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## Traffic Impact Study <br> Whetstone Industrial Park <br> Gunnison County, CO



State Highway 135 (mm 24.5)
Gunnison County, CO

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### 1.0 Introduction

This study is prepared as a CDOT Level Three Traffic Impact Study for "Whetstone Industrial Park" proposed industrial development located south of Crested Butte along SH 135 in unincorporated Gunnison County, Colorado. The purpose of this traffic analysis is to document the existing traffic conditions in the vicinity of the site, analyze the trip generation and trip distribution of the proposed development, estimate traffic volumes to the 20-year planning horizon, and determine what improvement's may be necessary to the SH 135 intersection for the Access Permit. The property is located adjacent to SH 135 and is shown in the vicinity map below.


Figure 1 - Vicinity Map

### 2.0 Project Description and Study Location

Whetstone Industrial Park is a 35.5 acre proposed development planned to consist of 17 industrial lots, with a use mix similar to the Riverland Industrial Park to the north. The proposal includes a single access to State Highway 135 using the existing permitted Buckley Dr (United access permit \#310086). The preliminary site plan is shown on Figure 2.


Figure 2 - Site Plan
The Whetstone Industrial Park site will access SH 135 near approximate mile 24.536, which is about $21 / 2$ miles south of the Town of Crested Butte and $241 / 2$ miles north of Gunnison. The industrial park will serve additional demand for these types of lots.

### 3.0 Methodology and Assumptions

This traffic analysis has been prepared in accordance with section 2.3(5) of the State Highway Access Code (Code) and the original assumptions have been discussed with the CDOT access manager for Region 3 and modeled in accordance with a similar adjacent property use and previously acceptable TIS submittal. The assumptions and methodology will provide a conservative analysis for the purposes of assessing traffic impacts resulting from buildout of Whetstone Industrial Park.

Trip generation, directional distribution, and truck percentages were developed based on traffic counts performed by SGM on June 6 \& 7, 2017, as well as information from CDOT's OTIS website.

Some assumptions that have been made to estimate future traffic generation and distribution may be influenced by many factors upon buildout. Those main assumptions are the trip generation rate and the directional distribution of traffic based upon the similar existing use at the Riverland Industrial Park.

### 4.0 Existing Roadway, Traffic, and Access Conditions

SH 135 is classified as R-A Regional Highway and is also designated as a Scenic Route. The intersection is aligned with a private property access to the east. The highway at the access location has developed auxiliary lanes as shown below.

Table 1 - Existing Auxiliary Lane Lengths at Buckley Drive

| Turn Lane | Lane Dimensions (ft) |
| :--- | :---: |
| NB Right Turn Deceleration | $250+175=425$ |
| NB Left Turn Deceleration | $250+125=375$ |
| NB Right Turn Acceleration | $325+150=475$ |
| SB Right Turn Deceleration | $215+200=415$ |
| SB Left Turn Deceleration | $100+100=200$ |

Traffic data for this study was collected on June 6 \& 7, 2017 and consisted of peak hour counts at the Riverland Dr (north) and the Buckley Dr (south). Both accesses serve Riverland, and the Buckley Drive access serves United and the proposed Whetstone Industrial Park as depicted in Figure 1. CDOT's OTIS website was consulted for SH 135 traffic volumes. The traffic counts, highway information and roadway signing is shown in Figure 3 below.


Figure 3 - Existing Traffic and Highway Information

Annual Average Daily Traffic from the CDOT OTIS data indicates 6700 vpd at the nearest station counter at milemarker 20.7. Peak hour movements collected at the existing Buckley Dr (S) / United access are also shown. Peak hour traffic counts were completed manually from 6:30 am to 9:00 am and 3:30 pm to 6:00 pm to determine the AM and PM peak hour. The raw counts and summarized information are contained in the Appendix.

The existing use at the west side of this intersection consists of Riverland Industrial Park, approximately 50 acres of light industrial uses. Riverland has two existing access locations along SH 135. Based upon the traffic counts, $73 \%$ (70\%) of the existing AM (PM) peak traffic generated by Riverland Industrial Park uses the north access location.

Also on the west side of the intersection is an existing United gravel pit and batch plant. These uses are a portion of the existing traffic shown in Figure 3, accounting for zero vehicles during the AM peak and two vehicles during the PM peak.

No traffic is generated by the proposed Whetstone Industrial Park site.
There is private residence at the east side of the intersection. The site consists of a residence and a small private contracting business.

The proposed access to the Whetstone Industrial Park site will be at Buckley Drive, a shared access currently used by Riverland and United. The site plan in figure 2 shows the sketch plan site layout.

