# MED-303 at Substation Road and Marks Road

AER/Traffic Study Update
Final Report

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# I. Executive Summary

## A. Purpose and Need

The purpose of this study is to analyze existing conditions and needed intersection improvements of SR-303 to improve operations and reduce crash frequency and vehicle delays. The study limits include the SR-303 intersections of Marks Road and Substation Road. The intersection of SR-303 & Marks Road was ranked as #23 on the 2024 Highway Safety Improvement (HSIP) Rural Intersection List and SR-303 & Substation Road was ranked #508 on the 2024 HSIP Suburban Intersection List.

## B. Overview of Safety Issues

Crash data was obtained from the ODOT Transportation Information Mapping System (TIMS) for three complete years of available data (2021-2023). A total of 37 crashes were obtained for the Marks Road intersection and 30 crashes were obtained for the Substation Road intersection. The most prevalent crash types at the Marks Road intersection with corresponding percentage of total crashes were rear end (56.8%), angle (18.9%), left turn (10.8%), fixed object (8.1%), sideswipe-passing (2.7%), and other non-collision (2.7%). At the Substation Road intersection the most prevalent crash types were rear end (56.7%), angle (23.3%), left turn (10.0%), fixed object (6.7%), and other non-collision (3.3%).

## C. Recommended Long-Term Countermeasures and Related Costs

Below is a brief overview of the countermeasures considered and associated costs.

**Long-term countermeasures:**

**SR-303 & Marks Road Intersection Improvements**

- Alternative 1: Add turn lanes and traffic signal upgrades *($2,700,800)*
- Alternative 2A: Chicane splitter islands with 110-foot inscribed circle diameter (ICD) *($4,029,200)*
- Alternative 2B: Straight splitter islands with 120-foot ICD *($3,803,400)*

**SR-303 & Substation Road Intersection Improvements**

- Alternative 1: Add turn lanes and traffic signal upgrades *($2,321,900)*
- Alternative 2A: Chicane splitter islands with 105-foot ICD *($3,694,300)*
- Alternative 2B: Straight splitter islands with 120-foot ICD *($3,709,000)*

**Future countermeasures to consider:**

- Widen SR-303 to a three-lane typical section
- Access management improvements

For the SR-303 & Marks Road intersection, Alternative 1 has the highest total benefit-cost (B/C) ratio, but the Alternative 2 roundabout options have the highest total benefits. The Alternative 2B roundabout has a lower total cost and fewer right-of-way impacts. Therefore, Alternative 2B is recommended for further consideration at this intersection.

For the SR-303 & Substation Road intersection, the Alternative 2 roundabout options have the highest total B/C ratio and highest benefits. The Alternative 2A roundabout has a lower total cost and fewer right-of-way impacts. Therefore, Alternative 2A is recommended for further consideration at this intersection.

# II. Purpose and Need

The purpose of this study is to update the previous 2020 Traffic Operations Study and 2021 Alternative Evaluation Report (AER) Design, reanalyze existing conditions, and determine needed intersection improvements to improve operations and reduce crash frequency and vehicle delays. The study limits include the SR-303 intersections with Marks Road and Substation Road. The intersection of SR-303 & Marks Road was ranked as #23 on the 2024 HSIP Rural Intersection List and SR-303 & Substation Road was ranked #508 on the 2024 HSIP Suburban Intersection List. A project location map is provided in **Figure 1** and a study area map is provided in **Figure 2**.

*Figure 1 - Project Location Map*

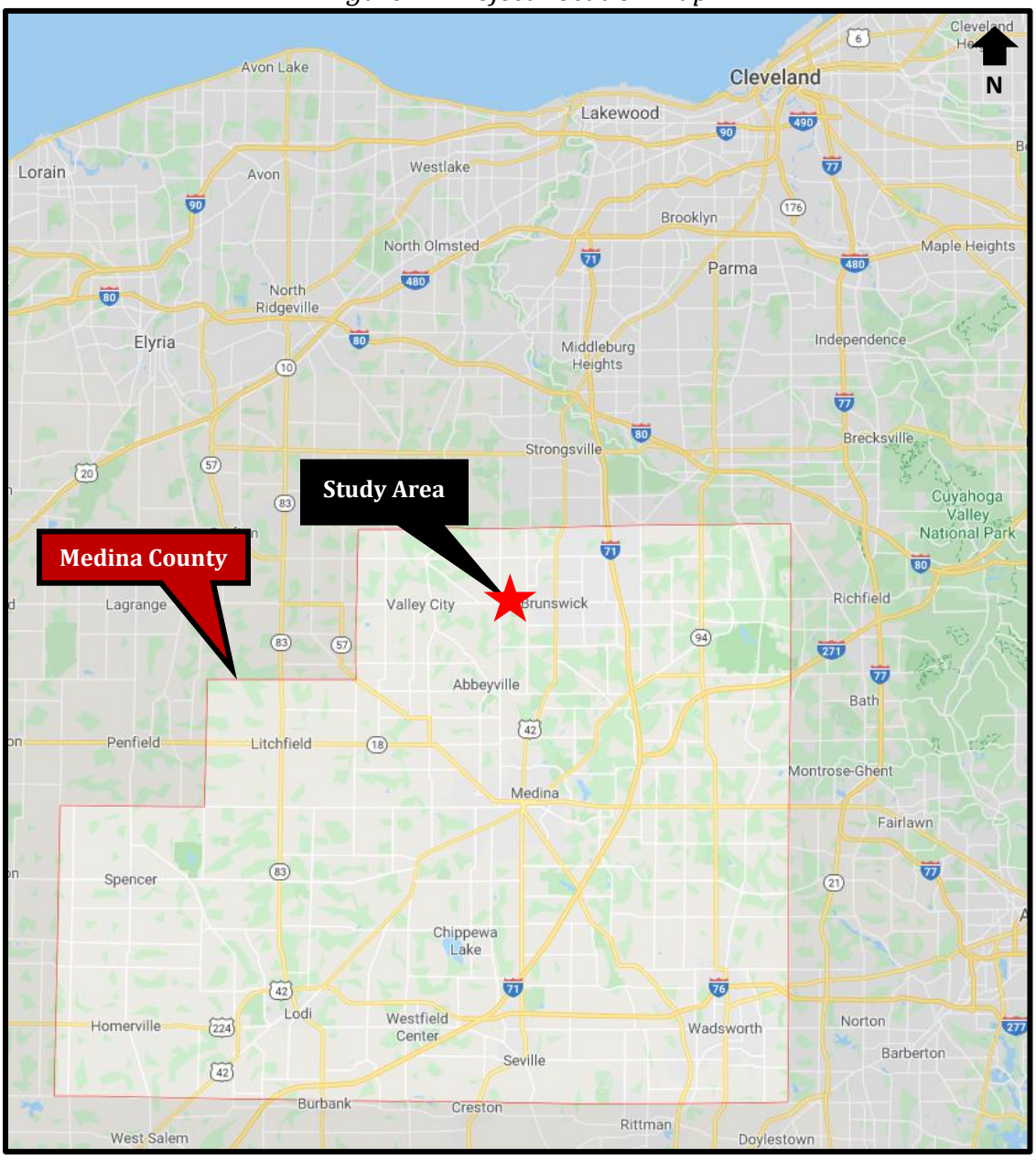


*Figure 2 – Study Area Map*



# III. Previous Studies

## A. MED-303-(4.85-6.00) Traffic Operations Study, February 2020

In 2019-2020, Carpenter Marty Transportation (CM) developed a traffic operations study of SR-303 from (and including) the intersections of Marks Road to Substation Road, the roadway segment in between, and the intersections with the Discount Drug Mart drive and Terrington Drive/Muirwood Drive. The study included the following recommended alternatives:

Alternative 1

- Widen SR-303 to a three-lane typical section with curb and gutter
- Add turn lanes and traffic signal upgrades at the Marks Road and Substation Road intersections with SR-303

Alternative 2

- Widen SR-303 to a three-lane typical section with curb and gutter
- Install a roundabout at Marks Road and Substation Road intersections with SR-303

In general, it was stated both alternatives can be considered for implementation to meet the purpose of improving operations and reducing crashes. However, the potential utility impacts involved in each alternative could be extreme. It was recommended that field survey be completed, utility impacts be quantified, and the planning-level concept plans and cost estimates from that study be updated and taken to a Feasibility Study level of detail. The 2020 Traffic Operations Study is provided in **Appendix A**.

## B. MED-303-(4.85-6.00) AER Design, November 2021

In 2020-2021, CM developed AER-level design for each alternative identified in the 2020 study. This included the production of typical sections, plan and profile sheets, cross sections, cost estimates, right-of-way impacts, and utility conflicts. The AER Design is provided in **Appendix A**.

# IV. Existing Conditions

## A. Land Use

The study area is approximately 0.5 miles west of the City of Brunswick. The study area includes the SR-303 intersections with Marks Road and Substation Road, including 500 feet on each intersection approach. The intersections are approximately 4,850 feet apart, measured from centerline to centerline.

A gas station, car wash, and other strip retail/restaurant establishments are in the northeast corner of SR-303 & Marks Road. Multiple industrial facilities are present further north on Marks Road. Additional developments in the surrounding area are currently in the planning/design process, including a gas station with convenience market, beverage drive through, automated car wash, and high-turnover sit-down restaurant in the northwest corner and a McDonald's in the southeast corner of the SR-303 & Marks Road intersection. A retail center with a Discount Drug Mart and other retail/restaurant establishments is located east of Marks Road with a singular access drive on SR-303.

A large substation is present in the southeast corner of SR-303 & Substation Road. Associated lines, along with many other overhead utilities, branch out from the substation in all four directions. Additional trip generators along SR-303 include a church, golf course, and childcare center. Single-family homes and access drives to residential developments are present on either side of SR-303 between the study intersections.

## B. Roadway Conditions

SR-303 serves as an east-west connector in northeast Ohio. SR-303 has an interchange with IR-71 approximately three miles east of the study area. The interchange is surrounded by numerous retailers. SR-303 is classified as an Urban Major Collector through the study area, and is classified as Rural west of Marks Road. SR-303 generally has a two-lane typical section between the study intersections. Approximately 1-2 foot paved shoulders with ditches are present on either side of the roadway. No rumble strips or stripes are present. Raised pavement markers are present on SR-303 at each study intersection and in between. Roadway lighting is only present at the intersections of SR-303 with Substation Road, Marks Road, Terrington Drive/Muirwood Drive, and at the Drug Mart drive. SR-303 currently has a posted speed limit of 45 MPH at each study intersection and in between. The posted speed limit was previously 50 MPH but was reduced to 45 MPH around 2020.

Marks Road serves as a north/south connector, starting at SR-82 in the City of Strongsville, changing name to State Road, and ending at W. Smith Road in the City of Medina. Within Medina County, Marks Road is classified as an Urban Major Collector. It has a posted speed limit of 45 MPH and a two-lane typical section with 1-2 foot paved shoulders. No rumble strips/stripes or roadway lighting is present. Raised pavement markers are only present on the southbound approach to SR-303.

Substation Road serves as a north/south connector between Boston Road and Hamilton Road. Substation Road is classified as an Urban Major Collector north of SR-303 and an Urban Local Road south of SR-303. It has a posted speed limit of 45 MPH and a two-lane typical section with 1-2 foot paved shoulders. No rumble strips/stripes, raised pavement markers, or roadway lighting is present.

## C. Intersection Conditions

**SR-303 & Marks Road**

SR-303 & Marks Road is a four-leg, signalized intersection. The northbound and eastbound approaches each have a single, shared left/though/right lane. The southbound approach has a dedicated left turn lane and a shared through-right lane. The westbound approach has a shared left-through lane and a dedicated right turn lane. The northeast corner has curb and gutter and an increased corner radius. The north and south lanes are not aligned through the intersection, resulting in sight line issues. See **Figure 3**.

The traffic signal is a diagonal span-wire configuration. All approaches have two, three-section heads. All signal heads are painted black with no retroreflective backplates. Loop detectors are utilized for vehicle detection on the north/south approaches. Intersection lighting is present. No sidewalks, pedestrian signal heads, pushbuttons, crossing signs, or pavement markings are present at the intersection.

Signal ahead warning signs are posted at the following locations prior to the intersection: 640 feet on the eastbound approach, 725 feet on the westbound approach, 800 feet on the northbound approach, and 730 feet on the southbound approach. Lane use signs are present on the westbound and southbound approaches at the start of the turn lanes and duplicated at the stop line for the southbound approach. The westbound approach has an "End Engine Brake Restriction" sign. Truck prohibition and "NO THROUGH VEHICLES IN EXCESS OF 5 TONS" signs are posted for the receiving lane on the south leg of the intersection.

*Figure 3 – SR-303 & Marks Road Intersection*



**SR-303 & Substation Road**

SR-303 & Substation Road is a four-leg, signalized intersection. All approaches have a single, shared left/though/right lane. See **Figure 4**.

The traffic signal is a diagonal, span-wire configuration. All approaches have two, three-section heads. All signal heads are painted black and only the east/west heads have retroreflective backplates. Loop detectors are utilized for vehicle detection for the north and south approaches. Intersection lighting is present. No sidewalks, pedestrian signal heads, pushbuttons, crossing signs, or pavement markings are present at the intersection.

Signal ahead warning signs are posted at the following locations prior to the intersection: 650 feet on the eastbound approach, 810 feet on the westbound approach, 510 feet on the northbound approach, and 580 feet on the southbound approach. The eastbound and westbound approaches have an "END ENGINE BRAKE RESTRICTION" sign. However, 150 feet west of the intersection there is a "NO ENGINE BRAKE" sign posted for westbound vehicles. Signs are posted on the SR-303 approaches restricting trucks from turning north onto Substation Road and directing Liverpool Industrial Park traffic to continue on SR-303. The southbound approach has a "DO NOT BLOCK DRIVE" sign posted for the drives closest to the intersection.

*Figure 4 – SR-303 & Substation Road Intersection*



### D. Data Collection

Vehicle turning movement counts were collected by ODOT District 3 at the intersections of SR-303 with Marks Road and Substation Road from 6:00 AM to 7:00 PM on September 17, 2024.

The following AM and PM peaks were noted at each SR-303 intersection:

- Marks Road: 7:15-8:15 AM and 4:30-5:30 PM
- Substation Road: 7:00-8:00 AM and 4:45-5:45 PM

2030 and 2050 estimated model volumes and calculated growth rates at each intersection were provided by the Northeast Ohio Areawide Coordinating Agency (NOACA). Traffic volumes were projected to an Opening Year of 2030 and a Design Year of 2050 using the calculated linear annual growth rates.

Additionally, Traffic Impact Study (TIS) volumes for known future developments were provided by the District. This includes a gas station with convenience market, beverage drive through, automated car wash, and high-turnover sit-down restaurant in the northwest corner of the SR-303 & Marks Road intersection and a McDonald's in the southeast corner of the SR-303 & Marks Road intersection. Site traffic for each development was added to 2030 and 2050 volumes for the SR-303 & Marks Road intersection. Count data, growth rate correspondence, relevant portions of the TIS, and traffic volume calculations are provided in **Appendix B**.

## V. Analysis

### A. Capacity Analysis

Capacity of the existing conditions was evaluated using Highway Capacity Software (HCS) 2024 at the study intersections to assess existing operations using 2024, 2030, and 2050 traffic volumes and existing signal timings. In general, a minimum level of service (LOS) of D for each intersection approach and movement was considered acceptable. Volume to capacity (V/C) ratios less than one for all movements (0.93 or less preferred) and queue storage ratios (QSR) less than one were also considered acceptable. Capacity analysis results are summarized in **Tables 1-4**. Detailed capacity analysis results are provided in **Appendix C**.

*Table 1 – Marks Road Intersection Existing Conditions AM Peak Capacity Analysis Results*

| Approach/ Movement | 2024 AM | | | | | 2030 AM | | | | | 2050 AM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | B | 13.4 | 0.523 | 0.17 | 166 | C | 20.7 | 0.740 | 0.27 | 269 | C | 26.2 | 0.819 | 0.35 | 346 |
| **EB Approach** | **B** | **13.4** | --- | --- | --- | **C** | **20.7** | --- | --- | --- | **C** | **26.2** | --- | --- | --- |
| WBL/T | B | 12.6. | 0.436 | 0.08 | 128 | B | 18.5 | 0.622 | 0.13 | 213 | C | 21.5 | 0.699 | 0.16 | 262 |
| WBR | B | 11.0 | 0.184 | 0.35 | 44 | B | 15.1 | 0.258 | 0.60 | 75 | B | 16.7 | 0.272 | 0.75 | 94 |
| **WB Approach** | **B** | **12.2** | --- | --- | --- | **B** | **17.5** | --- | --- | --- | **C** | **20.1** | --- | --- | --- |
| NBL/T/R | B | 17.8 | 0.592 | 0.22 | 200 | B | 16.2 | 0.558 | 0.24 | 217 | B | 17.7 | 0.562 | 0.28 | 248 |
| **NB Approach** | **B** | **17.8** | --- | --- | --- | **B** | **16.2** | --- | --- | --- | **B** | **17.7** | --- | --- | --- |
| SBL | C | 26.4 | 0.422 | 0.34 | 77 | C | 27.5 | 0.571 | 0.62 | 139 | C | 30.7 | 0.613 | 0.76 | 171 |
| SBT/R | B | 16.3 | 0.445 | 0.15 | 131 | B | 14.7 | 0.394 | 0.16 | 140 | B | 15.8 | 0.384 | 0.18 | 161 |
| **SB Approach** | **B** | **19.3** | --- | --- | --- | **B** | **19.7** | --- | --- | --- | **C** | **21.8** | --- | --- | --- |
| **Intersection** | **B** | **15.5** | --- | --- | --- | **B** | **18.5** | --- | --- | --- | **C** | **21.4** | --- | --- | --- |

*Table 2 – Marks Road Intersection Existing Conditions PM Peak Capacity Analysis Results*

| Approach/ Movement | 2024 PM | | | | | 2030 PM | | | | | 2050 PM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | B | 19.5 | 0.527 | 0.20 | 202 | C | 32.8 | 0.809 | 0.34 | 342 | D | 37.9 | 0.838 | 0.41 | 412 |
| **EB Approach** | **B** | **19.5** | --- | --- | --- | **C** | **32.8** | --- | --- | --- | **D** | **37.9** | --- | --- | --- |
| WBL/T | C | 20.5 | 0.609 | 0.15 | 246 | C | 30.9 | 0.794 | 0.23 | 383 | C | 33.5 | 0.813 | 0.27 | 446 |
| WBR | B | 17.3 | 0.272 | 0.68 | 85 | C | 22.1 | 0.299 | 1.01 | 127 | C | 21.0 | 0.301 | 1.14 | 143 |
| **WB Approach** | **B** | **19.6** | --- | --- | --- | **C** | **28.5** | --- | --- | --- | **C** | **30.0** | --- | --- | --- |
| NBL/T/R | B | 14.9 | 0.520 | 0.22 | 195 | B | 17.7 | 0.560 | 0.28 | 249 | C | 27.7 | 0.716 | 0.42 | 383 |
| **NB Approach** | **B** | **14.9** | --- | --- | --- | **B** | **17.7** | --- | --- | --- | **C** | **27.7** | --- | --- | --- |
| SBL | C | 29.2 | 0.673 | 0.83 | 188 | E | 65.6 | 0.907 | 1.67 | 376 | F | 343.5 | 1.604 | 4.06 | 915 |
| SBT/R | B | 15.9 | 0.591 | 0.27 | 243 | B | 18.1 | 0.578 | 0.35 | 308 | C | 22.6 | 0.630 | 0.41 | 366 |
| **SB Approach** | **C** | **20.3** | --- | --- | --- | **D** | **35.6** | --- | --- | --- | **F** | **141.4** | --- | --- | --- |
| **Intersection** | **B** | **18.9** | --- | --- | --- | **C** | **29.7** | --- | --- | --- | **E** | **69.8** | --- | --- | --- |

*Table 3 – Substation Road Intersection Existing Conditions AM Peak Capacity Analysis Results*

| Approach/ Movement | 2024 AM | | | | | 2030 AM | | | | | 2050 AM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | B | 12.8 | 0.726 | 0.19 | 219 | B | 13.6 | 0.742 | 0.21 | 239 | B | 17.4 | 0.801 | 0.29 | 330 |
| **EB Approach** | **B** | **12.8** | --- | --- | --- | **B** | **13.6** | --- | --- | --- | **B** | **17.4** | --- | --- | --- |
| WBL/T/R | B | 10.3 | 0.529 | 0.17 | 137 | B | 10.6 | 0.539 | 0.19 | 150 | B | 11.9 | 0.582 | 0.26 | 205 |
| **WB Approach** | **B** | **10.3** | --- | --- | --- | **B** | **10.6** | --- | --- | --- | **B** | **11.9** | --- | --- | --- |
| NBL/T/R | B | 16.2 | 0.282 | 0.06 | 56 | B | 16.8 | 0.303 | 0.06 | 64 | B | 19.2 | 0.356 | 0.09 | 88 |
| **NB Approach** | **B** | **16.2** | --- | --- | --- | **B** | **16.8** | --- | --- | --- | **B** | **19.2** | --- | --- | --- |
| SBL/T/R | B | 19.7 | 0.620 | 0.15 | 147 | C | 20.5 | 0.633 | 0.16 | 159 | C | 23.7 | 0.686 | 0.21 | 207 |
| **SB Approach** | **B** | **19.7** | --- | --- | --- | **C** | **20.5** | --- | --- | --- | **C** | **23.7** | --- | --- | --- |
| **Intersection** | **B** | **13.7** | --- | --- | --- | **B** | **14.4** | --- | --- | --- | **B** | **17.2** | --- | --- | --- |

*Table 4 – Substation Road Intersection Existing Conditions PM Peak Capacity Analysis Results*

| Approach/ Movement | 2024 PM | | | | | 2030 PM | | | | | 2050 PM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | B | 12.8 | 0.674 | 0.19 | 221 | B | 13.8 | 0.696 | 0.22 | 245 | C | 20.5 | 0.786 | 0.33 | 373 |
| **EB Approach** | **B** | **12.8** | --- | --- | --- | **B** | **13.8** | --- | --- | --- | **C** | **20.5** | --- | --- | --- |
| WBL/T/R | B | 14.2 | 0.733 | 0.32 | 253 | B | 15.5 | 0.754 | 0.35 | 283 | C | 24.2 | 0.847 | 0.56 | 445 |
| **WB Approach** | **B** | **14.2** | --- | --- | --- | **B** | **15.5** | --- | --- | --- | **C** | **24.2** | --- | --- | --- |
| NBL/T/R | C | 20.8 | 0.613 | 0.16 | 158 | C | 21.9 | 0.639 | 0.18 | 177 | C | 27.9 | 0.736 | 0.26 | 257 |
| **NB Approach** | **C** | **20.8** | --- | --- | --- | **C** | **21.9** | --- | --- | --- | **C** | **27.9** | --- | --- | --- |
| SBL/T/R | C | 21.0 | 0.632 | 0.17 | 168 | C | 21.9 | 0.643 | 0.18 | 182 | C | 26.1 | 0.704 | 0.25 | 246 |
| **SB Approach** | **C** | **21.0** | --- | --- | --- | **C** | **21.9** | --- | --- | --- | **C** | **26.1** | --- | --- | --- |
| **Intersection** | **B** | **15.9** | --- | --- | --- | **B** | **17.0** | --- | --- | --- | **C** | **23.9** | --- | --- | --- |

Capacity analysis of the existing conditions shows that capacity is acceptable at all intersections except for the southbound approach of Marks Road which has a high level of delay during the PM peak. Additionally, the QSRs for the westbound right movement and the southbound approach are over 1.0 at the Marks Road intersection during the PM peak.

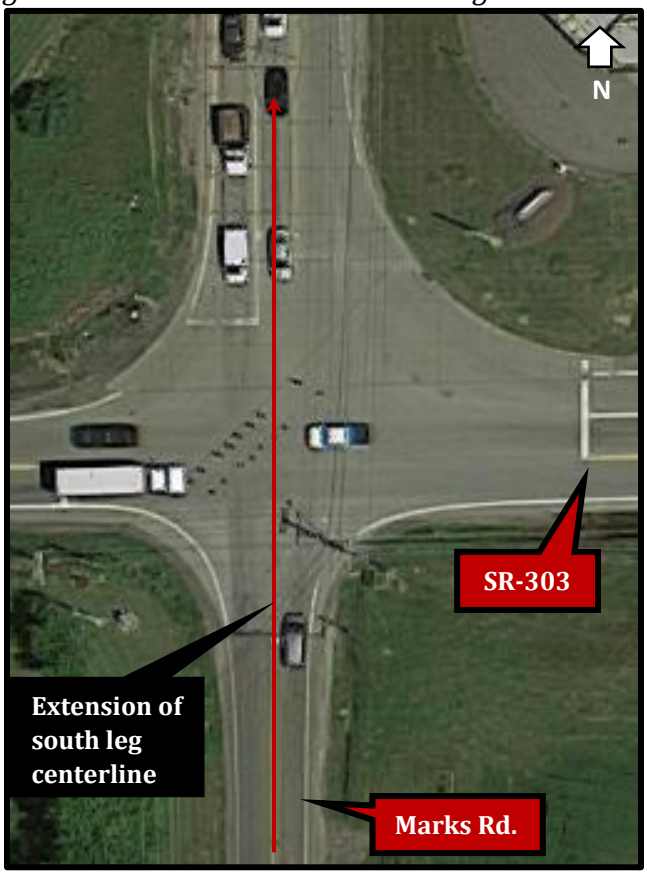
However, based on field observations and anecdotal reports, the HCS analysis results are expected to be under-representing the capacity issues in the area. When a left turning vehicle is present on SR-303, it blocks all following through traffic from proceeding through the intersection. This can lead to multicycle backups and long queues. So while the 2024 capacity analysis results appear to be acceptable, the field conditions are worse.

## B. Sight Distance Analysis

Intersection sight distance was evaluated at the SR-303 intersections with Marks Road and Substation Road as part of the previous 2020 safety study. Relevant sight distance exhibits are provided in **Appendix D**. It was determined that sight distance is generally acceptable for all movements at both study intersections. The exhibits can be utilized as a planning tool to keep trees, shrubbery, and utilities out of sight triangles in the future.

This analysis does not account for the fact that the north/south lanes are not aligned through the SR-303 & Marks Road intersection, resulting in sight line issues. This is depicted in **Figure 5**.

*Figure 5 - Northbound Marks Road Sight Line Issues*



# VI. Crash Data

## A. Crash Data Summary

Crash data was obtained from ODOT TIMS for three complete years of available data (2021-2023). The limits of the crash area query include SR-303 at the intersections of Marks Road and Substation Road, including 500 feet on each approach.

A total of 37 crashes occurred at the Marks Road intersection and 30 crashes occurred at the Substation Road intersection. The OH-1 report for each documented crash was reviewed to correct information, where necessary, and properly locate crashes within the study limits. The original crash data query included 90 crashes total, which was adjusted to 67 crashes after reviewing and relocating crashes. **Tables 5 and 6** provide a summary of the crash data at SR-303 intersections with Marks Road and Substation Road, respectively. Crash data was plotted on an aerial map to identify crash patterns and probable causes. The crash diagrams can be seen in **Figures 6-9**.

*Table 5 – SR-303 & Marks Road Crash Statistics*

| Crash Year | Number | Percent |
|---|---|---|
| 2021 | 16 | 43.2% |
| 2022 | 8 | 21.6% |
| 2023 | 13 | 35.1% |

| Crash Severity | Number | Percent |
|---|---|---|
| Injury Crash | 8 | 21.6% |
| Property Damage Crash | 29 | 78.4% |

| Hour of Day | Number | Percent |
|---|---|---|
| 06:00 AM | 2 | 5.4% |
| 07:00 AM | 3 | 8.1% |
| 08:00 AM | 3 | 8.1% |
| 09:00 AM | 2 | 5.4% |
| 10:00 AM | 1 | 2.7% |
| 11:00 AM | 1 | 2.7% |
| 12:00 PM | 2 | 5.4% |
| 1:00 PM | 1 | 2.7% |
| 2:00 PM | 9 | 24.3% |
| 3:00 PM | 1 | 2.7% |
| 4:00 PM | 3 | 8.1% |
| 5:00 PM | 1 | 2.7% |
| 6:00 PM | 3 | 8.1% |
| 7:00 PM | 1 | 2.7% |
| 8:00 PM | 4 | 10.7% |

| Crash Type | Number | Percent |
|---|---|---|
| Rear End | 21 | 56.8% |
| Angle | 7 | 18.9% |
| Left Turn | 4 | 10.8% |
| Fixed Object | 3 | 8.1% |
| Sideswipe-Passing | 1 | 2.7% |
| Other Non-Collision | 1 | 2.7% |

| Day of Week | Number | Percent |
|---|---|---|
| Sunday | 2 | 5.4% |
| Monday | 7 | 18.9% |
| Tuesday | 6 | 16.2% |
| Wednesday | 4 | 10.8% |
| Thursday | 6 | 16.2% |
| Friday | 8 | 21.6% |
| Saturday | 4 | 10.8% |

| Road Condition | Number | Percent |
|---|---|---|
| Dry | 21 | 56.8% |
| Wet | 11 | 29.7% |
| Water (Standing, Moving) | 3 | 8.1% |
| Snow | 2 | 5.4% |

*Table 6 – SR-303 & Substation Road Crash Statistics*

| Crash Year | Number | Percent |
|---|---|---|
| 2021 | 8 | 26.7% |
| 2022 | 10 | 33.3% |
| 2023 | 12 | 40.0% |

| Crash Severity | Number | Percent |
|---|---|---|
| Injury Crash | 9 | 30.0% |
| Property Damage Crash | 21 | 70.0% |

| Hour of Day | Number | Percent |
|---|---|---|
| 06:00 AM | 1 | 3.3% |
| 07:00 AM | 1 | 3.3% |
| 09:00 AM | 2 | 6.7% |
| 10:00 AM | 3 | 10.0% |
| 11:00 AM | 2 | 6.7% |
| 12:00 PM | 2 | 6.7% |
| 1:00 PM | 3 | 10.0% |
| 2:00 PM | 6 | 20.0% |
| 3:00 PM | 2 | 6.7% |
| 4:00 PM | 2 | 6.7% |
| 5:00 PM | 2 | 6.7% |
| 6:00 PM | 3 | 10.0% |
| 7:00 PM | 1 | 3.3% |

| Crash Type | Number | Percent |
|---|---|---|
| Rear End | 17 | 56.7% |
| Angle | 7 | 23.3% |
| Left Turn | 3 | 10.0% |
| Fixed Object | 2 | 6.7% |
| Other Non-Collision | 1 | 3.3% |

| Day of Week | Number | Percent |
|---|---|---|
| Sunday | 1 | 3.3% |
| Monday | 2 | 6.7% |
| Tuesday | 6 | 20.0% |
| Wednesday | 7 | 23.3% |
| Thursday | 1 | 3.3% |
| Friday | 5 | 16.7% |
| Saturday | 8 | 26.7% |

| Road Condition | Number | Percent |
|---|---|---|
| Dry | 21 | 70.0% |
| Wet | 6 | 20.0% |
| Snow | 2 | 6.7% |
| Ice | 1 | 3.3% |

*Figure 6 – SR-303 & Marks Road Intersection Crash Diagram* (1 of 2)

