

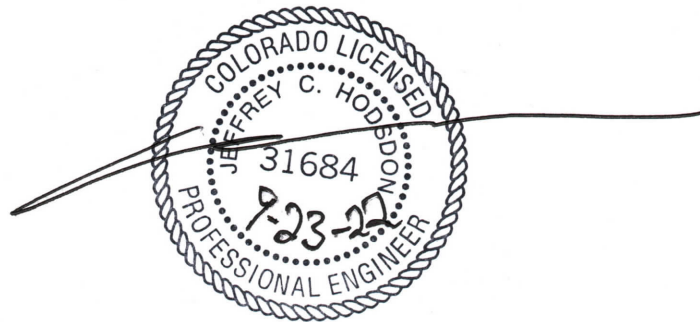


LSC TRANSPORTATION CONSULTANTS, INC.
2504 East Pikes Peak Avenue, Suite 304
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Rock Creek Canyon Batch Plant Traffic Technical Memorandum (LSC #S224470) September 23, 2022

Traffic Engineer's Statement

This traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

10.19.22

Date

Rock Creek Canyon Concrete Batch Plant

Prepared for:

Travis Bell
General Superintendent
Castle Rock Construction Company of Colo. LLC

SEPTEMBER 23, 2022

LSC Transportation Consultants
Prepared by: Jeffrey C. Hodsdon, P.E.

LSC #S224470



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 Site Plan Exhibit

 Site Distance Exhibit

 Haul Route Exhibit



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September 23, 2022

Travis Bell
General Superintendent
Castle Rock Construction Company of Colo. LLC

RE: Concrete Batch Plant
Traffic Technical Memorandum
El Paso County, CO
LSC # S224470

Dear Mr. Bell,

LSC Transportation Consultants, Inc. has prepared this transportation memorandum for the proposed temporary concrete batch plant on Rock Creek Canyon Road in El Paso County, Colorado (El Paso County parcel ID 7500000236).

One access point is proposed for the property, located approximately 640 feet northwest of the intersection of Rock Creek Canyon Road/State Highway 115. This temporary, private road connection would be stop-sign controlled on the westbound approach and would be a full-movement, T-intersection with Rock Creek Canyon Road. This report has been prepared for submittal to El Paso County and CDOT.

REPORT CONTENTS

The preparation of this report included the following:

- Inventory of existing adjacent Rock Creek Canyon Road. This included surface conditions, functional classification, roadway widths, posted speed limit, access spacing;
- Evaluation of intersection/access sight distance at the proposed batch plant temporary access point on Rock Creek Canyon Road, based on current criteria in El Paso County's *Engineering Criteria Manual (ECM)*;
- Truck turning analysis at the site access driveway to determine the width and corner radii necessary to accommodate the design vehicle;
- Estimates of average weekday and peak-hour trip generation for the proposed temporary concrete batch plant;
- Identification of the proposed haul route and projections of site-generated traffic volumes on Rock Creek Canyon Road east of the proposed site-access;

- EDLA and ESAL calculations for the segment of Rock Creek Canyon Road east of the proposed site-access; and
- Summary of compiled data, analysis, findings, and recommendations.

LAND USE AND ACCESS

The attached site plan shows the site location relative to the adjacent and nearby roads. The temporary concrete batch plant is located west of SH 115 at 710 Rock Creek Canyon Road in El Paso County, Colorado. A copy of the site plan is attached.

Access to the site is via a single private, temporary driveway to be located approximately 640 feet west of the intersection of SH 115/Rock Creek Canyon (centerline distance).

ROAD AND TRAFFIC CONDITIONS

The attached site plan shows the roads adjacent to and in the vicinity of the site. Adjacent roads serving the site are identified below followed by a brief description of each:

State Highway 115 (SH 115) is classified as “E-X: Expressway, Major Bypass” by CDOT and extends from Cañon City to Colorado Springs. The posted speed limit along SH 115 in the vicinity is 60 mph. Adjacent to the site, the State Highway right-of-way (ROW) is about 100 feet. There are four through lanes (two per direction) and existing auxiliary left- and right-turn lanes at the intersection of SH 115/Rock Creek Canyon.

