | 936 |
| Peak Hour | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 6 | 0 | 0 | 466 | 22 | 0 | 4 | 434 | 0 | 936 | 0 |

Wote: For all three-hour count summary, see next poge.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Les) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | SB | Total | EB | WB | NB | S8 | Total | East | West | North | South | Total |
| 4:45 PM | 0 | 0 | 10 | 5 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 0 | 13 | 3 | 16 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| 5:15 PM | 0 | 0 | 4 | 2 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 0 | 3 | 4 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour | 0 | 0 | 30 | 14 | 44 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |

## CURTIS ST E LATHROP RD

Date: Tue, Oct 20, 2020
Count Period: 6:00 AM to 9:00 AM
Peak Hour: 7:45 AM to 8:45 AM


| NB | $8.3 \%$ | 0.71 |
| :--- | :--- | :--- |

SB $\quad 7.2 \% \quad 0.89$
TOTAL $8.4 \% \quad 0.85$

Three-Hour Count Summaries

| Interval Start | LUKER LN |  |  |  | E LATHROP RD |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | $15-\mathrm{min}$ Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 7:45 AM | 0 | 1 | 0 | 3 | 0 | 8 | 0 | 3 | 0 | 1 | 111 | 23 | 0 | 2 | 89 | 0 | 241 | 0 |
| 8:00 AM | 0 | 0 | 0 | 3 | 0 | 14 | 0 | 7 | 0 | 1 | 63 | 20 | 0 | 6 | 77 | 1 | 192 | 0 |
| 8:15 AM | 0 | 0 | 0 | 2 | 0 | 15 | 0 | 3 | 0 | 0 | 63 | 14 | 0 | 5 | 75 | 3 | 180 | 0 |
| 8:30 AM | 0 | 0 | 0 | 4 | 0 | 11 | 0 | 3 | 0 | 0 | 69 | 20 | 0 | 4 | 94 | 3 | 208 | 821 |
| Peak Hour | 0 | 1 | 0 | 12 | 0 | 48 | 0 | 16 | 0 | 2 | 306 | 77 | 0 | 17 | 335 | 7 | 821 | 0 |

Note: For all three-hour count summary, see next page.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Leg) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | S8 | Total | EB | WB | NB | S8 | Total | East | West | North | South | Total |
| 7:45 AM | 1 | 2 | 5 | 3 | 11 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 8:00 AM | 0 | 1 | 8 | 6 | 15 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| 8:15 AM | 0 | 3 | 8 | 9 | 20 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| 8:30 AM | 1 | 3 | 11 | 8 | 23 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Peak Hour | 2 | 9 | 32 | 26 | 69 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 0 | 0 | 7 |



## CURTIS ST E LATHROP RD

Date: Tue, Oct 20, 2020
Count Period: $4: 00 \mathrm{PM}$ to 7:00 PM Peak Hour: 4:45 PM to 5:45 PM
Peak Hour


## Three-Hour Count Summaries

| Interval Start | LUKER LN |  |  |  | E LATHROP RD |  |  |  | CURTIS ST |  |  |  | CURTIS ST |  |  |  | 15-min Total | Rolling One Hour |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Eastbound |  |  |  | Westbound |  |  |  | Narthbound |  |  |  | Southbound |  |  |  |  |  |
|  | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT |  |  |
| 4:45 PM | 0 | 0 | 0 | 2 | 0 | 18 | 0 | 5 | 0 | 3 | 117 | 33 | 0 | 10 | 100 | 1 | 289 | 0 |
| 5:00 PM | 0 | 1 | 0 | 3 | 0 | 29 | 0 | 8 | 0 | 2 | 134 | 37 | 0 | 5 | 113 | 5 | 337 | 0 |
| 5:15 PM | 0 | 1 | 0 | 11 | 0 | 28 | 0 | 13 | 0 | 7 | 100 | 28 | 0 | 10 | 101 | 1 | 300 | 0 |
| 5:30 PM | 0 | 0 | 0 | 5 | 0 | 36 | 1 | 8 | 0 | 6 | 98 | 46 | 0 | 7 | 84 | 3 | 294 | 1,220 |
| Peak Hour | 0 | 2 | 0 | 21 | 0 | 111 | 1 | 34 | 0 | 18 | 449 | 144 | 0 | 32 | 398 | 10 | 1,220 | 0 |

Note: For all three-hour count summary, see next poge.

| Interval Start | Heavy Vehicle Totals |  |  |  |  | Bicycles |  |  |  |  | Pedestrians (Crossing Les) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | EB | WB | NB | SB | Total | EB | WB | NB | S8 | Total | East | West | North | South | Tolal |
| 4:45 PM | 0 | 0 | 7 | 4 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 2 | 12 | 2 | 16 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 4 |
| 5:15 PM | 0 | 2 | 3 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 3 |
| 5:30 PM | 0 | 2 | 6 | 4 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Peak Hour | 0 | 6 | 28 | 13 | 47 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 1 | 7 |

APPENDIX C: TRAFFIC DIAGRAMS AND FORECASTS



## Curtis Street at Lathrop / Luker

## Crossroad Diagram:

2040 AM Roundabout Turn Movements

Leg 1: | Curtis Street |
| :--- |
|  |
|  |
| North Leg |

Leg 4: Lathrop / Luker


|  | Leg 2: | Lathrop / Luker East Leg |  |
| :---: | :---: | :---: | :---: |
| RIGHT | 33 |  |  |
| THRU | 3 | 144 | WB |
| LEFT | 108 |  | 328 |
|  |  | 184 | EB |

Leg 3: Curtis Street South Leg

|  | LEFT | THRU | RIGHT |  |
| :---: | ---: | ---: | ---: | :---: |
|  | 20 | 459 | 145 |  |
| 572 |  | 624 |  |  |
| SB | 1196 | NB |  |  |
|  | TOTAL |  |  |  |
|  |  |  |  |  |

## Curtis Street at Lathrop / Luker

Roundabout Diagram:
2040 AM Roundabout Turn Movements
Leg 1: Curtis Street
North Leg
Pct. U-Turns?
Est. U-Turns: $\quad 31$


Leg 3: Curtis Street
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |





## Curtis Street at Lathrop / Luker

Crossroad Diagram:
2040 PM Roundabout Turn Movements
Leg 1: Curtis Street
North Leg

|  | TOTAL |  |  |
| :---: | :---: | :---: | :---: |
|  | SB | 1356 | NB |
|  | 644 |  | 712 |
| 16 | 577 | 51 |  |
| RIGHT | THRU | LEFT |  |

Leg 4: Lathrop / Luker


| Leg 2: | Lathrop / Luker East Leg |  |
| :---: | :---: | :---: |
| RIGHT 58 |  |  |
| THRU 8 | 308 | WB |
| LEFT 243 |  | 654 |
|  | 346 | EB |

Leg 3: Curtis Street
South Leg

|  | LEFT | THRU | RIGHT |
| :---: | :---: | :---: | :---: |
|  | 49 | 649 | 287 |
| 861 |  | 985 |  |
| SB | 1846 | NB |  |

## Curtis Street at Lathrop / Luker

## Roundabout Diagram:

2040 PM Roundabout Turn Movements
Leg 1: Curtis Street
North Leg
Pct. U-Turns? $0.0 \%$
Est. U-Turns: $\quad 21$


Est. U-Turns: $\qquad$
Leg 3: Curtis Street
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |

## Blackmore at Lathrop

Crossroad Diagram:
2020 Estimated AM Peak Turns
Leg 1: Blackmore
North Leg

|  |  | TOTAL |  |
| :---: | :---: | :---: | :---: |
|  | SB | 241 | NB |
|  | 143 |  | 98 |
| 15 | 128 | 0 |  |
| RIGHT | THRU | LEFT |  |

Leg 4: Lathrop


Leg 2: Lathrop


Leg 3: Blackmore
South Leg

|  | LEFT | THRU | RIGHT |
| :---: | :---: | :---: | :---: |
|  | 13 | 87 | 0 |
| 143 |  | 100 |  |
| SB | 243 | NB |  |

## Blackmore at Lathrop

Roundabout Diagram:
2020 Estimated AM Peak Turns
Leg 1: Blackmore
North Leg

|  |  |
| :--- | :---: |
| Pct. U-Turns? | $0.0 \%$ |
| Est. U-Turns: | 0 |



Leg 3: Blackmore
South Leg
Pct. U-Turns
Est. U-Turns:

## Blackmore at Lathrop

Crossroad Diagram:
2040 Estimated AM Peak Turns

| Leg 1: | Blackmore <br> North Leg |  | NB |
| :---: | :---: | :---: | :---: |
|  |  | TOTAL |  |
|  | SB | 495 |  |
|  | 292 |  | 202 |
| 33 | 259 | 0 |  |



Leg 3: Blackmore

| South Leg |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  | THRU | RIGHT |
|  | 29 | 176 | 0 |
| 293 |  | 205 |  |
| SB | 498 | NB |  |

## Blackmore at Lathrop

Roundabout Diagram:
2040 Estimated AM Peak Turns
Leg 1: Blackmore
North Leg
Pct. U-Turns?


Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |



Pct. U-Turns?
Leg 3: Blackmore
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |

## Blackmore at Lathrop

Crossroad Diagram:
2020 Estimated MIDDAY Peak Turns
Leg 1: Blackmore
North Leg

|  |  | TOTAL |  |
| :---: | :---: | :---: | :---: |
|  | SB | 261 | NB |
|  | 130 |  | 131 |
| 14 | 116 | 0 |  |
| RIGHT | THRU | LEFT |  |


| Leg 4: Lathrop |  |  |
| :--- | :---: | :---: |
| West Leg |  |  |
| WB |  |  |



Leg 3: Blackmore
South Leg

|  | LEFT | THRU | RIGHT |
| :---: | :---: | :---: | :---: |
|  | 25 | 115 | 0 |
| 145 |  | 140 |  |
| SB | 285 | NB |  |

## Blackmore at Lathrop

Roundabout Diagram:
2020 Estimated MIDDAY Peak Turns
Leg 1: Blackmore
North Leg
Pct. U-Turns? $0.0 \%$
Est. U-Turns: 0


Leg 3: Blackmore
South Leg

|  |  |
| :--- | :---: |
| Pct. U-Turns | $0.0 \%$ |
| Est. U-Turns: | 0 |

## Blackmore at Lathrop

Crossroad Diagram:
2020 Estimated PM Peak Turns
Leg 1: Blackmore
North Leg


Leg 2: Lathrop


Leg 3: Blackmore
South Leg

|  | LEFT | THRU | RIGHT |
| :---: | :---: | :---: | :---: |
|  | 23 | 148 | 0 |
| 155 |  | 171 |  |
| SB | 326 | NB |  |

## Blackmore at Lathrop

Roundabout Diagram:
2020 Estimated PM Peak Turns
Leg 1: Blackmore
Pct. U-Turns? $0.0 \%$
Est. U-Turns: 0


Leg 3: Blackmore
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |

## Blackmore at US-20/26

Crossroad Diagram:
2020 Estimated AM Peak Turns
Leg 1: Blackmore
North Leg


Leg 4: US-20/26


| Leg 2 |  | US-20/26 East Leg |  |  |
| :---: | :---: | :---: | :---: | :---: |
| RIGHT 55 |  |  |  |  |
| THRU | 168 | 250 | WB |  |
| LEFT | 27 |  |  | 380 TOTAL |
|  |  | 130 | EB |  |

Leg 3: Blackmore
South Leg


## Blackmore at US-20/26

## Roundabout Diagram:

2020 Estimated AM Peak Turns
Leg 1: Blackmore
North Leg
Pct. U-Turns? $0.0 \%$
Est. U-Turns: 0


Leg 3: Blackmore
South Leg
Pct. U-Turns

| $0.0 \%$ |
| :---: |
| 0 |

## Blackmore at US-20/26

## Crossroad Diagram:

2040 Estimated AM Peak Turns
Leg 1: Blackmore
North Leg


Leg 4: US-20/26

Leg 3: Blackmore
South Leg

|  | LEFT | THRU | RIGHT |
| :---: | :---: | :---: | :---: |
|  | 39 | 73 | 27 |
| 228 |  | 140 |  |
| SB | 367 | NB |  |

Blackmore at US-20/26

## Roundabout Diagram:

2040 Estimated AM Peak Turns
Leg 1: Blackmore
North Leg
Pct. U-Turns? $0.0 \%$
Est. U-Turns: 0


Leg 3: Blackmore
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |

Crossroad Diagram:
2020 Estimated MIDDAY Peak Turns


Leg 4: US-20/26


Leg 2: US-20/26


Leg 3: Blackmore
South Leg

|  | LEFT |  | THRU |
| :---: | ---: | ---: | ---: |
|  | RIGHT |  |  |
| 127 |  | 18 | 46 |
| SB | 256 | 129 |  |
|  | NB |  |  |
|  | TOTAL |  |  |

## Blackmore at US-20/26

Roundabout Diagram:
2020 Estimated MIDDAY Peak Turns
Leg 1: Blackmore
North Leg
Pct. U-Turns? $0.0 \%$
Est. U-Turns: 0


Est. U-Turns: $\qquad$ 0

Leg 3: Blackmore
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |

## Blackmore at US-20/26

## Crossroad Diagram:

## 2020 Estimated PM Peak Turns

Leg 1: Blackmore
North Leg


Leg 4: US-20/26

Leg 2: US-20/26


Leg 3: Blackmore

| South Leg |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  | THRU | RIGHT |
|  | 37 | 77 | 45 |
| 136 |  | 158 |  |
| SB | 294 | NB |  |

## Blackmore at US-20/26

Roundabout Diagram:
2020 Estimated PM Peak Turns
Leg 1: Blackmore
North Leg
Pct. U-Turns? $0.0 \%$
Est. U-Turns: $\quad 0$


Est. U-Turns: $\qquad$
Leg 3: Blackmore
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |

## Blackmore at US-20/26

## Crossroad Diagram:

2040 Estimated PM Peak Turns
Leg 1: Blackmore
North Leg

|  |  | TOTAL |  |
| :---: | :---: | :---: | :---: |
|  | SB | 290 | NB |
|  | 150 |  | 140 |
| 26 | 110 | 14 |  |
| RIGHT | THRU | LEFT |  |

Leg 4: US-20/26

Leg 2: US-20/26

| RIGHT 24 |  | East Leg | WB |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |
| THRU | 192 |  |  | 259 |  |
| LEFT |  |  |  | 604 TOTAL |
|  |  | 345 | EB |  |

Leg 3: Blackmore
South Leg

|  | EFT | THRU | RIGHT |
| :---: | :---: | :---: | :---: |
|  | 71 | 86 | 79 |
| 203 |  | 237 |  |
| SB | 440 | NB |  |

## Blackmore at US-20/26

Roundabout Diagram:
2040 Estimated PM Peak Turns
Leg 1: Blackmore

| North Leg |  |
| :--- | :--- |
|  |  |
| Pct. U-Turns? | $0.0 \%$ |
|  | 0 |
| Est. U-Turns: |  |



Pct. U-Turns?
Est. U-Turns: $\qquad$
Leg 3: Blackmore
South Leg
Pct. U-Turns
Est. U-Turns:

| $0.0 \%$ |
| :---: |
| 0 |

Two roundabout geometric alternatives were evaluated for the intersection of Curtis/Luker/Lathrop: a 2-lane N-S and a 1-lane N-S. Either roundabout would meet community objectives for safety, promoting development, aesthetics, and gateway feature. Forecast traffic flows in 2040 assume a new "oil boom" will occur as in 2012-2014. The following table shows a side-by-side comparison of these alternatives:

| Roundabout Geometric Alternatives |  |  |  |
| :---: | :---: | :---: | :---: |
| Criterion | Entry | 1 Lane N-S | 2-Lane N-S |
| PM Peak Average Delay per Vehicle (Seconds) | N Curtis | 8.75 | 2.82 |
|  | Luker | 6.53 | 5.26 |
|  | S Curtis | 7.47 | 4.08 |
|  | Lathrop | 6.17 | 6.12 |
| PM 95\% Queue (Vehicles <br> / Feet) | N Curtis | 5.98 (150') | 1.68 (21') |
|  | Luker | 0.65 | 0.51 |
|  | S Curtis | 5.21 (130') | 3.70 (47') |
|  | Lathrop | 1.69 | 1.59 |
| AM Peak Average Delay per Vehicle (Seconds) | N Curtis | 5.94 | 2.53 |
|  | Luker | 5.25 | 4.69 |
|  | S Curtis | 5.26 | 2.99 |
|  | Lathrop | 4.11 | 4.52 |
| AM 95\% Queue (Vehicles / Feet) | N Curtis | 2.67 (67') | 1.11 (28') |
|  | Luker | 0.40 | 0.35 |
|  | S Curtis | 2.10 (53') | 1.53 (38') |
|  | Lathrop | 0.40 | 0.44 |

## Capacity and Delay Findings:

1. A roundabout with 2 through lanes on Curtis operates at LOS A without bypass lanes.
2. A roundabout with one through lane on Curtis requires right turn bypass lanes on the northbound Curtis entry and the westbound Lathrop entry. These lanes would be yield controlled at their termini.
3. The 2-lane approach causes control delay of 5 seconds or less on the State highway, resulting in no noticeable effect on adjacent intersections where control delays will be much higher. The $95 \%$ maximum queue is 3.7 vehicles on the northbound approach, which divided over two lanes results in a $95 \%$ ile queue length of 47 feet.
4. Bypass lanes would allow single-lane entries to operate with low control delay, but one-lane entries on Curtis cause PM 95\% queue lengths to increase seven-fold on the southbound approach and triple on the northbound approach. Single-lane queues would extend $1 / 2$ way to the adjacent signalized intersections.

## Additional Geometric Considerations:

5. The cross section of Wyoming Boulevard is five lanes south of I-25. Continuation of two through lanes north of $\mathrm{I}-25$ provides a consistent cross section that will conform to driver expectations. Reduction to one through lane would force northbound drivers to execute last-second merge maneuvers to continue straight ahead.
6. While the WYDOT design vehicle is a WB-62 and the roundabout can be designed to accommodate that vehicle within lanes, the state highway must occasionally accommodate longer or wider loads, such as WB-67, mobile homes and oilfield tanks and structures. Provision of a 2-lane cross section will enable over size vehicles to transit the intersection by straddling lane lines.
7. If development accelerates and future volumes increase far beyond expectations, the 2-lane northbound entry can have a right-turn bypass constructed to increase entry capacity with no traffic disruption.

Conclusion: The two-lane N-S by 1-lane E-W roundabout is the preferred roundabout design.

## HCS 2010 Two-Way Stop-Control Report

| General Information |  | Site Information |  |
| :--- | :--- | :--- | :--- |
| Analyst | G Grigsby | Intersection | AM Peak |
| Agency/Co. | Westem R8:D | Jurisdiction |  |
| Date Performed | $1 / 6 / 2021$ | East/West Street | Lathrop |
| Analysis Year | 2020 | North/South Street | Curtis 5treet |
| Time Analyzed | No Action - 2020 AM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-5outh | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& Lathrop |  |  |
| Lanes |  |  |  |

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 |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 14 | 1 | 2 | 3 | 4 U | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration |  |  |  |  |  |  | LR |  |  |  | T | TR |  | L | T |  |
| Volume, V (vel/h) |  |  |  |  |  | 48 |  | 16 |  |  | 306 | 77 |  | 17 | 340 |  |
| Percent Heavy Vehicles (\%) |  |  |  |  |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |
| Proportion Time Blocked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Right Turn Channelized |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Median Type/Storage |  |  |  | Und |  |  |  |  |  |  |  |  |  |  |  |  |
| 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



[^1]
## HCS 2010 Two-Way Stop-Control Report

| General Information |  | Site Information |  |
| :--- | :--- | :--- | :--- |
| Analyst | G. Grigsby | Intersection | PM Peak |
| Agency/Co. | Western R\&D | Jurisdiction |  |
| Date Performed | $1 / 6 / 2021$ | East/West Street | Lathrop |
| Analysis Year | 2020 | North/South Street | Curtis Street |
| Time Analyzed | No Action - 2020 PM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& Lathrop |  |  |
| Lanes |  |  |  |