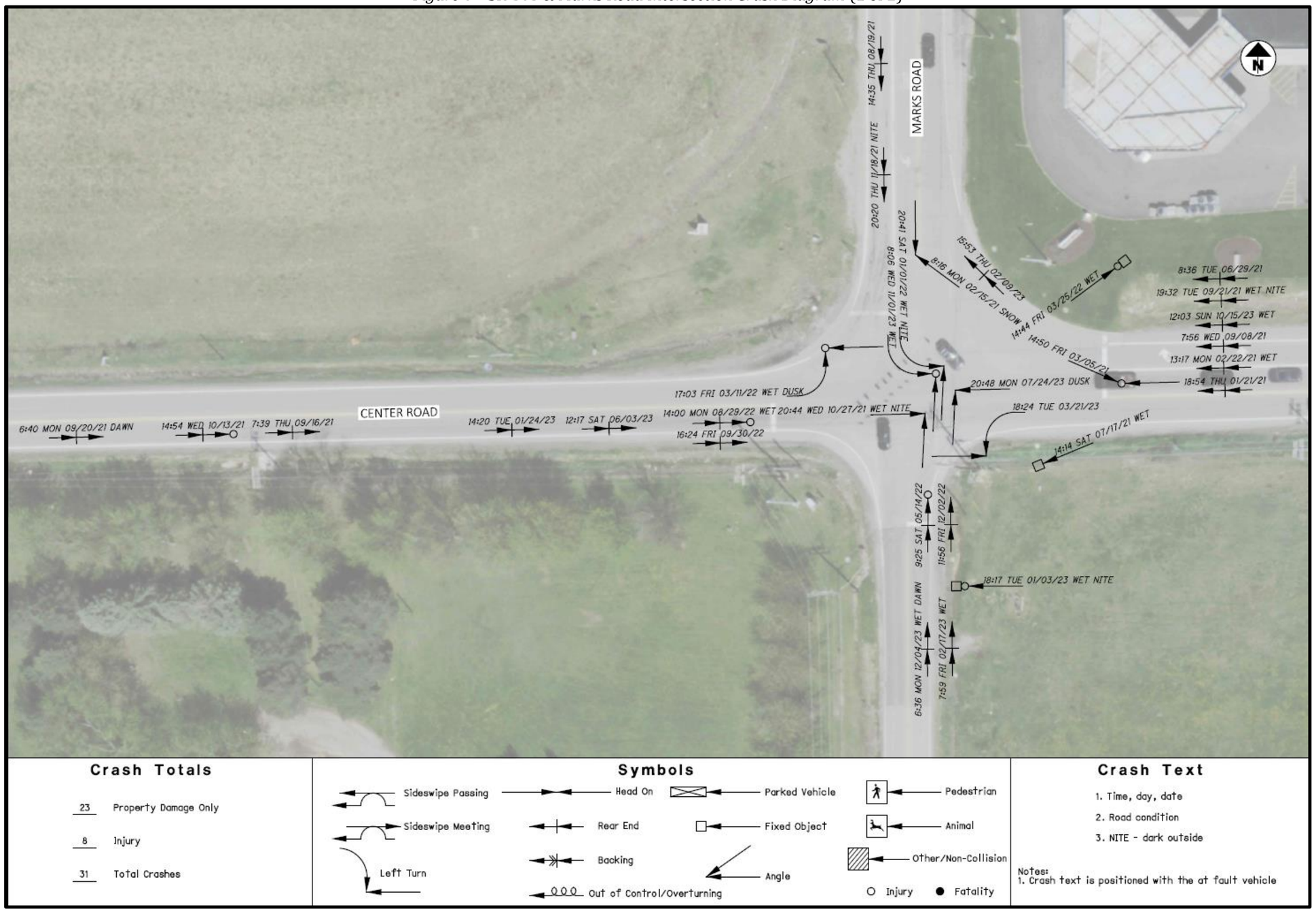


*Figure 7 – SR-303 & Marks Road Intersection Crash Diagram (2 of 2)*

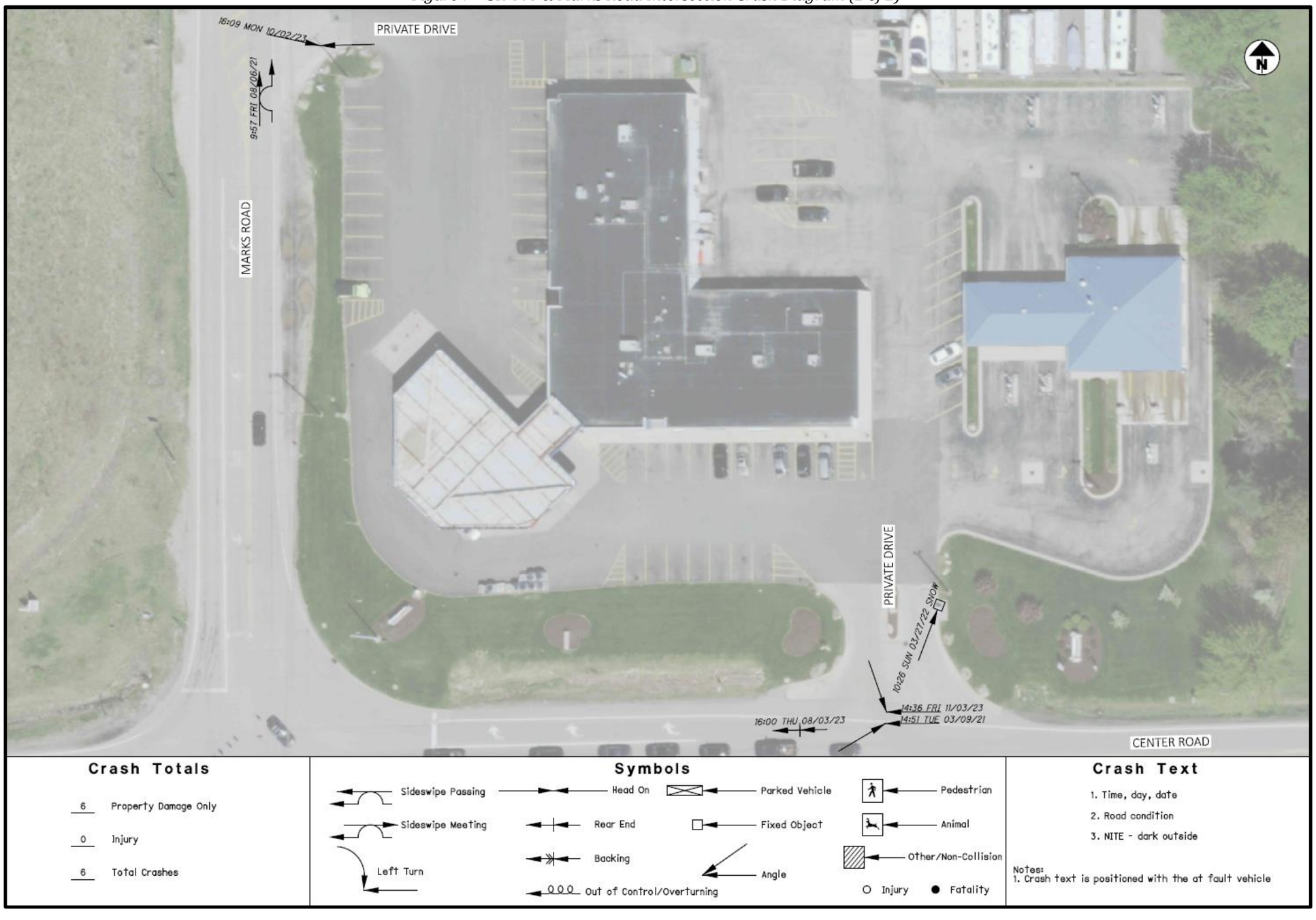


*Figure 8 – SR-303 & Substation Road Intersection Crash Diagram (1 of 2)*

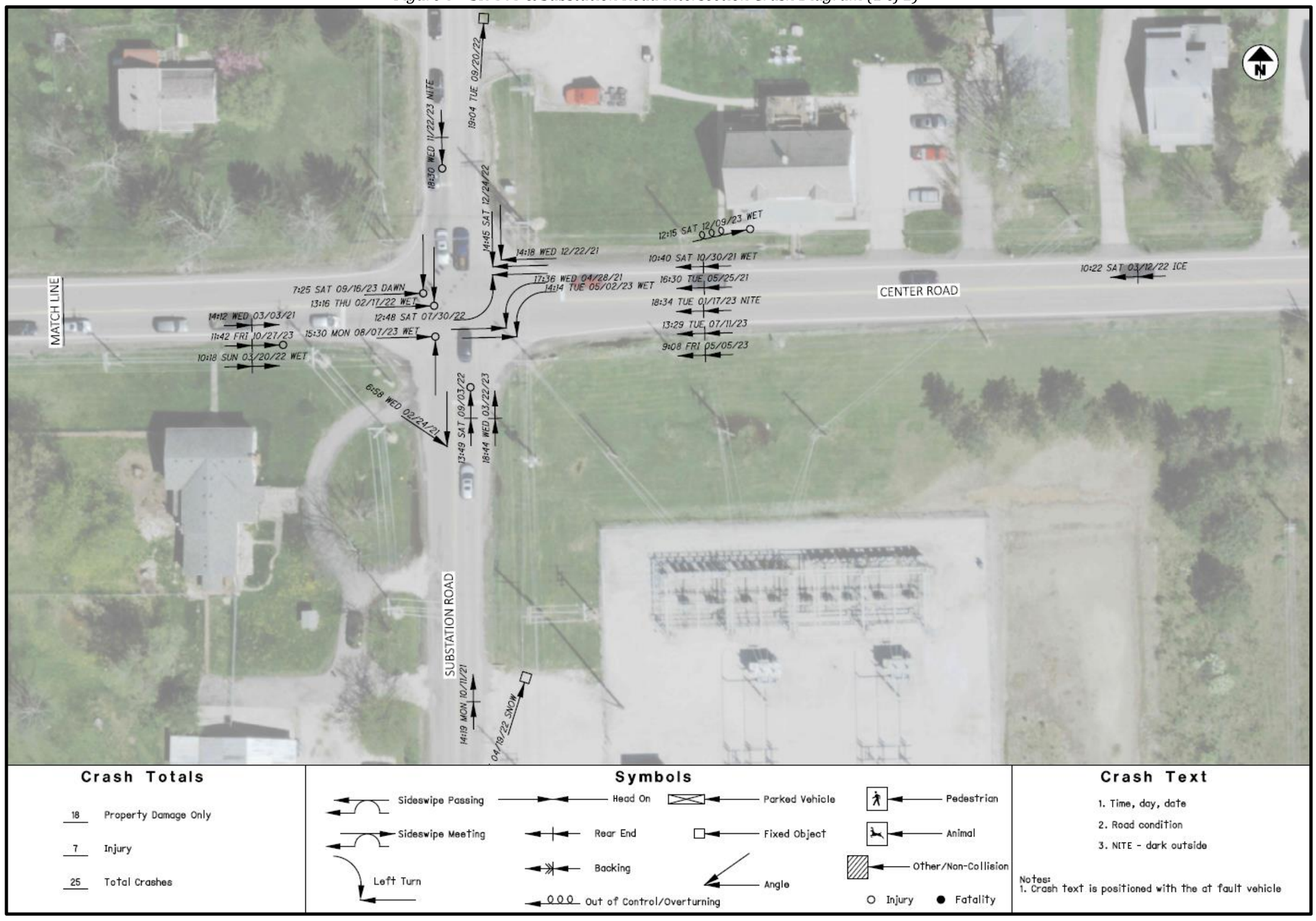
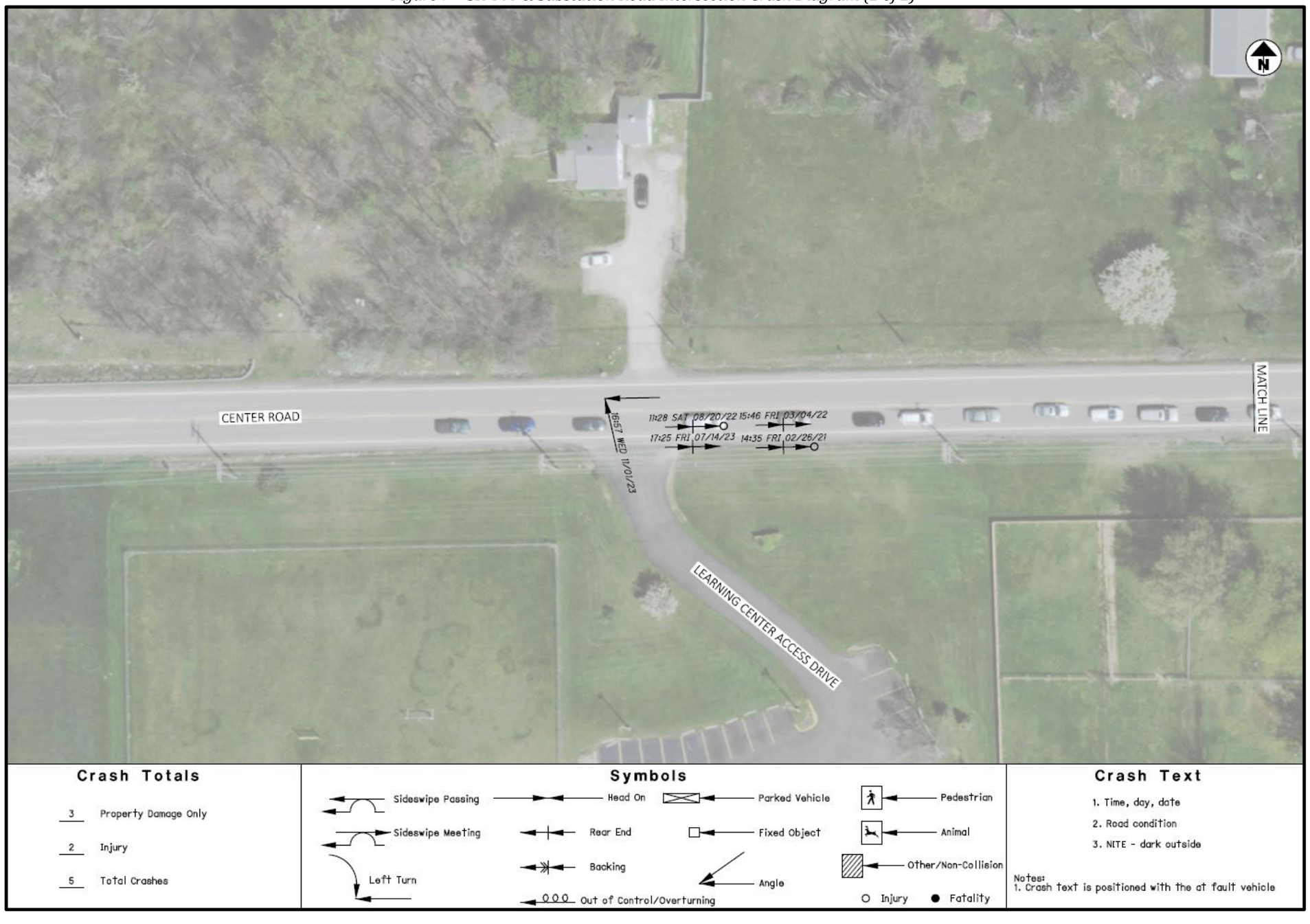


*Figure 9 – SR-303 & Substation Road Intersection Crash Diagram (2 of 2)*



## B. Probable Causes

Noteworthy crash patterns for each study intersection are summarized with supporting details and probable causes as follows:

**SR-303 & Marks Road**

- **Rear End Crashes**
  Rear end crashes were the most prevalent crash type at the Marks Road intersection. A total of 21 rear end crashes were reported, three resulting in injury. Rear end crashes represent 56.8 percent of the total crashes, higher than the statewide average of 42.3 percent. Long queues at study intersection and drivers not expecting to stop for queued or turning vehicles are likely the contributing factors for many of the rear end crashes. Of the total rear end crashes, approximately 19.0 percent occurred during the AM peak and 9.5 percent during the PM peak. Approximately 33.3 percent occurred during wet pavement conditions and 23.8 percent occurred in lighting conditions other than daylight (including dusk, night, and dawn).

- **Angle Crashes**
  Angle crashes were the second most prevalent crash type at the Marks Road intersection. A total of seven angle crashes were reported, one resulting in injury. Angle crashes represent 18.9 percent of the crashes reported in the study area, higher than the statewide average of 12.9 percent. Of the total angle crashes, 28.5 percent occurred under wet pavement conditions and 28.5 percent occurred in lighting conditions other than daylight (including dusk, night, and dawn). No clear trends are shown in these crashes, and all were between vehicles from different directions. Three angle crashes occurred at the gas station in the northeast quadrant of the Marks Road intersection, one at the access drive along Marks Road and two at the access drive along SR-303.

**SR-303 & Substation Road**

- **Rear End Crashes**
  Rear end crashes were the most prevalent crash type at the Substation Road intersection. A total of 17 rear end crashes were reported, five resulting in injury. Rear end crashes represent 56.7 percent of the total crashes, higher than the statewide average of 42.3 percent. Long queues at study intersection and drivers not expecting to stop for queued or turning vehicles are likely the contributing factors for many of the rear end crashes. Approximately 17.6 percent occurred during wet pavement conditions and 11.7 percent occurred in lighting conditions other than daylight (including dusk, night, and dawn).

- **Angle Crashes**
  Angle crashes were the second most prevalent crash type at the Substation Road intersection. A total of seven angle crashes were reported, three resulting in injury. Angle crashes represent 23.3 percent of the crashes reported in the study area, higher than the statewide average of 12.9 percent. Of the total angle crashes, 28.5

percent occurred under wet pavement conditions and 14.3 percent occurred in lighting conditions other than daylight (including dusk, night, and dawn). No clear trends are shown in these crashes, and all were between vehicles from different directions. One of the angle crashes occurred at the Learning Center access drive west of the Substation Road intersection.

### C. Highway Safety Manual

The Highway Safety Manual (HSM) predictive method for urban/suburban arterial intersections was applied to each study intersection to determine the potential for safety improvement. The results presented in **Table 7** show the expected crash frequency calculated using HSM predictive method with crash data and existing conditions for the study area elements.

*Table 7 - HSM Results for Existing Conditions for All Crashes (shown in crashes/year)*

| | Predicted Average Crash Frequency | Expected Average Crash Frequency – Existing Conditions | Expected Excess Crashes | Potential for Improvement |
|---|---|---|---|---|
| **SR-303 Intersections** | | | | |
| Marks Road | 5.1889 | 8.3360 | 3.1471 | Yes |
| Substation Road | 6.2201 | 7.7635 | 1.5434 | Yes |

The results conclude that the expected crash frequency is greater than the predicted crash frequency for the SR-303 intersections with Marks Road and Substation Road. This suggests that the intersections experience more average crashes per year than their peers and have a potential for crash reduction. HSM output reports are provided in **Appendix E**.

## VII. Long-term Countermeasures

The following section addresses possible countermeasures to mitigate the prevalent crash types in the study area. The countermeasures listed may be independent solutions and are not necessarily recommended to all be implemented concurrently.

### A. SR-303 & Marks Road Intersection Improvements

Operational issues, significant queues, and a history of crashes were noted at the SR-303 & Marks Road intersection in the 2020 Traffic Operations Study. Additionally, the north and south lanes are not aligned through the intersection, resulting in sight line issues. These issues are still present. For these reasons, it is recommended that improvements be made to the Marks Road intersection. Two intersection improvement alternatives are described below.

**Alternative 1: Add turn lanes and traffic signal upgrades**

It is recommended that the intersection be widened and reconfigured to provide a dedicated left turn lane and a shared through/right turn lane on each approach. This would result in all the approaches being properly aligned. Additionally, left turning vehicles would no longer cause unnecessary queues at the intersection. A full traffic signal reconstruction is recommended to be installed with these improvements. The new traffic signal should be

a mast arm configuration with backplates for all approaches and include intersection lighting.

Turn lane lengths for the intersection were calculated using methodologies in the ODOT Location & Design Manual. A summary of the calculated turn lane lengths (without diverging tapers) using 2050 volumes can be seen in **Table 8** below. The full turn lane length calculations are provided in **Appendix F.**

*Table 8 – SR-303 & Marks Road 2050 Turn Lane Analysis Results Summary*

| Turn Lane | Existing Length | Calculated Length |
|---|---|---|
| Eastbound Left | None | 265’ |
| Westbound Left | None | 195’ |
| Northbound Left | None | 175’ |
| Southbound Left | 210’ | 295’ |

Capacity analysis results of the proposed intersection configuration with optimized signal timings compared to existing conditions can be seen in **Tables 9 and 10**. Detailed results are provided in **Appendix G**.

*Table 9 – SR-303 & Marks Road Intersection Improvements: Alternative 1 AM Peak*

| Approach/ Movement | Existing Conditions - 2050 AM | | | | | Alternative 1 - 2050 AM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL | | | | | | C | 29.5 | 0.519 | 0.42 | 111 |
| EBT/R | | | | | | B | 16.2 | 0.452 | 0.17 | 172 |
| EBL/T/R | C | 26.2 | 0.819 | 0.35 | 346 | | | | | |
| **EB Approach** | **C** | **26.2** | --- | --- | --- | **C** | **20.3** | --- | --- | --- |
| WBL | | | | | | C | 22.5 | 0.298 | 0.37 | 72 |
| WBL/T | C | 21.5 | 0.699 | 0.16 | 262 | | | | | |
| WBT/R | | | | | | B | 18.2 | 0.637 | 0.15 | 248 |
| WBR | B | 16.7 | 0.272 | 0.75 | 94 | | | | | |
| **WB Approach** | **C** | **20.1** | --- | --- | --- | **B** | **19.0** | --- | --- | --- |
| NBL | | | | | | B | 20.0 | 0.132 | 0.18 | 31 |
| NBT/R | | | | | | B | 17.0 | 0.527 | 0.23 | 207 |
| NBL/T/R | B | 17.7 | 0.562 | 0.28 | 248 | | | | | |
| **NB Approach** | **B** | **17.7** | --- | --- | --- | **B** | **17.3** | --- | --- | --- |
| SBL | C | 30.7 | 0.613 | 0.76 | 171 | C | 27.9 | 0.594 | 0.52 | 153 |
| SBT/R | B | 15.8 | 0.384 | 0.18 | 161 | B | 15.9 | 0.407 | 0.17 | 151 |
| **SB Approach** | **C** | **21.8** | --- | --- | --- | **C** | **20.7** | --- | --- | --- |
| **Intersection** | **C** | **21.4** | --- | --- | --- | **B** | **19.3** | --- | --- | --- |

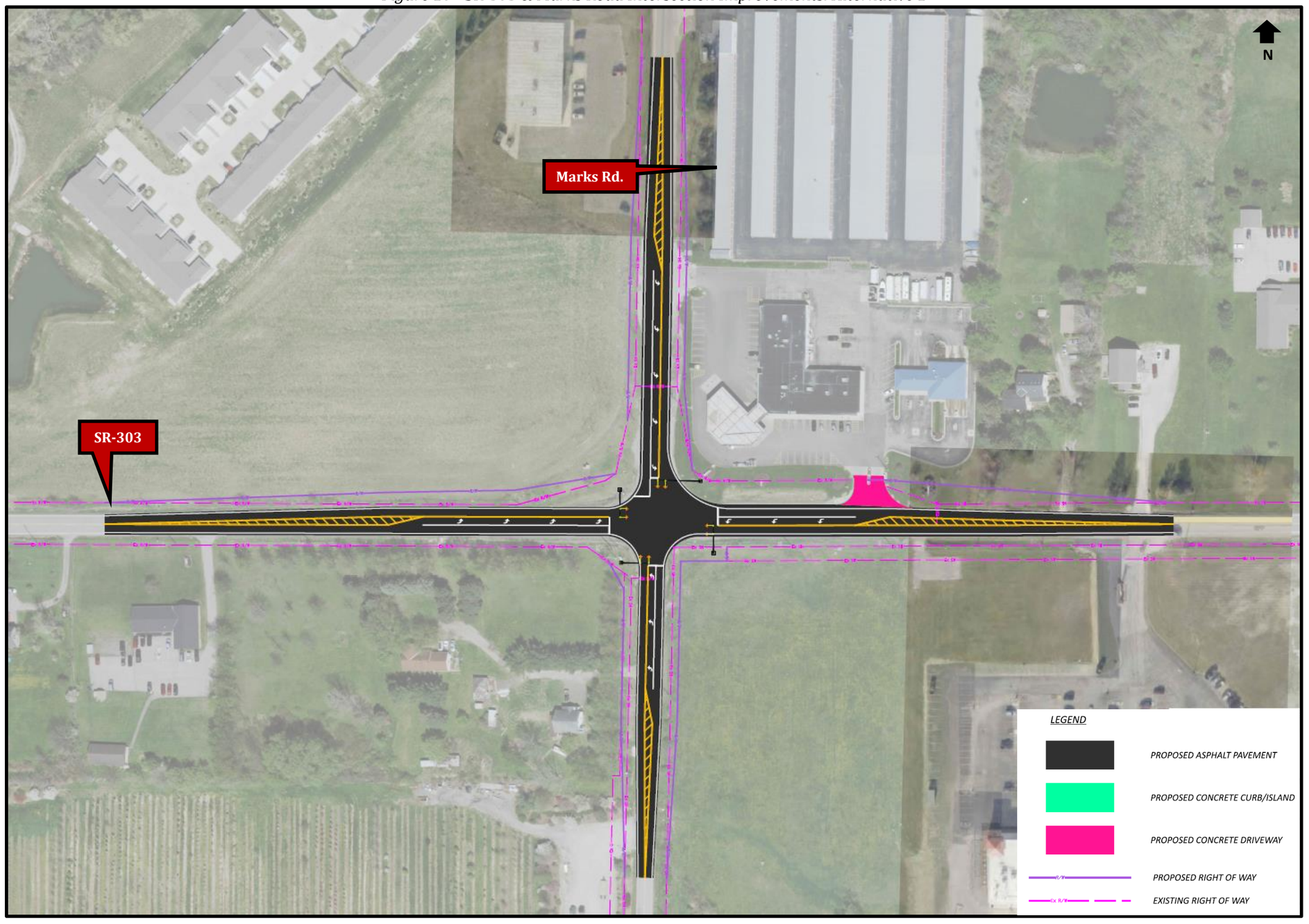
*Table 10 – SR-303 & Marks Road Intersection Improvements: Alternative 1 PM Peak*

| Approach/ Movement | Existing Conditions - 2050 PM | | | | | Alternative 1 - 2050 PM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL | | | | | | D | 52.4 | 0.761 | 0.50 | 133 |
| EBT/R | | | | | | B | 16.0 | 0.400 | 0.14 | 139 |
| EBL/T/R | D | 37.9 | 0.838 | 0.41 | 412 | | | | | |
| **EB Approach** | **D** | **37.9** | --- | --- | --- | **C** | **26.9** | --- | --- | --- |
| WBL | | | | | | C | 20.8 | 0.229 | 0.27 | 53 |
| WBL/T | C | 33.5 | 0.813 | 0.27 | 446 | | | | | |
| WBT/R | | | | | | C | 23.4 | 0.863 | 0.21 | 349 |
| WBR | C | 21.0 | 0.301 | 1.14 | 143 | | | | | |
| **WB Approach** | **C** | **30.0** | --- | --- | --- | **C** | **23.0** | --- | --- | --- |
| NBL | | | | | | C | 26.4 | 0.236 | 0.23 | 41 |
| NBT/R | | | | | | B | 15.6 | 0.501 | 0.21 | 186 |
| NBL/T/R | C | 27.7 | 0.716 | 0.42 | 383 | | | | | |
| **NB Approach** | **C** | **27.7** | --- | --- | --- | **B** | **17.1** | --- | --- | --- |
| SBL | F | 343.5 | 1.604 | 4.06 | 915 | D | 43.5 | 0.842 | 0.94 | 278 |
| SBT/R | C | 22.6 | 0.630 | 0.41 | 366 | B | 19.3 | 0.686 | 0.31 | 275 |
| **SB Approach** | **F** | **141.4** | --- | --- | --- | **C** | **28.3** | --- | --- | --- |
| **Intersection** | **E** | **69.8** | --- | --- | --- | **C** | **24.4** | --- | --- | --- |

The capacity analysis results show an overall improvement in LOS, delay, and queues with the implementation of Alternative 1 compared to existing conditions.

See **Figure 10** for the proposed intersection reconfiguration concept plan. More detailed concept plans are provided in **Appendix H**.

*Figure 10 - SR-303 & Marks Road Intersection Improvements: Alternative 1*



**Alternative 2: Implement a traditional roundabout**

A roundabout could be considered for implementation at this intersection. The FHWA Office of Safety identified roundabouts as a Proven Safety Countermeasure because of their ability to greatly reduce the types of crashes that result in serious injury or fatality. By reducing the number and severity of conflict points at the intersection, and because of the lower speeds of vehicles moving through the intersection, roundabouts are a proven, safer type of intersection.

Capacity analysis was conducted using HCS to determine the roundabout layout required for acceptable LOS/delay. The results show that a single lane circulating roundabout with an additional southbound right turn lane is needed in 2050. Capacity analysis results of the proposed roundabout compared to existing conditions are summarized in **Tables 11 and 12.** Detailed results are provided in **Appendix G.**

*Table 11 – SR-303 & Marks Road Intersection Improvements: Alternative 2 AM Peak*

| Approach/ Movement | Existing Conditions - 2050 AM | | | | | Alternative 2 - 2050 AM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | C | 26.2 | 0.819 | 0.35 | 346 | C | 18.4 | 0.68 | --- | 106 |
| **EB Approach** | **C** | **26.2** | --- | --- | --- | **C** | **18.4** | --- | --- | --- |
| WBL/T/R | | | | | | C | 22.8 | 0.76 | --- | 146 |
| WBL/T | C | 21.5 | 0.699 | 0.16 | 262 | | | | | |
| WBR | B | 16.7 | 0.272 | 0.75 | 94 | | | | | |
| **WB Approach** | **C** | **20.1** | --- | --- | --- | **C** | **22.8** | --- | --- | --- |
| NBL/T/R | B | 17.7 | 0.562 | 0.28 | 248 | C | 19.5 | 0.68 | --- | 108 |
| **NB Approach** | **B** | **17.7** | --- | --- | --- | **C** | **19.5** | --- | --- | --- |
| SBL | C | 30.7 | 0.613 | 0.76 | 171 | | | | | |
| SBL/T | | | | | | B | 11.5 | 0.51 | --- | 60 |
| SBT/R | B | 15.8 | 0.384 | 0.18 | 161 | | | | | |
| SBR | | | | | | A | 5.1 | 0.07 | --- | 4 |
| **SB Approach** | **C** | **21.8** | --- | --- | --- | **B** | **10.8** | **---** | **---** | **---** |
| **Intersection** | **C** | **21.4** | **---** | **---** | **---** | **C** | **18.1** | **---** | **---** | **---** |

*Table 12 – SR-303 & Marks Road Intersection Improvements: Alternative 2 PM Peak*

| Approach/ Movement | Existing Conditions - 2050 AM | | | | | Alternative 2 - 2050 AM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | D | 37.9 | 0.838 | 0.41 | 412 | C | 23.5 | 0.71 | --- | 118 |
| **EB Approach** | **D** | **37.9** | --- | --- | --- | **C** | **23.5** | --- | --- | --- |
| WBL/T/R | | | | | | D | 26.7 | 0.84 | --- | 200 |
| WBL/T | C | 33.5 | 0.813 | 0.27 | 446 | | | | | |
| WBR | C | 21.0 | 0.301 | 1.14 | 143 | | | | | |
| **WB Approach** | **C** | **30.0** | --- | --- | --- | **D** | **26.7** | --- | --- | --- |
| NBL/T/R | C | 27.7 | 0.716 | 0.42 | 383 | C | 19.1 | 0.67 | --- | 104 |
| **NB Approach** | **C** | **27.7** | --- | --- | --- | **C** | **19.1** | --- | --- | --- |
| SBL | F | 343.5 | 1.604 | 4.06 | 915 | | | | | |
| SBL/T | | | | | | D | 28.7 | 0.86 | --- | 210 |
| SBT/R | C | 22.6 | 0.630 | 0.41 | 366 | | | | | |
| SBR | | | | | | A | 6.0 | 0.16 | --- | 12 |
| **SB Approach** | **F** | **141.4** | --- | --- | --- | **D** | **25.0** | --- | --- | --- |
| **Intersection** | **E** | **69.8** | --- | --- | --- | **C** | **24.2** | --- | --- | --- |

Note, roundabouts have different LOS thresholds than signalized intersections, per the Highway Capacity Manual (HCM). **Table 13** provides a comparison of the LOS/control delay for each.

*Table 13 – LOS/Control Delay for Signal vs. Roundabout*

| LOS | Control Delay (seconds/vehicle)* | |
|---|---|---|
| | Signalized | Roundabout |
| A | ≤10 | ≤10 |
| B | >10-20 | >10-15 |
| C | >20-35 | >15-25 |
| D | >35-55 | >25-35 |
| E | >55-80 | >35-50 |
| F | >80 | >50 |

*Volume-to-capacity ratio ≤ 1.0

The capacity analysis results show an overall improvement in LOS, delay, and queues with the implementation of Alternative 2 compared to existing conditions. Also note, Alternative 1 and 2 capacity analysis results are relatively comparable.

Two roundabout options were evaluated:

- Alternative 2A: Chicane splitter islands with 110-foot ICD (see **Figure 11**)
- Alternative 2B: Straight splitter islands with 120-foot ICD (see **Figure 12**)

Smaller ICDs were considered for the roundabout designs at both intersections. However, the 120-foot ICD roundabout is already approaching the limits of acceptable design criteria. Entry angles are at the lower end of the recommended range, and the potential vehicle

speeds along the fastest paths slightly exceed the preferred thresholds. Reducing the ICDs further would result in more perpendicular conflict angles and even higher vehicle speeds. More detailed concept plans are provided in **Appendix H** which include tables with roundabout design calculations for each intersection. The recommended value for the entry angle is between 20 and 30 degrees. With straight road alignments, potential speeds higher than what is recommended on the straight movement are being calculated. Therefore, using larger ICDs for roundabouts with a straight alignment to provide the same level of speed control as other offset variants is recommended for these intersections.

*Figure 11 - SR-303 & Marks Road Intersection Improvements: Alternative 2A (Chicane Splitter Islands with 110' ICD)*

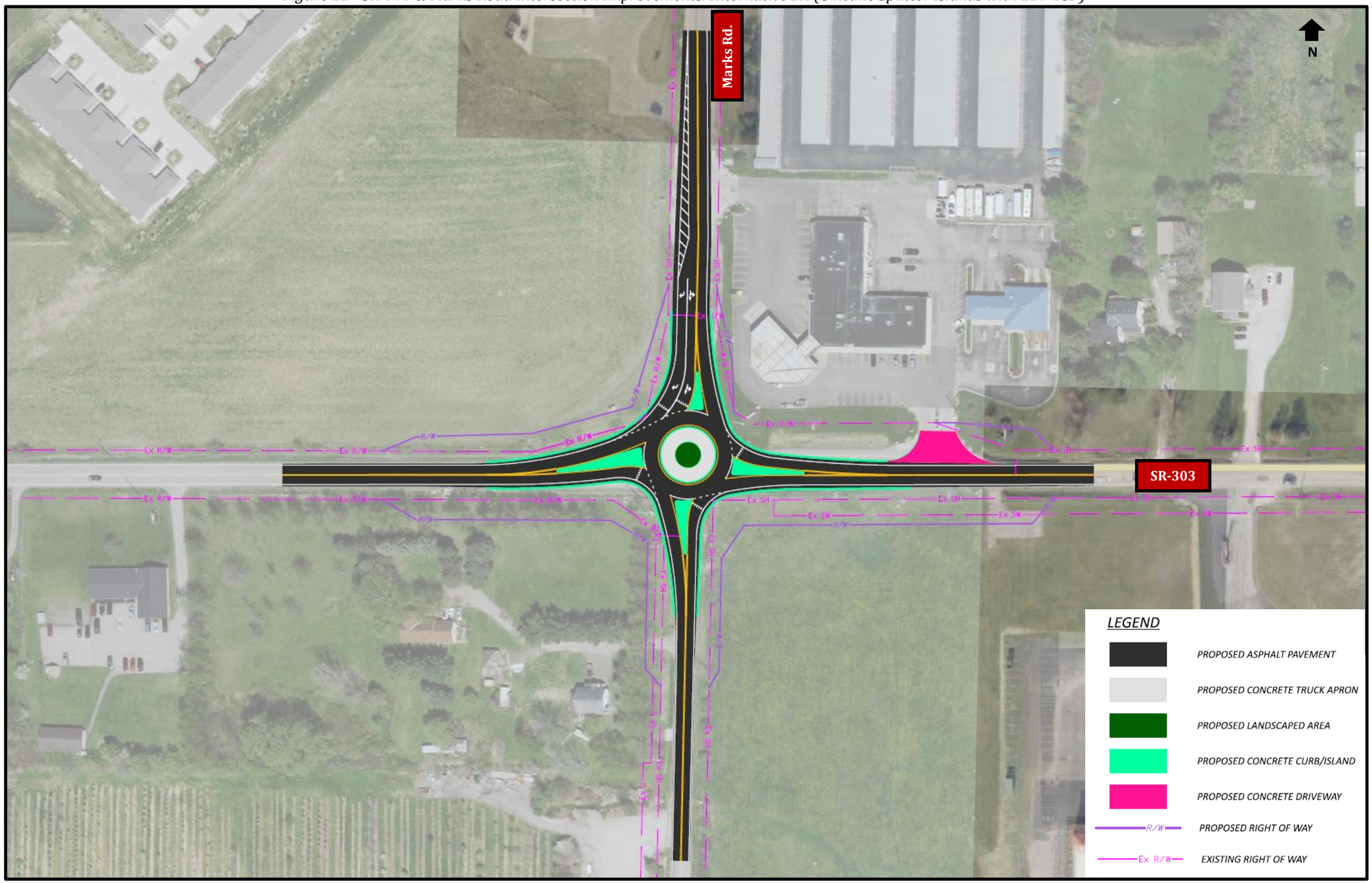
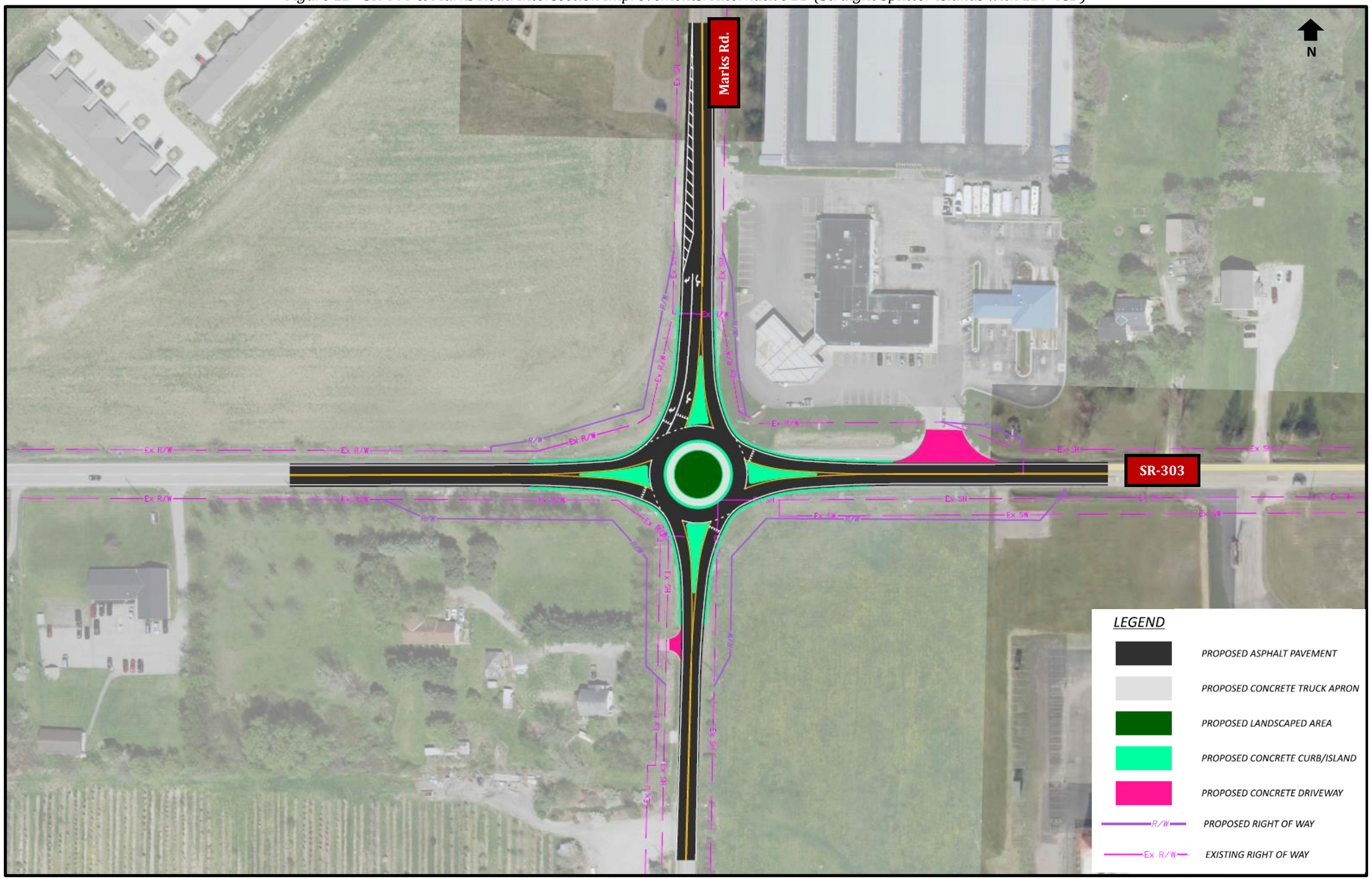


*Figure 12 - SR-303 & Marks Road Intersection Improvements: Alternative 2B (Straight Splitter Islands with 120' ICD)*



## B. SR-303 & Substation Road Intersection Improvements

Operational issues, significant queues, and a history of crashes were noted at the SR-303 & Substation Road intersection in the 2020 Traffic Operations Study. These issues are still present. For these reasons, it is recommended that improvements be made to the Substation Road intersection. Two intersection improvement alternatives are described below.