Rock Creek Canyon Road is a Local east-west, two-lane rural roadway with a posted speed limit of 20 mph. Between the proposed site access and SH 115, Rock Creek Canyon Road is a paved, 24-foot-wide roadway without a shoulder. Currently, there is a single-lane eastbound approach at the signalized intersection of SH 115/Rock Creek Canyon Road.

EXISTING TRAFFIC VOLUMES

Existing Traffic Volumes

Vehicular daily traffic counts were conducted on Rock Creek Canyon Road west of the site from Monday, August 22, 2022 through Friday, August 26, 2022. Raw count data is attached. The average daily traffic volume recorded was 481 vehicles per day. Note: it is our understanding that the campground and museum at the west end of Rock Creek Canyon Road will be closed for the season starting on October 1st.

SIGHT DISTANCE

El Paso County Requirements

The proposed access point (a private, temporary access driveway) must meet *Engineering Criteria Manual* standards for sight distance. The site-access point is anticipated to be a full-movement, stop-sign-controlled intersection with Rock Creek Canyon Road. All sight-distance field measurements utilized the following heights for vehicles approaching from the east or west:

- Passenger vehicles – 3.5 feet for driver's eye height
- Multi-unit trucks – 7.5 feet for driver's eye height

Entering Sight Distance

The minimum required entering sight distance for both approaches at the proposed site-access location is listed in Table 2-35 of the County's *Engineering Criteria Manual (ECM)*. The posted speed limit is 20-mph. Please refer to the attached sight distance exhibit.

Rock Creek Canyon Road has the following roadway gradients:

- At proposed site access – 6.6 percent gradient
- Downgrade in the southeast-bound-direction
- Upgrade for northwest-bound traffic
- Northwest of proposed site access – 4.1 - 5.7 percent downgrade
- Southeast of proposed site access – 7.7 - 8.2 percent upgrade

Multi-Unit Trucks

Sight distance for multi-unit trucks is based on a driver's eye height of 7.5 feet. For multi-unit trucks, 425 feet of entering sight distance would be required.

Field measurements recorded greater than 1,000 feet of sight distance looking to the west and 575 feet looking to the east (unobstructed to SH 115) from the proposed site-access location. As such, entering sight distances on both approaches at the proposed site access location would meet the *ECM* requirement for multi-unit trucks.

Passenger Vehicles

Sight distance for passenger vehicles is based on a driver's eye height of 3.5 feet. For passenger vehicles, 280 feet of entering sight distance would be required.

Field measurements recorded 921 feet of sight distance looking to the west and 575 feet looking to the east (unobstructed to SH 115) from the proposed site-access location. As such, entering sight distances on both approaches at the proposed site access location would meet the minimum *ECM* sight distance requirement for passenger vehicles.

Sight Distance Along the Roadway

Per *ECM* Table 2-34, due to the roadway gradients on Rock Creek Canyon Road northwest and southeast of the site access, the following sight-distance adjustment factors would be applied to the stopping sight distance:

- Upgrade – 0.80
- Downgrade – 1.35

The stopping sight distance required is also shown in the exhibit. Stopping sight distance would meet *ECM* criteria.

APPLICANT-PROPOSED HAUL ROUTE

The haul route described below (and shown in the attached exhibit) is proposed by the applicant. All wet-mix concrete trucks will use this specific route when traveling to/from the site:

1. From the site access, turn southbound-left onto Rock Creek Canyon Road and continue eastbound for 0.3 miles to SH 115.
2. Turn right onto SH 115 and travel a short distance south to the job site.

AUTOTURN VEHICLE-TURNING ANALYSIS

LSC has completed an AutoTurn analysis to determine the radii necessary to accommodate the design vehicles (WB-50) at the site access. A detailed AutoTurn analysis exhibit is attached, which depicts the entering and exiting vehicle-movement wheel and overhang paths.

Based on the AutoTurn results a northeast corner compound radius of about 140 feet followed by about a 60-foot radius would best accommodate a WB-50 design vehicle. Most trucks would be shorter than a WB-50. An access width of about 42 feet (exclusive of radii) is recommended based on this analysis. Access radii are based on those shown on that exhibit. The shaded areas on the attached exhibit represent areas where additional driving surface will be needed.

