

32ND STREET MINI-ROUNDBOUT FEASIBILITY STUDY
FOR
CITY OF DURANGO, COLORADO

MAY 9TH, 2022

Prepared for:
CITY OF DURANGO
949 E 2ND AVENUE
DURANGO, CO 81301

Prepared by:
BOHANNAN HUSTON, INC.
9785 MAROON CIR.
ENGLEWOOD, CO 80112

PREPARED BY:

APPROVED BY:

Kyle D. Morris, P.E.

Date

Jared M. Lee, P.E.

Date

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1 INTRODUCTION & PROJECT DESCRIPTION

Bohannon Huston Inc. (BHI) has prepared this mini-roundabout feasibility study report to evaluate if mini-roundabouts are feasible on the 32nd Street corridor, from 3rd Ave to Holly Street, in Durango, CO. BHI was originally contracted to develop construction drawings for various traffic calming measure along 32nd Street, from 2nd Ave to Holly Ave. These traffic calming measures include raised medians, curb bump-outs, and enhanced pedestrian crossings. As investigations progressed it became apparent that the implementation of mini-roundabout could be a viable traffic calming solution for the corridor.



Figure 1: Project location map.

2 SITE DESCRIPTION

The study site is located within the City of Durango in La Plata County, Colorado, along 32nd Street between 3rd Avenue and Holly Avenue, see Figure 1. 32nd Street is an existing 3-Lane roadway, with a posted speed limit of 25 MPH. There currently exists one through lane in each direction, a center Two-Way-Left-Turn-Lane, and bike lanes in each direction. All side streets within the study area are local residential or local collector streets. All study intersections are currently Two-Way-Stop Control, with the stop condition on the side street(s). The existing ROW widths along 32nd Street vary from 60'- 80'.

The surrounding land along the study area is mostly developed. The most prominent land use along 32nd Street is single family residential. However, there is also a retirement community and a few low traffic demand commercial sites such as a roofing company, and a self-storage site.

3 EXISTING & FUTURE TRAFFIC VOLUMES

Existing traffic counts along 32nd Street were conducted prior to the proliferation of the COVID-19 pandemic, on March 11, 2020. These counts were taken along the 100 Block of 32nd Street. Reviewing existing land uses and street networks, it is assumed that the 100 Block of 32nd Street is the most traveled along the study corridor, making the use of these counts a conservative condition when studying the feasibility of potential roundabout locations to the east. Existing counts indicate a daily volume of 4,240 Vehicle in the westbound direction, and 4,822 Vehicles in the eastbound direction. This results in a total daily volume of 9,062 Vehicles in the year 2020.

In order to analyze future adequacy of the mini-roundabouts, an average annual growth rate was applied to estimate a 20-year horizon volume in the year 2042. CDOT DTD 20-year traffic projections along Route 550 (Station 10556) indicate an average annual growth up to around 0.8%. In order to provide a conservative analysis, the traffic counts were grown by 2.0%. A 2.0% growth rate results in a projected daily volume of just over 14,000 Vehicles in the year 2042. National Cooperative Highway Research Program (NCHRP) and Colorado Department of Transportation (CDOT) guidance indicates that mini-roundabouts can serve up to approximately 15,000 Daily Vehicles before a detailed capacity analysis is necessary.

4 MINI-ROUNDABOUT FEASIBILITY

Mini-roundabouts are a small single-lane roundabout with fully traversable center islands. The design of a mini-roundabout aligns vehicles at entry to guide drivers to the intended path and minimize running over of the center island. They are a practical solution in low-speed environments, with ROW constraints, where additional traffic calming is required. For retrofit applications, mini-roundabouts can be relatively inexpensive because of little need for additional right-of-way at the intersections. The mini roundabouts along 32nd Avenue would be designed to accommodate bike traffic, with a slip-ramp for bike users that wish to not navigate the roundabout on their bicycle.