## Lanes



## Vehicle Volumes and Adjustments

| Approach | Eastbound |  |  |  | Westbound |  |  |  | Narthbound |  |  |  | Southbound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Movement | $u$ | L | T | R | U | L | $T$ | R | $u$ | L | $T$ | R | U | 1 | T | R |
| Priority |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 U | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration |  |  |  |  |  |  | LR |  |  |  | T | TR |  | L | T |  |
| Volume, V (vel/h) |  |  |  |  |  | 111 |  | 35 |  |  | 449 | 144 |  | 32 | 419 |  |
| Percent Heavy Vehicles (\%) |  |  |  |  |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |
| Proportion Time Blocked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Right Turn Channelized |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Median Type/Storage |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 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



## HCS 2010 Two-Way Stop-Control Report

General Information

| Analyst | G. Grigsty | Intersection | AM Peak |
| :--- | :--- | :--- | :--- |
| Agency/Co. | Westem R\&D | Jurisdiction |  |
| Date Performed | $1 / 6 / 2027$ | East/West Street | Lathrop Road |
| Analysis Year | 2040 | North/South Street | Curtis Street |
| Time Analyzed | No Action + 2040 AM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& E Lathrop Rd |  |  |
| Latnes |  |  |  |

## Vehicle Volumes and Adjustments



## 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


HCS 2010 Two-Way Stop-Control Report

| General Information | Site Information |  |  |
| :--- | :--- | :--- | :--- |
| Analyst | G. Grigsby | Intersection | PM Peak |
| Agency/Co. | Western RBLD | Jurisdiction |  |
| Date Performed | $2 / 3 / 2021$ | East/West Street | Lathrop Road |
| Analysis Year | 2040 | North/South Street | Curtis Street |
| Time Analyzed | No Action - 2040 PM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& E Lathrop Rd |  |  |
| 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 |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 40 | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration |  |  |  |  |  |  | LR |  |  |  | T | TR |  | L | T |  |
| Volume, V (veh/h) |  |  |  |  |  | 215 |  | 68 |  |  | 706 | 279 |  | 62 | 614 |  |
| Percent Heavy Vehicles (\%) |  |  |  |  |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |
| Proportion Time Blocked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Right Tufn 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



| HCS 2010 Two-May Stop-Control Report |  |  |  |
| :---: | :---: | :---: | :---: |
| General Information |  | Site Information |  |
| Analyst | G. Grigsby | Intersection | AM Peak |
| Agency/Co. | Western R\&D | Jurisdiction |  |
| Date Performed | 1/6/2021 | EastWest Street | Lathrop |
| Analysis Year | 2020 | North/South Street | Curtis Street |
| Time Analyzed | Added RT - 2020 AM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& Lathrop |  |  |
| 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 |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 1 J | 1 | 2 | 3 | 4 U | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration |  |  |  |  |  | L |  | $R$ |  |  | T | TR |  | L | T |  |
| Volume, V (weh/h) |  |  |  |  |  | 48 |  | 16 |  |  | 306 | 77 |  | 17 | 340 |  |
| 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) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Criticał Headway (sec) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Base Follow-Up Headway (sec) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Follow-Up Headway (sec) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Delay, Queue Length, and Level of Service



| General Information | Site Information |  |  |
| :--- | :--- | :--- | :--- |
| Analyst | G. Grigsby | Intersection | PM Peak |
| Agency/Co. | Western R\&D | Jurisdiction |  |
| Date Performed | $1 / 6 / 2021$ | East/West Street | Lathrop |
| Analysis Year | 2020 | North/South Street | Curtis Street |
| Time Analyzed | Added RT - 2020 PM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& Lathrop |  |  |
| 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 |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 14 | 1 | 2 | 3 | 4 U | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration |  |  |  |  |  | L |  | R |  |  | T | TR |  | L | T |  |
| Volume, V (veh/h) |  |  |  |  |  | 111 |  | 35 |  |  | 449 | 144 |  | 32 | 419 |  |
| 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



## HCS 2010 Two-Way Stop-Control Report

| General Information | Site Information |  |  |
| :--- | :--- | :--- | :--- |
| Analyst | G Grigsby | Intersection | AM Peak |
| Agency/Co. | Western R\&D | Jurisdiction |  |
| Date Performed | $1 / 6 / 2021$ | East/West Street | Lathrop Road |
| Analysis Year | 2040 | North/South Street | Curtis Street |
| Time Analyzed | Added RT - 2040 AM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& E Lathrop Rd |  |  |
| Lanes |  |  |  |



## Vehicle Volumes and Adjustments

| Approach | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Movement | U | L | T | R | U | L | T | R | U | L | $T$ | R | $\cup$ | L | $T$ | R |
| Priority |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 40 | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration |  |  |  |  |  | L |  | R |  |  | T | TR |  | L | T |  |
| Volume, V (veh/h) |  |  |  |  |  | 93 |  | 31 |  |  | 475 | 149 |  | 33 | 473 |  |
| Percent Heavy Vehicles (\%) |  |  |  |  |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |
| Proportion Time Blacked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 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



## HCS 2010 Two-Way Stop-Control Report

| General Information | Site Information |  |  |
| :--- | :--- | :--- | :--- |
| Analyst | G. Grigsby | Intersection | PM Peak |
| Agency/Co. | Westem R\&D | Jurisdiction |  |
| Date Performed | $2 / 3 / 2021$ | East/West Street | Lathrop Road |
| Analysis Year | 2040 | North/South Street | Curtis Street |
| Time Analyzed | Added RT - 2040 PM Peak | Peak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& E Lathrop Rd |  |  |
| Lanes |  |  |  |



## Vehicle Volumes and Adjustments

| Approach | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Movement | $u$ | L | T | R | U | L | T | R | $u$ | 1 | T | R | U | L | T | R |
| Priority |  | 10 | 11 | 12 |  | 7 | 8 | 9 | U | 1 | 2 | 3 | 4 J | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 |
| Configuration |  |  |  |  |  | L |  | R |  |  | T | TR |  | L | T |  |
| Volume, V (veh/h) |  |  |  |  |  | 215 |  | 68 |  |  | 706 | 279 |  | 62 | 614 |  |
| 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



## HCS7 Two-Way Stop-Control Report

| General Information |  | Site Information |  |
| :---: | :---: | :---: | :---: |
| Analys: | G. Grigstry | Intersection | AM Peak |
| Agency/Co. | Western R R D | Jurisdiction |  |
| Date Performed | 1/6/2021 | East/West Stree: | Luker |
| Analysis Year | 2020 | North/South Street | Curts Street |
| Time Analyzed | 2020 AM Pcak | Feak Hour Factor | 0.92 |
| Intersection Crientation | North-Scuth | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis 5t \& Luker |  |  |
| Lanes |  | No Action -1 | CuATIV |



Vehicle Volumes and Adjustments

| Approach | Eastbourd |  |  |  | Westbound |  |  |  | Northnound |  |  |  | Southbound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Movement | U | L | I | R | U | L | T | R | U | 1 | T | R | U | L | T | R |
| Priority |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 J | 4 | 5 | 6 |
| Number of Lanes |  | 1 | 0 | 1 |  | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 |
| Configuration |  | L |  | R |  |  |  |  |  | LT |  | TR |  | t |  | TR |
| Volurre, $V$ \{veh/h) |  | 1 |  | 12 |  |  |  |  |  | 2 | 322 | 15 |  | 6 | 335 | 7 |
| Percent Heavy Vehicles (\%) |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |  | 3 |  |  |
| Proportion Time Blocked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Right Turn Channelized | No |  |  |  | No |  |  |  | No |  |  |  | No |  |  |  |
| Median Type/Storage | Urdivided |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Critical and Follow-up Headways

| Base Critical Headway (sec) |  | 7.5 |  | 6.9 |  |  |  |  |  | 4.1 |  |  |  | 4.1 |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Critical Headway (sec) |  | 6.86 |  | 6.96 |  |  |  |  |  | 4.16 |  |  |  | 4.16 |  |
| Base Follow-Up Headway (sed) |  | 3.5 |  | 3.3 |  |  |  |  |  | 2.2 |  |  |  | 2.2 |  |
| Folow-Up Headway (sec) |  | 3.53 |  | 3.33 |  |  |  |  |  | 223 |  |  |  | 223 |  |

Delay, Queue Length, and Level of Service



## HCS7 Two-Way Stop-Control Report

| General Information |  | Site Information |  |
| :---: | :---: | :---: | :---: |
| Analyst | G. Grigsby | Intersection | AM Peak |
| Agency/Ca, | Western Rad | turisdiction |  |
| Date Performed | 1/6/2021 | East/West Street | Lathrop Road |
| Analysis Year | 2040 | North/South Sireet | Curtis Street |
| Time Analyzed | 2040 AM Peak | Peak Hour Factor | 0.92 |
| Intersection Crientation | North-South | Analysis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& E Lathrop Red |  |  |
| Lanes |  | 人) 5mar | 2scti |



## Vehicle Volumes and Adjustments

| Approach <br> Mowement | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | U | 1 | T | R | U | L | $T$ | R | $u$ | 1 | T | R | U | L | $T$ | R |
| Prionity |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 1 U | 1 | 2 | 3 | 4 U | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 |
| Configuration |  |  |  |  |  |  | LR |  |  |  | T | TR |  | tT | $T$ |  |
| Volume, V (veh/h) |  |  |  |  |  | 93 |  | 31 |  |  | 475 | 149 |  | 33 | 473 |  |
| Percent Heavy Vehicles (\%a) |  |  |  |  |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |
| Propartion Time Elorked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Right Tum Channeized | No |  |  |  | No |  |  |  | No |  |  |  | No |  |  |  |
| Median Type/Storage | Undivided |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Critical and Follow-up Headways |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Base Critical Headway (sec) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Critical Headway (sec) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Base Follow-Lp Headway (sec) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Follow-Up Headway (sec) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Delay, Queue Length, and Level of Service |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Flow Rate. v (veh/h) |  |  |  |  |  |  | 135 |  |  |  |  |  |  | 36 |  |  |
| Copacity, c (veh/h) |  |  |  |  |  |  | 302 |  |  |  |  |  |  | 903 |  |  |
| v/CRatio |  |  |  |  |  |  | 0.45 |  |  |  |  |  |  | 0.04 |  |  |
| 95\% Queue Lergth, Cas (veh) |  |  |  |  |  |  | 2.2 |  |  |  |  |  |  | 0.1 |  |  |
| Control Delay (s/veh) |  |  |  |  |  |  | 26.3 |  |  |  |  |  |  | 9.2 |  |  |
| Level of Service, LOS |  |  |  |  |  |  | D |  |  |  |  |  |  | A |  |  |
| Approach Delay (s/veh) |  |  |  |  | 26.3 |  |  |  |  |  |  |  | 0.8 |  |  |  |
| Appreach LOS |  |  |  |  | D |  |  |  |  |  |  |  |  |  |  |  |


| General Information |  | Site Information |  |
| :---: | :---: | :---: | :---: |
| Analyst | G. Grigsby | intersection | AM Peak |
| Agency/Co. | Westem R\&D | Muisfriction |  |
| Date Performed | 1/6/2021 | Eas//West Street | Lathrop Road |
| Analysis Year | 2040 | North/5outh Sireet | Curis street |
| Time Analyzed | 2040 AM Peak | Peak Hour Facior | 0.92 |
| Intersection Orientation | Nork-5outh | Analysis Time Period (hrs) | 0.25 |
| Project Destription | Curtis St A E Lathrog Rd |  |  |
| Lanes | LTMHOP $A_{1}$ GHT TUPU LATE ADOCO |  |  |
|  |  |  |  |