The proposed access is located along relatively straight section of the SH 135 alignment. The grade of SH 135 is less than $3 \%$ in this area. The following photos show that adequate sight distance is provided in both directions for vehicles entering SH 135 at the existing and proposed access. The required sight distance for entering traffic at this access is 935 feet (for Multi-unit Trucks). The access currently serves large vehicles and is approximately 40' wide.


Figure 4 - Buckley Drive (Looking North)


Figure 5 - Buckley Drive (looking south)
At the intersection of Buckley Drive and SH 135, sight distance was measured in the field to be adequate in both directions for vehicles turning onto SH 135.


Figure 6 - Buckley Drive Sight Distance

### 4.1 Background Traffic Volumes

Based on CDOT's OTIS website, the 20-year factor on this segment of SH 135 is 1.41. Using this factor to forecast 20-year traffic, SH 135 will carry nearly 9500 vehicles per day in 2037. The SH 135 through traffic intersection volumes were increased by this factor and are shown with the unadjusted side street volumes below in Figure 7. Side street volumes were not adjusted because the Riverland Industrial Park and the private east side accesses are fully developed and significant traffic increase is not anticipated.


Figure 7-2037 Background Intersection Volumes

### 4.2 Generated Traffic Volumes

Trip generation data used for new development project's are typically approximated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, $9^{\text {th }}$ Edition. However, Industrial Park (Code 130) data that would be used for this development lacks sample sites as well as sample sites that have any relation to central mountain region typical service area. Due to that, and the direct adjacent relationship to service area and usage of the Riverland Industrial Park, both Riverland access points were counted to establish peak hour trip generation rates and directional distribution percentages for this proposed light industrial usage.

The AM peak hour was found to be from 8 am to 9 am with a total hourly volume of 274 vehicles, the PM peak hour occurred from 4:30 pm to $5: 30 \mathrm{pm}$ with a total of 219 vehicles.

The peak hour trip generation rate was considered by using the total peak hour volume and applying that volume both to the Riverland acreage ( $\sim 50 \mathrm{ac}$ ) and to the number of lots (33).

Table 2 - Trip Generation

| Total AM Peak Hour trips | Acre | Lot | Total PM Peak Hour trips | Acre | Lot |  |  |
| :--- | :---: | :---: | :---: | :--- | :--- | :--- | :--- |
| Riverland | 274 | 5.48 | 8.30 | Riverland | 219 | 4.38 | 6.64 |
| Whetstone |  | 195 | 141 | Whetstone |  | 155 | 113 |

The use by acreage intuitively seems to be a better application, since lot sizes vary between to the two developments. Trip generation by acreage is also the more conservative approach. This study will use an acreage based trip generation rate of 5.48 for the AM peak and 4.38 for the PM peak. Whetstone Industrial Park as proposed is approximately 35.5 acres and consists of 17 lots and will generate a total of approximately 218 AM and 169 PM peak hour trips.

The distribution of generated traffic will also be based upon the recent traffic counts. Generally, traffic is distributed $68 \%$ to/from the North and $32 \%$ to/from the South in the AM peak hour; and distributed $69 \%$ to/from the North and $31 \%$ to/from the South in the PM peak hour. The actual trip generation rates by movement are provided below for the AM and PM peak hour.

Table 3 - Trip Distribution

|  | AM Rate per acre (50ac) |  |  |  |  | PM Rate per acre (50ac) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | IN |  | OUT |  |  | IN |  | OUT |  |
| LT | 1.08 | 41\% | 2.18 | 77\% | LT | 0.48 | 23\% | 1.46 | 63\% |
| Total ${ }^{5}$ | 2.64 |  | 2.84 |  | Total ${ }^{\text {F }}$ | 2.06 |  | 2.32 |  |
| RT | 1.56 | 59\% | 0.66 | 23\% | RT | 1.58 | 77\% | 0.86 | 37\% |

Using the above trip generation rates per acre, by movement, the future traffic generation for the Whetstone Industrial Park is shown below.


Figure 8 - Trip Generation Intersection Volumes
The traffic generated by the site shown above includes trucks as Passenger Car Equivalents (PCE's). Actual truck percentages were determined to be $12 \%$ in the AM peak and $9 \%$ in the PM peak. Truck volumes were increased by movement to account for 2 PCE's for anticipated truck trip generation. The design vehicle for this intersection will be a multi-unit truck.

### 4.3 2037 Forecast Traffic Volumes

The Figure 9 on the following page shows the forecast 2037 peak hour total traffic demand at the intersection of SH 135 and Buckley Drive, including PCE's. This results from adding the traffic generated by the site (Figure 8) to the 2037 Future Intersection Volumes (Figure 7). The turn lane analysis will be based upon the traffic volumes shown in Figure 9.