PROPOSED DAILY OPERATIONS

Hours of Operation

Hours of operation for the concrete batch plant will be from 7:00 a.m. – 7:00 p.m. for a 41-day period. Empty haul vehicles would begin arriving around 7:00 a.m. each weekday and depart shortly after being loaded. Drivers would transport wet-mix concrete to roadway paving locations along SH 115 south of Rock Creek Canyon Road. The applicant has provided truck trip-generation data estimates, with the complete data set attached for reference. Aggregate trucks, cement trucks, and other trucks are included in the estimates.

On-Site Employees

Per the applicant, five employees would remain on-site throughout the day. These employees would drive to the batch plant each morning (before 7:00 a.m.) using their personal vehicles and leave at the end of the shift (after 7:00 p.m.). Employee personal vehicles are anticipated to arrive slightly before heavy vehicles would arrive to begin preparing for the day's workload.

Truck Haul Frequency

An average of 220 loads per day (162 loaded concrete trucks exiting and 58 loaded aggregate/cement/water, etc. trucks entering the plant site) would be generated by the site for each day during peak mainline paving operations. Approximately 21 loaded trucks would enter/depart the site each hour.

Average Load Size

The anticipated average load size is 25 tons of load material for entering trucks and 11 cubic yards of wet-batch concrete for exiting trucks. The total amount of raw material required for the paving project is 57,000 cubic yards of concrete, which equates to 1,782 cubic yards of concrete hauled per day.

TRIP GENERATION

Typically, site-generated vehicle trips for proposed land uses are estimated using the nationally-published trip-generation rates from *Trip Generation, 11th Edition, 2021* by the Institute of Transportation Engineers (ITE). However, the applicant has provided trip-generation estimates based on the concrete plant's anticipated peak production rate during construction.

- Truck-haul trips only – 440 total vehicle trips on the average weekday (half entering and exiting every 24 hours)
- Employee and other passenger vehicle trips – 20 total vehicle trips on the average weekday (half entering and exiting every 24 hours)
- Truck-haul trips and employee/other passenger vehicle trips combined – 460 total vehicle trips on the average weekday (half entering and exiting every 24 hours)
- 42 total truck trips per hour, with approximately 21 empty trucks entering and 21 loaded trucks exiting the site each hour.

Table 1: Estimated Total Site Vehicle-Trip Generation

Vehicle Type	Analysis Period	Entering	Exiting	Total
Trucks (Empty and Loaded)	Daily 24-Hour	220	220	440
Employees & Other Passenger Veh.		10	10	20
Total (Trucks + Passenger Veh.)		230	230	460
Vehicle Type	Analysis Period	Entering	Exiting	Total
Trucks (Empty and Loaded)	Hourly Average	21	21	42

TRIP DISTRIBUTION AND ASSIGNMENT

Trip Directional Distribution

All site-trips would use the segment of Rock Creek Canyon Road between SH 115 and the site access. No trips would be oriented to/from the west of the site on Rock Creek Canyon Road.

Site-Generated Traffic

The projected site-generated daily and average hourly traffic volumes on Rock Creek Canyon Road between SH 115 and the site access is equal to the trip-generation estimates shown in Table-1, as all site-generated trips will utilize this segment of roadway.

Existing-Plus-Site-Generated Traffic Volumes

The total projected volume for Rock Creek Canyon Road east of the batch-plant driveway is 940 vehicles per day (vpd). This total is the sum of the existing traffic volumes (481 vpd) and projected average daily batch-plant-generated traffic volumes (460 vpd). These volumes represent the projected total daily traffic volume during the 41-day period the batch plant will be operating.

EDLA AND ESAL CALCULATIONS

Equivalent Daily Load Application (EDLA) and Equivalent Single Axle Load (ESAL) values based on projected ADTs on Rock Creek Canyon Road. Analysis results are shown in Table 2.

AUXILIARY TURN LANES

Based on an average of 21 entering vehicles per hour, *ECM* thresholds requiring auxiliary turn lanes on Rock Creek Canyon Road would not be exceeded.