## Vehicle Volumes and Adjustments

| Approach | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Movement | U | L | T | R | U | L | T | R | U | L | 亏 | R | $U$ | L | T | R |
| Prionty |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 J | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 |
| Configuration |  |  |  |  |  | L |  | R |  |  | T | TR |  | LT | T |  |
| Volume, V [veh/h) |  |  |  |  |  | 93 |  | 31 |  |  | 475 | 149 |  | 33 | 473 |  |
| Percent Heary Vehicles (9\%) |  |  |  |  |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |
| Proportion Time Blocked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) |  |  |  |  | 0 |  |  |  |  |  |  |  |  |  |  |  |
| Aight Tum Channelized | No |  |  |  | No |  |  |  | No |  |  |  | No |  |  |  |
| Median Type/Storage | Undivided |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Critical and Follow-up Headways

| Base Critical Headway (sec) |  |  |  |  |  | 7.5 |  | 69 |  |  |  |  |  | 4.1 |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Critical Headway (sec) |  |  |  |  |  | 6.86 |  | 696 |  |  |  |  |  | 4.16 |  |
| Base Follow-Up Headway (sec) |  |  |  |  |  | 3.5 |  | 3.3 |  |  |  |  |  | 22 |  |
| Folow-Up Headway (sec) |  |  |  |  |  | 3.53 |  | 3.33 |  |  |  |  |  |  |  |

Delay, Queue Length, and Level of Service


| HCS7 Two-Way Stop-Control Report |  |  |  |
| :---: | :---: | :---: | :---: |
| General Informati |  | Site Information |  |
| Analyst | G. Grigsty | Intersection | AM Peak |
| Agency/Co. | Westerti R \& \% | jurisdiction |  |
| Date Performed | 1/6/2021 | East/West Street | Lathrop Road |
| Analysis Year | 2040 | North/South Street | Curtis Street |
| Time Analyzed | 2040 PM Peak | Feak Hour Factor | 0.92 |
| Intersection Orientation | North-South | Anabsis Time Period (hrs) | 0.25 |
| Project Description | Curtis St \& E Lathrop Rd |  |  |
| Lanes |  | rraco Rum | aut LADVE |



Vehicle Volumes and Adjustments

| Approach <br> Movemen: | Eastbound |  |  |  | Westbound |  |  |  | Northbound |  |  |  | Southbound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | U | 1 | T | R | 4 | 1 | $T$ | R | 4 | L | $T$ | R | U | 1 | $T$ | R |
| Pricrity |  | 10 | 11 | 12 |  | 7 | 8 | 9 | 1 U | 1 | 2 | 3 | 4 U | 4 | 5 | 6 |
| Number of Lanes |  | 0 | 0 | 0 |  | 1 | 0 | 1 | 0 | 0 | 2 | 0 | c | c | 2 | 0 |
| Configuration |  |  |  |  |  | 1 |  | $R$ |  |  | T | TR |  | LT | T |  |
| Volurne, V (veh/h] |  |  |  |  |  | 215 |  | 68 |  |  | 706 | 279 |  | 62 | 614 |  |
| Percent Heawy Vehicles (\%) |  |  |  |  |  | 3 |  | 3 |  |  |  |  |  | 3 |  |  |
| Propartion Time Blocked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Right Turn Channelized | No |  |  |  | No |  |  |  | No |  |  |  | Ne |  |  |  |
| Median Type/5torage | Undivided |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Critical and Follow-up Headways |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| Base Critical Headway (sec) |  |  |  |  |  | 7.5 |  | 6.9 |  |  |  |  |  | 4.1 |
| :--- | :--- | :--- | :--- | :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Critical Headway (sec) |  |  |  |  |  | 6.86 |  | 6.96 |  |  |  |  |  |  |
| Base Follow-Up Headway (sec) |  |  |  |  |  | 3.5 |  | 3.3 |  |  |  |  |  |  |
| Folow-Up Headway (sec) |  |  |  |  |  | 3.16 |  |  |  |  |  |  |  |  |

Delay, Queue Length, and Level of Service


## HCS7 Two-Way Stop-Control Report

| General Information |  | Site Information |  |
| :--- | :--- | :--- | :--- |
| Analyst | G Grigsby | Intersection | AM Peak |
| Agency/Co. | Western R\&O | Jurisdiction |  |
| Date Ferformed | $1 / 6 / 2021$ | East/West Street | Luker |
| Analysis Year | 2040 | North/5outh Street | Curtis Street |
| Time Analyzed | 2040 AM Peak | Peak Hour Factor | 0.92 |
| Intersection Crientation | North-South | Analysis Time Feriod /hrs) | 0.25 |
| Project Description | Curtis St \& Luker |  |  |
| Lanes |  |  |  |



Vehicle Volumes and Adjustments

| Approach | Eastbound |  |  |  | Westbound |  |  |  |  | Northbeund |  |  |  | Southhound |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Movement | U | L | T | R | U | L |  | T | R | U | L | 1 | R | U | 1 | T | R |
| Prionty |  | 10 | 11 | 12 |  | 7 |  | 8 | 9 | 10 | 1 | 2 | 3 | 4 U | 4 | 5 | 6 |
| Number of Lanes |  | 1 | 0 | 1 |  | 0 |  | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 |
| Configuration |  | L |  | R |  |  |  |  |  |  | LT |  | TR |  | LT |  | TR |
| Volume, V (velv/h) |  | 4 |  | 45 |  |  |  |  |  |  | 14 | 477 | 15 |  | 6 | 461 | 47 |
| Percent Heavy Vehicles (\%) |  | 3 |  | 3 |  |  |  |  |  |  | 3 |  |  |  | 3 |  |  |
| Proportion Time Blocked |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Grade (\%) | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Right Tum Channelized | No |  |  |  | No |  |  |  |  | No |  |  |  | No |  |  |  |
| Median Type/Storage | Undivided |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Critical and Follow-up Headways |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Base Critical Headway (sec) |  | 7.5 |  | 6.9 |  |  |  |  |  |  | 4.1 |  |  |  | 4.1 |  |  |
| Critica! Heacway (sec) |  | 6.86 |  | 6.95 |  |  |  |  |  |  | 4.16 |  |  |  | 4.16 |  |  |
| Base Follow-Up Headway (sec) |  | 3.5 |  | 33 |  |  |  |  |  |  | 2.2 |  |  |  | 22 |  |  |
| Follow-Up Headway (sec) |  | 3.53 |  | 3.33 |  |  |  |  |  |  | 223 |  |  |  | 2.23 |  |  |

Delay, Queue Length, and Level of Service


## HCS7 Two-Way Stop-Control Report

| General Information |  | Site Information |  |
| :---: | :---: | :---: | :---: |
| Analyst | G. Grigsby | Intersection | PM Peak |
| Agency/Co | Western RED | Jursdiction |  |
| Date Performed | 1/6/2021 | East/West Street | Luker |
| Analysis Year | 20.40 | North/South Street | Curtis Street |
| Time Analyzed | 2040 PM. Peak | Peak Hour Factor | 0.92 |
| Intersection Crientation | North-50uth | Analysis Time Period (hry | 025 |
| Praject Description | Curtis St B Luker |  |  |
| Lanes |  |  |  |



Vehicle Volumes and Adjustments


Delay, Queue Length, and Level of Service



## Operational Data

## Main Geometry (ft)

Approach and Entry Geometry

| Leg | Leg Names | Approach <br> Bearing <br> (deg) | Grade <br> Separatlon <br> $\mathbf{G}$ | Half Wldth <br> $\mathbf{V}$ | Approach <br> Lanes <br> $\mathbf{n}$ | Entry <br> Width <br> $\mathbf{E}$ | Entry <br> Lanes <br> $\mathbf{n}$ | Flare <br> Length <br> $\mathbf{L}^{\prime}$ | Entry <br> Radius <br> $\mathbf{R}$ | Entry <br> Angle <br> Phi |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | Curtis North | 0 | 0 | 26.00 | 2 | 28.00 | 2 | 164.00 | 66.00 | 25.00 |
| 2 | Luker Lane | 90 | 0 | 11.00 | 1 | 13.00 | 1 | 30.00 | 15.00 | 45.00 |
| 3 | Curtis South | 180 | 0 | 26.00 | 2 | 28.00 | 2 | 164.00 | 66.00 | 25.00 |
| 4 | Lathrop Road | 270 | 0 | 13.00 | 1 | 16.00 | 1 | 164.00 | 66.00 | 20.00 |

Circulating and Exit Geometry

| Leg | Leg Names | Inscribed <br> Dlameter <br> D | Circulating <br> Width <br> C | Circulating <br> Lanes <br> nc | Exit <br> Width <br> Ex | Exit <br> Lanes <br> nex | Exit <br> Half Width <br> Vx | Exit Half <br> Width Lanes |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| nvx |  |  |  |  |  |  |  |  |$|$