Figure 9-2037 Future Intersection Volumes

### 5.0 Turn Lane Analysis

Based on the State Highway Access Code (SHAC), a left turn deceleration lane is required on an R-A Regional Highway when the peak hour entering volume exceeds 10 vph . A right turn deceleration lane is required on an R-A Regional Highway when the peak hour entering volume exceeds $25 . \mathrm{vph}$. A right turn acceleration lane is required when the peak hour turning volumes exceeds 50 vph .

A left turn acceleration lane may be required if it would benefit the safety and operation of the highway considering such factors as; highway speed and traffic, density, access volume, the volume of commercial trucks, the influence of nearby access, existing highway auxiliary lanes close to the access, nearby traffic control devices, available stopping sight distance, and where other topographic and highway design factors exist that determine the need.

Based upon the SHAC, Buckley Drive will require left and right deceleration lanes, and right turn acceleration based upon exceeding the volumes listed above. A northbound left turn acceleration lane is recommended based upon the left turning volume, speed and density of traffic of SH 135 and use of multi and single unit trucks at the access.

The table provided below shows the lane lengths required by the SHAC, as well as the lengths of the existing lanes. Substandard lane lengths are recommended to be improved due to the turning volume of the access speed and density of the highway. Also included in the table are existing auxiliary lanes for the east side private access that are not proposed to be improved as part of this permit.

Table 4-Auxiliary Lane Lengths at Buckley Drive

| Required Turn Lane | Required Lane Dimensions (ft) | Existing Lane Full + Taper (ft) |
| :--- | :--- | :--- |
| NB Right Turn Deceleration* |  | $250+175=425$ |
| NB Right Turn Acceleration* |  | $325+150=475$ |
| NB Left Turn Acceleration | 960 (inc. 18.5:1 taper) | none |
| NB Left Turn Deceleration | 600 (inc. 18.5:1 taper) +75 (storage) | $250+125=375$ |
| SB Right Turn Deceleration | 600 (inc. 18.5:1 taper) | $215+200=415$ |
| SB Left Turn Deceleration* |  | $100+100=200$ |
| SB Right Turn Acceleration | 960 (inc. 18.5:1 taper) | none |

*associated with private access to east, no improvements required
Additional requirements for construction of the proposed access include the following:

- The existing 35-40 ft width is adequate for multi-unit truck access
- The existing radii shall be confirmed to adequately pass entering and existing multi-unit trucks simultaneously using Autoturn or similar methodology
- Asphalt surfacing at least 50 ft from edge of highway
- NB Left turn storage length of at least 75 ft
- Redirect taper rate of 55:1


### 6.0 Conclusions / Recommendations

The proposed development of the Whetstone Industrial Park site along SH 135 will generate a total of approximately 218 AM and 169 PM peak hour trips, approximately $10 \%$ of which will be trucks.

The existing access has developed auxiliary lanes that will require improvements based upon Table 4.

## APPENDIX

Site Plan<br>Warranty Deed<br>Traffic Counts<br>Trip Generation Tables


18) Check with the issuing authority to determine which of the following documents are required to complete the review of your application.
a) Property map indicating other access, bordering roads and streets.
b) Highway and driveway plan profile.
c) Drainage plan showing impact to the highway right-of-way.
d) Map and letters detailing utility locations before and after development in and along the right-of-way.
e) Subdivision, zoning, or development plan.
f) Proposed access design.
g) Parcel and ownership maps including easements.
h) Traffic studies.
i) Proof of ownership.

1- It is the applicant's responsibility to contact appropriate agencies and obtain all environmental clearances that apply to their activities. Such clearances may include Corps of Engineers 404 Permits or Colorado Discharge Permit System permits, or ecological, archeological, historical or cultural resource clearances. The CDOT Environmental Clearances Information Summary presents contact information for agencies administering certain clearances, information about prohibited discharges, and may be obtained from Regional CDOT Utility/Special Use Permit offices or accessed via the CDOT Planning/Construction-Environmental-Guidance webpage http://www.dot.state.co.us/environmental/Forms.asp.

2- All workers within the State Highway right of way shall comply with their employer's safety and health policies/ procedures, and all applicable U.S. Occupational Safety and Health Administration (OSHA) regulations - including, but not limited to the applicable sections of 29 CFR Part 1910 - Occupational Safety and Health Standards and 29 CFR Part 1926 - Safety and Health Regulations for Construction.