FINDINGS/CONCLUSIONS

- The applicant has provided trip-generation estimates based on the concrete plant's anticipated peak production rate during construction.
- Truck-haul trips only – 440 total vehicle trips on the average weekday (half entering and exiting every 24 hours).
- Truck-haul trips and employee trips combined – 460 total vehicle trips on the average weekday (half entering and exiting every 24 hours).
- On average, 42 total truck trips per hour, with approximately 21 empty trucks entering and 21 loaded trucks exiting the site each hour.
- The proposed site-access point would meet the *Engineering Criteria Manual's* standards for stopping sight distance on grade and intersection sight distance. Please refer to the "Sight Distance" section for details.
- Please refer to the AutoTurn Analysis section for the truck turning exhibits at the site access and recommendations for the access radii, width, etc.
- Please refer to the "EDLA/ESAL Calculations" section for calculated street-segment-specific EDLA and ESAL) values based on projected ADTs on Rock Creek Canyon Road and the number of days this segment of County road will be used for hauling.

* * * * *

Please contact me if you have any questions regarding this report.

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Jeffrey C. Hodsdon, P.E.
Principal

JCH/JAB:jas

Enclosures: Table 2
Figure 1
Traffic Count Report
Site Plan Exhibit
Sight Distance Exhibit
Haul Route Exhibit

Table 2

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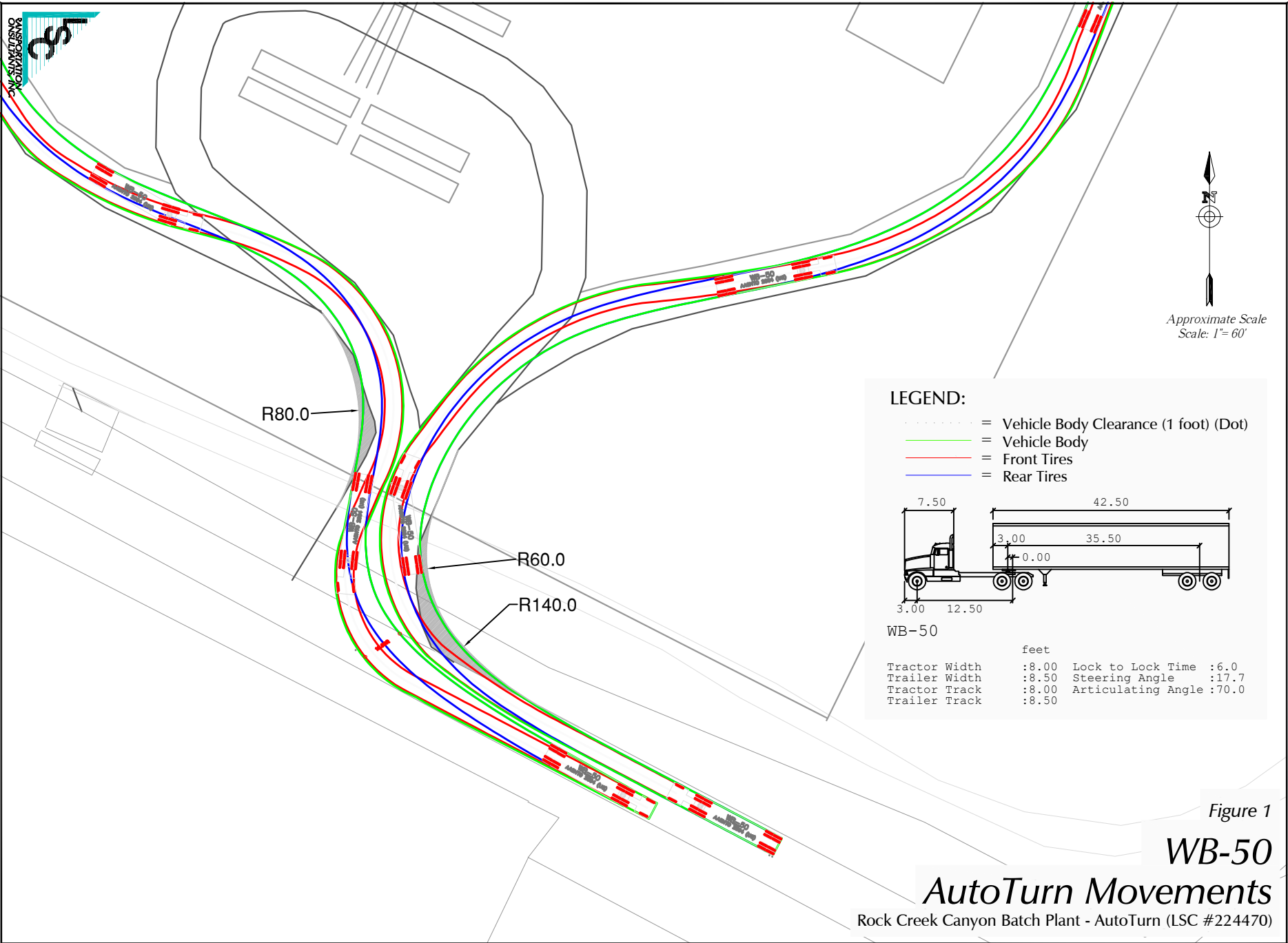
Table 2
Rock Creek Canyon Road - Temporary Concrete Batch Plant
ESAL Calculation Table
Rock Creek Canyon Road
Rural Local