**Alternative 1: Add turn lanes and traffic signal upgrades**

It is recommended that the intersection be widened and reconfigured to provide a dedicated left turn lane and a shared through/right turn lane on the east/west approaches. This would result in left-turning vehicles no longer causing unnecessary queues on the east/west approaches. Additionally, a full traffic signal reconstruction is recommended. The new traffic signal should be a mast arm configuration with backplates for all approaches and include intersection lighting.

The addition of left turn lanes on the north/south approaches of Substation Road was considered. This addition would further improve safety and operations at the intersection but is not necessarily recommended at this time. Impacts from the recommended east/west improvements are substantial, so adding north/south improvements would further increase the impacts. Overall north/south capacity is acceptable, and operations are expected to improve with added efficiencies from the recommended east/west improvements. For these reasons, left turn lanes on the north/south approaches are not recommended at this time, but could be considered in the future if determined necessary.

A summary of the calculated turn lane lengths using 2050 volumes can be seen in **Table 14** below. The full turn lane length calculations are provided in **Appendix F.**

*Table 14 – SR-303 & Substation Road 2050 Turn Lane Analysis Results Summary*

| Turn Lane | Existing Length | Calculated Length |
|---|---|---|
| Eastbound Left | None | 175’ |
| Westbound Left | None | 175’ |

Capacity analysis results of the proposed intersection configuration with optimized signal timings compared to existing conditions can be seen in **Tables 15 and 16.** Detailed results are provided in **Appendix G**.

*Table 15 – SR-303 & Substation Road Intersection Improvements: Alternative 1 AM Peak*

| Approach/ Movement | Existing Conditions - 2050 AM | | | | | Alternative 1 - 2050 AM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL | | | | | | B | 16.3 | 0.084 | 0.08 | 14 |
| EB T/R | | | | | | B | 17.1 | 0.806 | 0.28 | 313 |
| EBL/T/R | B | 17.4 | 0.801 | 0.29 | 330 | | | | | |
| **EB Approach** | **B** | **17.4** | --- | --- | --- | **B** | **17.1** | --- | --- | --- |
| WBL | | | | | | C | 23.0 | 0.090 | 0.07 | 12 |
| WBT/R | | | | | | B | 11.8 | 0.588 | 0.24 | 195 |
| WBL/T/R | B | 11.9 | 0.582 | 0.26 | 205 | | | | | |
| **WB Approach** | **B** | **11.9** | --- | --- | --- | **B** | **12.2** | --- | --- | --- |
| NBL/T/R | B | 19.2 | 0.356 | 0.09 | 88 | B | 18.9 | 0.354 | 0.09 | 86 |
| **NB Approach** | **B** | **19.2** | --- | --- | --- | **B** | **18.9** | --- | --- | --- |
| SBL/T/R | C | 23.7 | 0.686 | 0.21 | 207 | C | 23.3 | 0.683 | 0.20 | 204 |
| **SB Approach** | **C** | **23.7** | --- | --- | --- | **C** | **23.3** | **---** | **---** | **---** |
| **Intersection** | **B** | **17.2** | **---** | **---** | **---** | **B** | **17.0** | **---** | **---** | **---** |

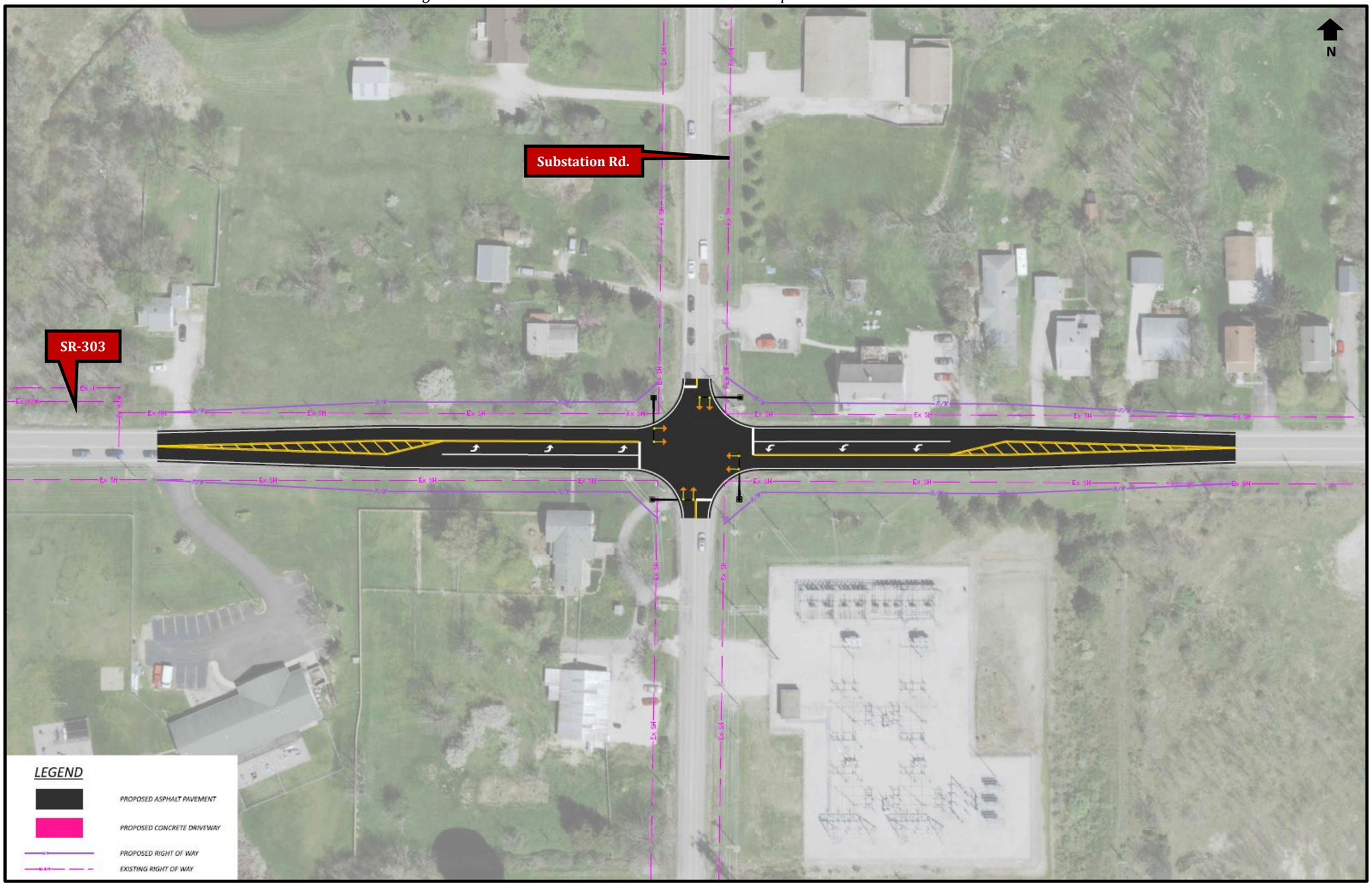
*Table 16 – SR-303 & Substation Road Intersection Improvements: Alternative 1 PM Peak*

| Approach/ Movement | Existing Conditions - 2050 PM | | | | | Alternative 1 - 2050 PM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL | | | | | | C | 32.4 | 0.178 | 0.14 | 24 |
| EB T/R | | | | | | B | 19.4 | 0.760 | 0.31 | 353 |
| EBL/T/R | C | 20.5 | 0.786 | 0.33 | 373 | | | | | |
| **EB Approach** | **C** | **20.5** | --- | --- | --- | **B** | **20.0** | --- | --- | --- |
| WBL | | | | | | C | 25.6 | 0.043 | 0.04 | 7 |
| WBT/R | | | | | | C | 26.2 | 0.870 | 0.57 | 457 |
| WBL/T/R | C | 24.2 | 0.847 | 0.56 | 445 | | | | | |
| **WB Approach** | **C** | **24.2** | --- | --- | --- | **C** | **26.2** | --- | --- | --- |
| NBL/T/R | C | 27.9 | 0.736 | 0.26 | 257 | C | 28.9 | 0.744 | 0.27 | 265 |
| **NB Approach** | **C** | **27.9** | --- | --- | --- | **C** | **28.9** | --- | --- | --- |
| SBL/T/R | C | 26.1 | 0.704 | 0.25 | 246 | C | 26.9 | 0.710 | 0.25 | 253 |
| **SB Approach** | **C** | **26.1** | --- | --- | --- | **C** | **26.9** | **---** | **---** | **---** |
| **Intersection** | **C** | **23.9** | **---** | **---** | **---** | **C** | **24.8** | **---** | **---** | **---** |

The capacity analysis shows generally comparable results with the implementation of Alternative 1 compared to existing conditions. However, as previously described, based on field observations and anecdotal reports, the HCS analysis results are expected to be under-representing the capacity issues in the existing conditions. When a left turning vehicle is present on SR-303, it blocks all following through traffic from proceeding through the intersection, leading to multicycle backups and long queues. With the proposed conditions providing left turn lanes on SR-303, these issues are expected to be resolved.

See **Figure 13** for the proposed intersection reconfiguration concept plan. More detailed concept plans are provided in **Appendix H**.

*Figure 13 - SR-303 & Substation Road Intersection Improvements: Alternative 1*



**Alternative 2: Implement a traditional roundabout**

A roundabout could be considered for implementation at this intersection. The safety benefits of roundabouts are described in the previous countermeasure.

Capacity analysis was conducted using HCS to determine roundabout layout required for acceptable capacity. The results show that a single lane circulating roundabout with single lane approaches is needed. Capacity analysis results are summarized in **Tables 17 and 18**. Detailed results are provided in **Appendix G**.

*Table 17 – SR-303 & Substation Road Intersection Improvements: Alternative 2 AM Peak*

| Approach/ Movement | Existing Conditions - 2050 AM | | | | | Alternative 2 - 2050 AM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | B | 17.4 | 0.801 | 0.29 | 330 | C | 22.4 | 0.82 | --- | 186 |
| **EB Approach** | **B** | **17.4** | --- | --- | --- | **C** | **22.4** | --- | --- | --- |
| WBL/T/R | B | 11.9 | 0.582 | 0.26 | 205 | A | 9.5 | 0.51 | --- | 60 |
| **WB Approach** | **B** | **11.9** | --- | --- | --- | **A** | **9.5** | --- | --- | --- |
| NBL/T/R | B | 19.2 | 0.356 | 0.09 | 88 | B | 11.0 | 0.32 | --- | 26 |
| **NB Approach** | **B** | **19.2** | --- | --- | --- | **B** | **11.0** | --- | --- | --- |
| SBL/T/R | C | 23.7 | 0.686 | 0.21 | 207 | B | 11.7 | 0.48 | --- | 54 |
| **SB Approach** | **C** | **23.7** | --- | --- | --- | **B** | **11.7** | **---** | **---** | **---** |
| **Intersection** | **B** | **17.2** | **---** | **---** | **---** | **C** | **15.4** | **---** | **---** | **---** |

*Table 18 – SR-303 & Substation Road Intersection Improvements: Alternative 1 PM Peak*

| Approach/ Movement | Existing Conditions - 2050 PM | | | | | Alternative 1 - 2050 PM | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue | LOS | Delay (sec/veh) | v/c | QSR | 95th % Queue |
| EBL/T/R | C | 20.5 | 0.786 | 0.33 | 373 | C | 16.5 | 0.73 | --- | 176 |
| **EB Approach** | **C** | **20.5** | --- | --- | --- | **C** | **16.5** | --- | --- | --- |
| WBL/T/R | C | 24.2 | 0.847 | 0.56 | 445 | D | 26.1 | 0.86 | --- | 216 |
| **WB Approach** | **C** | **24.2** | --- | --- | --- | **D** | **26.1** | --- | --- | --- |
| NBL/T/R | C | 27.9 | 0.736 | 0.26 | 257 | C | 16.8 | 0.60 | --- | 80 |
| **NB Approach** | **C** | **27.9** | --- | --- | --- | **C** | **16.8** | --- | --- | --- |
| SBL/T/R | C | 26.1 | 0.704 | 0.25 | 246 | C | 18.0 | 0.62 | --- | 84 |
| **SB Approach** | **C** | **26.1** | --- | --- | --- | **C** | **18.0** | **---** | **---** | **---** |
| **Intersection** | **C** | **23.9** | **---** | **---** | **---** | **C** | **20.1** | **---** | **---** | **---** |

The capacity analysis results show an improvement in LOS for the overall intersection with the implementation of Alternative 2 compared to existing conditions. However, some approaches show an increase in delay and queues, but are still considered acceptable. Also note, Alternative 1 capacity analysis results are slightly better than Alternative 2, but are still relatively comparable.

Two roundabout options were evaluated:

- Alternative 2A: Chicane splitter islands with 105-foot ICD (see **Figure 14**)
- Alternative 2B: Straight splitter islands with 120-foot ICD (see **Figure 15**)

More detailed concept plans are provided in **Appendix H**.

*Figure 14 - SR-303 & Substation Road Intersection Improvements: Alternative 2A (Chicane Splitter Islands with 105' ICD)*

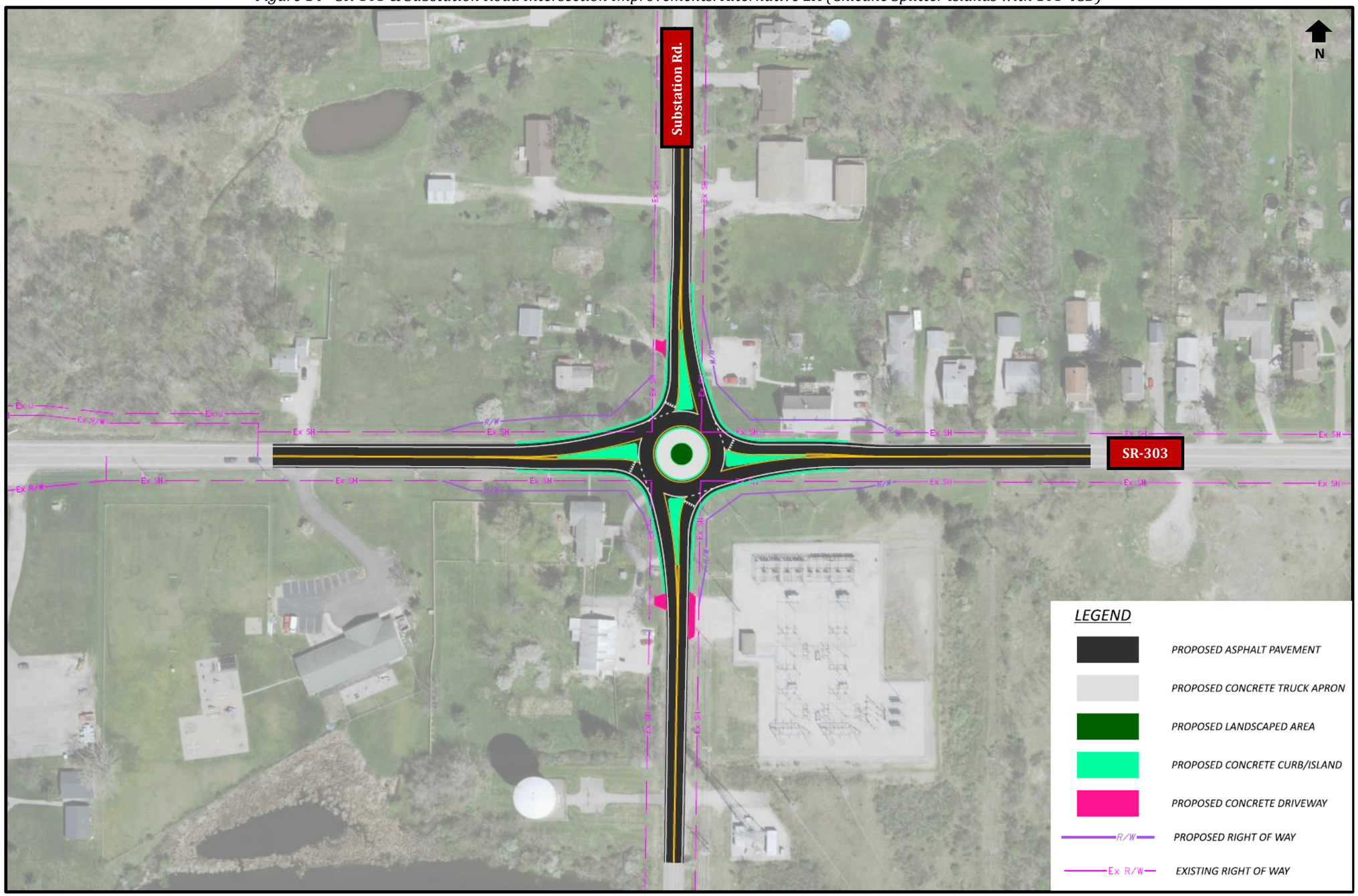
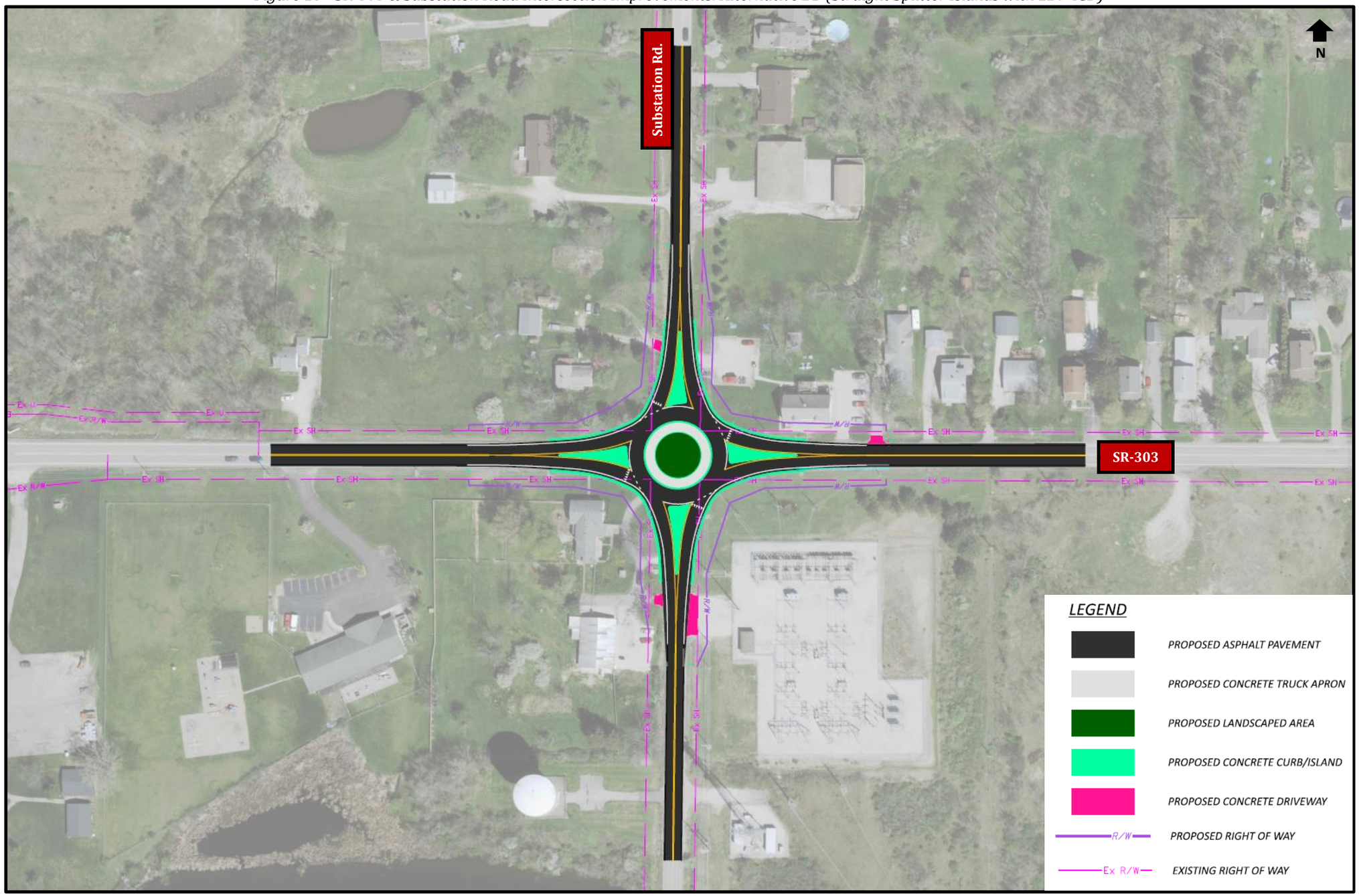


*Figure 15 - SR-303 & Substation Road Intersection Improvements: Alternative 2B (Straight Splitter Islands with 120' ICD)*



## C. Future Countermeasures to Consider

**Widen SR-303 to a Three-lane Typical Section**

West of Pearl Road, approximately 0.85 miles east of Substation Road, SR-303 transitions from a five-lane section to the two-lane section which continues through the study intersections. A three-lane typical section is already present on SR-303 between Easton Way and W. Chase Drive due to housing developments in the area needing to provide turn lanes. The areas in between these dedicated left turn lanes are currently striped out with transverse lines.

It is recommended that future planning efforts be made to consider widening SR-303 to a three-lane section from Marks Road to Pearl Road. Widening SR-303 to a three-lane typical between Marks Road and Substation Road was evaluated in the 2020 Traffic Operations Study and AER design. The proposed widening is expected to result in improved operations throughout the corridor with fewer left turning vehicles slowing or stopping in the through lanes. Concurrently, this is expected to result in a reduction of the rear end crashes documented in the 2020 Traffic Operations Study.

**Access management improvements**

As previously discussed, three angle crashes occurred at the access drives to the gas station in the northeast quadrant of the Marks Road intersection. Additionally, an angle crash occurred at the learning center access drive, west of Substation Road. The crashes are expected to be caused by the interaction of vehicles entering/exiting the access drives and the nearby study intersections and related queues.

Improved access management is recommended for the segment of SR-303 between Marks Road and Drug Mart Drive. It is understood that the development of the outlots in the southeast quadrant of the SR-303 & Marks Road intersection is being planned and/or discussed. As parcels in or surrounding this area develop or redevelop, consider access management improvements when appropriate. Specifically, it is recommended that all existing and proposed access drives on SR-303 between Marks Road and Drug Mart Drive be restricted to right-in, right-out movements only. This can be facilitated through "porkchop" islands on the drives or medians/longitudinal channelizers on SR-303. This improvement would provide improved operations and safety in this segment. Additionally, if roundabout installation is chosen at each intersection, this would allow for U-turn movements which would make driveway restrictions less impactful to local businesses.

If additional retail establishments are developed in the Drug Mart shopping center, to utilize the same Drug Mart Drive access, it is recommended that an additional connection be made onto Marks Road. A somewhat delineated gravel drive already exists in this area. This would provide relief at the Drug Mart Drive on SR-303 and provide access for traffic destined to west SR-303 or north Marks Road, to turn out without making an unsignalized left turn onto SR-303.

Improved access management is also recommended for the approaches to Substation Road intersection. Per ODOT State Highway Access Management Manual (SHAMM) Table 4-2,

each approach should have a minimum driveway spacing of 50', with a recommended spacing of 360'. Many of the access points falling within 360' of the intersection cannot be consolidated. However, it is recommended that the access located in the southwest corner of the intersection in the intersection radius be closed. An additional access is already provided further south from the intersection that may be maintained while removing an access point located in the intersection.

# VIII. Benefit-Cost Analysis

B/C analysis is a tool used to determine the financial benefits of a project by comparing the net present value (NPV) of a project to the NPV of the safety and operational benefits provided by the project. B/C values greater than one indicate a positive return on the original investment. Preferred countermeasures are those having the highest NPV of safety benefits. A B/C analysis for the recommended long-term countermeasure alternatives was prepared using the ODOT Intersection Control Evaluation (ICE) tool and Economic Crash Analysis Tool (ECAT).

## A. Cost Estimates

Cost estimates were prepared for all long-term countermeasure alternatives. The construction cost estimates assume the following:

- 25 percent engineering design
- 10 percent environmental, geotechnical, and miscellaneous federal requirements
- 25 percent contingency
- 22.4 percent inflation rate for an estimated 2030 construction year
- Estimated right-of-way costs (when necessary)
- Cost for utility relocation is not included

The estimated costs for the long-term countermeasure alternatives are summarized in **Table 19.** Detailed cost estimates are included in **Appendix I.**

*Table 19 – Cost Estimates*

| Long-term Countermeasure | | Total |
|---|---|---|
| **Alternative 1** | | |
| Add turn lanes and signal upgrades at Marks Road | | $2,700,800 |
| Add turn lanes and signal upgrades at Substation Road | | $2,321,900 |
| **Alternative 2** | | |
| Implement a roundabout at Marks Road | 2A. Chicane Splitter Islands with 110' ICD | $4,029,200 |
| | 2B. Straight Splitter Islands with 120' ICD | $3,803,400 |
| Implement a roundabout at Substation Road | 2A. Chicane Splitter Islands with 105' ICD | $3,694,300 |
| | 2B. Straight Splitter Islands with 120' ICD | $3,709,000 |

Note, utility impacts are expected to be high, especially for constructing the roundabouts in Alternative 2. In addition to the overhead electric and communication lines along SR-303, there is a large electrical substation present in the southeast corner of the Substation Road

intersection. Numerous poles and overhead wires coming from this facility are located within the intersection area to feed electric distribution in all directions on SR-303 and Substation Road.

## B. ICE

The ODOT Intersection Control Evaluation (ICE) process was utilized to consider and screen from among many proven combinations of geometry and traffic control. In general, the goal of ICE is to better inform the decision-making process to identify and select a control strategy that meets the project's Purpose and Need, reflects the overall best value, and moves Ohio towards zero traffic deaths. Ultimately, ICE is intended to foster thoughtful consideration of the full range of intersection geometrics and control and ensure a thorough quantitative analysis is completed when selecting an intersection control type for intersections across the State.

The ODOT ICE Tool was used for B/C and net present value analyses, considering both safety and operations. The analysis results are summarized in **Tables 20 and 21**. Detailed analysis is provided in **Appendix J.**

*Table 20 – ICE Analysis Summary – Marks Road Intersection*

| Benefit Categories | NPV of Benefits Relative to Base Case | | |
|---|---|---|---|
| | Alternative 1 Traffic Signal | Alternative 2A Roundabout | Alternative 2B Roundabout |
| Auto Passenger Delay | $5,189,926 | $5,896,157 | $5,896,157 |
| Truck Delay | $304,774 | $346,247 | $346,247 |
| Safety | $41,872 | $48,745 | $48,745 |
| NPV of Benefits | $5,536,572 | $6,291,149 | $6,291,149 |
| NPV of Costs | $2,468,640 | $3,824,287 | $3,603,447 |
| NPV of Improvement | $3,067,932 | $2,466,862 | $2,687,702 |
| B/C Ratio | 2.24 | 1.65 | 1.75 |
| Delay B/C | 2.23 | 1.63 | 1.73 |
| Safety B/C | 0.02 | 0.01 | 0.01 |

*Table 21 – ICE Analysis Summary – Substation Road Intersection*

| Benefit Categories | NPV of Benefits Relative to Base Case | | |
|---|---|---|---|
| | Alternative 1 Traffic Signal | Alternative 2A Roundabout | Alternative 2B Roundabout |
| Auto Passenger Delay | $ (133,120) | $ 940,095 | $ 940,095 |
| Truck Delay | $ (20,161) | $142,374 | $142,374 |
| Safety | $ 21,088 | $ 83,646 | $ 83,646 |
| NPV of Benefits | $ (132,192) | $ 1,166,115 | $ 1,166,115 |
| NPV of Costs | $1,753,260 | $ 3,095,627 | $ 3,104,487 |
| NPV of Improvement | $(1,885,452) | $(1,929,512) | $(1,938,372) |
| B/C Ratio | * | 0.38 | 0.38 |
| Delay B/C | * | 0.35 | 0.35 |
| Safety B/C | 0.01 | 0.03 | 0.03 |

* Control Strategy not preferred. Benefits are less than base case and cost is greater than base case.

The ICE analysis results shows the Alternative 1 turn lanes and traffic signal upgrades have a better B/C ratio compared to the Alternative 2 roundabout installation options at the Marks Road intersection. However, the NPV benefit of installing the Alternative 2 roundabout options is greater than the NPV benefit of installing Alternative 1.

At the Substation Road intersection, the results show the Alternative 1 turn lanes and traffic signal upgrades benefits are less than and cost is greater than the base case. Therefore, the Alternative 2 roundabout installation options has a better B/C ratio and positive benefit for Substation Road.

## C. ECAT

Crash modification factors (CMF) were applied for the proposed long-term improvements. This analysis does not account for all recommended improvements, rather only countermeasures that have CMF values. In general, the HSM analysis of the proposed conditions for each alternative was compared to the existing conditions. CMFs utilized for the proposed long-term countermeasure alternatives include:

**Alternative 1– Turn lanes and signal upgrades at Marks Road and Substation Road intersections**

- **Add left turn lanes:** Three left turn lanes will be added to the Marks Road intersection and two left turn lanes will be added to the Substation Road intersection. This is a standard CMF offering.
- **Remove right turn lane:** The existing westbound right turn lane at Marks Road is proposed to be removed with the implementation of the proposed intersection configuration. This is a standard CMF offering.
- **Improve visibility of signal heads**: A CMF of 0.71 was applied to all fatal and serious/minor injury crashes, and a CMF of 0.79 was applied to all property damage only crashes at the signalized intersections. This accounts for upgrading to mast arm configuration and signal heads with backplates. These CMFs were obtained from the FHWA CMF Clearinghouse and have a three-star quality rating. At the Substation Road intersection, since backplates are currently present for the east/west approaches, but not for the north/south approaches, only a proportion of 0.50 of each CMF was applied to the intersection. The CMF is provided in **Appendix E.**

**Alternative 2– Roundabout implementation at Marks Road and Substation Road intersections**

- **Conversion of signalized intersection into roundabout:** The proposed roundabout has a dedicated site type in ECAT, which was utilized for the proposed conditions analysis.
- Note, this was considered to be the same for both roundabout options.

**Tables 22 and 23** summarize the B/C analysis results from ECAT. Detailed B/C analysis reports from ECAT are included in **Appendix K**.

*Table 22 – ECAT Summary – Marks Road Intersection*

| | Alternative 1 Traffic Signal | Alternative 2A Roundabout | Alternative 2B Roundabout |
|---|---|---|---|
| **Expected Annual Crash Adjustment** | **-2.138** | **-2.515** | **-2.515** |
| **NPV of Project** | $2,206,536 | $3,291,830 | $3,107,354 |
| **NPV of Safety Benefit** | $791,389 | $984,781 | $984,781 |
| **B/C Ratio** | **0.36** | **0.30** | **0.32** |

*Table 23 – ECAT Summary – Substation Road Intersection*

| | Alternative 1 Traffic Signal | Alternative 2A Roundabout | Alternative 2B Roundabout |
|---|---|---|---|
| **Expected Annual Crash Adjustment** | **-1.764** | **-3.142** | **-3.142** |
| **NPV of Project** | $1,896,978 | $3,018,219 | $3,030,229 |
| **NPV of Safety Benefit** | $656,026 | $1,261,613 | $1,261,613 |
| **B/C Ratio** | **0.35** | **0.42** | **0.42** |

The expected annual crash adjustment shows a decrease in crashes for all countermeasure alternatives. However, the B/C ratio is less than 1.0 for all alternatives. This indicates the ECAT methods predict the cost of each project is not justified based on the calculated value of safety benefits to be obtained. This shows the proposed projects would not have a positive return on the original investment.

The B/C ratios for each alternative are comparable. While Alternative 2 options have higher costs, they are expected to reduce more crashes compared to Alternative 1 for each intersection. Crash reductions associated with Alternative 2 roundabout options are expected to be greater than the Alternative 1 intersection improvements because of industry knowledge that roundabouts are a proven, safer type of intersection.

## D. Total

For overall alternative selection, the ICE auto passenger and truck delay benefits were added to the ECAT safety benefits and divided by the NPV of each project utilized in ECAT to calculate the total B/C ratio for each alternative. **Tables 24 and 25** summarize the total B/C for each intersection.

*Table 24 – Total B/C – Marks Road Intersection*

| | Alternative 1 Traffic Signal | Alternative 2A Roundabout | Alternative 2B Roundabout |
|---|---|---|---|
| Auto Passenger Delay (ICE) | $5,189,926 | $5,896,157 | $5,896,157 |
| Truck Delay (ICE) | $304,774 | $346,247 | $346,247 |
| Safety (ECAT) | $791,389 | $984,781 | $984,781 |
| Total NPV of Benefits | $6,286,089 | $7,227,185 | $7,227,185 |
| NPV of Project (ECAT) | $2,206,536 | $3,291,830 | $3,107,354 |
| **Total B/C** | **2.85** | **2.20** | **2.33** |

*Table 25 – Total B/C – Substation Road Intersection*

| | Alternative 1 Traffic Signal | Alternative 2A Roundabout | Alternative 2B Roundabout |
|---|---|---|---|
| Auto Passenger Delay (ICE) | $ (133,120) | $ 940,095 | $ 940,095 |
| Truck Delay (ICE) | $ (20,161) | $142,374 | $142,374 |
| Safety (ECAT) | $656,026 | $1,261,613 | $1,261,613 |
| Total NPV of Benefits | $502,745 | $2,344,082 | $2,344,082 |
| NPV of Project (ECAT) | $1,896,978 | $3,018,219 | $3,030,229 |
| **Total B/C** | **0.27** | **0.78** | **0.77** |

For the SR-303 & Marks Road intersection, Alternative 1 has the highest total B/C ratio, but the Alternative 2 roundabout options have the highest total benefits. The Alternative 2B roundabout has a lower total cost and fewer right-of-way impacts. Therefore, Alternative 2B is recommended for further consideration at this intersection.

For the SR-303 & Substation Road intersection, the Alternative 2 roundabout options have the highest total B/C ratio and highest benefits. The Alternative 2A roundabout has a lower total cost and fewer right-of-way impacts. Therefore, Alternative 2A is recommended for further consideration at this intersection.