For passenger vehicle traffic, mini-roundabouts would make an effective and practical solution for additional traffic calming along 32nd Street corridor, which has an existing posted speed of 25 MPH. NCHRP and CDOT guidance indicates that mini-roundabouts along 32nd Street will comfortably service the existing and horizon year (2042) traffic volumes without requiring the need for detailed capacity analysis. An example mini-roundabout layout is provided in the appendix to demonstrate how they will typically fit within the existing ROW along 32nd Avenue. Additionally, travel speeds entering and traveling within the roundabout would need to be reduced to 15mph in order to accommodate the required intersection sight distance. A 4-legged mini-roundabout is estimated to cost approximately \$450,000.00 to design and construct. A 3-legged mini-roundabout is estimated to cost approximately \$420,000.00 to design and construct. These cost estimates do not include any drainage improvements or utility relocations.

5 FIRE DEPARTMENT CONCERNS

Durango Fire & Rescue has highlighted several concerns regarding the implementation of mini-roundabouts along the 32nd Street corridor. The main issue being a negative effect on response time. The Durango Fire & Rescue station is located along 32nd Street, to the east of the project site. However, much of the service area is accessed via 32nd Street through the proposed roundabout locations, making 32nd Street a primary response route. It has been indicated that current Fire & Rescue response times are nearing the maximum allowable time of 6.5 minutes, and that no additional delays will be acceptable in the interest of public health and safety. Currently, the associated rescue vehicles are able to operate along 32nd Street near the posted speed of 25 MPH. It should be noted that vehicle turn template analysis has indicated that a typical fire apparatus would need to slow down to 5 MPH in order to navigate the proposed mini-roundabout(s), which includes some mounting of the center island.

6 CONCLUSION

For passenger vehicle traffic, mini-roundabouts would make an effective and practical solution for additional traffic calming along 32nd Street corridor, which has an existing posted speed of 25 MPH. NCHRP and CDOT guidance indicates that mini-roundabouts along 32nd Street will comfortably service the existing and horizon year (2042) traffic volumes without requiring the need for detailed capacity analysis.

Durango Fire & Rescue has highlighted several concerns regarding the implementation of mini-roundabouts along the 32nd Street corridor. Much of the department's service area is

accessed via 32nd Street through the proposed roundabout locations, making 32nd Street a primary response route. It has been indicated that current Fire & Rescue response times are nearing the maximum allowable time, and that no additional delays will be acceptable in the interest of public health and safety. Turn template analysis has indicated that a typical fire apparatus would need to slow down to 5 MPH in order to navigate the proposed mini-roundabout(s).

APPENDICES

APPENDIX A – TRAFFIC COUNTS

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Durango
Street: 200 block E 32nd St (bridge)

A study of vehicle traffic was conducted with the device having serial number 303419. The study was done in the eb lane at 200 block E 32nd St (bridge) in Durango, CO in La Plata county. The study began on 03/11/2020 at 12:01 AM and concluded on 03/16/2020 at 12:01 AM, lasting a total of 120.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 24,111 vehicles passed through the location with a peak volume of 188 on 03/13/2020 at [03:31 PM-03:46 PM] and a minimum volume of 0 on 03/11/2020 at [02:46 AM-03:01 AM]. The AADT count for this study was 4,822.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 20 - 25 MPH range or lower. The average speed for all classified vehicles was 24 MPH with 41.05% vehicles exceeding the posted speed of 25 MPH. 0.68% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 20MPH and the 85th percentile was 28.75 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
580	273	1978	11062	8177	1092	125	51	42	28	34	22	19	25	61

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 14618 which represents 62 percent of the total classified vehicles. The number of Vans & Pickups in the study was 8157 which represents 35 percent of the total classified vehicles. The number of Busses & Trucks in the study was 535 which represents 2 percent of the total classified vehicles. The number of Tractor Trailers in the study was 248 which represents 1 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
14618	6765	1392	322	125	116	58	173							

CHART 2

HEADWAY

During the peak traffic period, on 03/13/2020 at [03:31 PM-03:46 PM] the average headway between vehicles was 4.762 seconds. During the slowest traffic period, on 03/11/2020 at [02:46 AM-03:01 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 34.00 and 81.00 degrees F.