Vehicle Type	Total Percent of One-Way ADT	Design Lane Percent of One-Way ADT	Vehicles in Single Lane	CDOT Factor	EDLA	EDLA X 41 Days	20 yr ESAL
Batch Plant Traffic (41 Days)							
Multi-Unit Trucks	91.67%	91.67%	220	1.087	239.14	9805	Loading for 41 days only
Single-Unit Trucks	0.00%	0.00%	0	0.249	0.00	0.0	
Passenger Cars/Pickup Trucks	8.33%	8.33%	20	0.003	0.06	2.5	
Totals			240		239.20	9,807	9,807
Existing Traffic							
Multi-Unit Trucks	1.00%	1.00%	2	1.087	2.61		19,044
Single-Unit Trucks	2.00%	2.00%	5	0.249	1.20		8,725
Passenger Cars/Pickup Trucks	97.00%	97.00%	233	0.003	0.70		5,098
Total			240		4.50	185	32,868
Total 20 year (ESAL) loading (Existing plus Batch Plant)							42,675
Percent of 20-year ESAL loading by the batch plant							23%

Source: LSC Transportation Consultants, Inc.

Figures 1-2





Approximate Scale
Scale: 1" = 60'

Figure 1
WB-50
AutoTurn Movements
Rock Creek Canyon Batch Plant - AutoTurn (LSC #224470)

Traffic Counts



Default Report Title
 Use Preferences to Define Titles

Site Code: 00224270
 Station ID:
 Location 1:
 Location 2:
 Location 3:
 Location 4:

Comment 1:
 Comment 2:
 Comment 3:
 Comment 4:
 Latitude: 0.000000
 Longitude: 0.000000

8/22/2022	Unknown, 1	Unknown, 2	Total
Time			
12:00 AM	*	*	0
1:00	*	*	0
2:00	*	*	0
3:00	*	*	0
4:00	*	*	0
5:00	*	*	0
6:00	*	*	0
7:00	*	*	0
8:00	*	*	0
9:00	*	*	0
10:00	*	*	0
11:00	*	*	0
12:00 PM	*	*	0
1:00	*	*	0
2:00	*	*	0
3:00	*	*	0
4:00	27	12	39
5:00	26	11	37
6:00	27	9	36
7:00	17	6	23
8:00	8	5	13
9:00	5	2	7
10:00	0	0	0
11:00	2	0	2
Total	112	45	157
Percent	71.3%	28.7%	
AM Peak			
Volume			
PM Peak	4:00	4:00	4:00
Volume	27	12	39

Default Report Title
 Use Preferences to Define Titles

Site Code: 00224270
 Station ID:
 Location 1:
 Location 2:
 Location 3:
 Location 4:

Comment 1:
 Comment 2:
 Comment 3:
 Comment 4:
 Latitude: 0.000000
 Longitude: 0.000000