# IX. Recommendations

Based on the ECAT and ICE results and the analysis herein, it is recommended Alternative 2B (roundabout with straight splitter islands and 120-foot ICD) be installed at the Marks Road intersection and Alternative 2A (roundabout with chicane splitter islands and 105-foot ICD) be installed at the Substation Road intersection. Each roundabout design can be further defined during the detailed design process.

# Appendix A
## Previous Traffic Operations Study and AER Design

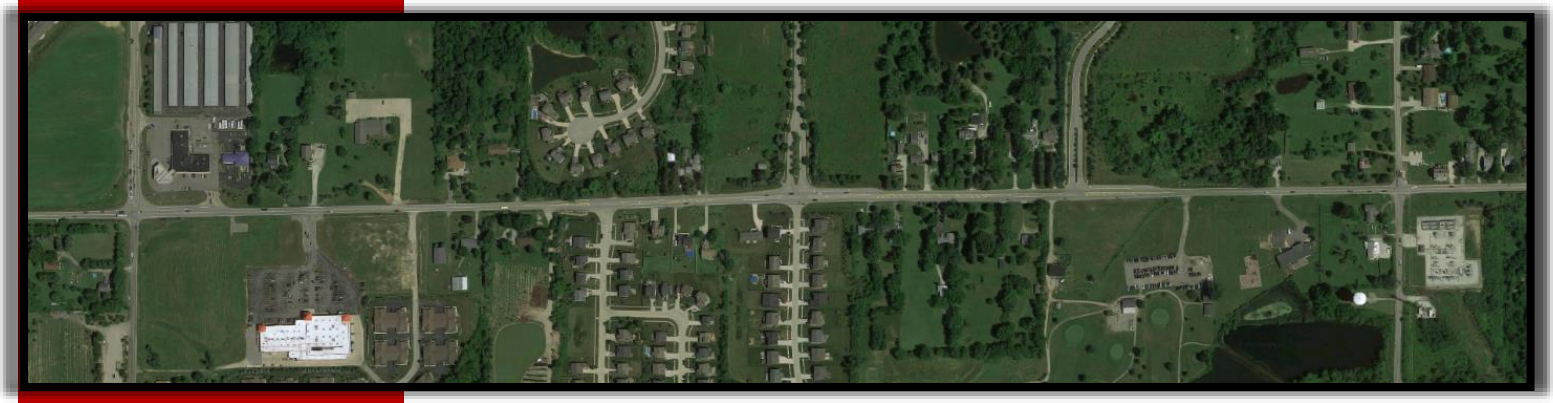
Appendix A

CARPENTER MARTY transportation

# MED-303-(4.85-6.00)

## Traffic Operations Study
## PID 111150
## Final Report
## February 28, 2020





ODOT District 3

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CARPENTER MARTY transportation

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# I. Executive Summary

## A. Purpose and Need

The purpose of this study is to analyze existing conditions, needed intersection improvements, and the potential widening of SR-303 to a three-lane section through the study limits to improve operations and reduce crash frequency and vehicle delays. The study limits include Center Road (SR-303) from Marks Road (logpoint 4.96) to Substation Road (logpoint 5.44), including the intersections of SR-303 with the Discount Drug Mart drive and Terrington Drive/Muirwood Drive. The intersection of SR-303 & Marks Road was ranked as #21 on the 2018 Highway Safety Improvement Program (HSIP) Rural Intersection List. The segments of SR-303 from logpoint 4.96-5.06 and 5.06-5.16 are ranked #648 and #371, respectively, on the 2018 HSIP Suburban Non-Freeway List.

## B. Overview of Safety Issues

Crash data was obtained from the ODOT Transportation Information Mapping System (TIMS) for three complete years of available data (2016-2018). A total of 108 crashes were obtained. The most prevalent crash types with corresponding percentage of total crashes were rear end (38.9%), angle (25.0%), left turn (10.2%), fixed object (8.3%), and sideswipe-passing (7.4%).

## C. Recommended Long-Term Countermeasures and Related Costs

Below is a brief overview of the recommended countermeasures. See section **VI Countermeasures** for further details.

**Long-term countermeasures:**

**Alternative 1**

- Widen SR-303 to a three-lane typical section
- Add turn lanes and traffic signal upgrades at the Marks Road and Substation Road intersections with SR-303

**Alternative 2**

- Widen SR-303 to a three-lane typical section
- Implement a roundabout at Marks Road and Substation Road intersections with SR-303

The estimated cost of Alternative 1 is $6,428,700 and Alternative 2 is $6,653,600.

**Future countermeasures to consider:**

- Access management improvements
- Continue three-lane section east to Pearl Road

In general, both alternatives can be considered for implementation to meet the purpose of improving operations and reducing crashes. However, the potential utility impacts involved in each alternative could be extreme. It is recommended that field survey be completed, utility impacts be quantified, and the planning-level concept plans and cost estimates from this study be updated and taken to a Feasibility Study level of detail.

# II. Purpose and Need

The purpose of this study is to analyze existing conditions, needed intersection improvements, and the potential widening of SR-303 to a three-lane section through the study limits to improve operations and reduce crash frequency and vehicle delays. The study limits include SR-303 from Marks Road (logpoint 4.96) to Substation Road (logpoint 5.44), including the intersections of SR-303 with the Discount Drug Mart drive and Terrington Drive/Muirwood Drive. The intersection of SR-303 & Marks Road was ranked as #21 on the 2018 HSIP Rural Intersection List. The segments of SR-303 from logpoint 4.96-5.06 and 5.06-5.16 are ranked #648 and #371, respectively, on the 2018 HSIP Suburban Non-Freeway List. A project location map is provided in **Figure 1** and a study area map is provided in **Figure 2**.

*Figure 1 - Project Location Map*

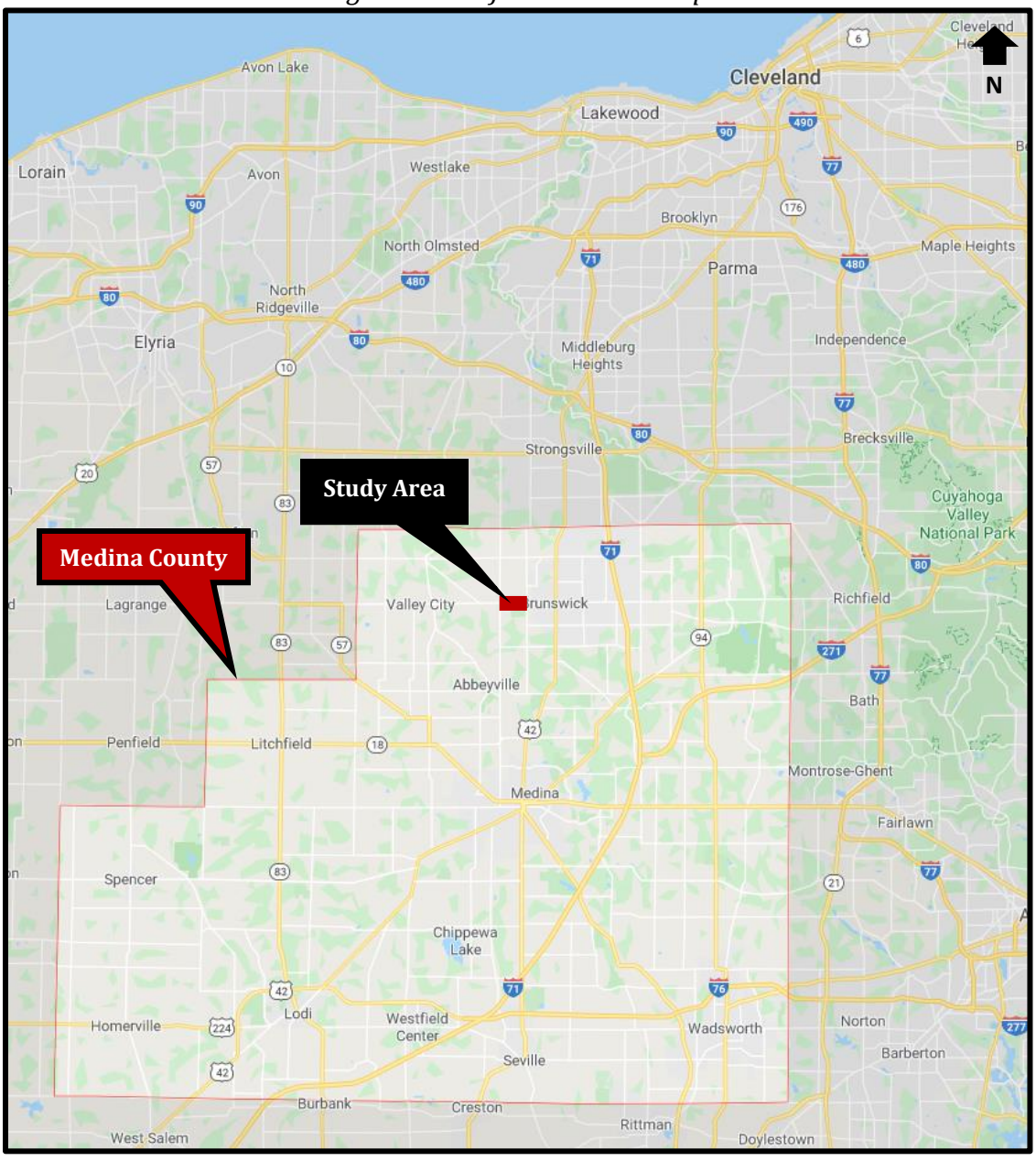
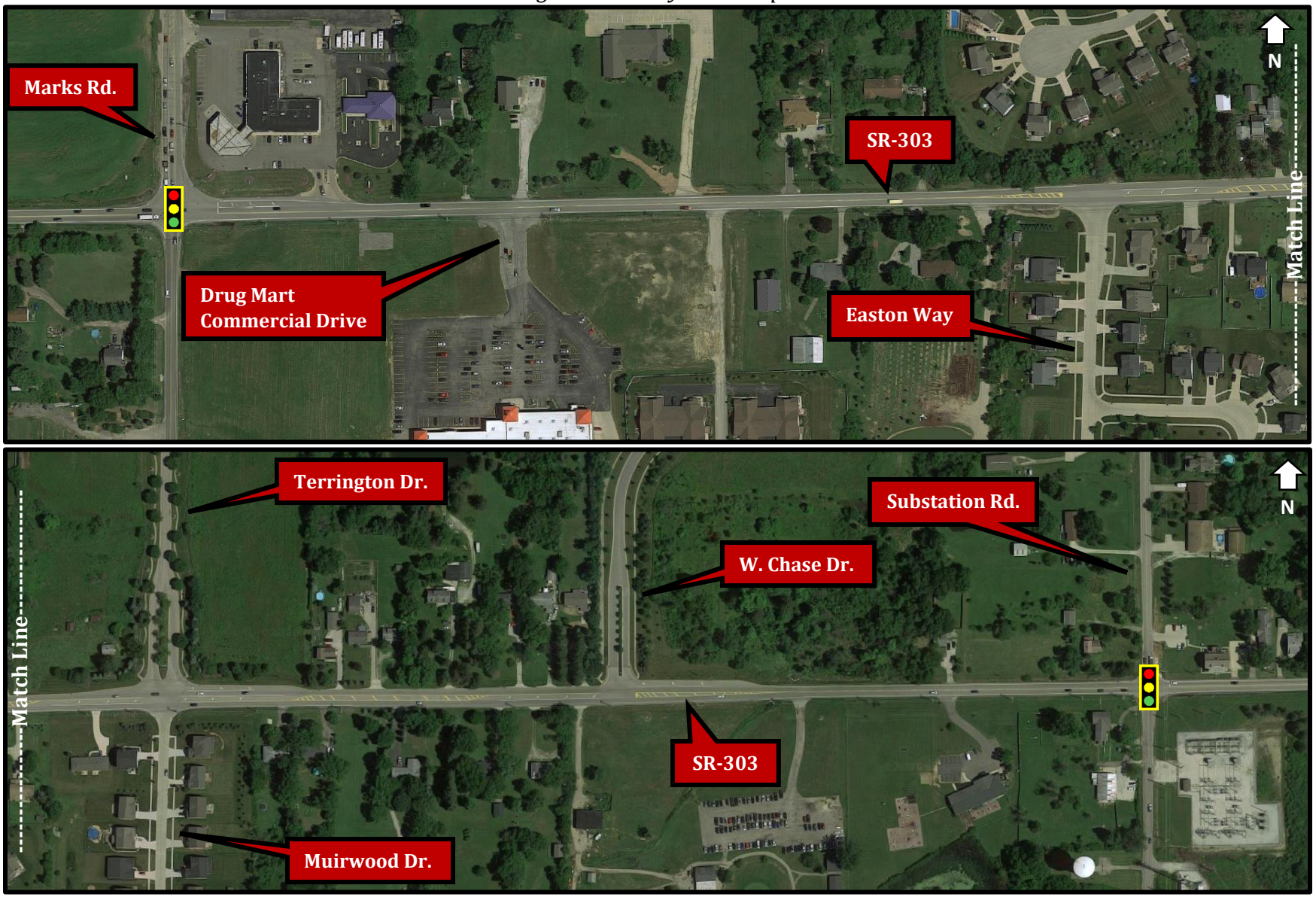


*Figure 2 – Study Area Map*



# III. Existing Conditions

## A. Land Use

The study area is approximately 0.5 miles west of the City of Brunswick. The study area includes SR-303 from just west of Marks Road to just east of Substation Road, including intersection approaches and all intersections in between.

Single-family homes and access drives to residential developments are present on either side of SR-303 throughout the study area. A gas station, car wash, and other retail/restaurant establishments are in the northeast corner of SR-303 & Marks Road. Multiple industrial facilities are present further north on Marks Road. A retail center with a Discount Drug Mart and other retail/restaurant establishments is located east of Marks Road with a singular access drive on SR-303 (referred to as "Drug Mart Drive" in this report). Additional trip generators along SR-303 includes a church, golf course, and childcare center. A large substation is present in the southeast corner of SR-303 & Substation Road. Associated lines along with many other overhead utilities branch out from the substation in all four directions.

## B. Roadway Conditions

SR-303 serves as an east-west connector along northeast Ohio. SR-303 has an interchange with IR-71, with a large retail area surrounding it, approximately three miles east of the study area. Through the study area, SR-303 is classified as an Urban Major Collector.

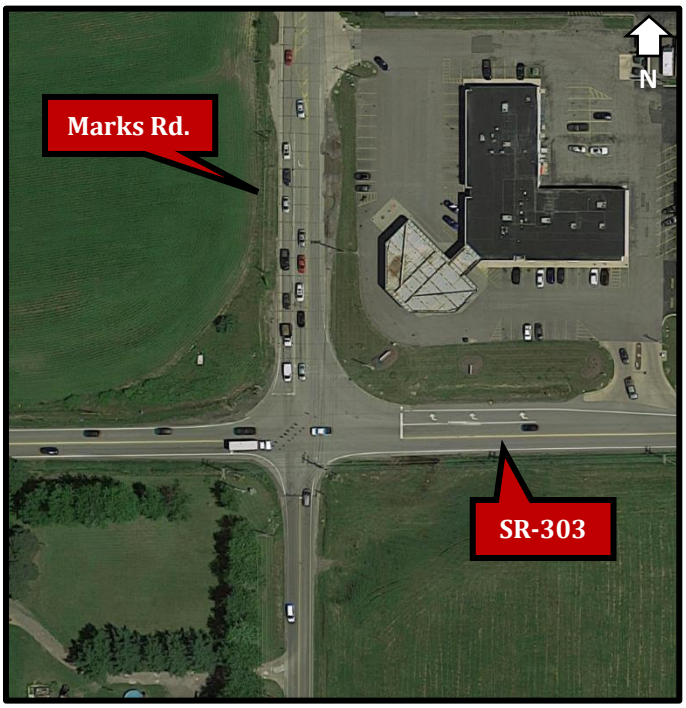
SR-303 generally has a two-lane typical section with left and right turn lanes at some intersections through the study area. Curb and gutter are present along the north and south sides of SR-303 from roughly Easton Way to Chase Drive. Where the roadway does not have curb and gutter, approximately 1-2 foot paved shoulders with ditches are present on either side of the roadway. Guardrail is present along the north and south sides of SR-303 from east of Chase Drive to the entrance to the golf course. This rail protects a culvert running under SR-303. No rumble strips or stripes are present. Raised pavement markers are present throughout the study area. Roadway lighting is only present at the intersections of SR-303 with Substation Road, Terrington Drive/Muirwood Drive, Drug Mart Drive, and Marks Road.

SR-303 currently has a posted speed limit of 50 MPH in the study area. The speed limit in the study area is being reduced to 45 MPH. The speed zone evaluation sheet and revision map, provided by the District, are in **Appendix A**.

## C. Intersection Conditions

**SR-303 & Marks Road**

*Figure 3 - SR-303 & Marks Road Intersection*




SR-303 & Marks Road is a four-leg, signalized intersection. The northbound and eastbound approaches each have a single, shared left/though/right lane. The southbound approach has a dedicated left turn lane and a shared through-right lane. The westbound approach has a shared left-through lane and a dedicated right turn lane. The northeast corner has curb and gutter and in increased corner radius. The north/south lanes are not aligned through the intersection, resulting in sight line issues.
See **Figure 3**.

The traffic signal is a diagonal span-wire configuration. All approaches have two three-section heads. All signal heads are painted black with no retroreflective backplates. Loop detectors are utilized for vehicle detection on the north/south approaches. Intersection lighting is present.

Signal ahead warning signs are posted at the following locations prior to the intersection: 640 feet on the eastbound approach, 725 feet on the westbound approach, 800 feet on the northbound approach, and 730 feet on the southbound approach. Lane use signs are present on the westbound and southbound approaches at the start of the turn lanes and duplicated at the stop line for the southbound approach. The westbound approach has an "End Engine Brake Restriction" sign. Truck prohibition and "NO THROUGH VEHICLES IN EXCESS OF 5 TONS" signs are posted for the receiving lane on the south leg of the intersection.

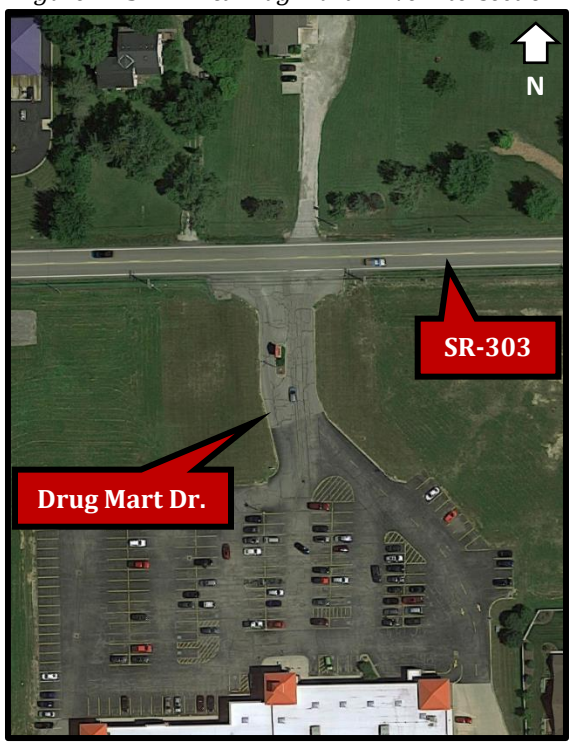
No sidewalks, pedestrian signal heads, pushbuttons, crossing signs, or pavement markings are present at the intersection.

**SR-303 & Drug Mart Commercial Drive**

SR-303 & Drug Mart Commercial Drive (referred to as "Drug Mart Drive" for brevity) is a four-leg intersection with Drug Mart Drive being a stop-controlled commercial drive. A single-family home drive is directly across from the Drug Mart Drive. The Drug Mart Drive approach does not have any pavement markings, but it is wide enough to operate as northbound dedicated left and right turn lanes. No turn lanes are present on SR-303 at this intersection. See **Figure 4**.

"NO SEMI TRUCKS" signs are posted for vehicles entering Drug Mart Drive. A relatively small median island is present on the south leg with a sign for the retail establishments. The south leg is curbed except for the drive radius returns which have large rocks to delineate the edge of pavement. No sidewalks or pedestrian crossings are present at the intersection. Intersection lighting is present.

*Figure 4 - SR-303 & Drug Mart Drive Intersection*

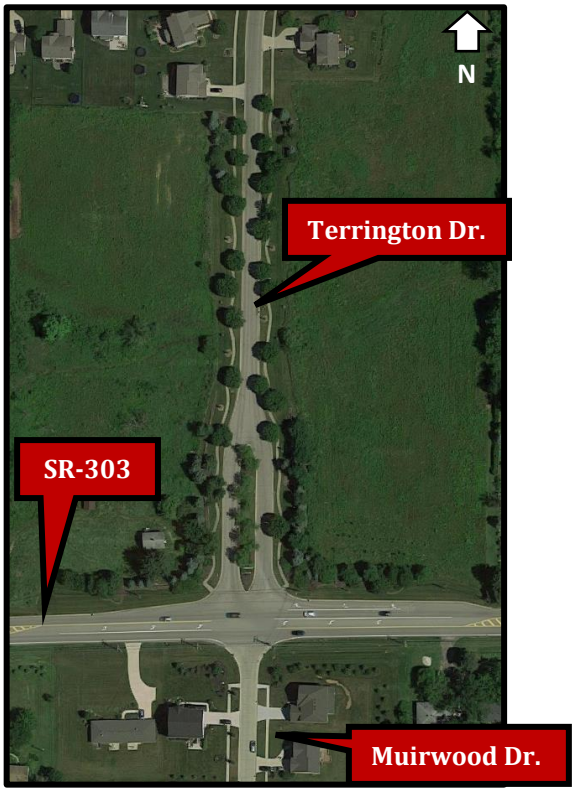



**SR-303 & Terrington Drive/Muirwood Drive**

SR-303 & Terrington Drive/Muirwood Drive is a four-leg intersection with Terrington Drive and Muirwood Drive being stop-controlled. The northbound approach has a single shared left/through/right lane. The southbound approach is a boulevard style design. It does not have any pavement markings but is wide enough to function as one right turn lane and one shared through/left turn lane. The westbound approach has a left turn lane and a right turn lane. The eastbound approach has a left turn lane. No intersection ahead warning signs are present. See **Figure 5**.

Sidewalk is present on both sides of Terrington Drive and Muirwood Drive, but both terminate at SR-303. No pedestrian crossing signs or pavement markings are present. Intersection lighting is present on utility poles.

*Figure 5- SR-303 & Terrington Drive /Muirwood Drive Intersection*



**SR-303 & Substation Road**

SR-303 & Substation Road is a four-leg, signalized intersection. All approaches have a single, shared left/though/right lane. See **Figure 6**.

*Figure 6 - SR-303 & Substation Road Intersection*




The traffic signal is a diagonal, span-wire configuration. All approaches have two three-section heads. All signal heads are painted black and only the east/west heads have retroreflective backplates. Loop detectors are utilized for vehicle detection for the north/south approaches. Intersection lighting is present.

Signal ahead warning signs are posted at the following locations prior to the intersection: 650 feet on the eastbound approach, 810 feet on the westbound approach, 510 feet on the northbound approach, and 580 feet on the southbound approach. The eastbound and westbound approaches have an "END ENGINE BRAKE RESTRICTION" sign. However, 150 feet west of the intersection there is a "NO ENGINE BRAKE" sign posted for westbound vehicles. Signs are posted on the SR-303 approaches restricting trucks from turning north onto Substation Road and directing Liverpool Industrial Park traffic to continue on SR-303. The south leg has a "THROUGH TRUCKS PROHIBITED" sign posted for southbound vehicles departing the intersection. The southbound approach has a "DO NOT BLOCK DRIVE" sign posted for the drives closest to the intersection.

No sidewalks, pedestrian signal heads, pushbuttons, crossing signs, or pavement markings are present at the intersection.

## D. Field Observations

Field observations were conducted by two engineers on November 19-20, 2019 during the AM and PM peak hours. The weather was overcast but dry both days. The following observations were noted:

**SR-303 & Marks Road**

- Intermittent queuing was noted on each approach during the PM peak. The westbound queue was the most significant, extending back past Drug Mart Drive. The queue in both lanes on the southbound approach extended past the gas station drive. A northbound queue of about 19 vehicles was noted.

- The long westbound queues would block vehicles from getting to the westbound right turn lane.
- During the AM peak, queues were noted on all approaches except for the southbound approach. The longest westbound queue was 10 vehicles, eastbound queue was 20 vehicles, and northbound queue was 16 vehicles.
- The lack of left turn lanes on the SR-303 and northbound approaches contributed to the queue problems.
- Some cycle failures were noted for all approaches.
- High truck traffic was observed to/from the north leg from/to SR-303. Frequent movement of trucks turning from both directions of SR-303 to the north leg of Marks Road, and vice versa, were observed.
- The southbound right truck turning movement was noted to be difficult, but possible, for the truck drivers in some instances.
- Due to the north/south lanes not being aligned through the intersection, sight lines for making a northbound left turn are unacceptable. Especially when a southbound left turning truck is present.

**SR-303 & Drug Mart Drive**

- A queue of approximately six vehicles was noted during the PM peak at the Drug Mart Drive. This was likely due to northbound left turning vehicles not being able to find an acceptable gap because the westbound queues from Marks Road extend back past this drive.

**SR-303 & Terrington Drive/Muirwood Drive**

- A maximum southbound queue of approximately five vehicles was noted during the AM peak and three vehicles during the PM peak. No northbound queues were noted.

**SR-303 & Substation Road**

- During the AM and PM peaks, significant queuing was observed on all approaches except for the northbound approach. Eastbound queues extended to W. Chase Drive, westbound queues extended approximately 24 vehicles, and the southbound queue extended for about 10 vehicles. See **Figure 7**.
- Cycle failures were observed during both peaks on approaches with long queues.

*Figure 7 - SR-303 Westbound Queues at Substation Road*



- The lack of left turn lanes on the SR-303 approaches contributed to the queue problem. Some through vehicles would decide to pass on the right and go around the left turning vehicle waiting for a gap in traffic.
- School buses stopped at the houses along SR-303 to pick up students. This would block through traffic and cause for queues extending back to the traffic signal.
- Many utility poles are present in the intersection area, within the clear zone. Some have been struck.
- A multi-family housing unit is in the northeast corner of the intersection and is located close to SR-303. This may be a significant consideration when proposing any improvements/widening at the intersection (complicated to acquire R/W from a multi-family residence).

## E. Data Collection

Vehicle turning movement counts were collected at the intersections of SR-303 with Marks Road, Drug Mart Drive, Terrington Drive/Muirwood Drive, and Substation Road on November 19, 2019. The data was collected from 7:00 AM to 8:00 PM.

The following AM and PM peaks were noted at each SR-303 intersection:

- Marks Road: 7:15-8:15 AM and 4:30-5:30 PM
- Drug Mart Drive: 7:15-8:15 AM and 4:15-5:15 PM
- Terrington Drive/Muirwood Drive: 7:15-8:15 AM and 4:15-5:15 PM
- Substation Road: 7:15-8:15 AM and 4:30-5:30 PM

Simplified Highway Forecasting Tool (SHIFT) growth rates for SR-303 were provided by the District. Traffic volumes were projected to a Design Year of 2039 using the linear annual growth rates shown in **Table 1**. The 2039 volumes conservatively assume that the side street volumes are growing at the same rate as mainline SR-303.

*Table 1 – SHIFT Growth Rates*

| SR-303 Logpoint | Linear Annual Growth Rate |
|---|---|
| 2.64-4.96 | 0.23% |
| 4.96-5.88 | 1.16% |
| 5.88-6.04 | 1.16% |
| 6.04-6.88 | 1.03% |

A Traffic Impact Study (TIS) for the future development of 35 single family homes west of Easton Way was provided by the District. Site traffic from this TIS was added to 2039 Design Year traffic for this study. Count data, growth rate correspondence, relevant portions of the TIS, and traffic volume calculations are provided in **Appendix B**.

## F. Past and Future Developments

The District noted that the westbound right and southbound left turn lanes were added at the intersection of SR-303 & Marks Road when the industrial sites to the north developed.

Turn lanes were added to SR-303 at Easton Way, Terrington Drive, Muirwood Drive, and W. Chase Drive as each respective single-family housing development was constructed.

Multiple future developments in the study area are being planned and/or discussed. The only development known with certainty at this point is the 35 single family homes west of Easton Way discussed previously and detailed in the referenced TIS. Other potential future developments being discussed include:

- Outlots in the southeast quadrant of the SR-303 & Marks Road intersection
- Existing golf course south of SR-303 between Muirwood Drive and Substation Road to be developed into single family homes

Site traffic for these other potential future developments was not included because no details are known at this time.

# IV. Analysis

## A. Capacity Analysis

Capacity of the existing conditions was evaluated using Highway Capacity Software (HCS) version 7.6 at the study intersections to assess existing operations using 2019 and 2039 traffic volumes. Levels of service (LOS) and vehicle delay are summarized in **Table 2**. Detailed capacity analysis results are provided in **Appendix C**.

*Table 2 – Existing Intersection Capacity Analysis Results Summary*

| Intersection *(Traffic Control Type)* | Approach | 2019 | | 2039 | |
|---|---|---|---|---|---|
| | | AM | PM | AM | PM |
| **SR-303 & Marks Road** *(Signal)* | Eastbound | C/21.0 | C/20.9 | B/19.9 | C/20.2 |
| | Westbound | B/18.5 | C/21.6 | B/18.0 | C/23.4 |
| | Northbound | B/17.9 | B/16.3 | B/19.4 | B/17.4 |
| | Southbound | B/19.3 | C/21.9 | C/20.9 | C/23.6 |
| | **Total** | **B/19.1** | **C/20.7** | **B/19.4** | **C/21.9** |
| **SR-303 & Drug Mart Drive** *(Stop-Control)* | Eastbound | A/0.0 | A/0.0 | A/0.0 | A/0.0 |
| | Westbound | A/0.9 | A/2.3 | A/1.0 | A/3.0 |
| | Northbound | B/14.6 | D/33.1 | C/17.8 | F/80.3 |
| | Southbound | B/10.7 | A/0.0 | B/11.4 | A/0.0 |
| **SR-303 & Terrington Drive/ Muirwood Drive** *(Stop-Control)* | Eastbound | A/0.1 | A/0.5 | A/0.1 | A/0.5 |
| | Westbound | A/0.1 | A/0.2 | A/0.1 | A/0.2 |
| | Northbound | B/12.7 | C/21.2 | B/14.6 | D/30.1 |
| | Southbound | C/24.3 | E/35.6 | E/37.0 | F/68.6 |
| **SR-303 & Substation Road** *(Signal)* | Eastbound | C/21.8 | C/21.8 | C/26.0 | D/35.9 |
| | Westbound | B/16.5 | C/25.9 | B/16.2 | C/31.8 |
| | Northbound | B/20.0 | C/23.8 | C/22.2 | C/29.0 |
| | Southbound | C/22.6 | C/26.9 | C/25.2 | D/35.7 |
| | **Total** | **C/20.2** | **C/24.5** | **C/22.4** | **C/33.4** |

*Letter/Number – Level of Service/ Average Delay per Vehicle in seconds*
*Red text denotes unacceptable LOS/delay*
*Note that HCM has different delay thresholds for stop-controlled vs. signalized intersections*

Capacity analysis of the existing conditions shows that capacity is acceptable at all intersections, except for the southbound approach of Terrington Drive which is borderline unacceptable. Short (3-5 vehicle) southbound queues were noted at this intersection during field observations. For the signalized intersections, HCS is not accounting for the queues and blockages noted during field observations. The analysis of Drug Mart Drive does not account for the queues from Marks Road blocking the drive during the PM peak. The capacity analysis using 2039 Design Year volumes shows that this southbound approach of Terrington Drive will continue to worsen and the Drug Mart Drive will reach unacceptable levels of delay if no improvements are made.

## B. Turn Lane Analysis

Turn lane warrant analysis was conducted at the existing intersection of SR-303 & Drug Mart Drive using methodologies located in the ODOT Location & Design Manual. Currently, no turn lanes are present at this intersection. A design speed of 5 MPH over the proposed speed limit of 45 MPH was utilized for analysis. It was determined that a 245-foot westbound left turn lane and a 245-foot eastbound right turn lane, each inclusive of a 50-foot diverging taper, are warranted with existing volumes. With anticipated SR-303 growth, by 2039 the eastbound right turn lane length would need to be 295 feet. Other stop-controlled intersections which would warrant turn lanes already have them.

Additionally, the turn lane lengths for the signalized intersections were calculated using ODOT criteria. A summary of the existing and calculated turn lane lengths using 2039 volumes can be seen in **Table 3** below. The full turn lane warrant analysis and length calculations are provided in **Appendix D.**

*Table 3 – 2039 Turn Lane Analysis Results Summary*

| Intersection | Approach | Existing Length (ft) | Calculated Length (ft) |
|---|---|---|---|
| **SR-303 & Marks Road** | Eastbound | None | 315’ LTL |
| | Westbound | 125’ RTL | 295’ LTL<br>345’ RTL |
| | Northbound | None | 225’ LTL |
| | Southbound | 210’ LTL | 395’ LTL |
| **SR-303 & Drug Mart Drive** | Eastbound | None | 295’ RTL Warranted |
| | Westbound | None | 245’ LTL Warranted |
| **SR-303 & Terrington Drive/ Muirwood Drive** | Eastbound | 235’ LTL | 225’ LTL |
| | Westbound | 260’ LTL<br>235’ RTL | 225’ LTL<br>150’ RTL |
| **SR-303 & Substation Road** | Eastbound | None | 245’ LTL |
| | Westbound | None | 225’ LTL |
| | Northbound | None | 295’ LTL |
| | Southbound | None | 320’ LTL |

## C. Signal Warrant Analysis

The eight-hour vehicular volume, four-hour vehicular volume, and peak hour signal warrants were assessed at the study intersections of SR-303 with Drug Mart Drive and Terrington Drive/Muirwood Drive using 2019 and 2039 volumes. Signal warrants were analyzed without using any of the discounted warrant volume criteria or right turn reduction factors. The 2039 volumes conservatively assume the side street volumes are growing at the same rate as mainline SR-303.

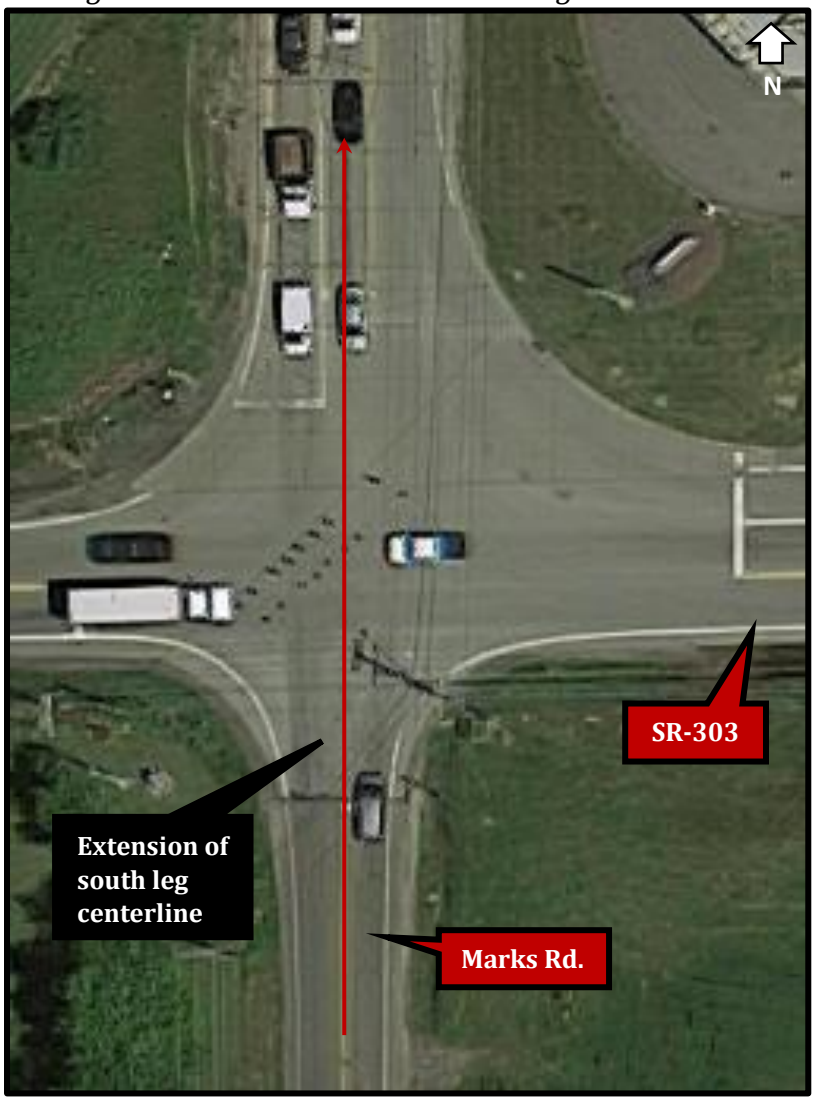
The analysis shows that signal warrants are not met at either intersection in 2019. With 2039 volumes, the Drug Mart Drive intersection meets the four-hour warrant and warrant B of the eight-hour warrant. The Terrington Drive/Muirwood Drive intersection still does not meet warrants with 2039 volumes. Full signal warrant analysis can be seen in **Appendix E**.