MH Corbin Traffic Analyzer Study
Computer Generated Summary Report
City: Durango
Street: 200 block E 32nd St (bridge)

A study of vehicle traffic was conducted with the device having serial number 303420. The study was done in the wb lane at 200 block E 32nd St (bridge) in Durango, CO in La Plata county. The study began on 03/11/2020 at 12:01 AM and concluded on 03/16/2020 at 12:01 AM, lasting a total of 120.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 21,201 vehicles passed through the location with a peak volume of 204 on 03/11/2020 at [07:46 AM-08:01 AM] and a minimum volume of 0 on 03/11/2020 at [02:16 AM-02:31 AM]. The AADT count for this study was 4,240.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 25 - 30 MPH range or lower. The average speed for all classified vehicles was 27 MPH with 71.46% vehicles exceeding the posted speed of 25 MPH. 0.51% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 25MPH and the 85th percentile was 31.00 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
205	122	507	5038	10966	3059	413	100	40	23	21	16	11	13	43

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 12881 which represents 63 percent of the total classified vehicles. The number of Vans & Pickups in the study was 6955 which represents 34 percent of the total classified vehicles. The number of Busses & Trucks in the study was 538 which represents 3 percent of the total classified vehicles. The number of Tractor Trailers in the study was 154 which represents 1 percent of the total classified vehicles.

< to 17	18 to 20	21 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to >							
12881	5528	1427	353	102	108	42	136							

CHART 2

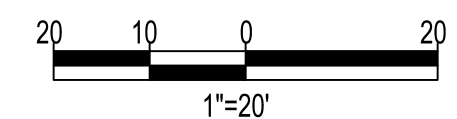
HEADWAY

During the peak traffic period, on 03/11/2020 at [07:46 AM-08:01 AM] the average headway between vehicles was 4.39 seconds. During the slowest traffic period, on 03/11/2020 at [02:16 AM-02:31 AM] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 34.00 and 86.00 degrees F.

APPENDIX B – TYPICAL MINI-ROUNDAABOUT LAYOUT

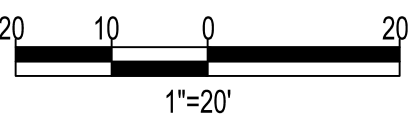
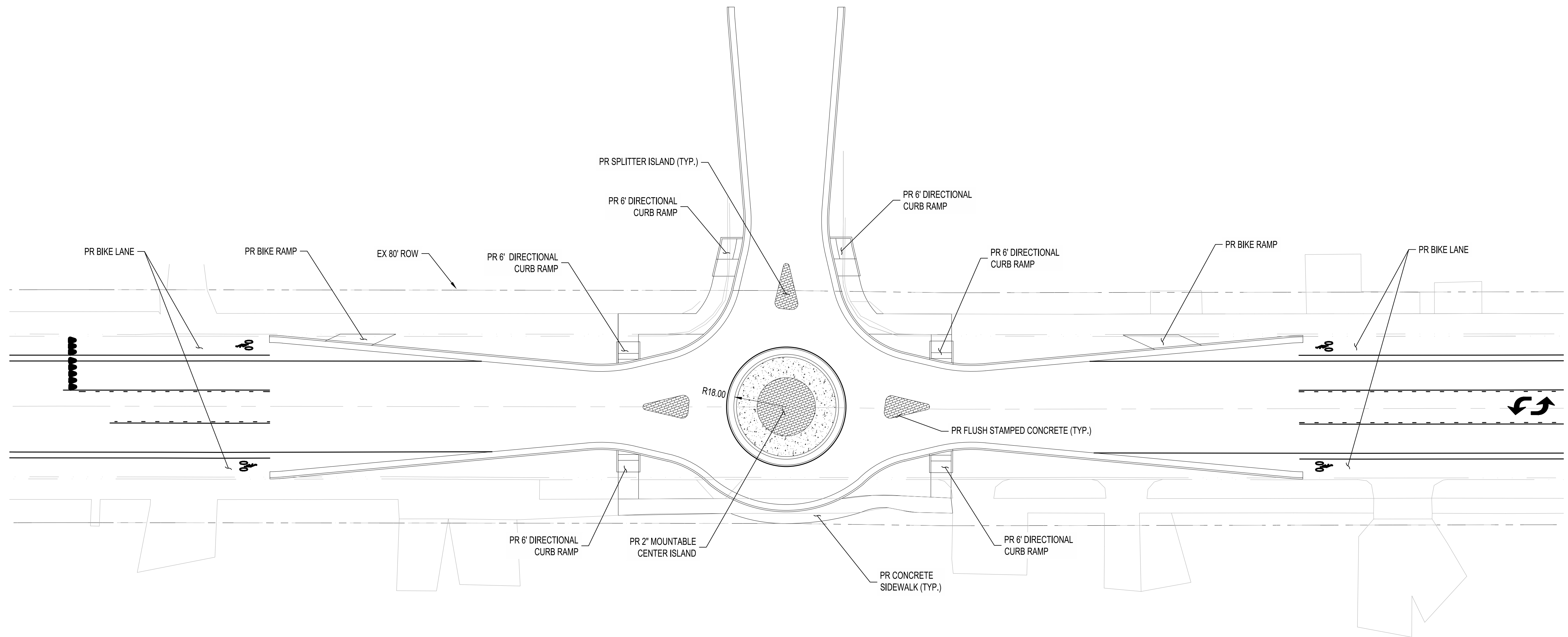