Personal protective equipment (e.g. head protection, footwear, high visibility apparel, safety glasses, hearing protection, respirators, gloves, etc.) shall be worn as appropriate for the work being performed, and as specified in regulation. At a minimum, all workers in the State Highway right of way, except when in their vehicles, shall wear the following personal protective equipment: High visibility apparel as specified in the Traffic Control provisions of the documentation accompanying the Notice to Proceed related to this permit (at a minimum, ANSI/ISEA 107-1999, class 2); head protection that complies with the ANSI Z89.1-1997 standard; and at all construction sites or whenever there is danger of injury to feet, workers shall comply with OSHA's PPE requirements for foot protection per 29 CFR 1910.136, 1926.95, and 1926.96. If required, such footwear shall meet the requirements of ANSI Z41-1999.

Where any of the above-referenced ANSI standards have been revised, the most recent version of the standard shall apply.

3- The Permittee is responsible for complying with the Revised Guidelines that have been adopted by the Access Board under the American Disabilities Act (ADA). These guidelines define traversable slope requirements and prescribe the use of a defined pattern of truncated domes as detectable warnings at street crossings. The new Standards Plans and can be found on the Design and Construction Project Support web page at:
[http://www.dot.state.co.us/DesignSupport/](http://www.dot.state.co.us/DesignSupport/), then click on Design Bulletins.
If an access permit is issued to you, it will state the terms and conditions for its use. Any changes in the use of the permitted access not consistent with the terms and conditions listed on the permit may be considered a violation of the permit.
The applicant declares under penalty of perjury in the second degree, and any other applicable state or federal laws, that all information provided on this form and submitted attachments are to the best of their knowledge true and complete.

I understand receipt of an access permit does not constitute permission to start access construction work.

Applicant or Agent for Permittee signature

| Print name | Date |
| :--- | :--- |
| Dan Cokley | $6 / 21 / 17$ |

If the applicant is not the owner of the property, we require this application also to be signed by the property owner or their legally authorized representative (or other acceptable written evidence). This signature shall constitute agreement with this application by all owners-of-interest unless stated in writing. If a permit is issued, the property owner, in most cases, will be listed as the permittee.

| Property owner signature | Print name | Date |
| :---: | :---: | :---: |

# INSTRUCTIONS FOR COMPLETING APPLICATION FOR ACCESS PERMIT (CDOT FORM NO. 137) <br> January 2010 

To construct, relocate, close, or modify access(es) to a State Highway or when there are changes in use of such access point(s), an application for access permit must be submitted to the Colorado Department of Transportation (CDOT) or the local jurisdiction serving as the issuing authority for State Highway Access Permits. Contact the CDOT Regional Access Unit in which the subject property is located to determine where the application must be submitted. The following link will help you determine which CDOT Region office to contact:

## http://www.dot.state.co.us/AccessPermits/PDF/Region_Address_and_Map.pdf

All applications are processed and access permits are issued in accordance to the requirements and procedures found in the most current version of the State Highway Access Code (Access Code). Copies of the Access Code and the application form are available from the CDOT Headquarters, Access Unit located at 4201 East Arkansas Avenue, Denver, CO 80222 and in each of the six Regional CDOT offices. The locations of CDOT Regional Offices, the Access Code and the application form are also available from CDOT's web site at:
http://www.dot.state.co.us/AccessPermits/index.htm
Please complete all information requested accurately. Access permits granted based on applications found to contain false information may be revoked. An incomplete application will not be accepted. If additional information, plans and documents are required, attach them to the application. Keep a copy of your submittal for your records. Please note that only the original signed copy of the application will be accepted. Do not send or enclose any permit fee at this time. A permit fee will be collected if an access permit is issued. The following is a brief description of the information to be provided on each enumerated space on the application form (CDOT Form 137, 2010).