8/23/2022	Unknown, 1	Unknown, 2	Total
Time			
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2:00	0	0	0
3:00	0	2	2
4:00	0	1	1
5:00	1	10	11
6:00	2	15	17
7:00	11	24	35
8:00	8	24	32
9:00	17	21	38
10:00	11	15	26
11:00	16	10	26
12:00 PM	12	18	30
1:00	11	13	24
2:00	16	15	31
3:00	21	12	33
4:00	31	22	53
5:00	29	16	45
6:00	25	7	32
7:00	15	8	23
8:00	9	4	13
9:00	6	0	6
10:00	2	1	3
11:00	2	0	2
Total	245	238	483
Percent	50.7%	49.3%	
AM Peak	9:00	7:00	9:00
Volume	17	24	38
PM Peak	4:00	4:00	4:00
Volume	31	22	53

Default Report Title
 Use Preferences to Define Titles

Site Code: 00224270
 Station ID:
 Location 1:
 Location 2:
 Location 3:
 Location 4:

Comment 1:
 Comment 2:
 Comment 3:
 Comment 4:
 Latitude: 0.000000
 Longitude: 0.000000

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4:00	0	1	1
5:00	0	6	6
6:00	3	19	22
7:00	4	14	18
8:00	12	20	32
9:00	14	22	36
10:00	12	18	30
11:00	11	16	27
12:00 PM	13	17	30
1:00	16	20	36
2:00	12	15	27
3:00	23	9	32
4:00	29	12	41
5:00	23	10	33
6:00	30	14	44
7:00	21	8	29
8:00	12	4	16
9:00	6	2	8
10:00	4	4	8
11:00	0	1	1
Total	246	234	480
Percent	51.3%	48.8%	
AM Peak	9:00	9:00	9:00
Volume	14	22	36
PM Peak	6:00	1:00	6:00
Volume	30	20	44

Default Report Title
 Use Preferences to Define Titles

Site Code: 00224270
 Station ID:
 Location 1:
 Location 2:
 Location 3:
 Location 4:

Comment 1:
 Comment 2:
 Comment 3:
 Comment 4:
 Latitude: 0.000000
 Longitude: 0.000000

8/25/2022	Unknown, 1	Unknown, 2	Total
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3:00	0	1	1
4:00	1	2	3
5:00	1	12	13
6:00	5	15	20
7:00	3	27	30
8:00	17	24	41
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2:00	12	15	27
3:00	17	11	28
4:00	28	12	40
5:00	28	26	54
6:00	22	7	29
7:00	14	6	20
8:00	18	2	20
9:00	9	5	14
10:00	6	0	6
11:00	1	1	2
Total	255	244	499
Percent	51.1%	48.9%	
AM Peak	8:00	7:00	8:00
Volume	17	27	41
PM Peak	4:00	5:00	5:00
Volume	28	26	54