MAY 2022 - PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

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3 LEG ROUNDABOUT TYPICAL LAYOUT

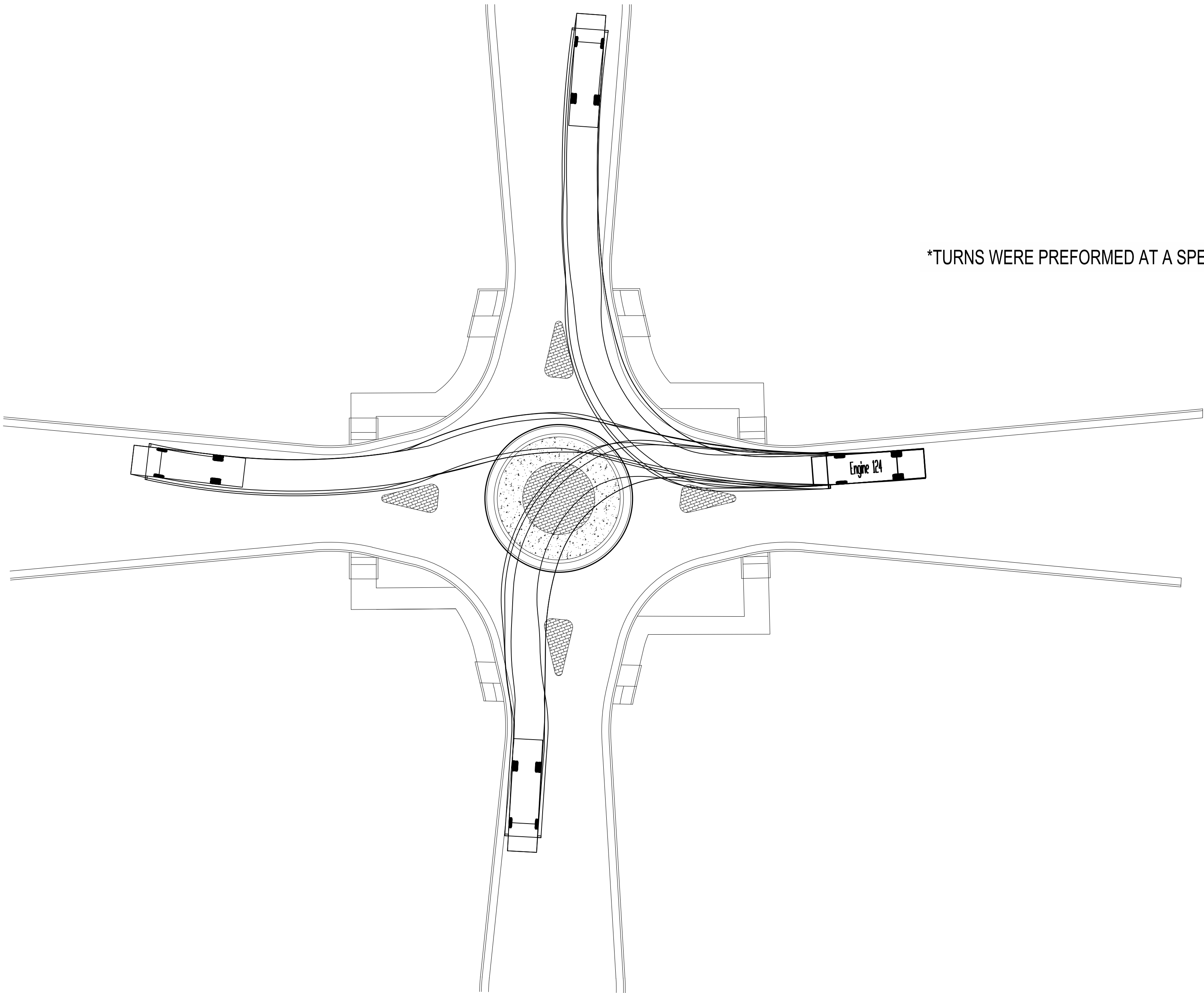