## D. Sight Distance Analysis

Intersection sight distance was evaluated at the SR-303 intersections with Marks Road, Drug Mart Drive, Terrington Drive, Muirwood Drive, and Substation Road. Sight distance exhibits are provided in **Appendix F**. It was determined that sight distance is generally acceptable for all movements at all study intersections. The exhibits can be utilized as a planning tool to keep trees, shrubbery, and utilities out of the sight triangles in the future.

This analysis does not account for the fact that the north/south lanes are not aligned through the SR-303 & Marks Road intersection, resulting in sight line issues. This is depicted in **Figure 8**.

*Figure 8 - Northbound Marks Road Sight Line Issues*




# V. Crash Data

## A. Crash Data Summary

Crash data was obtained from the ODOT TIMS for three complete years of available data (2016-2018). The limits of the crash area query include SR-303 from 500 feet west of Marks Road to 500 feet east of Substation Road, including all approaches to intersections within this area.

A total of 102 crashes were obtained. The OH-1 report for each documented crash was reviewed to correct information, where necessary, and properly locate crashes within the study limits. The original crash data query included 108 crashes, which was adjusted to 102 crashes after reviewing and relocating crashes. **Table 4** represents a breakdown of the crash data. Crash data for the study area was plotted on an aerial map to identify crash patterns and probable causes. The crash diagrams for the study area is included in **Appendix G**.

*Table 4 - Crash Statistics*

| Crash Year | Number | Percent |
|---|---|---|
| 2016 | 34 | 33.3% |
| 2017 | 34 | 33.3% |
| 2018 | 34 | 33.3% |

| Hour of Day | Number | Percent |
|---|---|---|
| 12:00 AM | 3 | 2.9% |
| 02:00 AM | 2 | 2.0% |
| 05:00 AM | 3 | 2.9% |
| 06:00 AM | 5 | 4.9% |
| 07:00 AM | 6 | 5.9% |
| 08:00 AM | 5 | 4.9% |
| 09:00 AM | 1 | 1.0% |
| 10:00 AM | 6 | 5.9% |
| 11:00 AM | 4 | 3.9% |
| 12:00 PM | 4 | 3.9% |
| 1:00 PM | 9 | 8.8% |
| 2:00 PM | 6 | 5.9% |
| 3:00 PM | 7 | 6.9% |
| 4:00 PM | 15 | 14.7% |
| 5:00 PM | 5 | 4.9% |
| 6:00 PM | 8 | 7.8% |
| 7:00 PM | 1 | 1.0% |
| 8:00 PM | 7 | 6.9% |
| 9:00 PM | 1 | 1.0% |
| 10:00 PM | 2 | 2.0% |
| 11:00 PM | 2 | 2.0% |

| Crash Severity | Number | Percent |
|---|---|---|
| Injury Crash | 24 | 23.5% |
| Property Damage Crash | 78 | 76.5% |

| Crash Type | Number | Percent |
|---|---|---|
| Rear End | 45 | 44.1% |
| Angle | 21 | 20.6% |
| Fixed Object | 19 | 18.6% |
| Left Turn | 5 | 4.9% |
| Sideswipe-Meeting | 4 | 3.9% |
| Sideswipe-Passing | 4 | 3.9% |
| Animal | 2 | 2.0% |
| Overturning | 2 | 2.0% |

| Day of Week | Number | Percent |
|---|---|---|
| Monday | 14 | 13.7% |
| Tuesday | 16 | 15.7% |
| Wednesday | 12 | 11.8% |
| Thursday | 16 | 15.7% |
| Friday | 24 | 23.5% |
| Saturday | 12 | 11.8% |
| Sunday | 8 | 7.8% |

| Road Condition | Number | Percent |
|---|---|---|
| Dry | 73 | 71.6% |
| Wet | 19 | 18.6% |
| Snow | 6 | 5.9% |
| Ice | 2 | 2.0% |
| Other | 2 | 2.0% |

## B. Probable Causes

Noteworthy crash patterns in the study area are summarized with supporting details and probable causes as follows:

- **Rear End Crashes**
  Rear end crashes were the most prevalent crash type in the study area. A total of 45 rear end crashes were reported, eight resulting in injury. Rear end crashes represent 44.1 percent of the total crashes, higher than the statewide average of 31.1 percent. **Table 5** shows a breakdown of the rear end crash by general location. This table does not include all rear end crashes, just the rear end crash clusters.

*Table 5 – Rear End Crashes Breakdown by Location*

| Intersection | Approach | Rear End Crashes |
|---|---|---|
| **SR-303 & Marks Road** | Eastbound | 4 |
| | Westbound | 6* |
| | Northbound | 3 |
| | Southbound | 7 |
| **SR-303 & Substation Road** | Eastbound | 6 |
| | Westbound | 6 |
| | Northbound | 0 |
| | Southbound | 6 |

*Three of these crashes could have been associated with either the Drug Mart Drive or the long queue from the Marks Road intersection.

Long queues at the SR-303 intersections with Marks Road and Substation Road and drivers not expecting to stop for queued or turning vehicles are likely the contributing factors for many of the rear end crashes. Of the total rear end crashes, approximately 17.8 percent occurred during the AM peak and 24.4 percent during the PM peak. Approximately 26.7 percent occurred during wet pavement conditions and 26.7 percent occurred in lighting conditions other than daylight (including dusk, night, and dawn).

- **Angle Crashes**
  Angle crashes were the second most prevalent crash type in the study area. A total of 21 angle crashes were reported, three resulting in injury. Angle crashes represent 20.6 percent of the crashes reported in the study area, higher than the statewide average of 16.0 percent. Of the total angle crashes, 19.0 percent occurred under wet pavement conditions and 38.1 percent occurred in the dark. Five of the angle crashes occurred at the Marks Road intersection and four at the Substation Road intersection with SR-303. No clear trends are shown in these crashes, all were between vehicles from different directions. Three angle crashes occurred at the gas station drive on SR-303 in the northwest quadrant of the Marks Road intersection. In all three crashes, a southbound left turning vehicle struck a westbound through vehicle. Two angle crashes each involved a vehicle turning left out of W. Chase Drive, the daycare, and the golf course and striking a through vehicle.

- **Fixed Object/Overturning Crashes**
  Fixed object crashes were the third most prevalent crash type in the study area. Overturning crashes are often the result of similar causes as fixed object crashes, and therefore are being included in this summary. A total of 19 fixed object and two overturning crashes were reported, six resulting in injury. Fixed object crashes represent 18.6 percent of the crashes reported in the study area (higher than the statewide average of 14.1 percent) and overturning crashes represent an additional 2.0 percent (higher than the statewide average of 0.9 percent). All fixed object and overturning crashes involved vehicles traveling along SR-303. Three westbound fixed object crashes occurred just west of the intersection of Marks Road with SR-

303. A cluster of seven westbound fixed object crashes occurred in the area from Drug Mart Drive to 650 feet east. Three of those crashes occurred during the PM peak, which could have been due to a vehicle avoiding the unexpected queue from the Marks Road intersection. The remaining crashes were scattered throughout the study area. Of the fixed object and overturning crashes, 28.6 percent occurred during wet pavement conditions and 38.1 percent occurred in the dark.

## C. Highway Safety Manual

The Highway Safety Manual (HSM) predictive method for urban/suburban arterial intersections and segments was applied to the study area to determine the potential for safety improvement. See **Appendix H** for an overview of the HSM methodology. The results presented in **Table 6** show the expected crash frequency calculated using HSM predictive method with crash data and existing conditions for the study area elements.

*Table 6 - HSM Results for Existing Conditions for All Crashes (shown in crashes/year)*

| | Predicted Average Crash Frequency | Expected Average Crash Frequency – Existing Conditions | Expected Excess Crashes | Potential for Improvement |
|---|---|---|---|---|
| **SR-303 Intersections** | | | | |
| Marks Road | 9.8873 | 10.2520 | 0.3647 | Yes |
| Easton Way | 0.3836 | 0.4560 | 0.0724 | Yes |
| Terrington/Muirwood Drive | 0.9407 | 0.8132 | -0.1275 | No |
| W. Chase Drive | 0.6066 | 0.8690 | -0.2624 | No |
| Substation Road | 10.0177 | 10.5620 | 0.5443 | Yes |
| **SR-303 Segment** | | | | |
| Logpoints 4.90 – 5.97 | 3.7778 | 1.9877 | -1.7901 | No |

The results conclude that the expected crash frequency is greater than the predicted crash frequency for the SR-303 intersections with Marks Road, Easton Way, and Substation Road. This suggests that the intersections experience more average crashes per year than their peers and have a potential for crash reduction.

However, the results of the HSM analysis concludes that the expected crash frequency is less than the predicted crash frequency for SR-303 intersections with Terrington Drive/Muirwood Drive and W. Chase Drive as well as the segment of SR-303 through the study area. This suggests that these elements experience fewer average crashes per year than their peers. Elements that have fewer crashes than their peers could still see a crash reduction or have some safety benefit per the HSM. Countermeasures can still be implemented to reduce the number of crashes that are occurring. Additionally, many crashes within the SR-303 segment were assigned to an intersection, which could be lowering the crash frequency/density for the segment. HSM output reports are provided in **Appendix H**.

# VI. Long-term Countermeasures

The following section addresses possible countermeasures to mitigate the prevalent crash types in the study area. The countermeasures listed may be independent solutions and are not necessarily recommended to all be implemented concurrently.

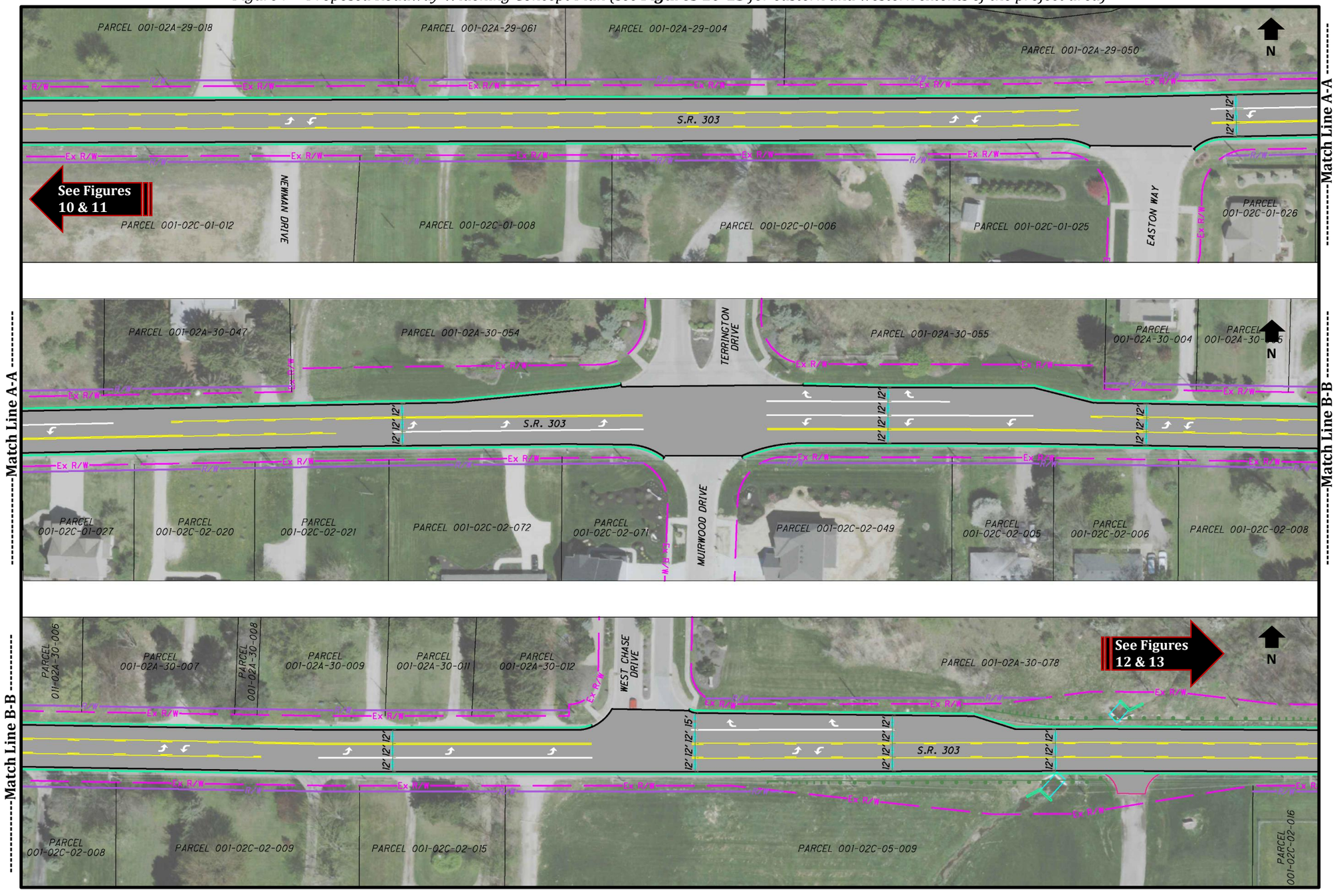
## A. Widen SR-303 to a Three-lane Typical Section

It is recommended that SR-303 be widened to a three-lane typical section throughout the study limits. The typical section would generally include one 12-foot through lane in each direction and a 12-foot wide TWLTL with dedicated left turn lanes at intersections. A three-lane typical section is already present on SR-303 between Easton Way and W. Chase Drive due to housing developments in the area needing to provide turn lanes. The areas in between these dedicated left turn lanes are currently striped out with transverse lines. It is recommended that TWLTL pavement markings be implemented in these areas for vehicles accessing the single-family homes in this area. The proposed widening will extend the limits of the three-lane section to Marks Road and Substation Road.

The proposed widening is expected to result in improved operations throughout the corridor with less left turning vehicles slowing or stopping in the through lanes. Concurrently, this is expected to result in a reduction of the documented rear end crashes in the study area.

See **Figure 9** for the proposed roadway widening concept plan. This figure only shows the proposed configuration from east of Marks Road to west of Substation Road. The eastern and western extents of the project area are covered in the next countermeasures and shown in **Figures 10-13**.

*Figure 9 – Proposed Roadway Widening Concept Plan (see **Figures 10-13** for eastern and western extents of the project area)*



## B. SR-303 & Marks Road Intersection Improvements

Operational issues and significant queues were noted at the SR-303 & Marks Road intersection during field observations. Additionally, the north/south lanes are not aligned through the intersection, resulting in sight line issues. In conjunction with the roadway widening of SR-303, it is recommended that improvements be made to the Marks Road intersection. Two alternatives of intersection improvements are described below.

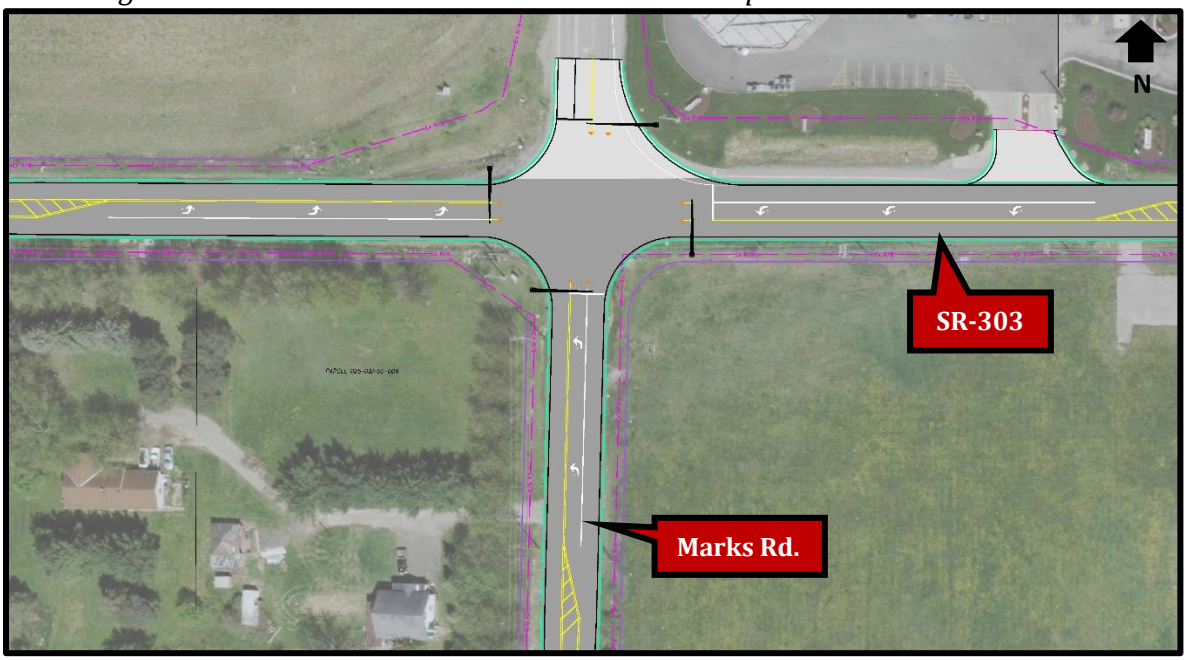
**Alternative 1: Add turn lanes and traffic signal upgrades**

It is recommended that the intersection be widened and reconfigured to provide a dedicated left turn lane and a shared through/right turn lane on each approach. This would result in all the approaches being properly aligned. Additionally, left turning vehicles would no longer cause unnecessary queues at the intersection. A full traffic signal reconstruction is recommended to be installed with these improvements. The new traffic signal should be a mast arm configuration with backplates for all approaches and intersection lighting. See **Figure 10** for the proposed intersection reconfiguration concept plan. Capacity analysis results of the proposed intersection configuration can be seen in **Table 7**. Detailed results are provided in **Appendix C**. More detailed concept plans are provided in **Appendix I**.

*Table 7 – SR-303 & Marks Road Intersection Improvements: Alternative 1*

| Approach | 2019 | | 2039 | |
|---|---|---|---|---|
| | AM | PM | AM | PM |
| Eastbound | B/19.3 | C/21.0 | C/20.2 | C/21.0 |
| Westbound | B/19.0 | C/23.4 | C/20.2 | C/26.2 |
| Northbound | B.19.1 | B/18.1 | B/19.3 | B/19.3 |
| Southbound | C/20.6 | C/23.7 | C/20.9 | C/25.5 |
| **Total** | **B/19.4** | **C/22.2** | **C/20.1** | **C/24.0** |

*Figure 10 - SR-303 & Marks Road Intersection Improvements: Alternative 1*



**Alternative 2: Implement a roundabout**

A roundabout could be considered for implementation at this intersection. The FHWA Office of Safety identified roundabouts as a Proven Safety Countermeasure because of their ability to greatly reduce the types of crashes that result in serious injury or fatality. By reducing the number and severity of conflict points at the intersection, and because of the lower speeds of vehicles moving through the intersection, roundabouts are a proven, safer type of intersection.

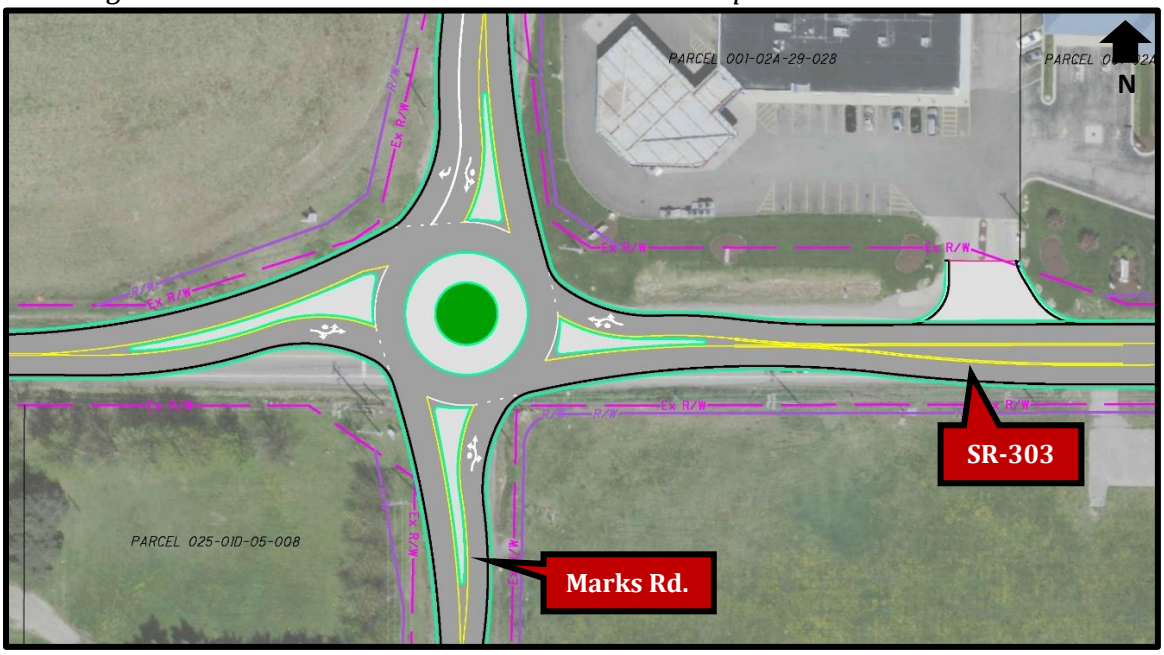
Capacity analysis was conducted using HCS and Sidra Intersection 7.0 to determine roundabout layout required for acceptable capacity. Per ODOT Sidra standards, an environmental factor of 1.10 was used in the 2019 analysis and 1.00 in the 2039 analysis for roundabouts with a single circulating lane. Some of the Sidra results will show slightly improved capacity from 2019 to 2039. This is due to the impacts of the reduction in the environmental factor reduction (ODOT standard) having a greater impact than the traffic growth. ODOT standards for HCS are to use the defaults.

HCS and Sidra results show that a single lane circulating roundabout with an additional southbound right turn lane is needed in 2019 and 2039. See **Figure 11** for the proposed roundabout concept plan. Capacity analysis results are summarized in **Table 8**. Detailed results are provided in **Appendix C**. More detailed concept plans are provided in **Appendix I**.

*Table 8 – SR-303 & Marks Road Intersection Improvements: Alternative 2*

| Analysis Software | Approach | Single Lane Circulating, With Single Lane Approaches | | | | Single Lane Circulating, With Additional SB Right Turn Lane | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2019 | | 2039 | | 2019 | | 2039 | |
| | | AM | PM | AM | PM | AM | PM | AM | PM |
| Sidra | Eastbound | A/8.3 | B/17.2 | A/7.9 | B/14.5 | A/8.3 | B/16.4 | A/7.9 | B/14.0 |
| | Westbound | A/9.6 | A/7.6 | A/9.4 | A/7.6 | A/9.6 | A/7.6 | A/9.4 | A/7.6 |
| | Northbound | A/8.2 | A/9.0 | A/7.2 | A/7.8 | A/8.2 | A/9.0 | A/7.2 | A/7.8 |
| | Southbound | A/8.4 | D/39.8 | A/8.4 | D/36.6 | A/7.8 | B/11.8 | A/7.8 | B/11.7 |
| | **Total** | **A/8.7** | **C/21.4** | **A/8.3** | **B/18.8** | **A/8.5** | **B/10.9** | **A/8.2** | **B/10.1** |
| HCS | Eastbound | A/9.0 | B/14.6 | A/9.7 | C/15.9 | A/9.0 | B/14.6 | A/9.7 | C/15.9 |
| | Westbound | B/11.7 | B/11.5 | C/15.1 | C/15.9 | B/11.7 | B/11.5 | C/15.1 | C/15.9 |
| | Northbound | B/11.0 | B/11.2 | B/11.3 | B/11.5 | B/11.0 | B/11.2 | B/11.3 | B/11.5 |
| | Southbound | A/6.9 | D/31.0 | A/7.5 | E/48.6 | A/5.7 | B/13.7 | A/6.1 | C/17.1 |
| | **Total** | **A/9.9** | **C/19.2** | **B/11.4** | **D/26.5** | **A/9.6** | **B/12.8** | **B/11.1** | **C/15.6** |

*Figure 11 - SR-303 & Marks Road Intersection Improvements: Alternative 2*




## C. SR-303 & Substation Road Intersection Improvements

Operational issues and significant queues were noted at the SR-303 & Substation Road intersection during field observations. In conjunction with the roadway widening of SR-303, it is recommended that improvements be made to the Substation Road intersection. Two alternatives of intersection improvements are described below.

**Alternative 1: Add turn lanes and traffic signal upgrades**

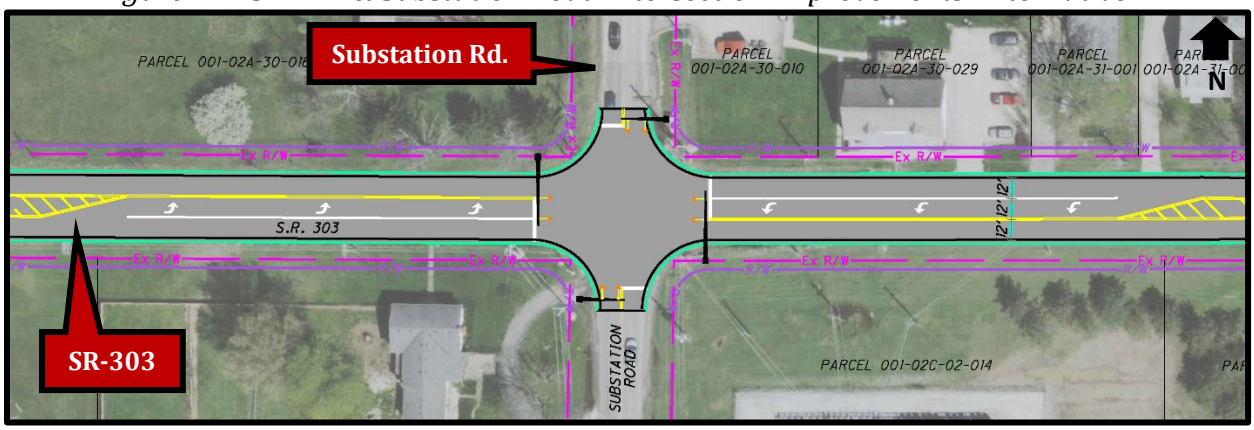
It is recommended that the intersection be widened and reconfigured to provide a dedicated left turn lane and a shared through/right turn lane on the east/west approaches. This would result in left turning vehicles no longer causing unnecessary queues on the east/west approaches. Additionally, a full traffic signal reconstruction is recommended. The new traffic signal should be a mast arm configuration with backplates for all approaches and intersection lighting. See **Figure 12** for the proposed intersection reconfiguration concept plan. Capacity analysis results of the proposed intersection configuration can be seen in **Table 9**. Detailed results are provided in **Appendix C**. More detailed concept plans are provided in **Appendix I**.

The addition of left turn lanes on the north/south approaches of Substation Road was considered. This addition would further improve safety and operations at the intersection but is not necessarily recommended at this time. No northbound queues or backups were noted during field observations. A maximum southbound queue of about 10 vehicles was noted and only one multicycle backup was observed. Impacts from the east/west recommended improvements are substantial, so adding north/south improvements would further increase the impacts. Overall north/south capacity is acceptable, and operations are expected to improve with added efficiencies from the recommended east/west improvements. For these reasons, left turn lanes on the north/south approaches are not recommended at this time, but could be considered in the future if determined necessary.

*Table 9 – SR-303 & Substation Road Intersection Improvements: Alternative 1*

| Approach | 2019 | | 2039 | |
|---|---|---|---|---|
| | AM | PM | AM | PM |
| Eastbound | C/21.8 | B/19.9 | C/24.5 | B/20.0 |
| Westbound | B/17.5 | C/27.1 | B/17.3 | C/34.6 |
| Northbound | B/19.3 | C/23.8 | C/21.4 | C/29.0 |
| Southbound | C/21.8 | C/26.9 | C/24.3 | D/35.7 |
| **Total** | **C/20.3** | **C/24.4** | **C/21.9** | **C/29.2** |

*Figure 12 - SR-303 & Substation Road Intersection Improvements: Alternative 1*




**Alternative 2: Implement a roundabout**

A roundabout could be considered for implementation at this intersection. The safety benefits of roundabouts are described in the previous countermeasure. Capacity analysis was conducted to determine roundabout layout required for acceptable capacity. Analysis standards utilized are described in the previous countermeasure.

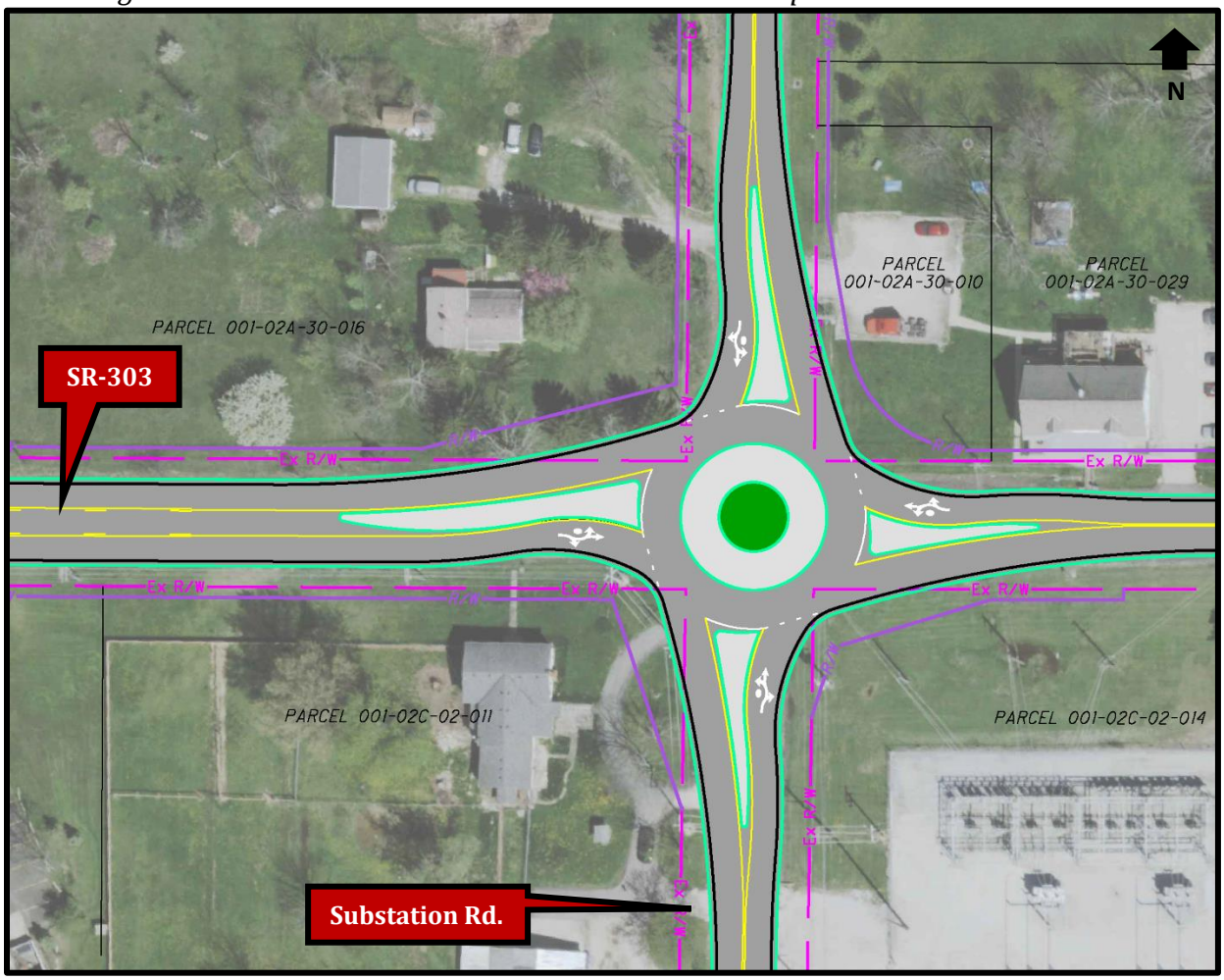
Sidra analysis shows a single lane circulating roundabout with single lane approaches is sufficient for 2019 and 2039. HCS analysis shows that the westbound approach may reach LOS E during the PM peak in 2039. This suggests that an additional westbound right turn lane may need to be considered in the future. In this case, the difference between the HCS and Sidra results is likely due to the environmental factors used in Sidra. HCS analysis parameters remained constant between the 2019 and 2039 analyses.

Overall, based on these results, a single lane circulating roundabout with single lane approaches is recommended. See **Figure 13** for the proposed roundabout concept plan. Capacity analysis results are summarized in **Table 10**. Detailed results are provided in **Appendix C**. More detailed concept plans are provided in **Appendix I**.

*Table 10 – SR-303 & Substation Road Intersection Improvements: Alternative 2*

| Analysis Software | Approach | 2019 | | 2039 | |
|---|---|---|---|---|---|
| | | AM | PM | AM | PM |
| Sidra | Eastbound | A/7.2 | A/8.1 | A/7.5 | A/8.5 |
| | Westbound | A/5.1 | A/9.5 | A/5.1 | B/11.5 |
| | Northbound | B/10.4 | B/11.8 | B/11.0 | B/13.0 |
| | Southbound | A/9.5 | B/15.5 | A/9.6 | B/19.5 |
| | **Total** | **A/7.4** | **B/10.4** | **A/7.4** | **B/11.8** |
| HCS | Eastbound | B/13.1 | B/14.1 | C/19.6 | C/22.3 |
| | Westbound | A/7.7 | C/19.1 | A/9.4 | E/41.8 |
| | Northbound | A/8.2 | B/11.5 | A/9.8 | B/14.4 |
| | Southbound | A/8.4 | C/15.0 | A/9.7 | C/20.7 |
| | **Total** | **B/10.1** | **C/15.9** | **B/13.9** | **D/29.0** |

*Figure 13 - SR-303 & Substation Road Intersection Improvements: Alternative 2*



## D. Future Countermeasures to Consider

**Access management improvements**

As previously discussed, three angle crashes occurred at the gas station drive on SR-303 in the northwest quadrant of the Marks Road intersection. Additionally, multiple angle, rear end, and fixed object crashes occurred near the Drug Mart Drive. The crashes are expected to be due to the interaction of vehicles entering/exiting the access drives and the nearby Marks Road intersection and related queues.