1. Property Owner (Permittee): Please provide the full name, mailing address and telephone number and the E-mail address (if available) of the legal property owner (owner of the surface rights). Please provide a telephone number where the Permittee can be reached during business hours (8:00 a.m. to 5:00 p.m.). Having a contract on the property is not a sufficient legal right to that property for purposes of this application. If the access is to be on or across an access easement, then a copy of the easement MUST accompany this application. If federal land is involved, provide the name of the relevant federal agency AND attach copy of federal authorization for property use.
2. Agent for permittee: If the applicant (person completing this application) is different than the property owner (Permittee), provide entity name (if applicable), the full name of the person serving as the Agent, mailing address, telephone number, and the E-mail address (if available). Please provide a telephone number where the Agent can be reached during business hours (8:00 a.m. to 5:00 p.m.). Joint applications such as owner/lessee may be submitted. Corporations must be licensed to do business in Colorado: All corporations serving as, or providing, an Agent as the applicant must be licensed to do business in Colorado.
3. Address of Property to be Served: Provide if property to be served has an official street address. If the access is a public road, note the name (or future name) of the road.
4. Legal Description of Property: Fill in this item to the extent it applies. This information is available at your local County Courthouse, or on your ownership deed(s). A copy of the deed may be required as part of this application in some situations. To determine applicability, check with the CDOT's Regional Access Manager or issuing authority staff.
5. State Highway: Provide the State Highway number from which the access is requested.
6. Highway Side: Mark the appropriate box to indicate what side of the highway the requested access is located.
7. Access Mile Point: Without complete information, we may not be able to locate the proposed access. To obtain the distance in feet, drive the length between the mile point and the proposed access, rounding the distance on the odometer to the nearest tenth of a mile; multiply the distance by 5,280 feet to obtain the number of feet from the mile point. Then enter the direction (i.e. north, south, east, west) from the mile point to the proposed access. Finally, enter the mile point number. It is helpful in rural or undeveloped areas if some flagging is tied to the right-of-way fence at the desired location of the access. Also, if there is a cross street or road close to the proposed access, note the distance in feet (using the same procedures noted above) from that cross street or road.
8. Access Construction Date: Fill in the date on which construction of the access is planned to begin.
9. Access Request: Mark items that apply. More than one item may be checked.
10. Existing property use: Describe how the property is currently being used. For example, common uses are Single Family Residential, Commercial or Agricultural.
11. Existing Access: Does the property have any other legal alternatives to reach a public road other than the access requested in this application? Note the access permit number(s) for any existing state highway access point(s) along with their issue date(s). If there are no existing access point(s), mark the "no" box.
12. Adjacent Property: Please mark the appropriate box. If the "yes" box is marked, provide a brief description of the property (location of the property in relation to the property for which this access application is being made).
13. Abutting Streets: If there are any other existing or proposed public roads or easements abutting the property, they should be shown on a map or plan attached to this application.
14. Agricultural Acres: Provide number of acres to be served.
15. Access Use: List the land uses and square footage of the site as it will be when it is fully developed. The planned land uses as they will be when the site is fully developed are used to project the amount of traffic that the site will generate, peak hour traffic levels and the type of vehicles that can be expected as a result of the planned land uses. There may be exceptional circumstances that would allow phased installation of access requirements. This is at the discretion of the CDOT Regional Access Unit or issuing authority staff.
16. Estimated Traffic Count: Provide a reasonable estimate of the traffic volume expected to use the access. Note the type of vehicles that will use the access along with the volume (number of vehicles in and out at either the peak hour or average daily rates) for each type of vehicle. A vehicle leaving the property and then returning counts as two trips. If 40 customers are expected to visit the business daily, there would be 80 trips in addition to the trips made by all employees and other visitors (such as delivery and trash removal vehicles). If the PDF on-line version of this application is being used, the fields for each type of vehicle will automatically be added together to populate the last field on the page.
17. Documents and Plans: The CDOT Regional Access Manager or issuing authority staff will determine which of these items must be provided to make the application complete. Incomplete applications will not be accepted. If an incomplete application is received via U.S. mail or through means other than in the hand of the Access Manager or issuing authority staff, it will not be processed. It is the responsibility of the applicant to verify with the CDOT Regional Access Manager or issuing authority staff whether the application is complete at the time of submission.

Signature: Generally, if the applicant is not the property owner, then the property owner or a legally authorized representative must sign the application. With narrow exceptions, proof of the property owner's consent is required to be submitted with the application (proof may be a power of attorney or a similar consent instrument). The CDOT Regional Access Manager or issuing authority staff will determine if the exception provided in the Access Code (2.3 (3) (b)) is applicable.

If CDOT is the issuing authority for this application, direct your questions to the CDOT Regional Access Manager or the issuing authority staff serving the subject property.
http://www.dot.state.co.us/AccessPermits/PDF/Region_Address_and_Map.pdf
If the application is accepted, it will be reviewed by the CDOT Regional Access Manager or the issuing authority staff. If an Access Permit is issued, be sure to read all of the attached Terms and Conditions before signing and returning the Access Permit. The Terms and Conditions may require that additional information be provided prior to issuance of the Notice to Proceed.

The CDOT Regional Access Manager (or issuing authority staff) MUST be contacted prior to commencing work on any Access Permit project. A Notice to Proceed that authorizes the Permittee to begin access related construction MUST be issued prior to working on the access in the State Highway right-of-way. The Notice to Proceed may also have Terms and Conditions that must be fulfilled before work may begin on the permitted access.