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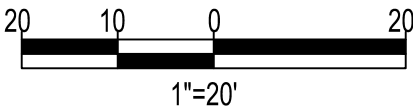
APPENDIX C – FIRE APPARATUS TURN TEMPLATES



ENGINE 124 TURNING SCENARIOS



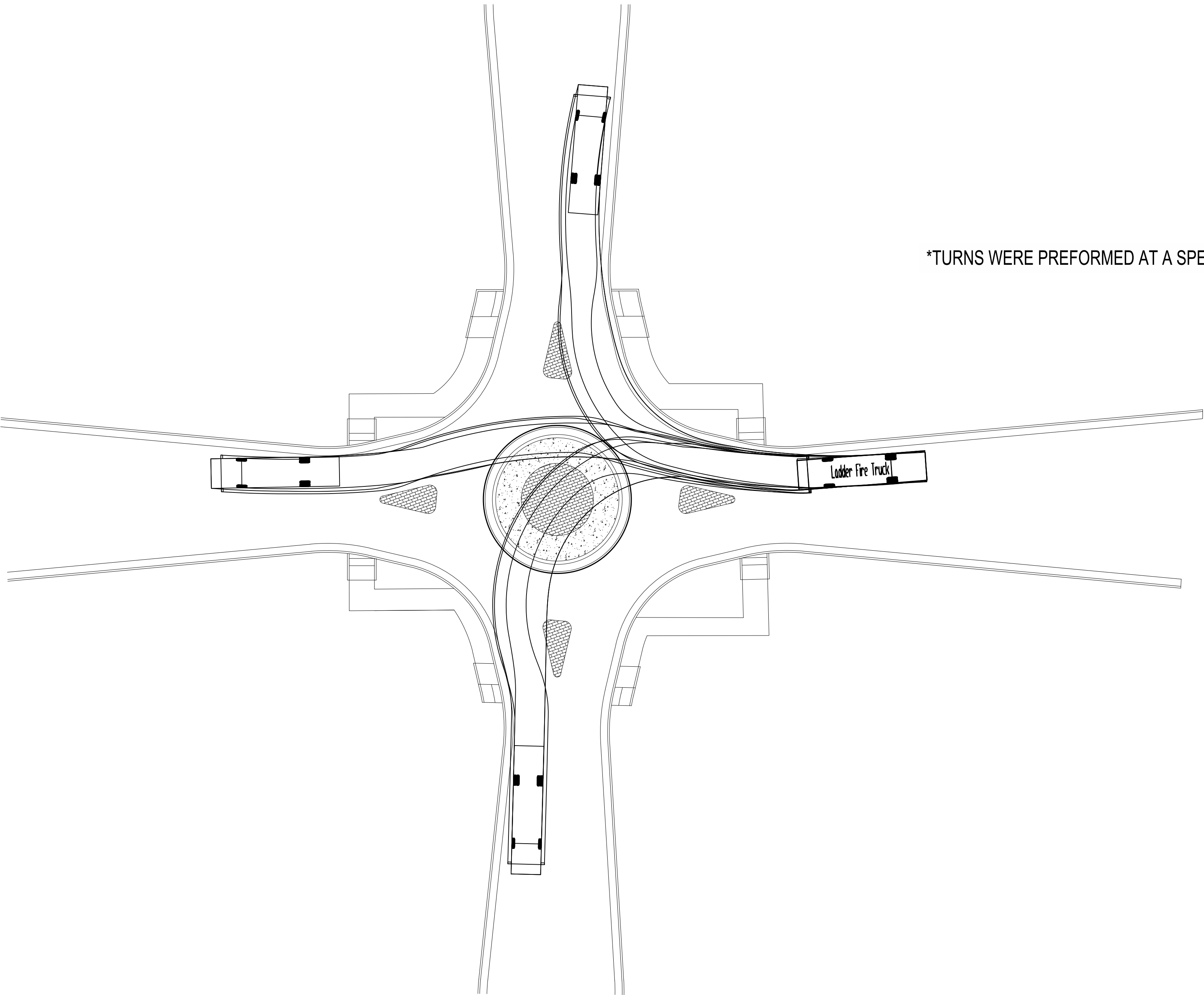
*TURNS WERE PREFORMED AT A SPEED OF 5 MPH