Capacity Modifiers and Capacity Calibration (veh/hr)

| Leg | Leg Names | Entry Capacity |  | Entry Calibration |  | Approach Road |  |  | Exth Road |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Capacity + or - | XWalk Factor | Intercept + or - | Slope Factor | $\begin{gathered} \mathbf{V} \\ (\mathrm{ft}) \end{gathered}$ | Default Capeclty | Callb Capacity | $\begin{gathered} V \\ (f t) \end{gathered}$ | Default Capacity | Callb Capacity |
| 1 | Curtis North | 0 | 1.000 | 0 | 1.000 | 20.00 | 3883 | 0 | 26.00 | 3883 | 0 |
| 2 | Luker Lane | 0 | 1.000 | 0 | 1.000 | 20.00 | 1643 | 0 | 11.00 | 1643 | 0 |
| 3 | Curtis South | 0 | 1.000 | 0 | 1.000 | 20.00 | 3883 | 0 | 26.00 | 3883 | 0 |
| 4 | Lathrop Road | 0 | 1.000 | 0 | 1.000 | 12.00 | 1942 | 0 | 12.00 | 1792 | 0 |

## Traffic Flow Data (veh/hr)

## 2040 AM Peak Peak Hour Flows

$\left.$| Leg | Leg Names | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks | Flow Modifiers <br> Flow |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  | | Peak Hour |
| :---: |
| Factor | \right\rvert\,

## Operational Results

## 2040 AM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | $\begin{gathered} \text { Bypass } \\ \text { Type } \end{gathered}$ | Flows (veh/hr) |  |  |  |  | Capacity (veh/hr) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Arrival Flow |  | Opposing Flow |  | Exit Flow | Capacity |  | Average VCR |  |
|  |  |  | Entry | Bypass | Entry | Bypass |  | Entry | Bypass | Entry | Bypass |
| 1 | Curtis North | None | 539 |  | 140 |  | 528 | 2216 |  | 0.2433 |  |
| 2 | Luker Lane | None | 50 |  | 605 |  | 74 | 630 |  | 0.0793 |  |
| 3 | Curtis South | None | 630 |  | 77 |  | 578 | 2234 |  | 0.2820 |  |
| 4 | Lathrop Road | None | 146 |  | 522 |  | 185 | 1215 |  | 0.1201 |  |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass <br> Type | Average Delay (sec) |  | $95 \%$ Queue (veh) |  | Level of Service |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass |
| 1 | Curtis North | None | 4.38 |  | 4.38 | 0.98 |  | Leg |
| 2 | Luker Lane | None | 6.61 |  | 6.61 | 0.43 | A | A |
| 3 | Curtis South | None | 4.95 | 4.95 | 1.34 | A | A |  |
| 4 | Lathrop Road | None | 5.66 | 5.66 | 0.57 | A | A |  |

## Traffic Flow Data (veh/hr)

2040 OFF Peak Peak Hour Flows

| Leg | Leg Names | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Turning Flows <br> Trucks | Flow Modifiars <br> Factor | Peak Hour <br> Factor |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Curtis North | 21 | 29 | 333 | 22 | 0 | 10.0 | 1.00 | 0.900 |
|  | Luker Lane | 1 | 6 | 4 | 28 | 0 | 10.0 | 1.00 | 0.900 |
| 3 | Curtis South | 5 | 23 | 369 | 144 | 0 | 10.0 | 1.00 | 0.900 |
| 4 | Lathrop Road | 0 | 117 | 4 | 30 | 0 | 10.0 | 1.00 | 0.900 |

## Operational Results

## 2040 OFF Peak - 60 minutes

## Flows and Capacity

| Leg | Leg Names | Bypass Туре | Flows (veh/hr) |  |  |  |  | Capacity (veh/hr) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Arrival Flow |  | Opposing Flow |  | Exit Flow | Capacity |  | Average VCR |  |
|  |  |  | Entry | Bypass | Entry | Bypass |  | Entry | Bypass | Entry | Bypass |
| 1 | Curtis North | None | 405 |  | 150 |  | 426 | 1887 |  | 0.2146 |  |
| 2 | Luker Lane | None | 39 |  | 505 |  | 50 | 451 |  | 0.0865 |  |
| 3 | Curtis South | None | 541 |  | 61 |  | 483 | 1952 |  | 0.2771 |  |
| 4 | Lathrop Road | None | 151 |  | 425 |  | 177 | 889 |  | 0.1699 |  |

## Delays, Queues and Level of Service

| Leg | Leg Names | Bypass | Average Delay (sec) |  | $95 \%$ Queue (veh) |  | Level of Service |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Type | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | Curtis North | None | 4.41 |  | 4.41 | 0.83 |  | A |  |  |
| 2 | Luker Lane | None | 8.61 |  | 8.61 | 0.26 |  | A |  |  |
| 3 | Curtis South | None | 5.28 |  | 5.28 | 1.38 |  | A | A |  |
| 4 | Lathrop Road | None | 7.45 |  | 7.45 | 0.75 |  | A | A |  |

## 2040 OFF Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) |  |  |  |  | Capacity (veh/hr) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Arrival Flow |  | Opposing Flow |  | Exit <br> Flow | Capacity |  | Average VCR |  |
|  |  |  | Entry | Bypass | Entry | Bypass |  | Entry | Bypass | Entry | Bypass |
| 1 | Curtis North | None | 450 |  | 167 |  | 473 | 1875 |  | 0.2400 |  |
| 2 | Luker Lane | None | 43 |  | 561 |  | 56 | 436 |  | 0.0994 |  |
| 3 | Curtis South | None | 601 |  | 68 |  | 536 | 1947 |  | 0.3087 |  |
| 4 | Lathrop Road | None | 168 |  | 472 |  | 197 | 867 |  | 0.1934 |  |

## Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) |  |  | 95\% Queue (veh) |  | Level of Service |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | Curtis North | None | 3.43 |  | 3.43 | 0.83 |  | A |  | A |
| 2 | Luker Lane | None | 8.26 |  | 8.26 | 0.26 |  | A |  | A |
| 3 | Curtis South | None | 4.02 |  | 4.02 | 1.38 |  | A |  | A |
| 4 | Lathrop Road | None | 6.80 |  | 6.80 | 0.75 |  | A |  | A |

## Traffic Flow Data (veh/hr)

2040 PM Peak Peak Hour Fiows

| Leg | Leg Names | U-Turn | Exit-3 | Exit-2 | Exit-1 | Bypass | Trucks <br> $\%$ | Flow Modifiers <br> Flow <br> Factor | Peak Hour <br> Factor |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Curtis North | 21 | 51 | 577 | 16 | 0 | 3.0 | 1.00 |  |
|  | Luker Lane | 1 | 5 | 8 | 42 | 0 | 1.0 | 1.00 | 0.890 |
| 3 | Curtis South | 10 | 49 | 649 | 287 | 0 | 4.6 | 1.00 | 0.880 |
| 4 | Lathrop Road | 3 | 243 | 8 | 58 | 0 | 4.1 | 1.00 | 0.810 |

## Operational Results

## 2040 PM Peak - 60 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Туре | Flows (veh/hr) |  |  |  |  | Capacity (veh/hr) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Arrival Flow |  | Opposing Flow |  | Exit Flow | Capacity |  | Average VCR |  |
|  |  |  | Entry | Bypass | Entry | Bypass |  | Entry | Bypass | Entry | Bypass |
| 1 | Curtis North | None | 665 |  | 314 |  | 733 | 2225 |  | 0.2989 |  |
| 2 | Luker Lane | None | 56 |  | 905 |  | 74 | 630 |  | 0.0889 |  |
| 3 | Curtis South | None | 995 |  | 89 |  | 872 | 2330 |  | 0.4270 |  |
| 4 | Lathrop Road | None | 312 |  | 735 |  | 349 | 1046 |  | 0.2984 |  |

## Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) |  |  | 95\% Queus (veh) |  | Level of Service |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | Curtis North | None | 4.91 |  | 4.91 | 1.46 |  | A |  | A |
| 2 | Luker Lane | None | 7.60 |  | 7.60 | 0.64 |  | A |  | A |
| 3 | Curtis South | None | 6.52 |  | 6.52 | 3.12 |  | A |  | A |
| 4 | Lathrop Road | None | 8.69 |  | 8.69 | 2.04 |  | A |  | A |

## 2040 PM Peak - 15 minutes

Flows and Capacity

| Leg | Leg Names | Bypass Type | Flows (veh/hr) |  |  |  |  | Capaclty (veh/hr) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Arrival Flow |  | Opposing Flow |  | Exit Flow | Capacity |  | Average VCR |  |
|  |  |  | Entry | Bypass | Entry | Bypass |  | Entry | Bypass | Entry | Bypass |
| 1 | Curtis North | None | 747 |  | 382 |  | 843 | 2171 |  | 0.3441 |  |
| 2 | Luker Lane | None | 117 |  | 1044 |  | 86 | 589 |  | 0.1982 |  |
| 3 | Curtis South | None | 1131 |  | 114 |  | 1046 | 2312 |  | 0.4891 |  |
| 4 | Lathrop Road | None | 385 |  | 840 |  | 404 | 995 |  | 0.3870 |  |

Delays, Queues and Level of Service

| Leg | Leg Names | Bypass Type | Average Delay (sec) |  |  | 95\% Queue (veh) |  | Level of Service |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Entry | Bypass | Leg | Entry | Bypass | Entry | Bypass | Leg |
| 1 | Curtis North | None | 3.53 |  | 3.53 | 1.46 |  | A |  | A |
| 2 | Luker Lane | None | 6.99 |  | 6.99 | 0.64 |  | A |  | A |
| 3 | Curtis South | None | 4.61 |  | 4.61 | 3.12 |  | A |  | A |
| 4 | Lathrop Road | None | 7.60 |  | 7.60 | 2.04 |  | A |  | A |

## APPENDIX E: SIGNAL WARRANT STUDIES:

Signal warrant studies were completed for the Curtis Street/Lathrop road Intersection and the US-20/26/Blackmore Road intersections.

## E1. Signal Warrant Analysis, Curtis St. (WYO 258) at Lathrop Road

## Executive Summary:

Numerous citizens have reported difficulty making left turns from westbound Lathrop to Southbound Curtis. A traffic signal has been suggested at this intersection as a solution to that problem.

## Finding:

The US Manual of Uniform Traffic Control Devices (MUTCD offers nine warrants for a traffic signal. Review of all warrants and conditions at Curtis/Lathrop reveals the intersection currently does not meet any MUTCD warrant for a traffic signal. If traffic grows as projected, the intersection may meet more signal volume warrants in coming years. However, its location between to other signalized intersections is a strong contraindication, as noted in Warrant \#6.