Improved access management is recommended for the segment of SR-303 between Marks Road and Drug Mart Drive. It is understood that the development of the outlots in the southeast quadrant of the SR-303 & Marks Road intersection is being planned and/or discussed. As parcels in or surrounding this area develop or redevelop, consider access management improvements when appropriate. Specifically, it is recommended that all existing and proposed access drives on SR-303 between Marks Road and Drug Mart Drive (including this drive) be restricted to right-in, right-out movements only. This can be facilitated through "porkchop" islands on the drives or medians/longitudinal channelizers on SR-303. This improvement would provide improved operations and safety in this segment.

If additional retail establishments are developed in the Drug Mart shopping center, to utilize the same Drug Mart Drive access, it is recommended that an additional connection be made onto Marks Road. A somewhat delineated gravel drive already exists in this area. This would provide relief at the Drug Mart Drive on SR-303 and provide an access for traffic destined to west SR-303 or north Marks Road, to turn out without making an unsignalized left turn onto SR-303.

**Continue three-lane section east to Pearl Road**

West of Pearl Road, approximately 0.85 miles east of the study area, SR-303 transitions from a five-lane section to the two-lane section which continues through the study area. It is recommended that future planning efforts be made to consider widening SR-303 to a three-lane section from the eastern limits of the study area to Pearl Road. This area is within the Brunswick city limits. If the recommendations provided in this report are implemented, operations and safety through the study area will be improved. However, this area between Substation Road and Pearl Road will remain a bottleneck unless similar improvements are considered.

# VII. Benefit-Cost Analysis

Benefit-cost analysis is a tool used to determine the financial benefits of a project by comparing the net present value (NPV) of a project to the NPV of the safety benefit provided by the project. Benefit-cost values greater than one indicate a positive return on the original investment. Preferred countermeasures are those having the highest NPV of safety benefits. A benefit-cost analysis for the recommended long-term countermeasure alternatives was prepared using the ODOT Economic Crash Analysis Tool (ECAT). Crash modification factors (CMF) were applied for the proposed long-term improvements. This analysis does not account for all recommended improvements, rather only countermeasures that have CMF values.

Cost estimates were prepared for all long-term countermeasure alternatives. The construction cost estimates assume the following:

- 25 percent engineering design
- 35 percent contingency
- 10.5 percent inflation rate for an estimated 2023 construction year
- Estimated right-of-way costs (when necessary)
- Cost for utility relocation is not included

Utility impacts are expected to be high, especially for constructing the roundabouts in Alternative 2. In addition to the overhead electric and communication lines along SR-303, there is a large electrical substation present in the southeast corner of the Substation Road intersection. Numerous poles and overhead wires coming from this facility are located within the intersection area to feed electric distribution in all directions on SR-303 and Substation Road. It is recommended that utility impacts be considered before moving forward with a preferred alternative. Information from the District 3 Utility Coordinator is provided in **Appendix J**.

The estimated cost for the long-term countermeasure alternatives are summarized in **Table 10.** Detailed cost estimates are included in **Appendix J.**

*Table 11 – Cost Estimates*

| Long-term Countermeasure | Subtotal | Total |
|---|---|---|
| **Alternative 1** | | |
| Widen SR-303 to a three-lane typical section | $1,316,200 | $6,428,700 |
| Add turn lanes and signal upgrades at Marks Road | $3,316,800 | |
| Add turn lanes and signal upgrades at Substation Road | $1,795,700 | |
| **Alternative 2** | | |
| Widen SR-303 to a three-lane typical section | $1,466,600 | $6,653,600 |
| Implement a roundabout at Marks Road | $3,317,200 | |
| Implement a roundabout at Substation Road | $1,869,800 | |

The subtotal cost for each alternative is intended to give an order of magnitude breakdown of the cost per improvement. The subtotals do not necessarily represent the cost of that countermeasure as a separate project. The results of the cost estimates show that the total cost of each alternative is relatively comparable. Improvements at the Substation Road intersection, for both alternatives, incur significant right-of-way impacts and costs. This area is also expected to have high utility impacts, as previously discussed, which are not included in the cost estimates.

CMFs utilized for the proposed long-term countermeasure alternatives include:

**Alternative 1– Three-lane section SR-303 + turn lanes and signal upgrades at Marks Road and Substation Road intersections**

- **Widen SR-303 to a three-lane section**: The proposed improvement of a widening SR-303 to a three-lane section in the project area fundamentally changes the conditions of the base safety performance function. For this reason, a separate HSM analysis was conducted for the proposed conditions, and it was compared to the existing conditions.
- **Add left turn lanes:** Standard Part C CMFs were applied to the Marks Road intersection for the implementation of three additional left turn lanes and two additional left turn lanes on Substation Road for the implementation of two. This is a standard offering in ECAT, which was used to calculate the Combined CMF.
- **Remove right turn lane:** The existing westbound right turn lane at Marks Road is proposed to be removed with the implementation of the proposed intersection configuration. The HSM analysis for the proposed conditions was compared to the existing conditions.
- **Improve visibility of signal heads**: A CMF of 0.71 was applied to all fatal and serious/minor injury crashes, and a CMF of 0.79 was applied to all property damage only crashes at the signalized intersections. This accounts for the upgrading to mast arm configuration and signal heads with backplates. These CMFs were obtained from the FHWA CMF Clearinghouse and have a three-star quality rating. At the Substation Road intersection, since backplates are currently present for the east/west approaches, but not for the north/south approaches, only a proportion of 0.50 of each CMF was applied to the intersection. The CMF is provided in **Appendix H.**

**Alternative 2– Three-lane section SR-303 + roundabout implementation at Marks Road and Substation Road intersections**

- **Widen SR-303 to a three-lane section**: The proposed improvement of a widening SR-303 to a three-lane section in the project area fundamentally changes the conditions of the base safety performance function. For this reason, a separate HSM analysis was conducted for the proposed conditions, and it was compared to the existing conditions.
- **Conversion of signalized intersection into single or multi-lane:** A CMF of 0.29 was applied to all crashes except property damage only crashes in which a CMF of 0.74 was applied. This is a standard CMF offering in ECAT.

**Table 12** summarizes the benefit-cost analysis results. Detailed benefit-cost analysis reports from ECAT are included in **Appendix K**.

*Table 12 - Benefit-Cost Analysis*

| | Long-term Countermeasure Alternatives | |
|---|---|---|
| | 1 | 2 |
| **Expected Annual Crash Adjustment** | **-7.751** | **-8.427** |
| **NPV of Project** | $5,817,824.00 | $6,021,357.60 |
| **NPV of Safety Benefit** | $3,895,523.72 | $5,759,728.29 |
| **Benefit-Cost Ratio** | **0.67** | **0.96** |

The expected annual crash adjustment shows a decrease in crashes for both countermeasure alternatives. However, the benefit-cost ratio is less than 1.0 for both alternatives. This indicates the ECAT methods predict the cost of each project is not justified based on the calculated value of safety benefits to be obtained. This shows both proposed projects would not have a positive return on the original investment.

Crash reductions and the benefit-cost ratio are slightly greater for Alternative 2. It was expected that the crash reductions associated with the Alternative 2 roundabout implementations would be greater than the Alternative 1 intersection improvements because of industry knowledge that roundabouts are a proven, safer type of intersection. However, it was unexpected that the cost of the alternatives would be so comparable.

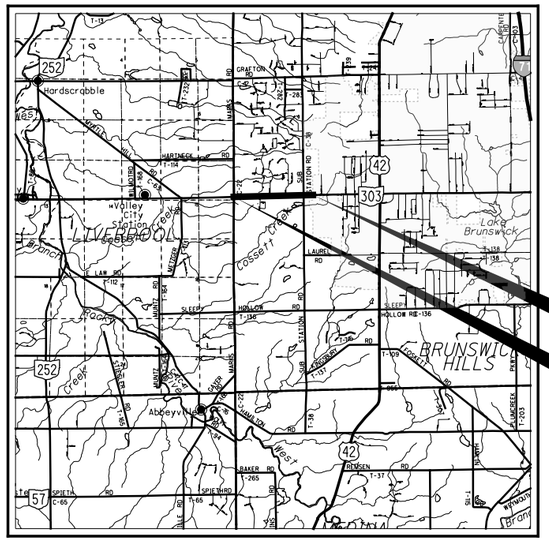
Furthermore, if separate elements of each alternative are reviewed as a standalone project (e.g. single intersection improvements only), some of those separate projects could have a positive benefit-cost ratio. Details of the NPV of Safety Benefits for the separate elements of each alternative are provided in **Appendix J**.

# VIII. Recommendations

In general, both alternatives can be considered for implementation in the study area to meet the purpose of improving operations and reducing frequency and/or severity of crashes. The alternatives can be mixed to install a roundabout at one intersection and turn lanes/signal upgrades at the other intersection. The intersection improvement projects can be completed separately from the SR-303 widening. Many options are available. However, the potential utility impacts involved in each alternative could be extreme. It is recommended that the If Authorized task of field survey and aerial mapping of the study limits be carried forward. Additionally, it is recommended that utility impacts (i.e. utilities to be relocated) be quantified for each alternative. The planning-level concept plans and cost estimates from this study can then be updated and taken to a Feasibility Study level of detail. Utility impacts could possibly set the two alternatives apart.

# STATE OF OHIO
# DEPARTMENT OF TRANSPORTATION

# MED-303-4.85




**LOCATION MAP**

LATITUDE: 41°14'17" LONGITUDE: 81°52'8"

PORTION TO BE IMPROVED
INTERSTATE HIGHWAY
FEDERAL ROUTES
STATE ROUTES
COUNTY & TOWNSHIP ROADS
OTHER ROADS

## DESIGN DESIGNATION

CURRENT ADT (20 )
DESIGN YEAR ADT (20 )
DESIGN HOURLY VOLUME (20 )
DIRECTIONAL DISTRIBUTION
TRUCKS (24 HOUR B&C)
DESIGN SPEED
LEGAL SPEED
DESIGN FUNCTIONAL CLASSIFICATION:

NHS PROJECT

## DESIGN EXCEPTIONS

## ADA DESIGN WAIVERS

**UNDERGROUND UTILITIES**
Contact Two Working Days Before You Dig
OHIO811.org Before You Dig
OHIO811, 8-1-1, or 1-800-362-2764
(Non members must be called directly)

PLAN PREPARED BY:
CARPENTER MARTY transportation
6612 SINGLETREE DRIVE COLUMBUS, OH 43229
614.656.2424 * WWW.CMTRAN.COM

ENGINEER'S SEAL:
SIGNED:
DATE:

ENGINEER'S SEAL:
SIGNED:
DATE:

## INDEX OF SHEETS:


| | |
|---|---|
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AER SUBMITTAL 9/16/2021

| STANDARD CONSTRUCTION DRAWINGS | | | | | SUPPLEMENTAL SPECIFICATIONS | SPECIAL PROVISIONS |
|---|---|---|---|---|---|---|
| | | | | | | |

## FEDERAL PROJECT NUMBER

## RAILROAD INVOLVEMENT

NONE

## PROJECT DESCRIPTION

THIS PROJECT CONSISTS OF TWO ALTERNATES FOR THE WIDENING OF S.R. 303 FROM EAST OF MARKS ROAD THROUGH SUBSTATION ROAD. ALTERNATE 1 CONSISTS OF PROPOSED INTERSECTION WIDENING AT SUBSTATION ROAD. ALTERNATE 2 CONSISTS OF A PROPOSED ROUNDABOUT AT SUBSTATION ROAD.

## EARTH DISTURBED AREAS

| | |
|---|---|
| PROJECT EARTH DISTURBED AREA: | ACRES |
| ESTIMATED CONTRACTOR EARTH DISTURBED AREA: | ACRES |
| NOTICE OF INTENT EARTH DISTURBED AREA: | ACRES |

## 2019 SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PLANS AND CHANGES LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

APPROVED
DATE _____ DISTRICT DEPUTY DIRECTOR

APPROVED
DATE _____ DIRECTOR, DEPARTMENT OF TRANSPORTATION

TITLE SHEET

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER BTP
REVIEWER MDW 09/15/21
PROJECT ID 111150
SHEET 1 TOTAL 94



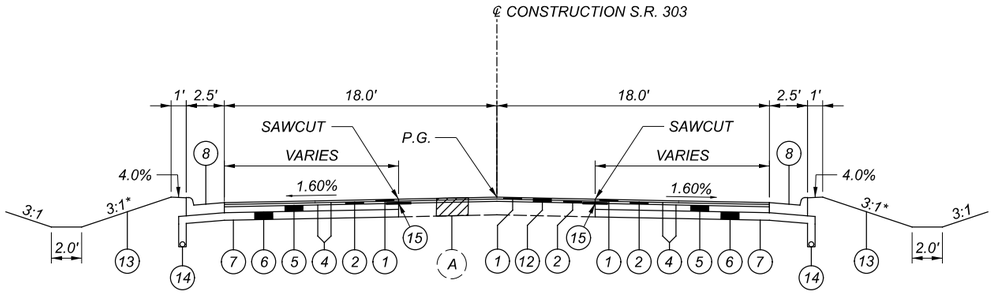
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## LEGEND

| | | |
|---|---|---|
| (1) | ITEM 441 | 1.25" ASPHALT CONCRETE SURFACE COURSE, TYPE 1 |
| (2) | ITEM 441 | 1.75" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1 |
| (3) | ITEM 452 | 10" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC 1P |
| (4) | ITEM 407 | TACK COAT |
| (5) | ITEM 302 | 6" ASPHALT CONCRETE BASE |
| (6) | ITEM 304 | 6" AGGREGATE BASE |
| (7) | ITEM 204 | SUBGRADE COMPACTION |
| (8) | ITEM 609 | COMBINATION CURB AND GUTTER, TYPE 2 |
| (9) | ITEM 609 | CURB, TYPE 6 |
| (10) | ITEM 609 | CURB, MISC.: MOUNTABLE TRUCK APRON |
| (11) | ITEM 609 | 6" CONCRETE TRAFFIC ISLAND |
| (12) | ITEM 254 | PAVEMENT PLANING, ASPHALT CONCRETE |
| (13) | ITEM 659 | SEEDING AND MULCHING |
| (14) | ITEM 605 | BASE PIPE UNDERDRAIN WITH GEOTEXTILE FABRIC |
| (15) | SPECIAL | PAVEMENT CRACK AND JOINT REINFORCING FABRIC |
| (16) | ITEM 304 | VARIABLE THICKNESS AGGREGATE BASE (MIN. 4") |

(A) EXISTING ASPHALT CONCRETE PAVEMENT

*3:1 FORESLOPE UNLESS NOTED OTHERWISE IN CROSS SECTIONS

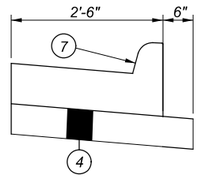



### NORMAL SECTION - PROPOSED S.R. 303

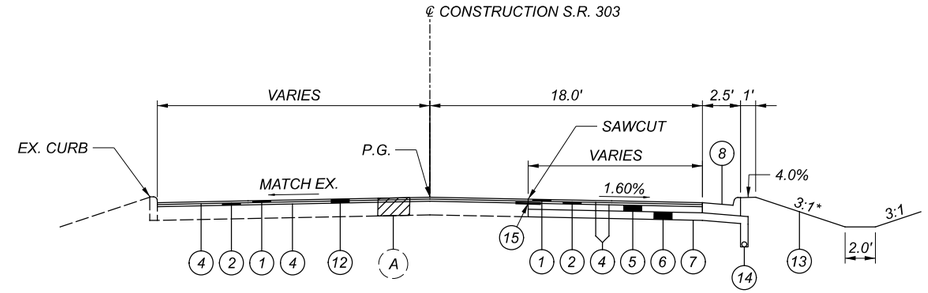
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STA. 302+57.71 TO STA. 318+00.00

ALTERNATE 2
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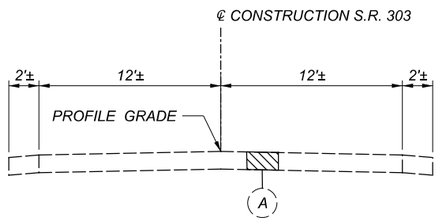

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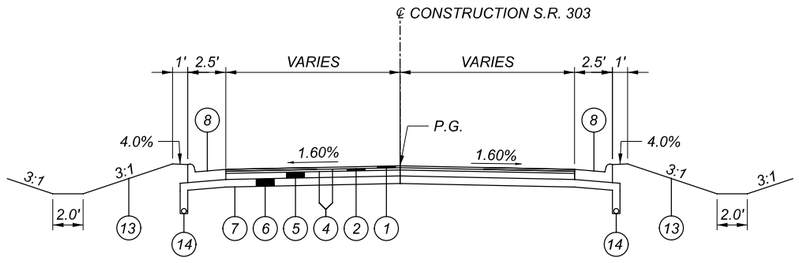

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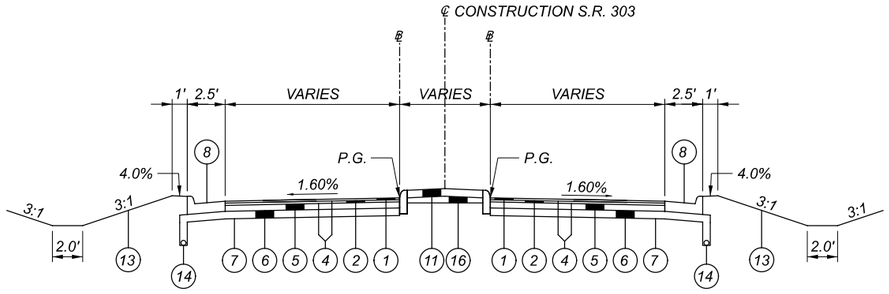

### NORMAL SECTION - EXISTING S.R. 303




### NORMAL SECTION - PROPOSED S.R. 303

SECTION APPLIES:

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STA. 264+71.41 TO STA. 267+00.00
STA. 308+50.00 TO STA. 309+62.67
STA. 312+92.56 TO STA. 313+77.54




### NORMAL SECTION - PROPOSED S.R. 303

SECTION APPLIES:

ALTERNATE 2
STA. 261+11.89 TO STA. 262+33.39
STA. 263+48.17 TO STA. 264+71.41
STA. 309+62.67 TO STA. 311+03.83
STA. 312+12.20 TO STA. 312+92.56

TYPICAL SECTIONS

DESIGN AGENCY
CARPENTER MARTY Transportation

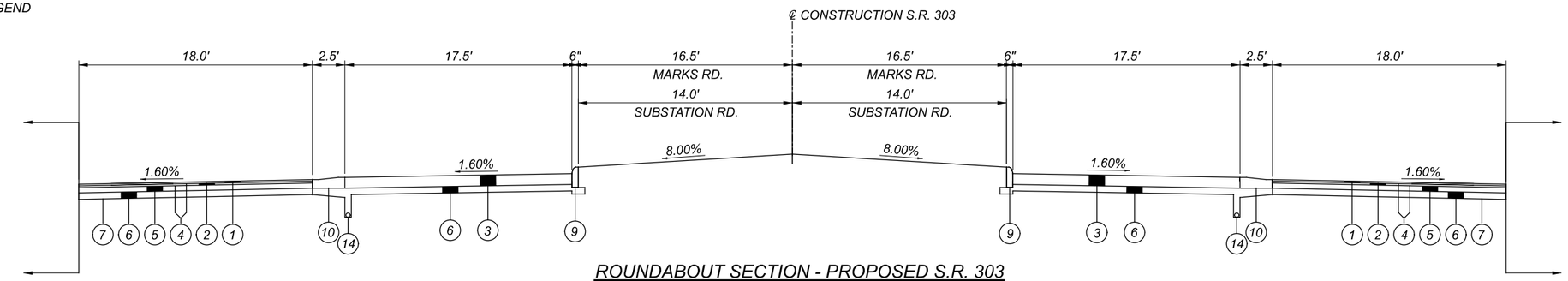
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REVIEWER MDW 09/15/21
PROJECT ID 111150
SHEET 2 TOTAL 94

MED-303-4.85

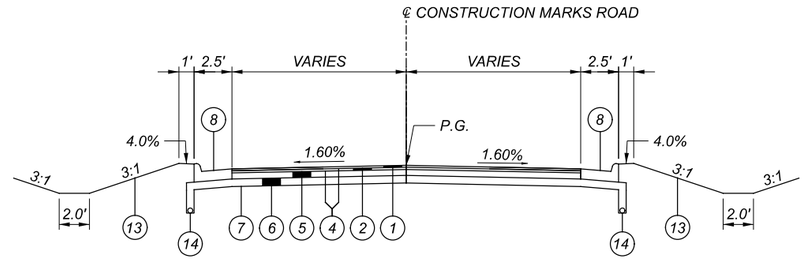
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NOTES

1. SEE SHEET 2 FOR LEGEND




ROUNDABOUT SECTION - PROPOSED S.R. 303

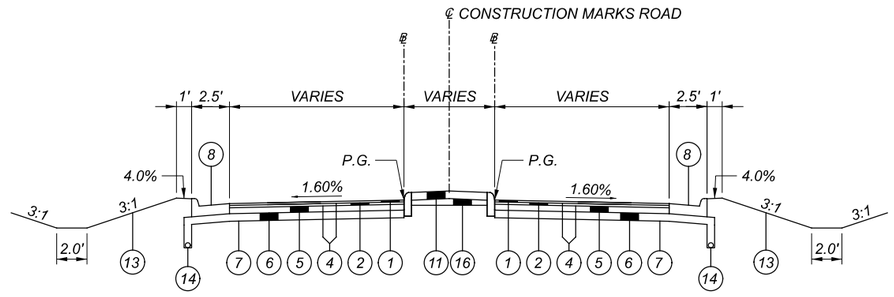



NORMAL SECTION - PROPOSED MARKS ROAD

SECTION APPLIES:

ALTERNATE 1
STA. 9+50.00 TO STA. 15+75.00

ALTERNATE 2
STA. 7+44.14 TO STA. 8+00.31
STA. 12+13.88 TO STA. 14+68.75




NORMAL SECTION - PROPOSED MARKS ROAD

SECTION APPLIES:
STA. 8+00.31 TO STA. 8+82.60

TYPICAL SECTIONS

MED-303-4.85

MODEL: Sheet PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:07:18 PM USER: dgohs
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DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
WCS

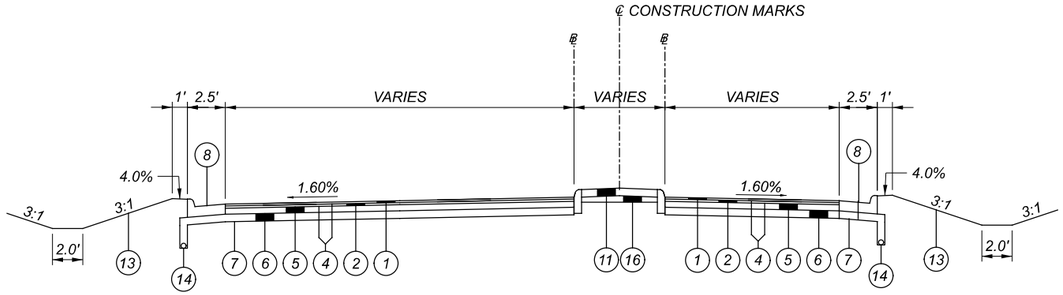
REVIEWER
MDW 09/15/21

PROJECT ID
111150

SHEET 3 TOTAL 94

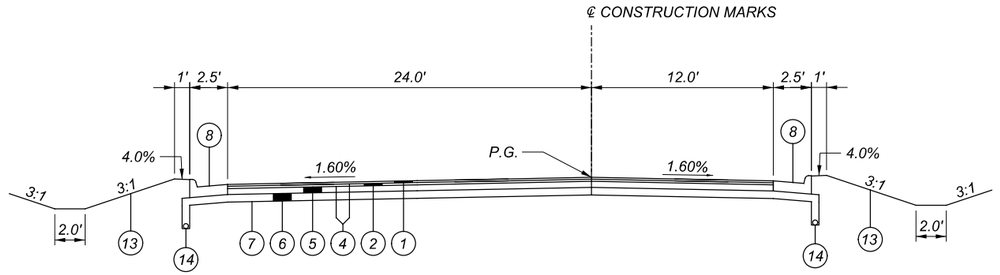
NOTES

1. SEE SHEET 2 FOR LEGEND



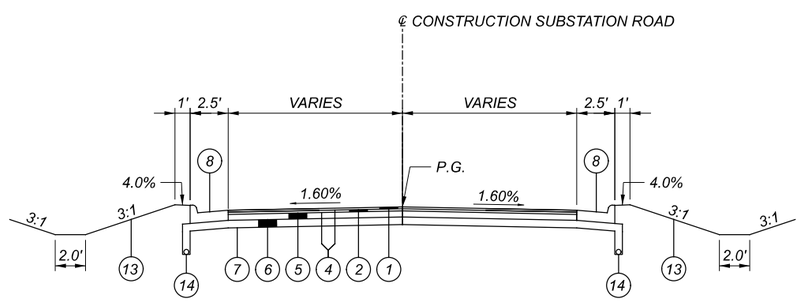

NORMAL SECTION - PROPOSED MARKS ROAD

SECTION APPLIES:
STA. 9+97.59 TO STA. 10+72.06




NORMAL SECTION - PROPOSED MARKS ROAD

SECTION APPLIES:
STA. 10+72.06 TO STA. 12+13.88

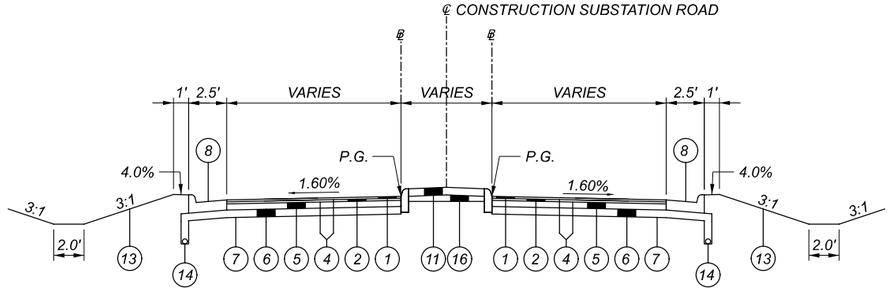



NORMAL SECTION - PROPOSED SUBSTATION ROAD

SECTION APPLIES:

ALTERNATE 1
STA. 28+75.00 TO STA. 30+91.48

ALTERNATE 2
STA. 27+78.51 TO STA. 28+52.33
STA. 31+54.40 TO STA. 32+18.58




NORMAL SECTION - PROPOSED SUBSTATION ROAD

SECTION APPLIES:
STA. 28+52.33 TO STA. 29+44.34
STA. 30+47.18 TO STA. 31+54.40

TYPICAL SECTIONS

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
WCS

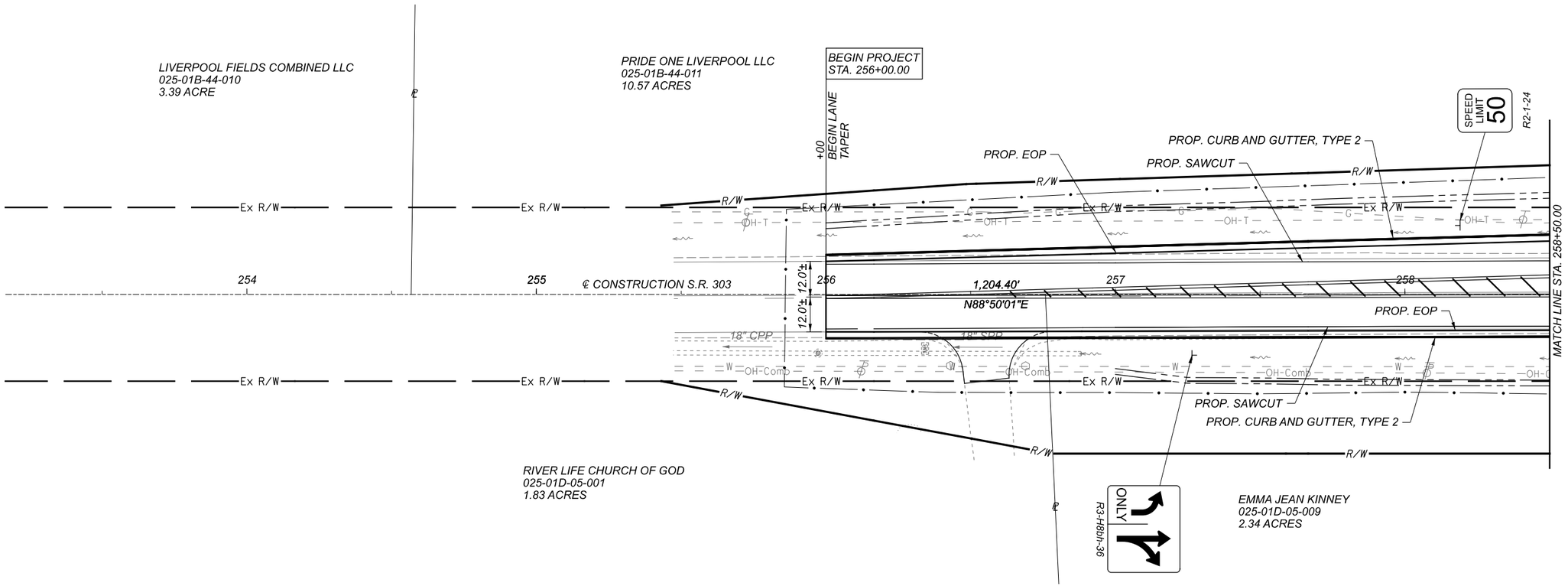
REVIEWER
MDW 09/15/21

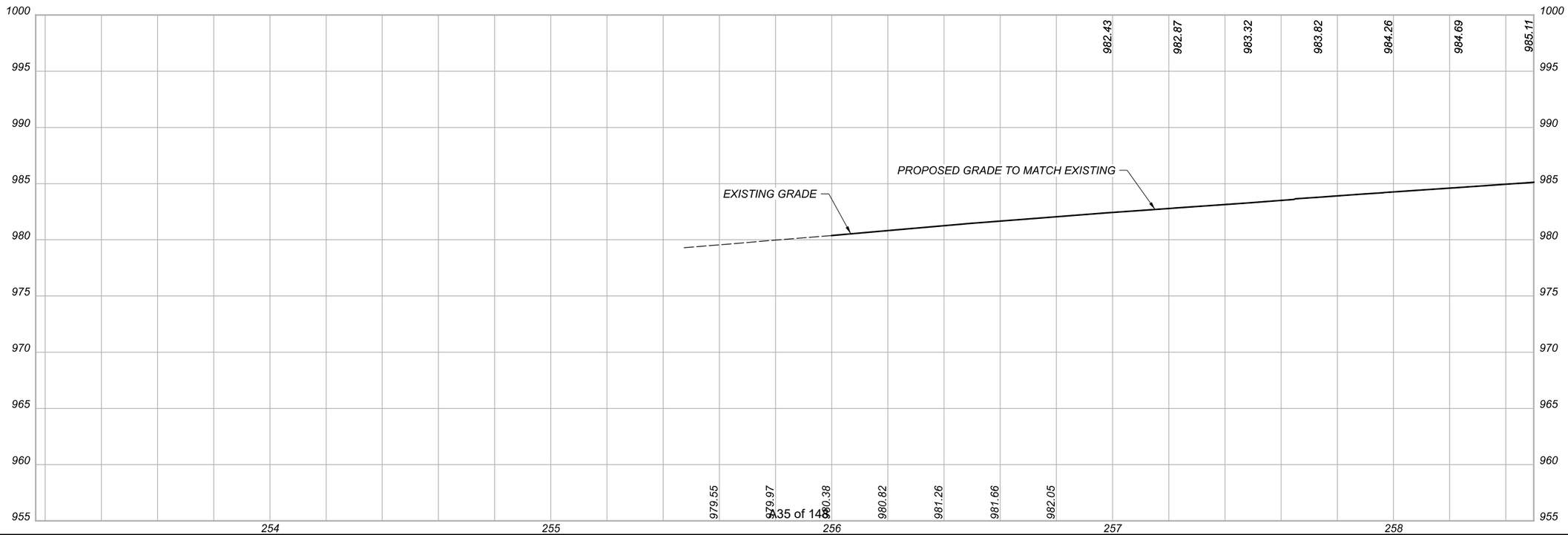
PROJECT ID
111150

SHEET 4 TOTAL 94

MED-303-4.85

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HORIZONTAL SCALE IN FEET
0 10 20 40

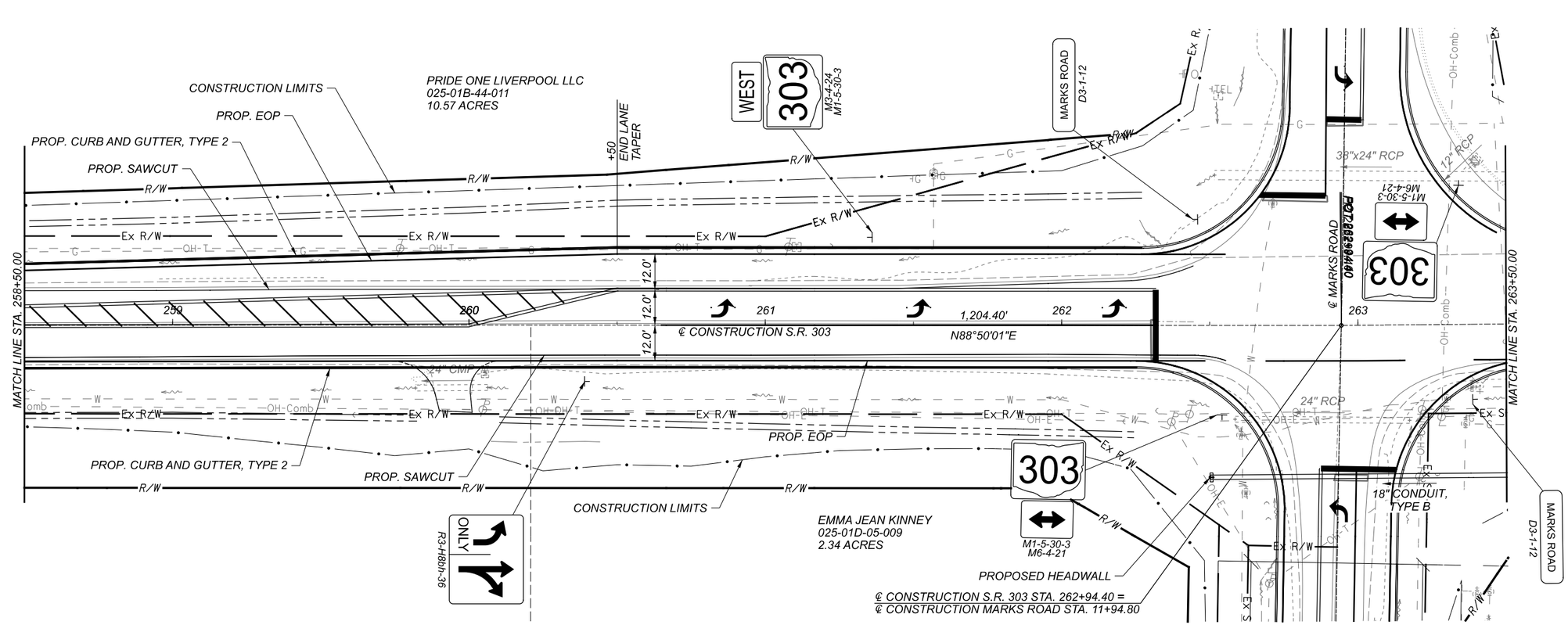
# PLAN AND PROFILE - S.R. 303
# STA. 253+00.00 TO STA. 258+50.00