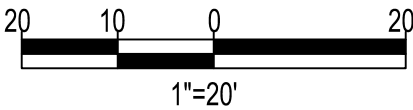
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LADDER TRUCK TURNING SCENARIOS



*TURNS WERE PREFORMED AT A SPEED OF 5 MPH

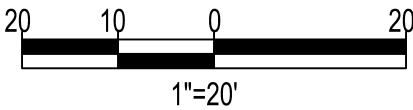
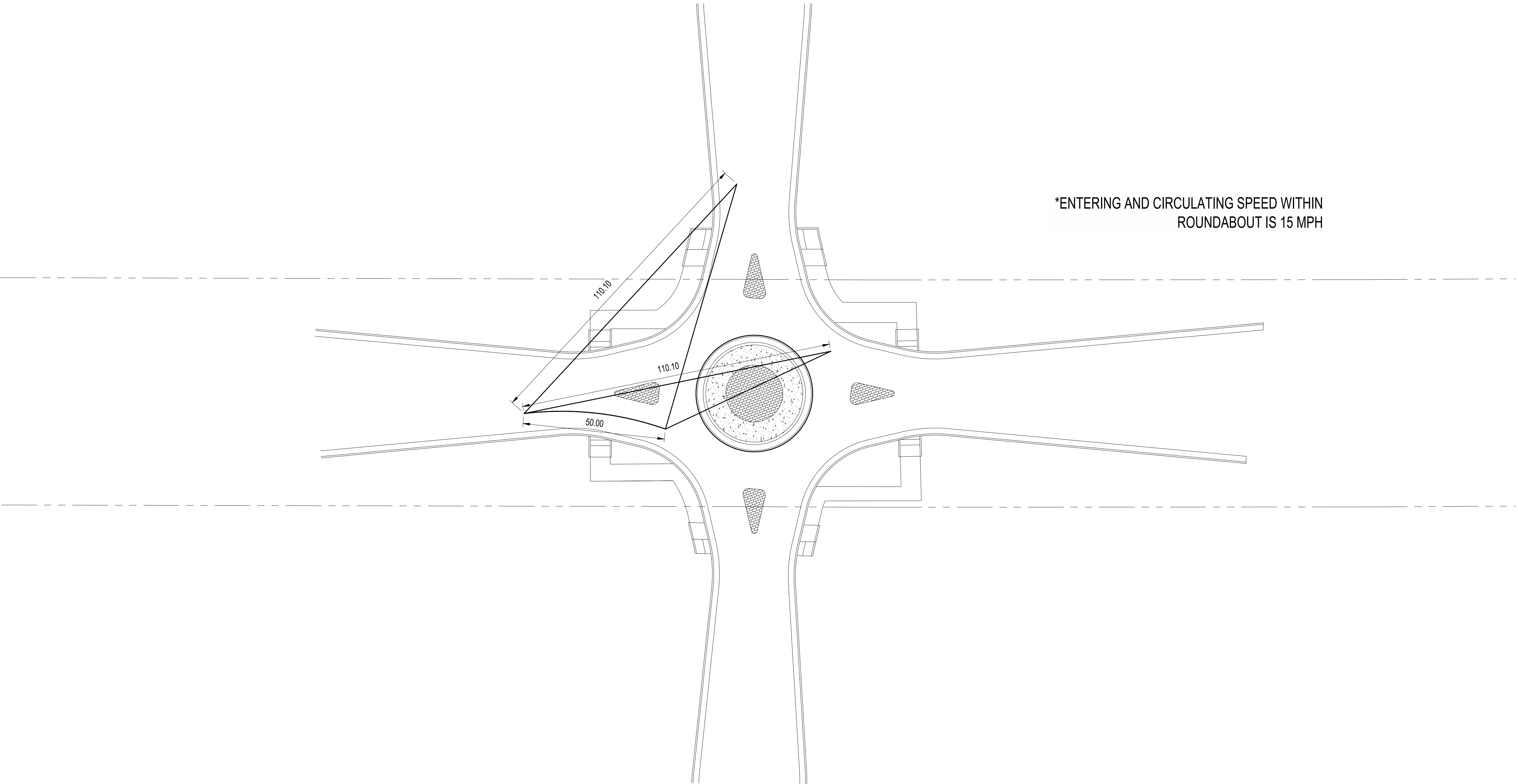