Default Report Title
 Use Preferences to Define Titles

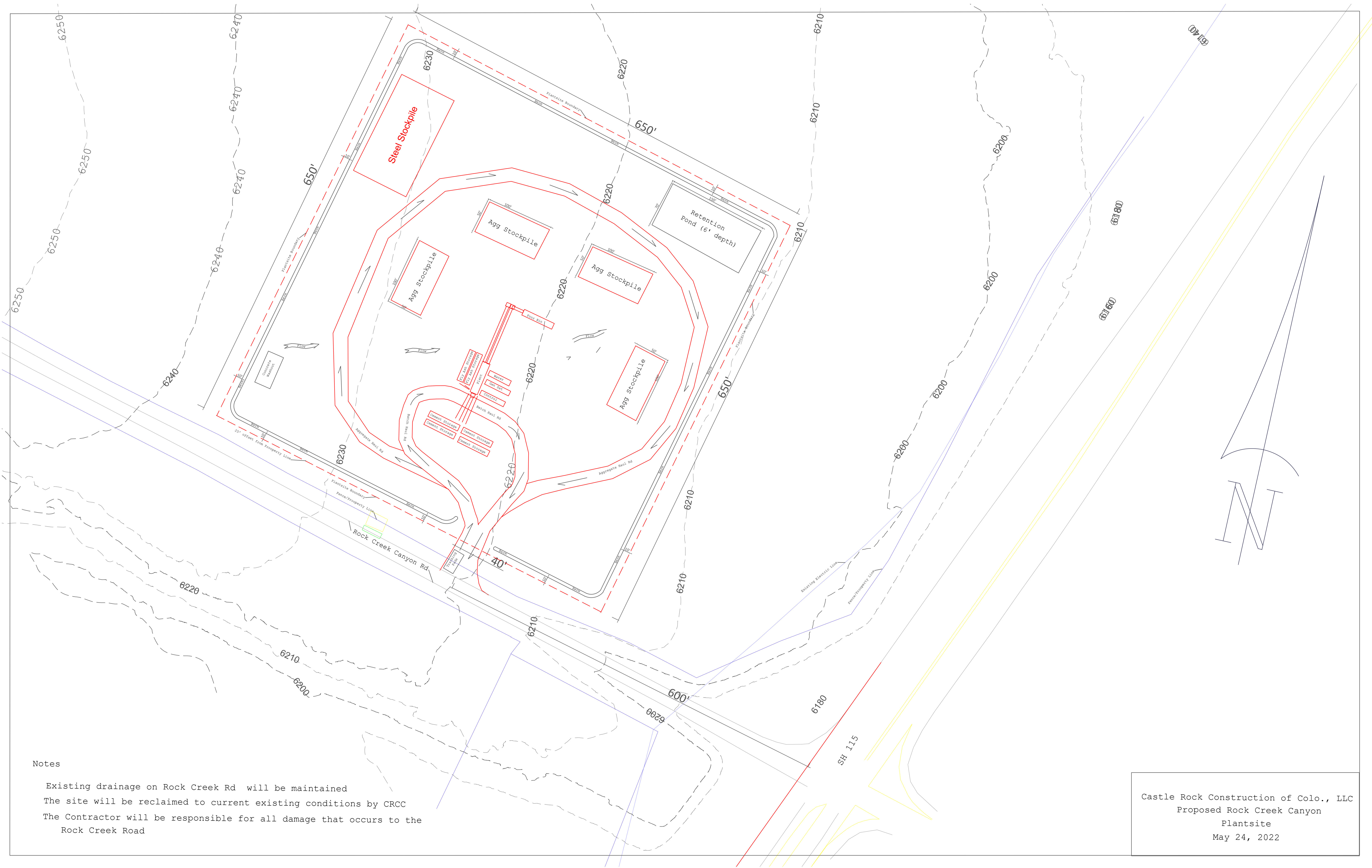
Site Code: 00224270
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 Location 2:
 Location 3:
 Location 4:

Comment 1:
 Comment 2:
 Comment 3:
 Comment 4:
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 Longitude: 0.000000

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5:00	1	9	10
6:00	5	18	23
7:00	5	21	26
8:00	13	28	41
9:00	16	16	32
10:00	14	17	31
11:00	13	21	34
12:00 PM	13	4	17
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4:00	*	*	0
5:00	*	*	0
6:00	*	*	0
7:00	*	*	0
8:00	*	*	0
9:00	*	*	0
10:00	*	*	0
11:00	*	*	0
Total	80	137	217
Percent	36.9%	63.1%	
AM Peak	9:00	8:00	8:00
Volume	16	28	41
PM Peak	12:00 PM	12:00 PM	12:00 PM
Volume	13	4	17
Grand Total	938	898	1836
Percent	51.1%	48.9%	
ADT		ADT: 481	AADT: 481