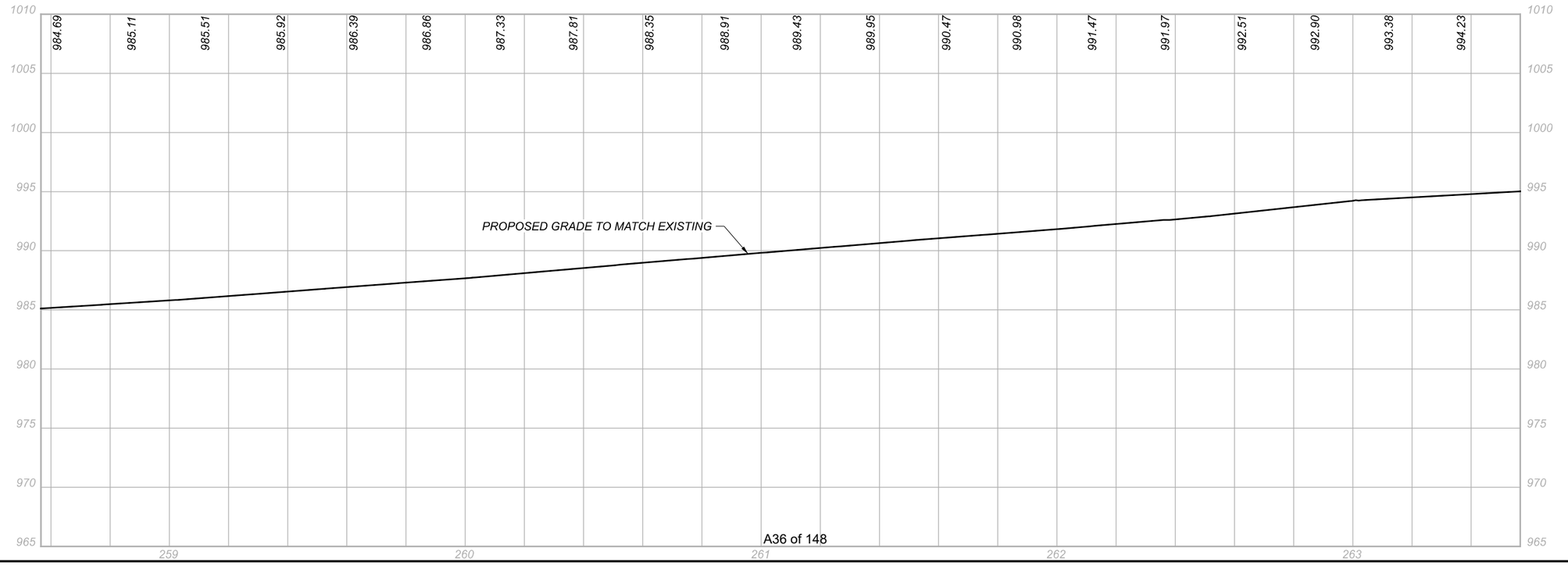
DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 5 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 12 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:07:37 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

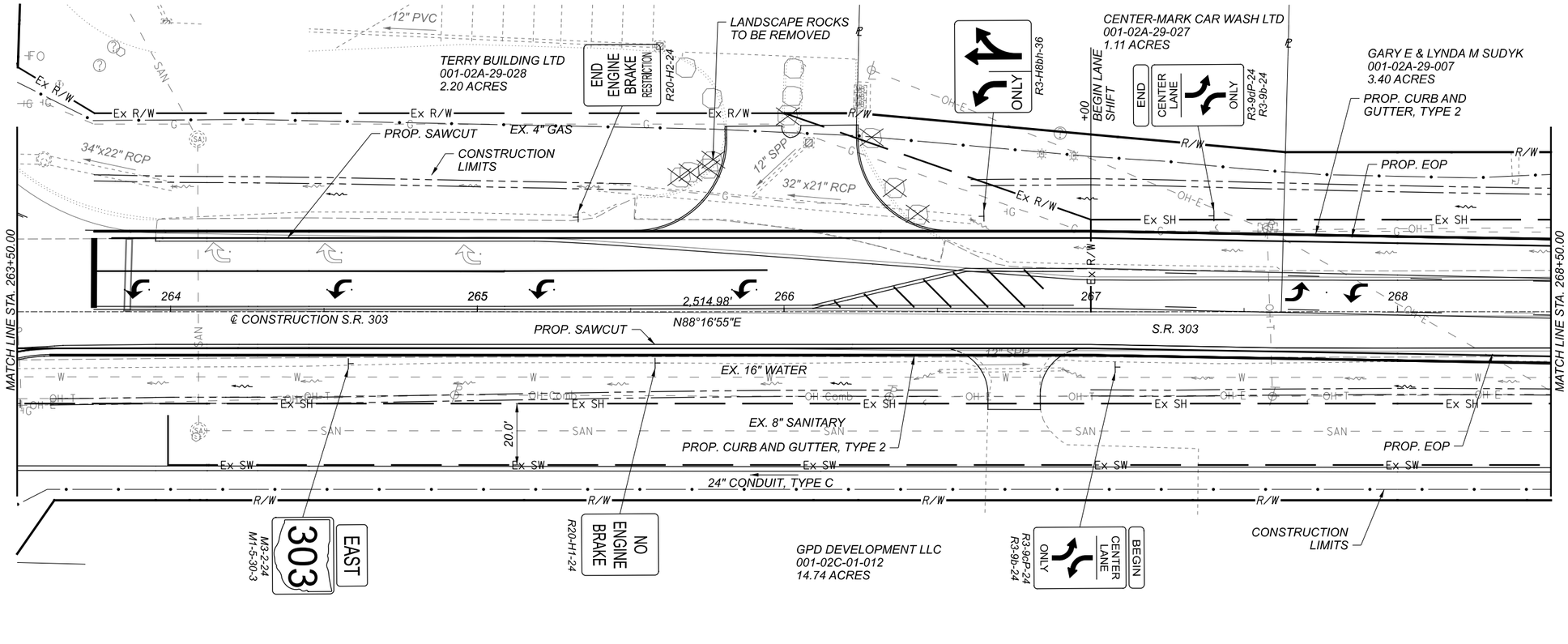
# PLAN AND PROFILE - S.R. 303
# STA. 258+50.00 TO STA. 263+50.00

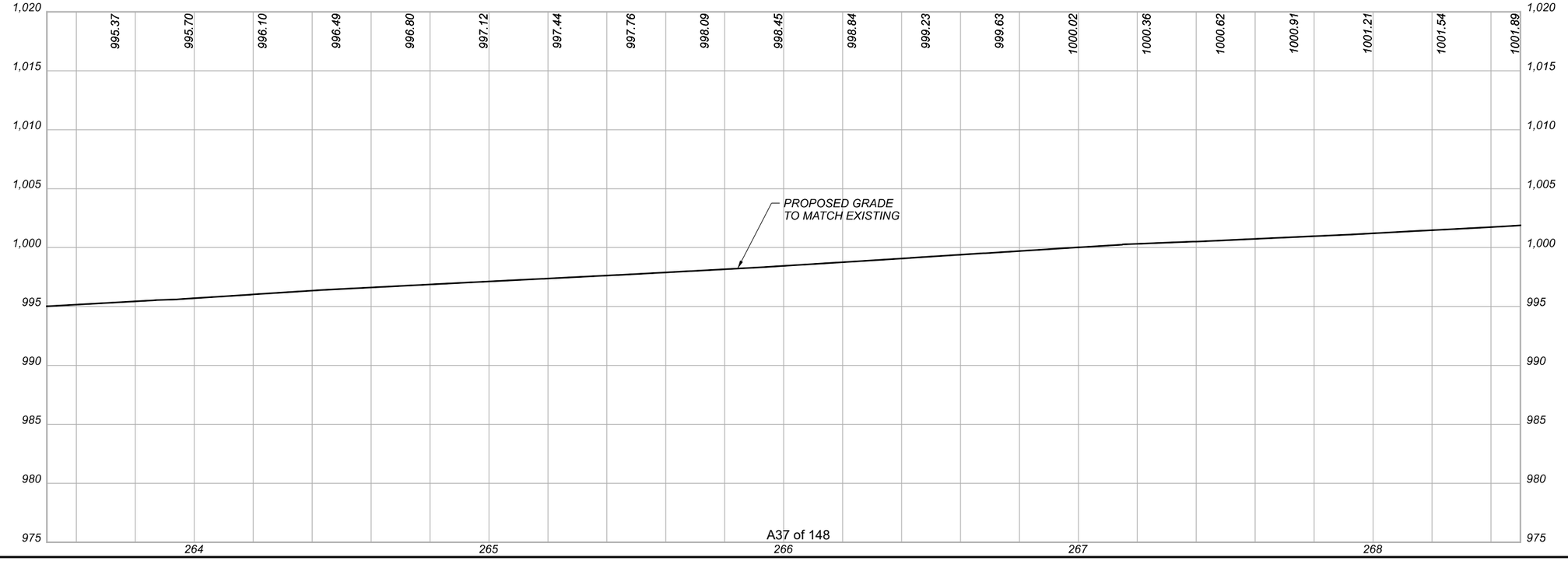
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 6 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 13 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:07:38 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

# PLAN AND PROFILE - S.R. 303
# STA. 263+95.14 TO STA. 268+50.00

DESIGN AGENCY
CARPENTER MARTY Transportation

DESIGNER
BTP

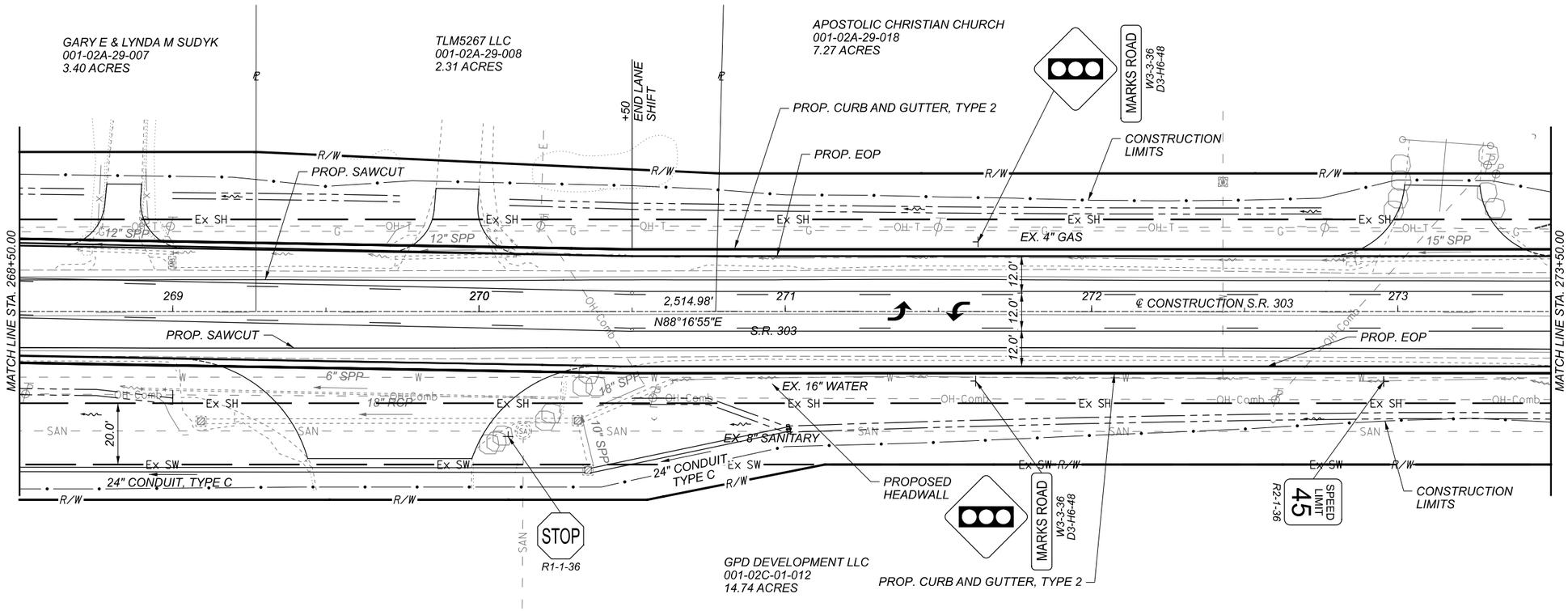
REVIEWER
MDW 09/15/21

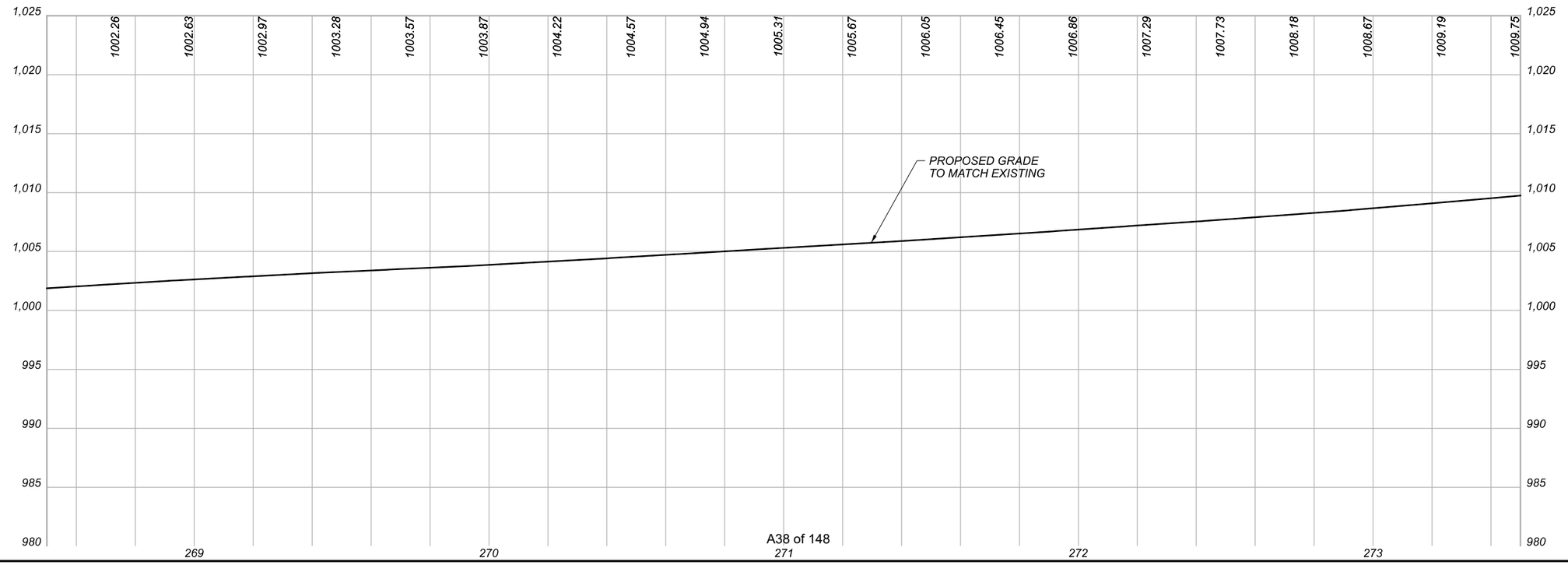
PROJECT ID
111150

SHEET 7 TOTAL 94

MED-303-4.85

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HORIZONTAL SCALE IN FEET
0 10 20 40

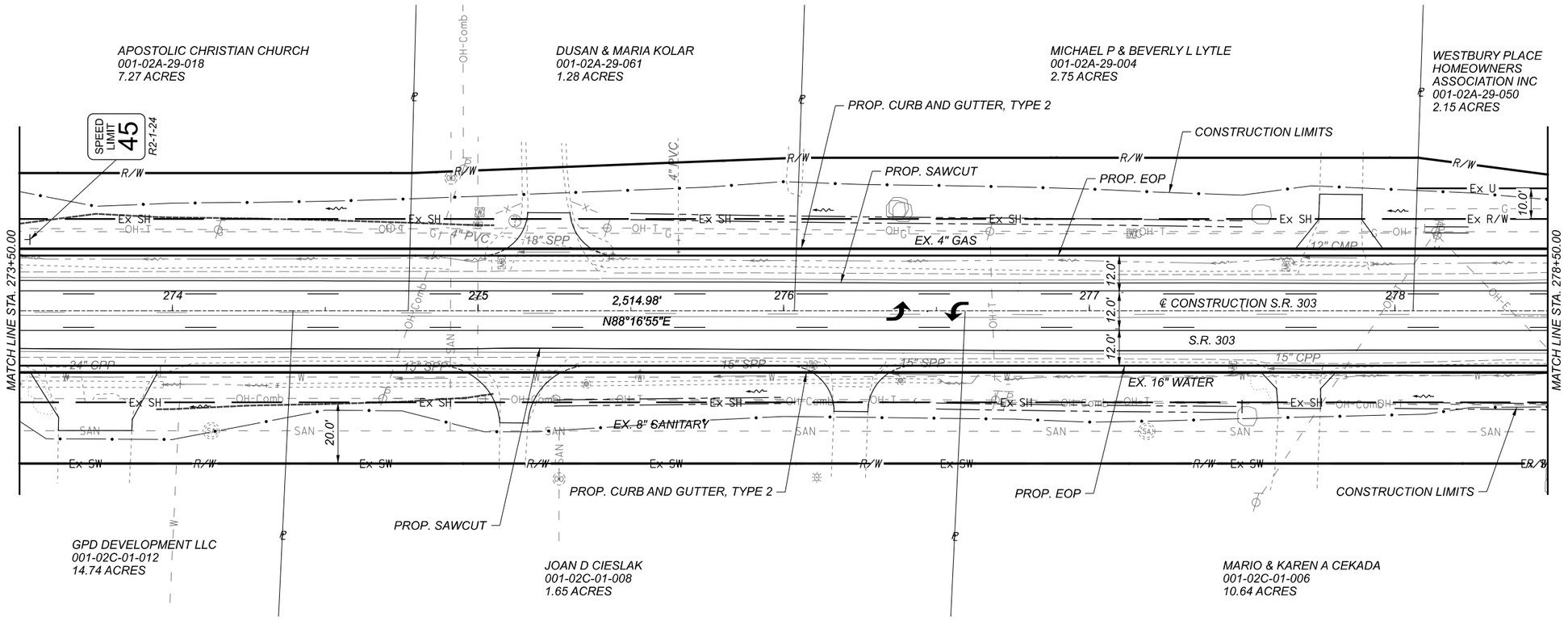
# PLAN AND PROFILE
# STA. 268+50.00 TO STA. 273+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 8 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:07:40 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

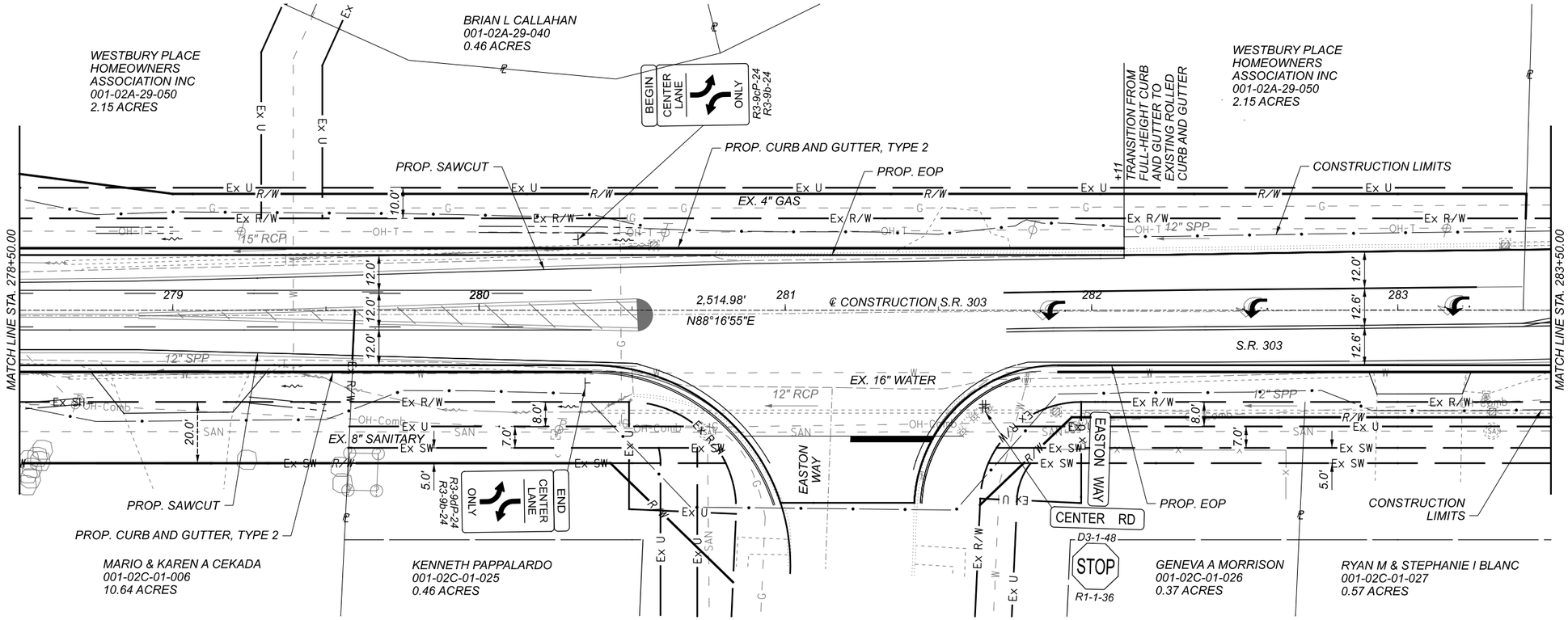
# PLAN AND PROFILE - S.R. 303
# STA. 273+50.00 TO STA. 278+50.00

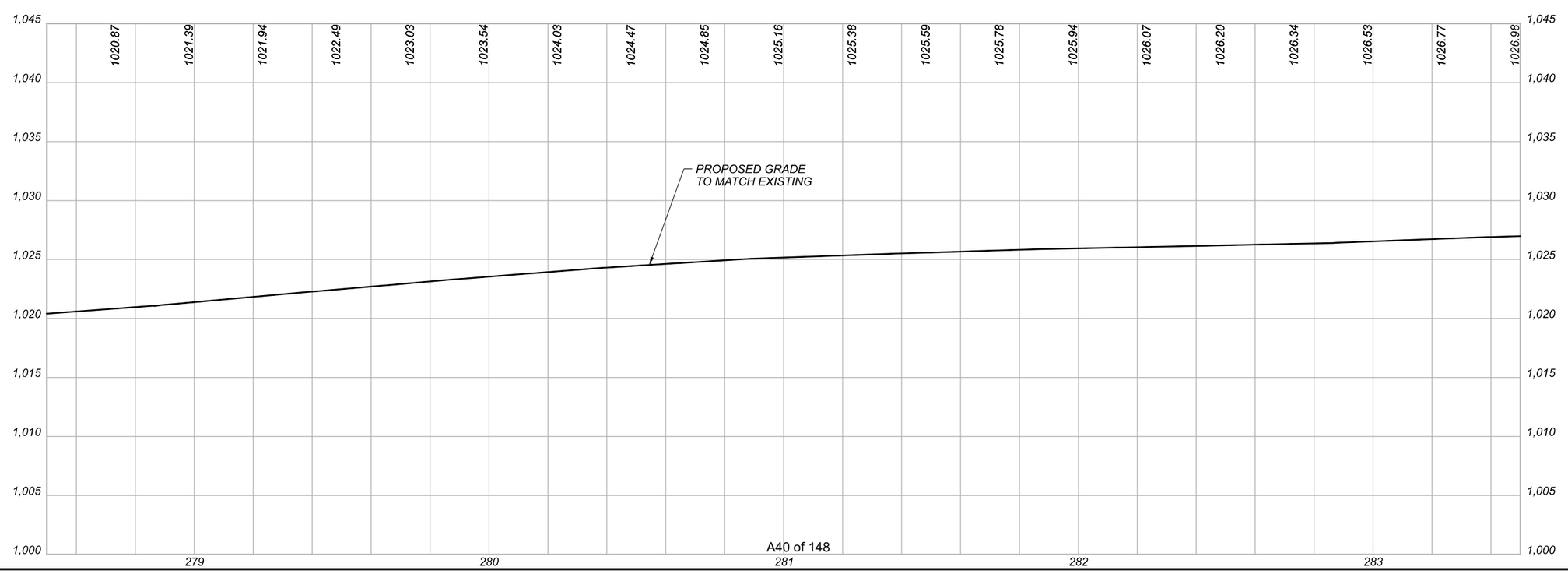
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 9 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 3 [Sheet] PAPERSIZE: 11x17 (in.) DATE: 11/22/2021 TIME: 4:07:41 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

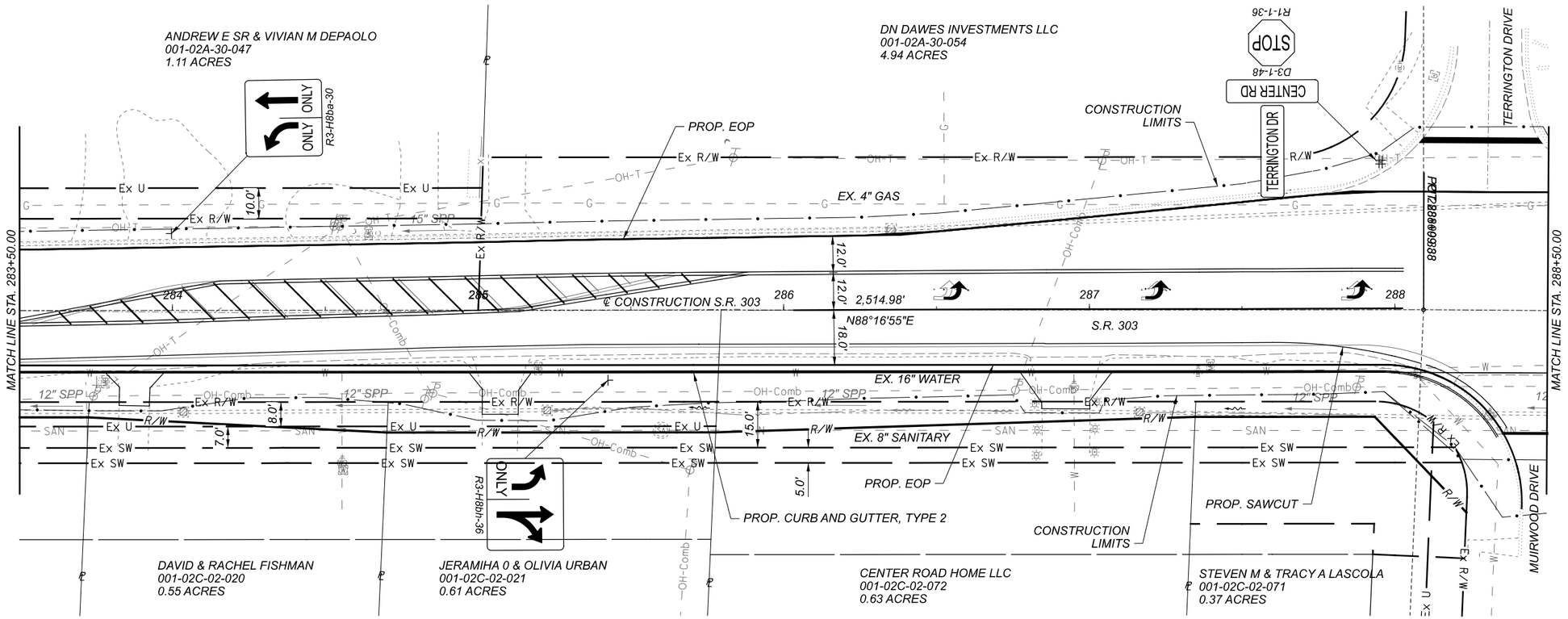
# PLAN AND PROFILE - S.R. 303
# STA. 278+50.00 TO STA. 283+50.00

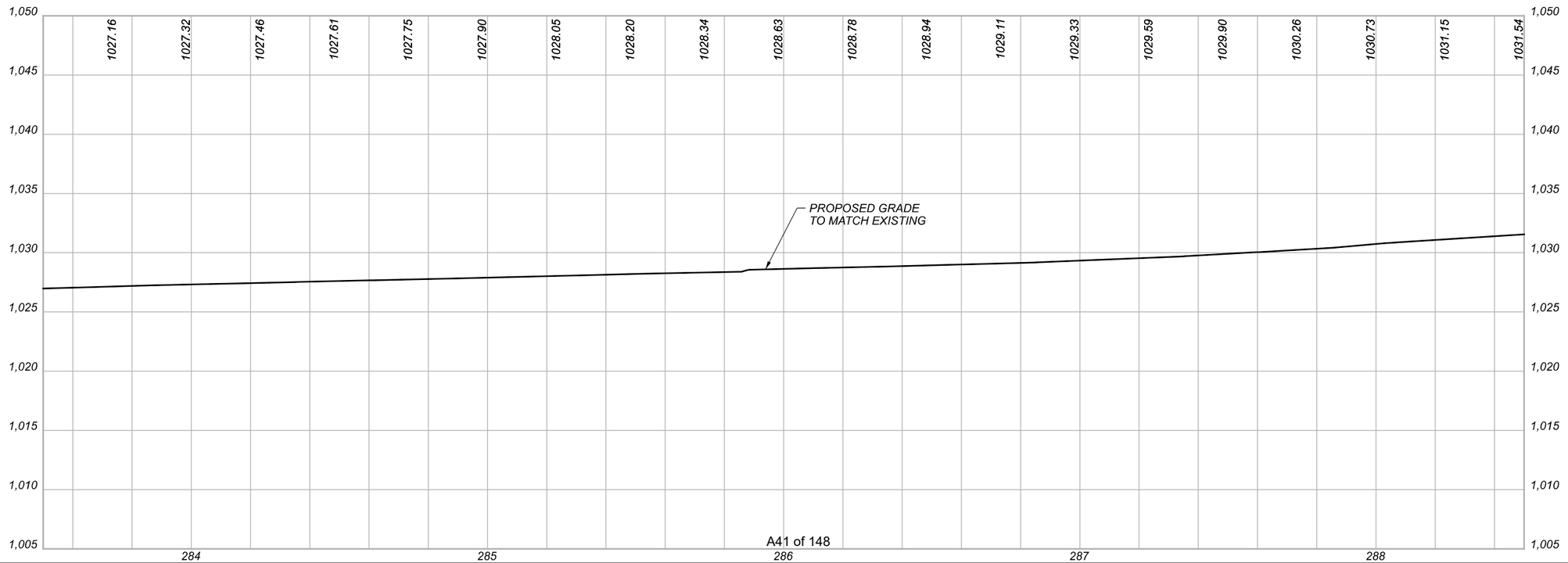
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 10 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 4 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:07:41 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

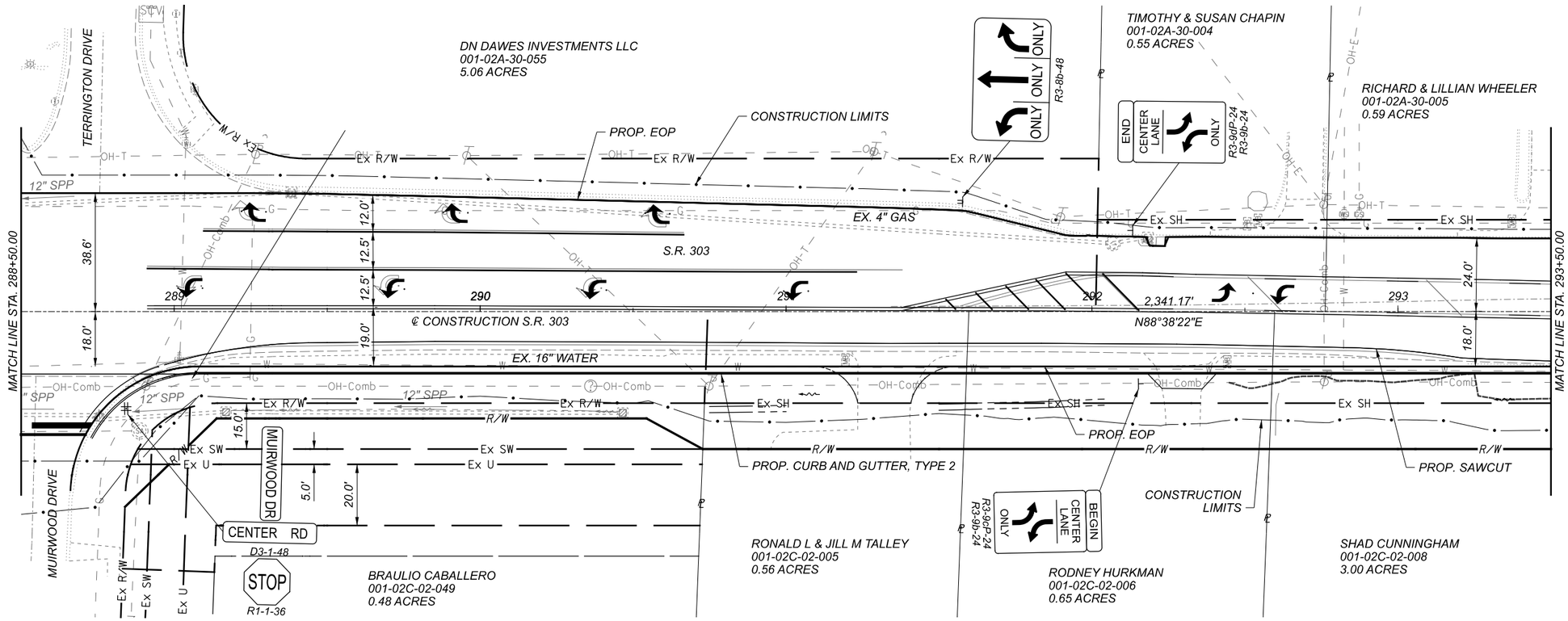
# PLAN AND PROFILE - S.R. 303
# STA. 283+50.00 TO STA. 288+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 11 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 5 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:07:42 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

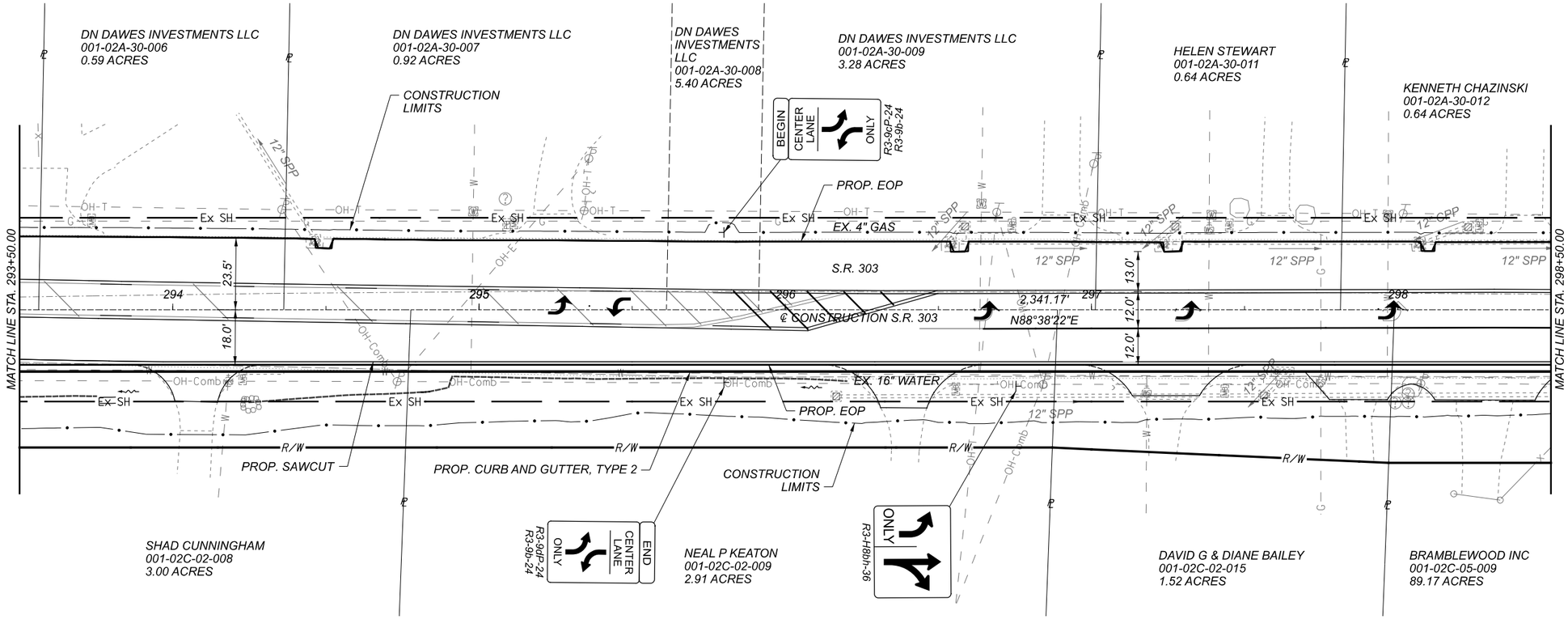
# PLAN AND PROFILE - S.R. 303
## STA. 288+50.00 TO STA. 293+50.00