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APPENDIX D – INTERSECTION SIGHT TRIANGLES



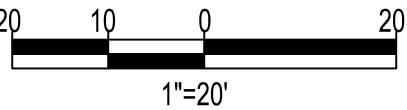
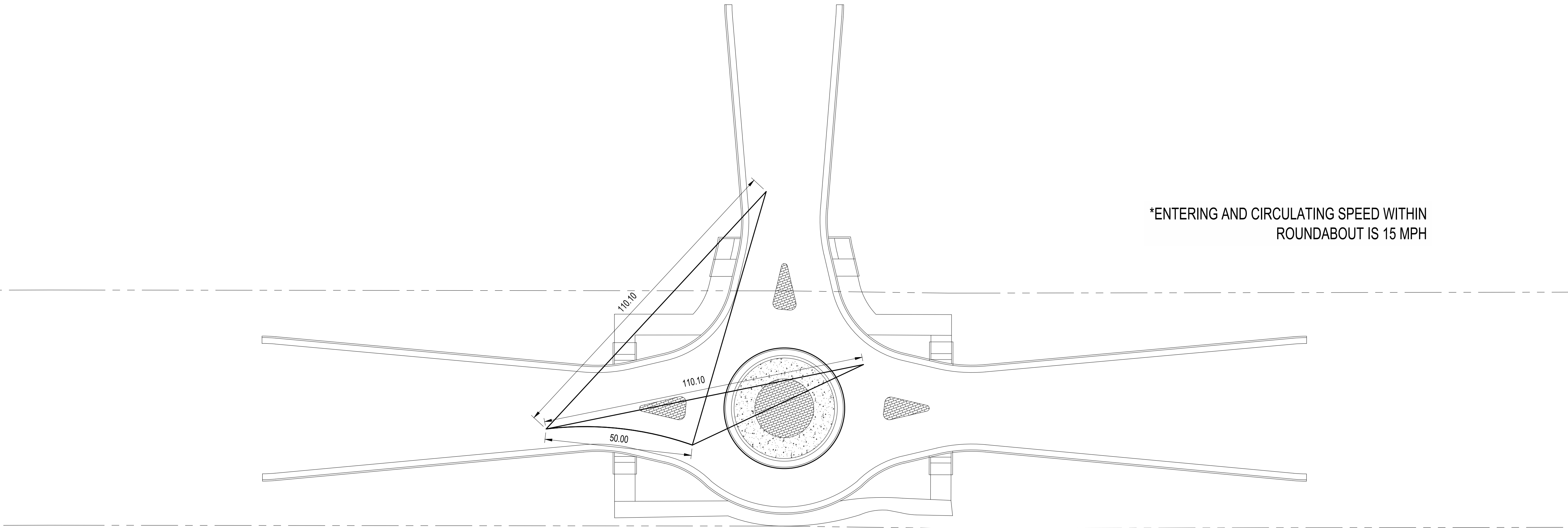
4 LEG ROUNDABOUT SIGHT TRIANGLES



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							SUBSET:		SHEETS: OF		SHEET NUMBER		####	



3 LEG ROUNDABOUT SIGHT TRIANGLES



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