## Warrant Analysis:

The Manual of Uniform Traffic Control Devices (MUTCD) lists warrants for installation of a traffic light.

## "MUTCD Standard:

1. An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.
2. The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:
3. The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."

## Support:

4. Sections 8C. 09 and 8C. 10 contain information regarding the use of traffic control signals instead of gates and/or flashing-light signals at highway-rail grade crossings and highway-light rail transit grade crossings, respectively.

## Guidance:

5. A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.
6. A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.
7. A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.
8. The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minorstreet traffic count when evaluating the count against the signal warrants listed in Paragraph 2.
9. Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics should dictate whether an approach is considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, if engineering judgment indicates that it should be considered a one-lane approach because the traffic using the left-turn lane is minor, the total traffic volume
approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.
10. Similar engineering judgment and rationale should be applied to a street approach with one through/left-turn lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.
11. At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of Warrant 8 to justify a signal, a traffic control signal installed under projected conditions should have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.
12. For signal warrant analysis, a location with a wide median, even if the median width is greater than 30 feet, should be considered as one intersection.

## Option:

13. At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the "minor-street" volume and the corresponding single direction of opposing traffic on the major street as the "major-street" volume.
14. For signal warrants requiring conditions to be present for a certain number of hours in order to be satisfied, any four sequential 15-minute periods may be considered as 1 hour if the separate 1-hour periods used in the warrant analysis do not overlap each other and both the major-street volume and the minor-street volume are for the same specific one-hour periods.
15. For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.

## Support:

16. When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.

## Option:

17. Engineering study data may include the following:
A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.
B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.
C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.
D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian volume count if the absence of a signal restrains their mobility.
$E$. The posted or statutory speed limit or the 85th-percentile speed on the uncontrolled approaches to the location.
F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.
G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.
18. The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods described in Item B of Paragraph 17:
A. Vehicle-hours of stopped time delay determined separately for each approach.
B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.
C. The posted or statutory speed limit or the 85th-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.
D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.
E. Queue length on stop-controlled approaches.

The following describes the results of a warrant analysis at this location.

## Warrant 1, Eight-Hour Vehicular Volume: Warrant Not Met.

- For Condition A: Curtis exceeds a maximum 600 vehicle 2-way volume from 7 AM to 6PM, however approach volumes on Lathrop exceed 150 vehicles only 1 hour per day (5-6 PM).
- For Condition B: While approach volumes on Lathrop exceed 75 vehicles for 10 hours from 10 AM to 8 PM, Curtis exceeds a maximum 900 vehicle 2-way volume for only five hours.


## MUTCD Standard:

04 The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:
A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the majorstreet and the higher-volume minor-street approaches, respectively, to the intersection; or
B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the majorstreet and the higher-volume minor-street approaches, respectively, to the intersection.

In applying each condition, the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

| Condition A-Minimum Vehicular Volume |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of lanes for moving traffic on each approach | Vehicles per hour on major street (total of both approaches) |  |  |  | Vehicles per hour on higher-volume minor-street approach (one direction only) |  |  |  |
| Major Street $\quad$ Minor Street | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ |
| 11 | 500 | 400 | 350 | 280 | 150 | 120 | 105 | 84 |


| 2 or more | 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 or more | 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
| 1 | 2 or more | 500 | 400 | 350 | 280 | 200 | 160 | 140 | 112 |
|  |  |  |  |  |  |  |  |  |  |
| Condition B-Interruption of Continuous Traffic |  |  |  |  |  |  |  |  |  |
| Number of lanes for moving traffic on each approach |  | Vehicles per hour on major street (total of both approaches) |  |  |  | Vehicles per hour on higher-volume minor-street approach (one direction only) |  |  |  |
| Major Street | Minor Street | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ |
| 1 | 1 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more | 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more | 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 | 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |

${ }^{\text {a }}$ Basic minimum hourly volume
${ }^{\mathrm{b}}$ Used for combination of Conditions $A$ and $B$ after adequate trial of other remedial measures
${ }^{c}$ May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
${ }^{d}$ May be used for combination of Conditions $A$ and $B$ after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000.

Warrant 2, Four-Hour Vehicular Volume: Warrant Not Met. Only one hour per day falls above the applicable curve in figure 4C-1 below. This warrant may be met in the future of traffic reaches 2040 projections.

Support: The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

MUTCD Standard: The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

This figure shows a graph depicting numerical values for Warrant 2, Four-Hour Vehicular Volume (see Section 4C. 03 for further details). The figure displays three curves-one for each existing combination of approach lanes: one lane and one lane, two or more lanes and one lane, and two or more lanes and two or more lanes.
The table below shows the approximate vehicles per hour (VPH) on the major street and corresponding VPH on the minor street for each combination of approach lanes.

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume


Warrant 3, Peak Hour: Warrant Not Met. Intersection fails to meet criterion Aa below, and fails to meet criterion B.

## Support:

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

## MUTCD Standard:

This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:
A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:
a. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and
b. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and
c. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or $\underline{\underline{800} \text { vehicles per hour for intersections with four or more }}$ approaches.
B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

> threshold volume for a minor-street approach with one lane.

## Warrant 4, Pedestrian Volume:

Warrant not Met: Too few pedestrian crossings.

## Support:

The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

## Standard:

The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that one of the following criteria is met:

For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in Figure 4C-5; or
For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve in Figure 4C-7.

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume


## Standard:

The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads complying with the provisions set forth in Chapter 4 E .

## Guidance:

If this warrant is met and a traffic control signal is justified by an engineering study, then:
If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.

If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs, and should be pedestrian-actuated. If the traffic control signal is installed at a non-intersection crossing, at least one of the signal faces should be over the traveled way for each approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should include suitable standard signs and pavement markings.

Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.

## Option:

The criterion for the pedestrian volume crossing the major street may be reduced as much as 50 percent if the 15th-percentile crossing speed of pedestrians is less than 3.5 feet per second.

A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street.

## Support:

Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

## Standard:

The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:

- On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.
- On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.


## Guidance:

The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 1,000 feet.

## Warrant 7, Crash Experience: Warrant not Met. No preventable crashes in preceding 12 months

- Crash mitigation alternatives have not been tried.
- Five or more preventable crashes have not occurred in the preceding 12 months. (1 occurred that was due to reckless driving and not preventable by a signal)
- Volumes do meet eight-hour minimum volumes.


## Support:

The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

## MUTCD Standard:

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:
A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and
C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.


If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph , or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000 , the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

## Warrant 8, Roadway Network:

Warrant Not Met. Projected volumes are not expected to meet one or more of Warrants 1,2 , and 3 in the next 5 years.

## Support:

Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.

## MUTCD Standard:

"The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:
A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday (No); or
B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday). (No)

A major route as used in this signal warrant shall have at least one of the following characteristics:
A. Part of the street or highway system that serves as the principal roadway network for through traffic flow.
B. Includes rural or suburban highways outside, entering, or traversing a city.
C. Appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study."


Warrant 9, Intersection Near a Grade Crossing:
Warrant not Met: No RR Crossing nearby.

## E2. Signal Warrant Analysis, Blackmore at US-20/26 (Yellowstone)

At the public involvement meeting on Dec 3, 2020, several attendees stated that traffic operations are difficult at Blackmore/US-20/26 during shift changes at the Sinclair Oil facility north of the intersection. A traffic signal was suggested at this intersection as a solution.

The Manual of Uniform Traffic Control Devices (MUTCD) lists warrants for installation of a traffic light.

## "MUTCD Standard:

19. An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.
20. The investigation of the need for a traffic control signal shall include an analysis of factors related to the existing operation and safety at the study location and the potential to improve these conditions, and the applicable factors contained in the following traffic signal warrants:
21. The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."

Finding: MUTCD offers nine warrants for a traffic signal. Review of all warrants and conditions at US-20/26 at Lathrop/Blackmore reveals the intersection does not currently meet MUTCD warrants for a traffic signal.

Recommendation: Side road congestion and delay occur during brief daily surges caused by shift changes at the adjacent Sinclair refinery. Congestion is because all workers arrive simultaneously at the intersection. Although this situation does not meet MUTCD signal warrants, Sinclair may mitigate this problem by staggering their shift change into four, 15 -minute intervals ( $3: 00,3: 15,3: 30,3: 45$ ) or into six, 10 -minute intervals. By spreading arrivals over an hour instead of all at once, it will sharply reduce the time workers spend waiting at the intersection.

The following describes the results of a warrant analysis at this location.

Warrant 1, Eight-Hour Vehicular Volume: Warrant Not Met. The maximum 2-way volume on US-20/26 is 428 vehicles between 4 and 5 PM. Volumes on Blackmore exceed 120 vehicles only 6 hours per day.
MUTCD Standard:

- The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:
- The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and
- The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

| Condition A-Minimum Vehicular Volume |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of lanes for moving traffic on each approach | Vehicles per hour on major street <br> (total of both approaches) |  |  |  | Vehicles per hour on higher-volume minor-street approach (one direction only) |  |  |  |
| Major Street Minor Street | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ |
| 2 or more 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| 2 or more 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
|  |  |  |  |  |  |  |  |  |
| Condition B-Interruption of Continuous Traffic |  |  |  |  |  |  |  |  |
| Number of lanes for moving traffic on each approach | Vehicles per hour on major street (total of both approaches) |  |  |  | Vehicles per hour on higher-volume minor-street approach (one direction only) |  |  |  |


| Major Street | Minor Street | $100 \%^{\mathrm{a}}$ | $80 \%^{\mathrm{b}}$ | $\mathbf{7 0} \%^{\mathrm{c}}$ | $56 \%^{\mathrm{d}}$ | $100 \%^{\mathrm{a}}$ | $80 \%^{\mathrm{b}}$ | $70 \%^{\mathrm{c}}$ | $56 \%^{\mathrm{d}}$ |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 1 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more | 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more | 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 | 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |

${ }^{\text {a }}$ Basic minimum hourly volume
${ }^{\mathrm{b}}$ Used for combination of Conditions A and B after adequate trial of other remedial measures
c May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
${ }^{d}$ May be used for combination of Conditions $A$ and $B$ after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Warrant 2, Four-Hour Vehicular Volume: Warrant Not Met. Maximum 4 hours of an average day fall short of this volume warrant. (See figure 4C-2 below)

Support: The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

MUTCD Standard: The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

This figure shows a graph depicting numerical values for Warrant 2, Four-Hour Vehicular Volume (see Section 4C. 03 for further details). The figure displays three curves-one for each existing combination of approach lanes: one lane and one lane, two or more lanes and one lane, and two or more lanes and two or more lanes. The table below shows the approximate vehicles per hour (VPH) on the major street and corresponding VPH on the minor street for each combination of approach lanes.