Site Plan Exhibit





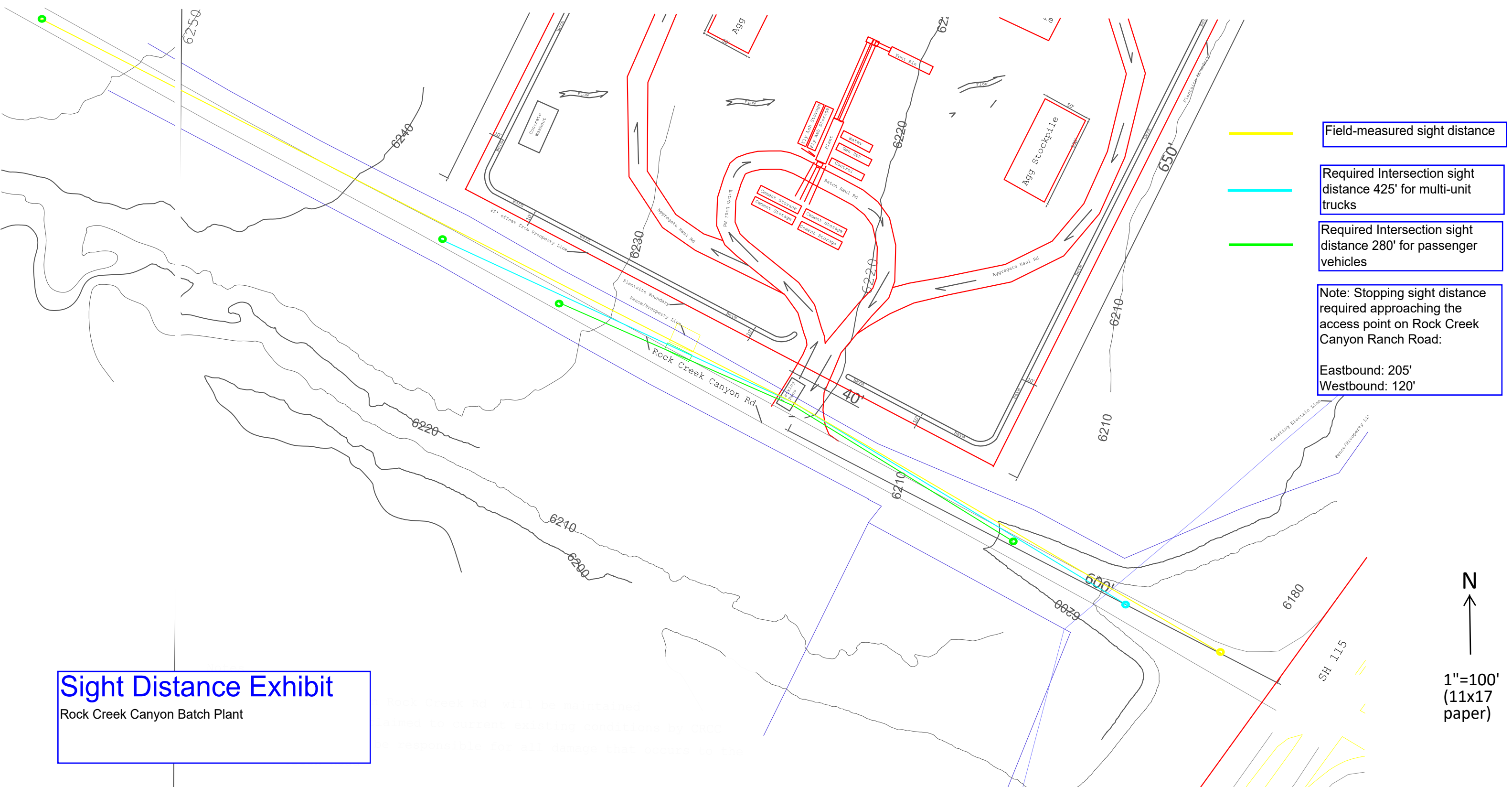
Notes

Existing drainage on Rock Creek Rd will be maintained
 The site will be reclaimed to current existing conditions by CRCC
 The Contractor will be responsible for all damage that occurs to the
 Rock Creek Road

Castle Rock Construction of Colo., LLC
 Proposed Rock Creek Canyon
 Plantsite
 May 24, 2022

Sight Distance Exhibit





Field-measured sight distance

Required Intersection sight distance 425' for multi-unit trucks

Required Intersection sight distance 280' for passenger vehicles

Note: Stopping sight distance required approaching the access point on Rock Creek Canyon Ranch Road:

Eastbound: 205'
Westbound: 120'

Sight Distance Exhibit

Rock Creek Canyon Batch Plant

Rock Creek Rd will be maintained maintained to current existing conditions by CRCC. CRCC will be responsible for all damage that occurs to the



1"=100'
(11x17
paper)

Haul Route Exhibit



Golden Eagle Plant Haul Plan

Notes:

- 1) See traffic impact analysis for the method of handling traffic leaving the plant, and anticipated traffic volumes.

Legend:

- ← Loaded Trucks
- ← Empty Trucks

A haul route agreement will be needed between the applicant/developer and the County Department of Public Works for haul vehicles on Rock Creek Canyon Road. They have been informed of this project. Any comments provided by them will be forwarded to the applicant.