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70\% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)


## Warrant 3, Peak Hour:

Warrant Not Met. Intersection fails to meet criterion Ac below, and also fails to meet criterion B.

## Support:

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

## MUTCD Standard:

This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:
C. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:
a. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach; and
b. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and
c. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.
D. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

Figure 4C-3. Warrant 3, Peak Hour


Warrant 4, Pedestrian Volume:

## Warrant 5, School Crossing:

Warrant 6, Coordinated Signal System:

## Warrant 7, Crash Experience:

- Crash mitigation alternatives have not been tried.
- Five or more preventable crashes have not occurred in the preceding 12 months. (2 occurred)
- Volumes do not meet eight-hour minimum volumes.


## Support:

The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

## MUTCD Standard:

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:
D. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
E. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and
F. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4 C -1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

| Condition A-Minimum Vehicular Volume |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of lanes for moving traffic on each approach | Vehicles per hour on major street <br> (total of both approaches) |  |  |  | Vehicles per hour on higher-volume minor-street approach (one direction only) |  |  |  |
| Major Street Minor Street | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ |
| 11 | 500 | 400 | 350 | 280 | 150 | 120 | 105 | 84 |
| 2 or more 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| 2 or more 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
| 12 or more | 500 | 400 | 350 | 280 | 200 | 160 | 140 | 112 |
|  |  |  |  |  |  |  |  |  |
| Condition B-Interruption of Continuous Traffic |  |  |  |  |  |  |  |  |
| Number of lanes for moving traffic on each approach | Vehicles per hour on major street <br> (total of both approaches) |  |  |  | Vehicles per hour on higher-volume minor-street approach (one direction only) |  |  |  |
| Major Street Minor Street | 100\% ${ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ | $100 \%{ }^{\text {a }}$ | 80\% ${ }^{\text {b }}$ | 70\% ${ }^{\text {c }}$ | 56\% ${ }^{\text {d }}$ |
| 11 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |

[^2]${ }^{\mathrm{b}}$ Used for combination of Conditions A and B after adequate trial of other remedial measures
${ }^{\text {c }}$ May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
${ }^{d}$ May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph , or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000 , the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

## Warrant 8, Roadway Network:

Warrant Not Met. Volumes too low.

## Support:

Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.

## MUTCD Standard:

"The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:
C. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday (NO); or
D. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday). (NO)

A major route as used in this signal warrant shall have at least one of the following characteristics:
D. Part of the street or highway system that serves as the principal roadway network for through traffic flow.
E. Includes rural or suburban highways outside, entering, or traversing a city.
F. Appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study."


Warrant 9, Intersection Near a Grade Crossing:
Warrant not Met: No RR Crossing nearby.



## LEGEND


| Bike Rack (2 bikes ea., 8 bikes total)

## NOTES

1. Plant species shall be as recommended by Evansville Parks \& Recreation Dept personnel.


## LANDSCAPE CONCEPT

Waypoint \#2-Outback Steakhouse
Waypoint \#3 - Texas Roadhouse

|  | MARCH 2021 | 10\% DESIGN OF PROPOSED LANDSCAPE |
| :---: | :---: | :---: |
|  |  |  |
|  |  |  |
|  |  |  |

## LEGEND



1
Bike Rack (2 bikes ea., 8 bikes total)

## NOTES

1. Plant species shall be as recommended by Evansville Parks \& Recreation Dept personnel.
2. Waypoints $4,5 \& 6$ shall be narrow in keeping with site restrictions. Orient benches and dimension concrete accordingly. Bike parking is recommended, particularly at anticipated bus stop locations.
3. Waypoint 4 may also feature a Bush Shelter see Waypoint 1 for example configuration.


## LANDSCAPE CONCEPT

Waypoint \#4, \#5, \#6 - East Lathrop

| $\begin{aligned} & \stackrel{\rightharpoonup}{n} \\ & 0 \\ & \Pi \\ & A \end{aligned}$ | MaRCH2021 | 10\% DESIGN OF <br> PROPOSED LANDSCAPE |
| :---: | :---: | :---: |
|  | 速 |  |
|  | Premer |  |
|  |  |  |






## LEGEND


| Bike Rack (2 bikes ea., 8 bikes total)

## NOTES

1. Plant species shall be as recommended by Evansville Parks \& Recreation Dept personnel.


## LANDSCAPE CONCEPT

Waypoint \#2-Outback Steakhouse
Waypoint \#3 - Texas Roadhouse

|  | MARCH 2021 | 10\% DESIGN OF PROPOSED LANDSCAPE |
| :---: | :---: | :---: |
|  |  |  |
|  |  |  |
|  |  |  |

## LEGEND



1
Bike Rack (2 bikes ea., 8 bikes total)

## NOTES

1. Plant species shall be as recommended by Evansville Parks \& Recreation Dept personnel.
2. Waypoints $4,5 \& 6$ shall be narrow in keeping with site restrictions. Orient benches and dimension concrete accordingly. Bike parking is recommended, particularly at anticipated bus stop locations.
3. Waypoint 4 may also feature a Bush Shelter see Waypoint 1 for example configuration.


## LANDSCAPE CONCEPT

Waypoint \#4, \#5, \#6 - East Lathrop

| $\begin{aligned} & \stackrel{\rightharpoonup}{n} \\ & 0 \\ & \Pi \\ & A \end{aligned}$ | MaRCH2021 | 10\% DESIGN OF <br> PROPOSED LANDSCAPE |
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## APPENDIX H: FINAL PUBLIC COMMENTS AND RESPONSES

The Lathrop Road Traffic Study team wishes to gratefully acknowledge the public minded citizens who offered many useful comments for the study. Each comment was carefully reviewed and incorporated into the study where possible. The following are comments received and the response to each.

## PUBLIC COMMENT:

"This email is in response to your request for input regarding the traffic study for Curtis Street, Lathrop Road \& Blackmore Roads between I-25 \& US-20/26 (Old Yellowstone Road).

I would like to share my concerns/suggestions with regard to the above -
1 - When leaving Blackmore \& trying to get across I25 \& US 20 - I have noticed that when traffic has to wait for the trucks to cross, they become impatient $\&$ make risky choices. I have seen plenty of vehicles use the bike trail right-of-way to facilitate quicker access. I believe a safer solution would be for all trucks to use Craig Thomas Way as oncoming traffic is only going 40 mph .

2 - When attempting to leave Blackmore Road to cross US 20/26, it is difficult to determine what lane the oncoming traffic is actually in. When there is a long wind row of snow, it does aid in determining the lane traveled by oncoming traffic. I believe a long median would be a solution to the problem, however, I acknowledge that this is at an expensive cost. So to save money leave the wind row there. It would probably cost the town $\$ 600$ to $\$ 900$ to remove plus adds an additional risk factor with loader on the road.

3 - I have also observed traffic catching air as they leave US 20/26 onto Blackmore Road. This is due to the dip in the road at this intersection - which has been fixed improperly on at least one occasion. I believe that this should be addressed and adequately repaired.

Thank you for your time and consideration. I appreciate the opportunity to share my thoughts regarding this traffic study. I've been here on this corner since 1987."

Sincerely,
Gene Williams, President
Alpine Landscape Inc.

## RESPONSE:

Thank you for offering comments. We very much appreciate that your perspective comes from 34 years of living next to the intersection and watching it year after year. We also passed your comments along to WYDOT. The study incorporates your observations by various methods, including turn lane delineation markings, improved signs and lane markings, new street lighting, and consideration of reducing the speed limit on US-20/26 to 40 MPH through this newly urban section.

## PUBLIC COMMENT:

"To whom it may concern,
We, Nick and Stevie McNamee, are writing to make comments and suggestions regarding the Lathrop Road traffic study. We live in east Casper near the intersection of E 17th Street and Newport. Nick commonly bicycles along the Blackmore route at a rate of about 2-3 times per week in all but the worst of weather.

The comments we wish to make are this:

We highly support and encourage any portion of a pedestrian pathway being built along the eastern side of Blackmore Road connecting west Yellowstone Highway (US HWY 87/20), under I-25, to the E 2nd street intersection. This is supported by the following points:
The east side of Blackmore Road has an attractive view of agricultural land and the Elkhorn creek drainage.
We often see other bicyclists on this road (probably 1-2 per trip). We also see many walking/boarding pedestrians (during good weather) whom seem to come from the Lathrop Road trailer parks and travel north on Blackmore to east Casper restaurants, bars, businesses, and shopping centers.

Blackmore is a narrow road with pedestrian safety concerns. Passing vehicles often pull/merge illegally into the opposite lane to give walkers/riders proper room. It is not a road we choose when riding with our grade school aged children because of safety concerns.

We support and encourage a waypoint with landscaping and tree planting somewhere near the intersection of the Casper Rail Trail, Blackmore Road, and E Yellowstone HWY.

Lastly, we encourage and support a small spur pathway that connects the Casper Rail trail to Evans Street in Evansville with an at grade signaled crossing of E Yellowstone HWY. Alternatively, consider a signaled crossing at Craig Thomas Blvd. The reason for this is that I see many pedestrian users of the Casper Rail trail try to cross at this location (Evans Street) for the following possible reasons:

There is a nearby mall with a coffee shop/café, smoke shop/bar, and other businesses that are attractive to Casper Rail Trail users.

Evans Street is a low traffic street that connects the Casper Rail Trail nicely with an Evansville town pathway along Evansville 5th street. This creates a biking loop connecting to the Reshaw subdivision trails and Reshaw river park trails, and the Oregon Trail Veterans cemetery bridge with possible eventual access to Casper Metro Road."

```
Respectfully,
-Nick and Stevie McNamee
Casper Residents
```


## RESPONSE:

Thank you for offering comments. A previous planning study also calls for a trail along the east side of Blackmore Road from the Casper Rail Trail to the I-25 Underpass. We accept that plan as a given and recommend a nonmotorized trail along Lathrop Road that will connect to the planned shared-use trail along Blackmore Road, as well as residences and commercial destinations along Lathrop Road and Curtis Street.

Evans Street is outside this study area. However, the Evansville Trail Linkage Study is now evaluating alternative trail alignments to connect Evansville to the Casper Rail Trail. One option under consideration is precisely the Evans Street connection you describe. While these US-20/26 intersections do not now meet warrants to allow signalization, a pedestrian-actuated warning light ("HAWK" or "RRFB") may be practical solution for a crossing US-20/26.

## PUBLIC COMMENT:

"We have approx. 200 Employees and contractors entering the Sinclair refinery at 7 AM and exiting at 3-4 PM. Traffic Control at the Blackmore and US-20/26 Intersection would allow easier entrance and exit to/from the Refinery. It would also make the intersection safer. A pedestrian crosswalk at Blackmore and US-20/26 would cause a security concern for the refinery. Our security systems are designed to deal with automobile traffic only. We would need to upgrade our security systems to deal with potential pedestrians."

## RESPONSE:

Thank you for offering comments. In response to your request, the study team evaluated signal warrants at this location. Traffic and crash analyses found that the intersection does not meet the necessary volume or crash warrants
to allow a traffic signal. One potential solution that has worked for large employers elsewhere is a staggered shift change. By changing a portion of employees ( $1 / 4$ th or $1 / 6$ th of them) every ten to fifteen minutes, the surge of traffic is spread out over an entire hour. Traffic demand during any minute is thereby reduced, which in turn reduces the delay experienced by individual drivers entering the intersection. Public roads normally allow pedestrians except on limited access highways.

## PUBLIC COMMENT:

"(It is) hard to get across US-20/26 at the Lathrop/Blackmore intersection. (Install a) stop light."

## RESPONSE:

Thank you for offering comments. In response, the study team evaluated traffic signal warrants at this location. However, traffic analysis found that the intersection does not now meet volume or crash warrants to allow installation of a traffic signal. Instead, the study recommends improved street lighting, signs, and markings, and consideration of a reduction in speed limit to 40 MPH .

## PUBLIC COMMENT:

During rush hour, turning left onto Yellowstone from Blackmore (is a problem). I am unsure, but possible lights or median merge are my suggestion.

## RESPONSE:

Thank you for offering comments. Traffic volumes do not currently meet MUTCD warrants for a traffic light. A median merge is not a legal maneuver, and it would require reconstruction of the corridor as a five-lane roadway, which is not financially feasible at present. The study has recommended short-term improvements (see previous responses) as well as consideration of future conversion of the corridor to an "Urban Boulevard" design with Indirect left turns (U-turn crossovers) at intervals along the road.

## PUBLIC COMMENT:

"A large amount of the traffic in this area is large commercial trucks. I have yet to see a roundabout that accommodates commercial vehicles safely, accommodates snowplows during the 8 months of the year they are a necessity, and in general they are less than practical for the traffic we have here. All you have to do is look at Cheyenne to know this is a very impractical solution.
-With the removal of the trailer park, there is absolutely no residential connected to Lathrop. It is entirely industrial. It makes absolutely no sense to spend money putting in trails, benches and crosswalks. This is not an area that is used and accessed by anyone for those purposes. Additionally, there are no planned trails that will directly connect and feed into this area. This is not an area where spending the money for complete streets makes any sense at all. I personally do not want children and pets encouraged to share space with heavy truck traffic when there are many other alternatives that will be much safer and make far more sense. Spending the money for the sake of making a project look good but without any true use for that bling is frankly stupid and the kind of waste that galls us all.

Here is what is truly needed: an actual to standards road, with drainage, curbs, and lighting. And without extra potholes. The signage needs to be better placed and there are a couple of intersections/driveways that could use better alignment to Lathrop. This road is used by heavy trucks and industrial traffic, but it is in no way built to support that. You cannot force the use to change by changing the design. The design needs to fit the use.

Yes, Curtis and Lathrop intersection is a mess. A lot of that has to do with the gas station driveway on Lathrop. If they closed that and forced all traffic to turn from Curtis into the gas station, Curtis is large enough to handle that traffic, Lathrop is not. It also doesn't help that the off ramp for 125 is right next to the Lathrop Road turn. It does force backups, because there is no dedicated right turn lane from Curtis onto Lathrop.

There are definitely hours of the day where it is impossible to turn left off of Lathrop onto Curtis. Fortunately, those of us who drive this every day know to take Craig Thomas over to Yellowstone Hwy and turn at the stop light onto Curtis. Again, two roads that can handle the traffic. Putting in additional stop lights so close to the two existing would actually create worse traffic backups. Honestly, a roundabout right there, especially with the train tracks less than a quarter mile from there, is begging for major issues across the board, but especially with emergency vehicles and industrial traffic. Having better turn areas, better signage and markings, some traffic islands, and a closed driveway from the gas station onto Lathrop, and many issues begin to lesson. It is not possible to erase all issues, because of how many roads and vehicles are condensed in that area. Frankly, it was badly "planned" from the start. Especially given where the railroad tracks are and will always be.

This project was meant to solve problems, not create an entire new set of more expensive and substantial problems. And I lived with roundabouts in Boston and Atlanta. They work in residential areas fairly well, but for large commercial and industrial traffic it creates headaches and hazards that never end. And that's before it snows.

There's my public input. I am frankly disappointed by what they gave us in the way of options and "ideas". It is all pretty cookie cutter and not really effective for the region, residents, or existing usages."

## RESPONSE:

Thank you for offering comments. Multiple competing community objectives, constraints due to the site and budget, pedestrian needs, community development, changing land use, and increasing traffic flows for this intersection offered difficult challenges to identify an appropriate solution. Nevertheless, we stand by our recommendation for the following reasons:

1. Circuitous Route: The Lathrop/Curtis intersection serves a service area with land uses largely intended for interstate travelers on I-25 (gas stations, hotels, restaurants, etc.) Drivers normally expect to return via the same route they used to reach their destination. Re-routing I-25-bound drivers to Craig Thomas Boulevard would create an excess travel distance of 1.7 miles ( 4 -to- 5 minutes driving time) and increase left-turn volumes and crash potential at four other intersections. Normally, traffic studies recommend alternatives that operate at a level of service " $C$ " or better in the design year (2040 in this case).
2. Public Skepticism Regarding Roundabouts: Since the first modern roundabout was built in the US in 1990, wherever highway agencies have proposed modern 'roundabouts' (not Boston's enormous antique 'rotaries,' or Atlanta's calming 'traffic circles') public opinion is typically 2/3rds opposed - before construction.

Surprisingly, this switches to 2/3rds in favor after construction. There are very good reasons for this change of opinion.
(Inset: Modern roundabout under construction inside a historic 'rotary' at the Interstate 87 / Interstate 587 interchange).

3. Large Trucks: Traffic counts show that heavy trucks account for $4 \%$ of peak hour vehicles entering the Curtis/Lathrop intersection, so the geometry of the roundabout was designed to accommodate commercial vehicles. All entry and circulating lanes are provided with extra width. Like many modern roundabouts, the proposed solution also has a traversable "Truck Apron" around the central island so that oversize vehicles can use the intersection without difficulty. This allows vehicles of any size to safely use the roundabout. In cases of very small urban roundabouts, the entire central island of a modern roundabout can be built low and flat so that it is traversable by trucks.
4. Roundabout Safety Record: National crash data shows roundabouts produce a more than $75 \%$ reduction in injuries and more than $90 \%$ reduction in fatalities compared to signal and stop-controlled intersections. Put another way: Signalized crossroads have four times as many injuries and ten times as many fatalities. This safety improvement is due to speed reduction and elimination of head-on, broad-side, angle, and head-on-left-turn crashes, which are the most dangerous intersection crash types. The safety improvement is helping our country eliminate some of the more than 10,000 fatalities and 2.4 million injuries that now occur at American intersections each year. (Source: Federal Highway Administration).
https://safety.fhwa.dot.gov/intersection/about/
5. Roundabout Snow Removal: Roundabouts are now commonplace at major ski resorts in Colorado, Utah, California, and Vermont. Plows remove snow from roundabouts in one continuous forward movement, starting at the central island and spiraling outward until the circulating roadway is cleared out. Plow drivers find the roundabout provides a convenient place to turn snowplows around so they can clear the opposite direction of the approach roadway. YIELD signs also allow all drivers to make a "rolling stop" so they do not get stuck in snow.
6. Roundabout Traffic Capacity: Roundabout capacity is best described as 'equal to or greater than a traffic signal.' Capacity depends on design, and the proposed design is tailored to fit the site. The most practical aspect at Curtis Street / Lathrop Road is that it will enable and promote desired land development on Lathrop Road and Luker Lane, without overloading left-turn capacity at the Curtis Street intersection. The roundabout also accommodates the gas station driveway on Lathrop Road by reducing westbound queues and allowing a right-turn-U-turn from that access point. The proposed design serves all traffic movements with very low delay and a high level of service under maximum traffic loads. The railroad tracks $1 / 4$ mile north are not significant for the Curtis/Lathrop intersection.
7. Lathrop Road Residential Area: The new owner of Aspens Mobile Home Park is removing obsolete dwelling units and updating streets and utilities in the neighborhood so that new housing units can be installed. A future trail planned on Blackmore Road will also connect to Lathrop Road. It is essential to provide safe pedestrian facilities along urban roadways so that non-drivers are not forced to share road space with trucks and other motor vehicles.
8. Roadway Needs: The study recommends improvements to drainage, lighting, pavement, and signage, as well as shoulders. Many of these improvements can be accomplished during routine street maintenance. However, forecast traffic and truck volumes do not suggest the need for additional travel lanes, and the roadway substructure does not show signs of failure that would call for reconstruction. We do recommend that areas of low shoulder should be filled with gravel and raised to pavement level. Curbs costs about $\$ 51.84$ per linear foot to install, so the projected $\$ 732,000$ cost for curbs along the entire Lathrop corridor would be unnecessary and cost prohibitive. However, curbs and enclosed drainage are recommended with proposed intersection improvements at the Curtis Road intersection.


[^0]:    ${ }^{1}$ Proven Safety Countermeasures: Medians and Pedestrian Crossing Islands in Urban Areas, Federal Highway Administration, Office of Safety Programs. https://www.eesi.org/files/cs-fhwa_medians.pdf

[^1]:    Copyright 02021 University of Florida. All Rights Reserved.

[^2]:    ${ }^{a}$ Basic minimum hourly volume