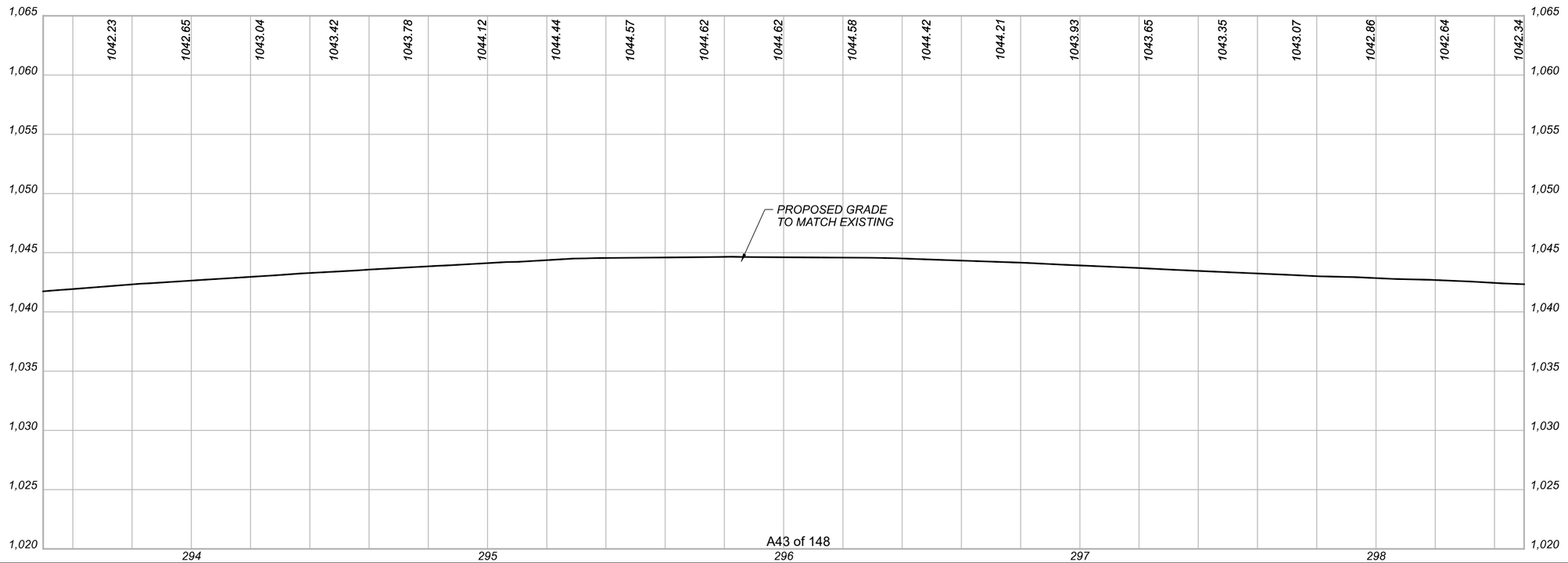
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 12 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 6 (Sheet1) PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:07:43 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

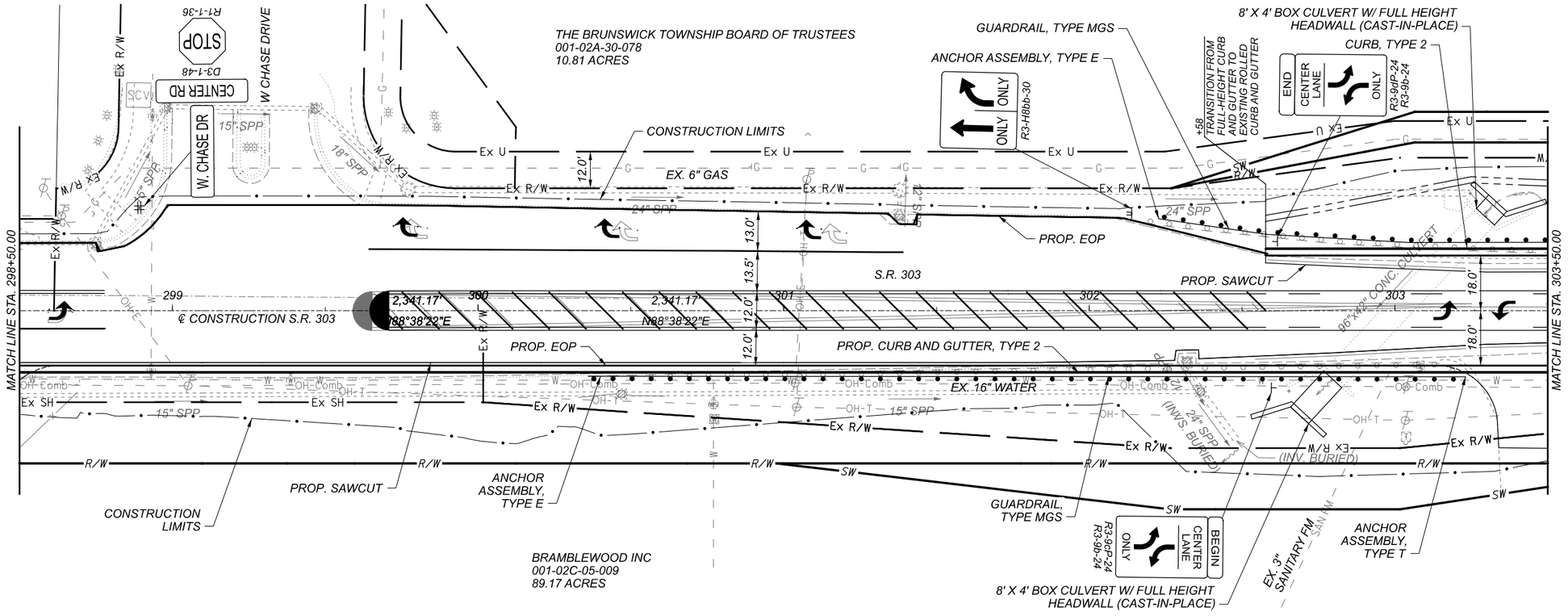
# PLAN AND PROFILE - S.R. 303
# STA. 293+50.00 TO STA. 298+50.00

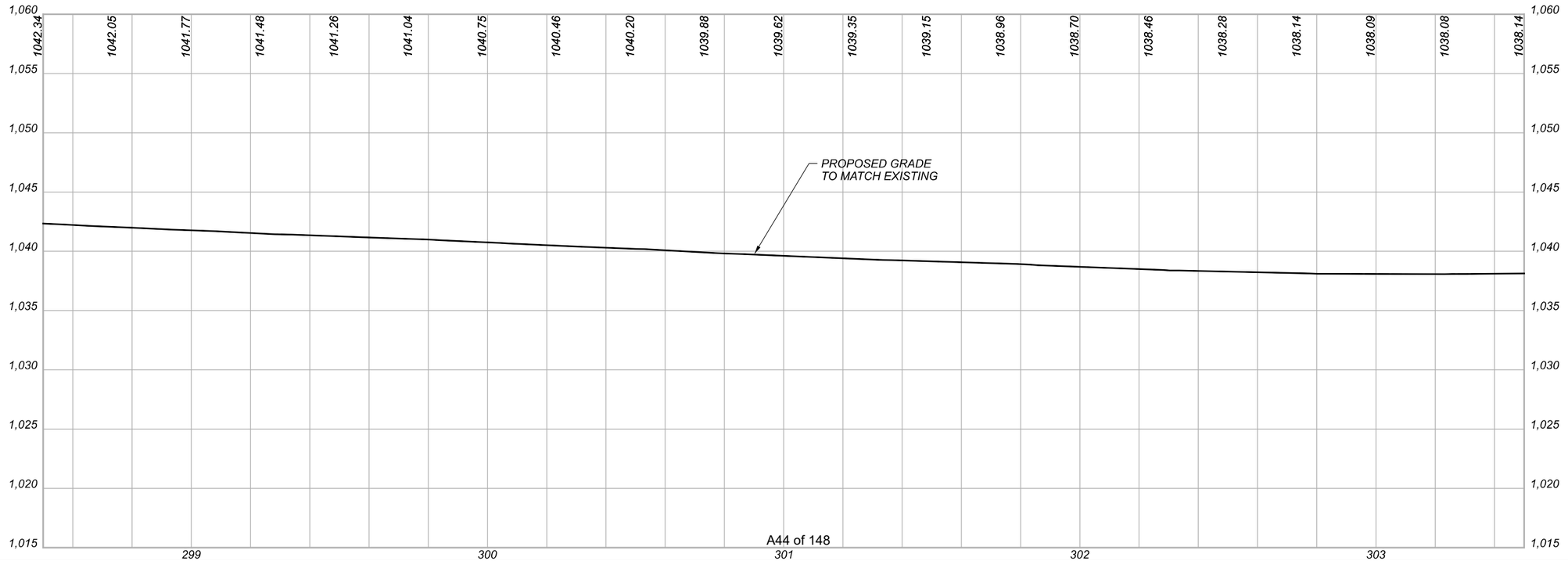
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 13 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 7 [Sheet] PAPERSIZE: 11x17 (in.) DATE: 11/22/2021 TIME: 4:07:44 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

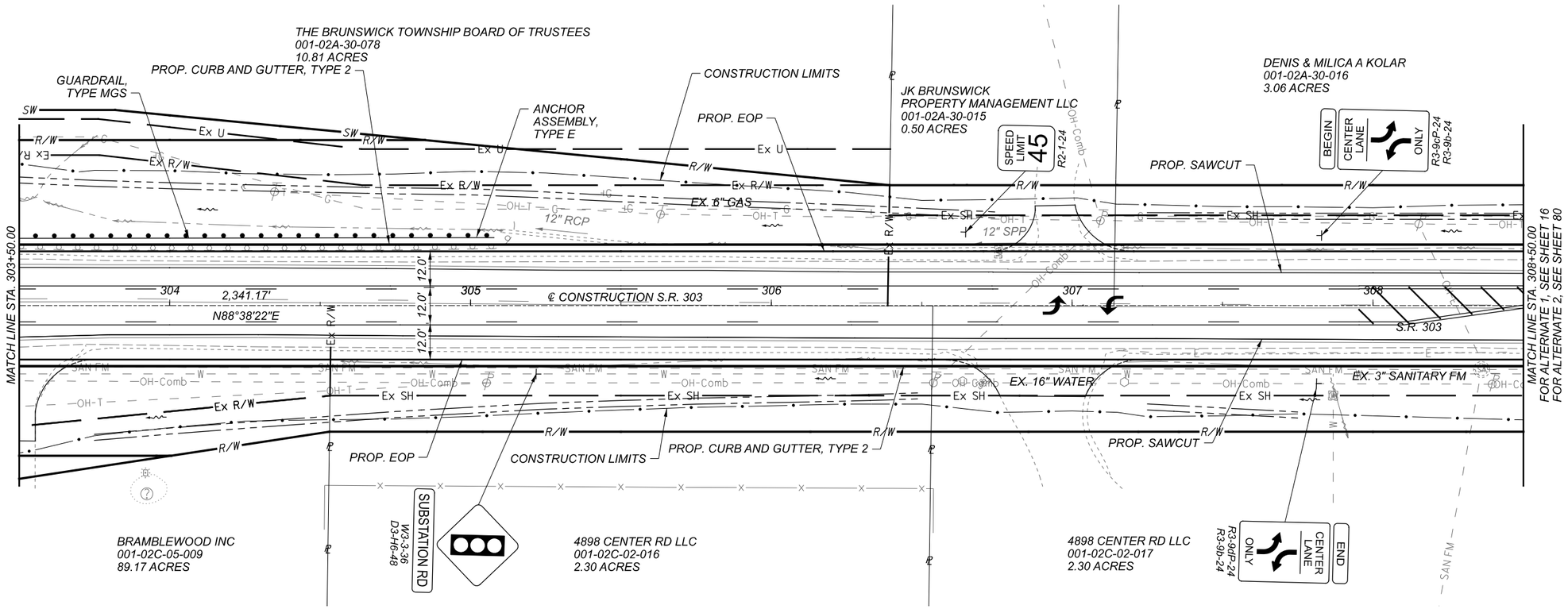
# PLAN AND PROFILE - S.R. 303
# STA. 298+50.00 TO STA. 303+50.00

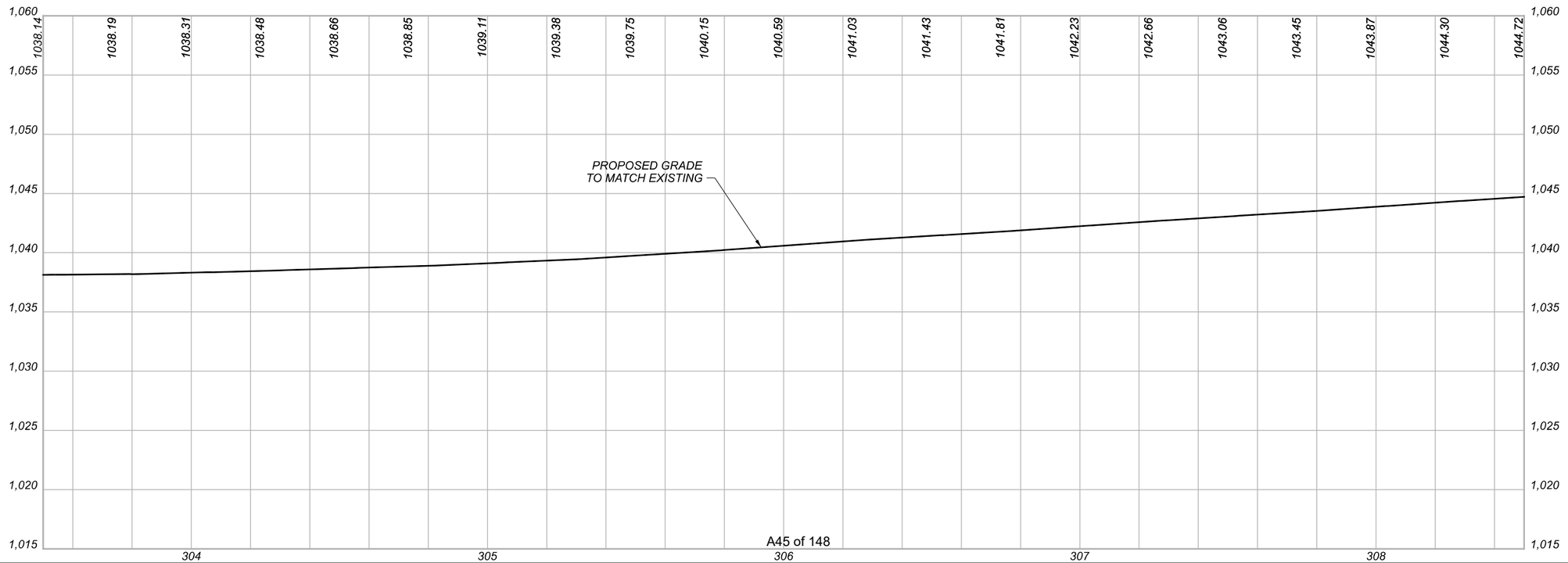
DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 14 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 8 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:07:45 PM USER: dgohs
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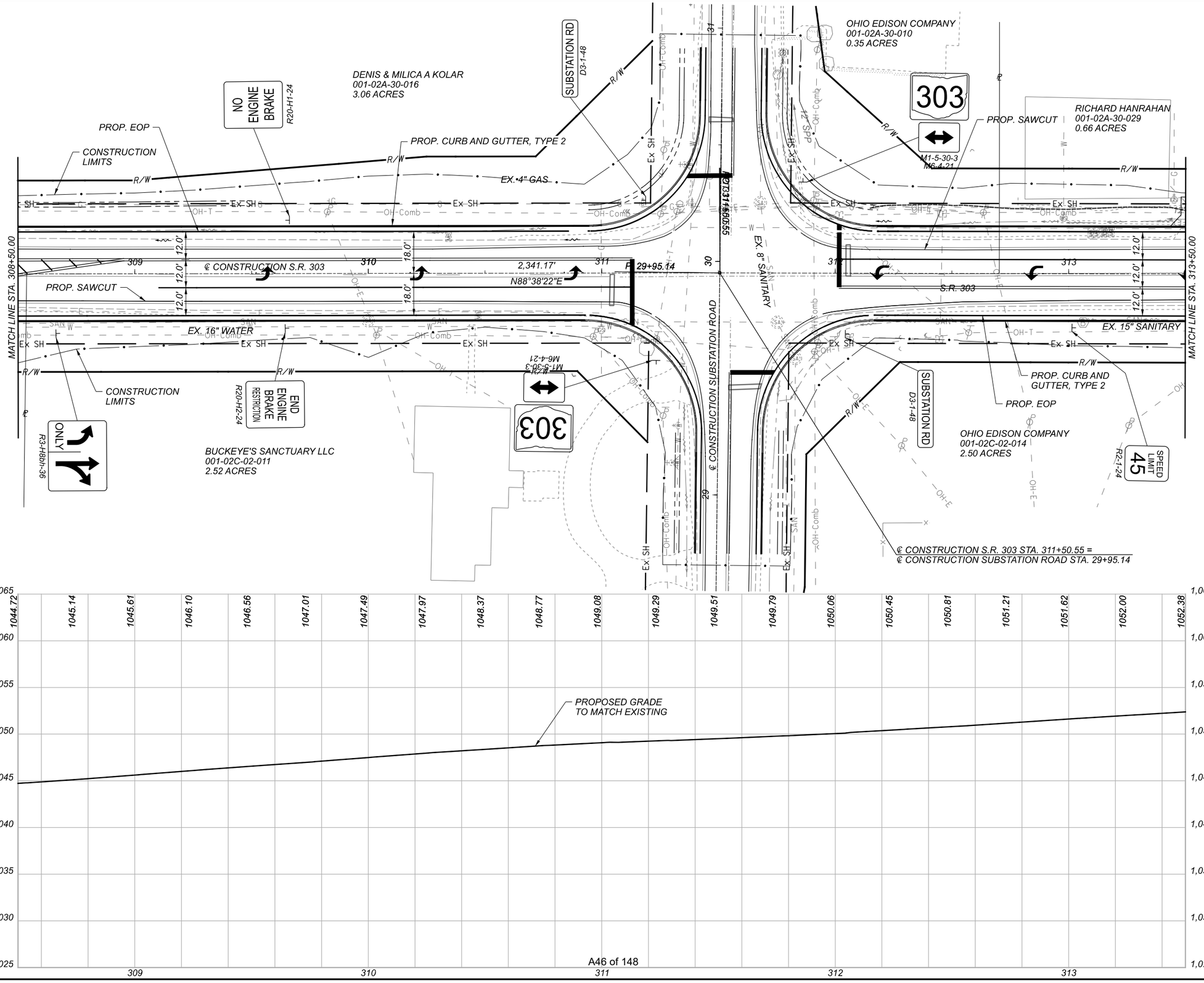

PLAN AND PROFILE - S.R. 303
STA. 303+50.00 TO STA. 308+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 15 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 9 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:07:46 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

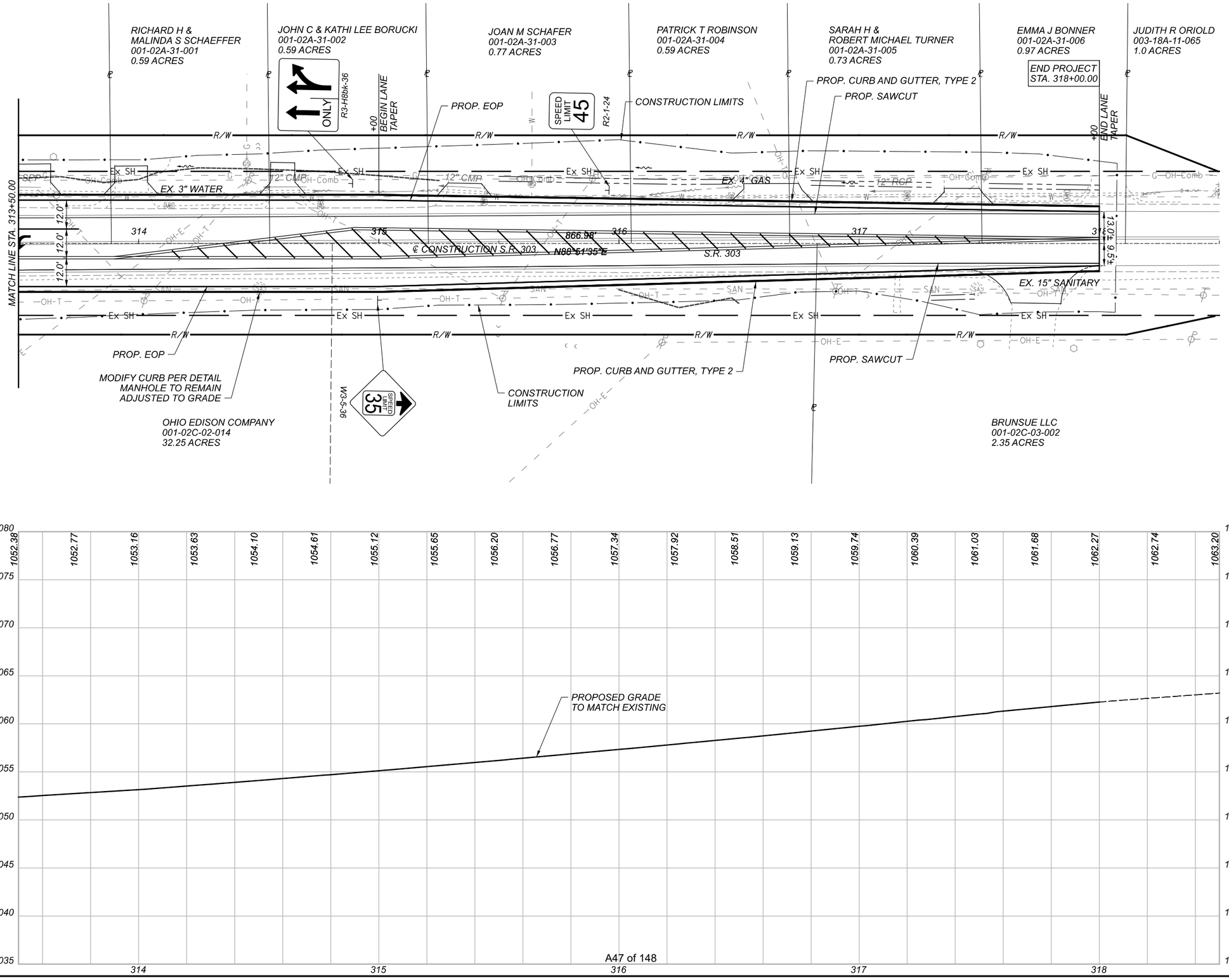
# PLAN AND PROFILE - S.R. 303 - ALTERNATE 1
# STA. 308+50.00 TO STA. 313+50.00

DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 16 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan (0 (Sheet) PAPERSIZE: 17x11in) DATE: 11/22/2021 TIME: 4:07:47 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

# PLAN AND PROFILE - S.R. 303 - ALTERNATE 1
## STA. 313+50.00 TO STA. 318+00.00

DESIGN AGENCY
CARPENTER MARTY Transportation

DESIGNER
BTP

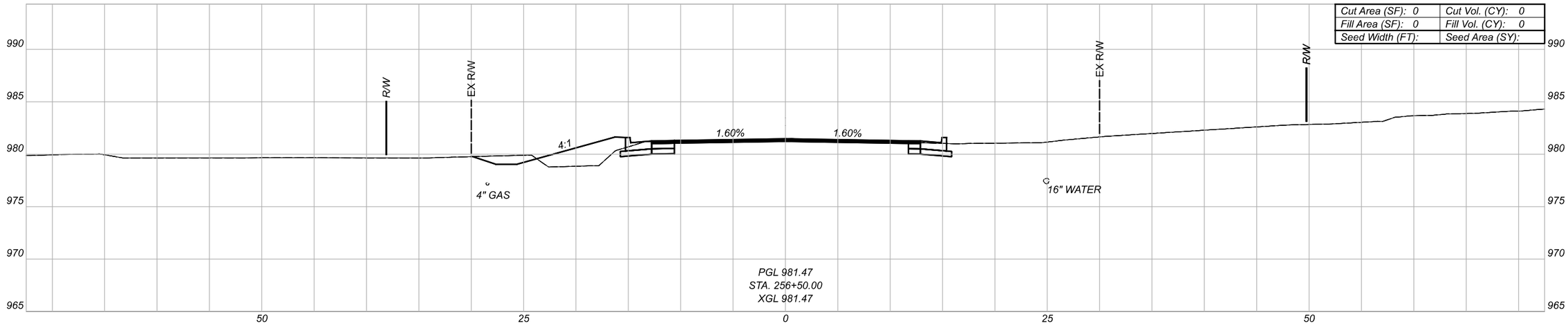
REVIEWER
DMG 09/15/21

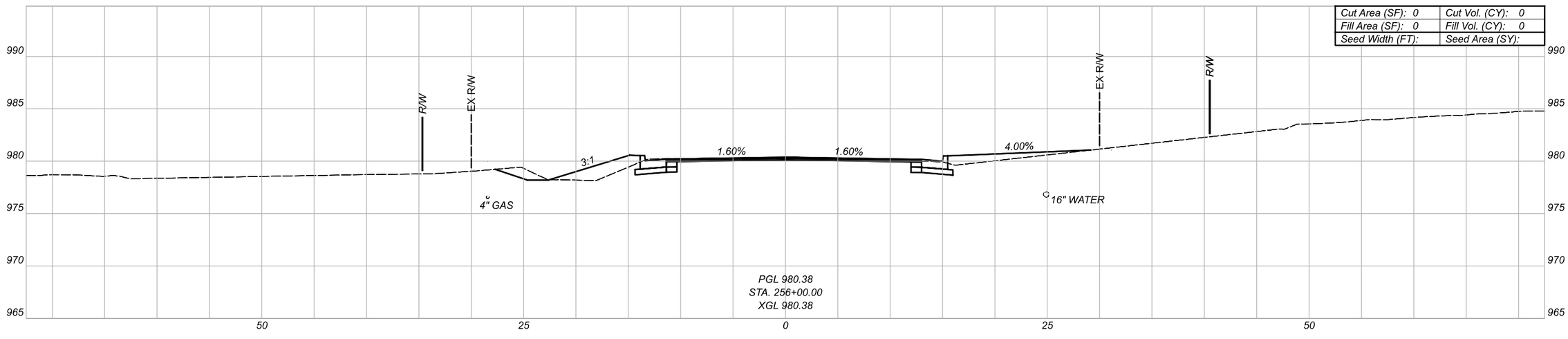
PROJECT ID
111150

SHEET 17 TOTAL 94

MED-303-4.85

MODEL: Plan II(Sheet) PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:07:48 PM USER: dgohs
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CROSS SECTIONS - S.R. 303
STA. 256+00.00 TO STA. 256+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

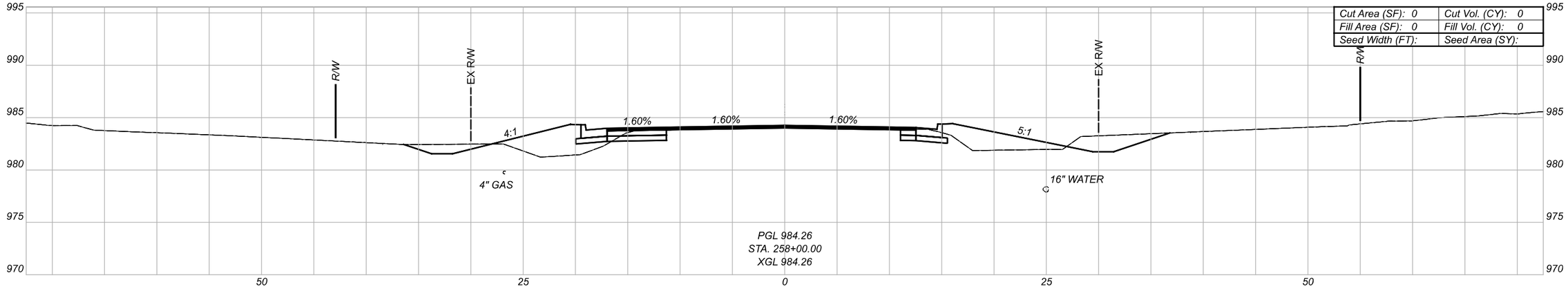
PROJECT ID
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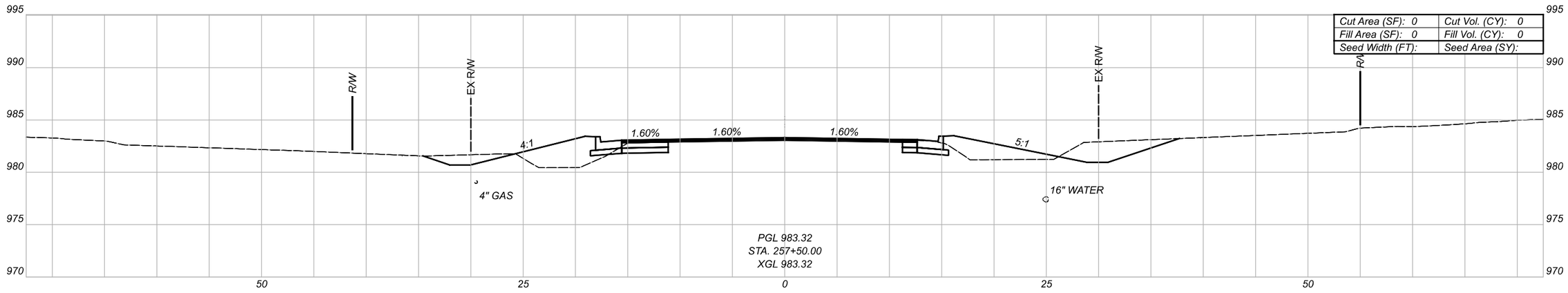
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| - | - | - |

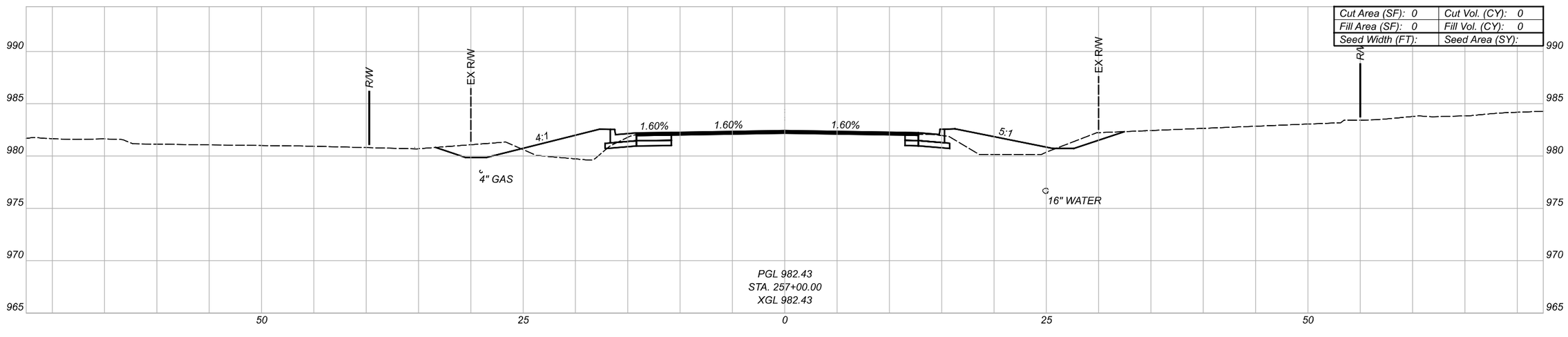
SHEET 18 TOTAL 94

MED-303-4.85

MODEL: CLX_303 - 256+00.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:07:57 PM USER: dgohs
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CROSS SECTIONS - S.R. 303
STA. 257+00.00 TO STA. 258+00.00

DESIGN AGENCY
CARPENTER MARTY Transportation

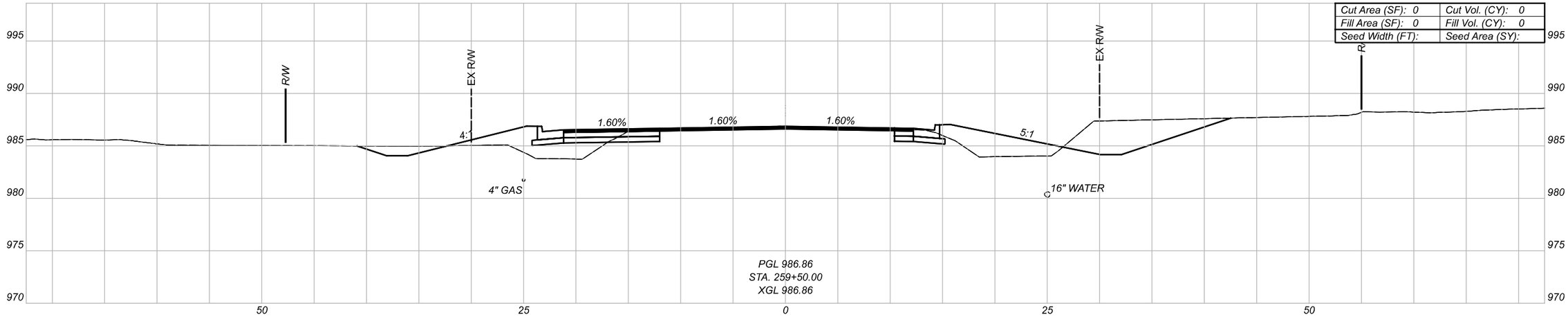
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

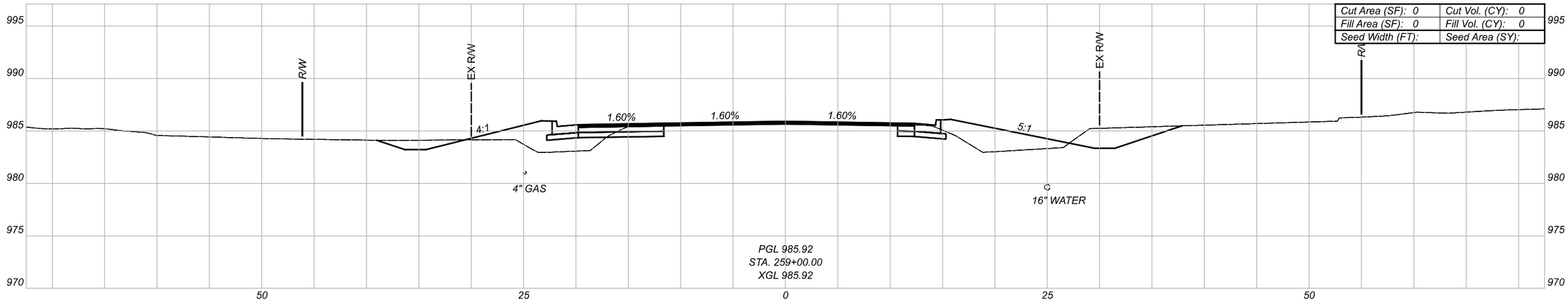
| SHEET | TOTAL |
|---|---|
| 19 | 94 |

MED-303-4.85

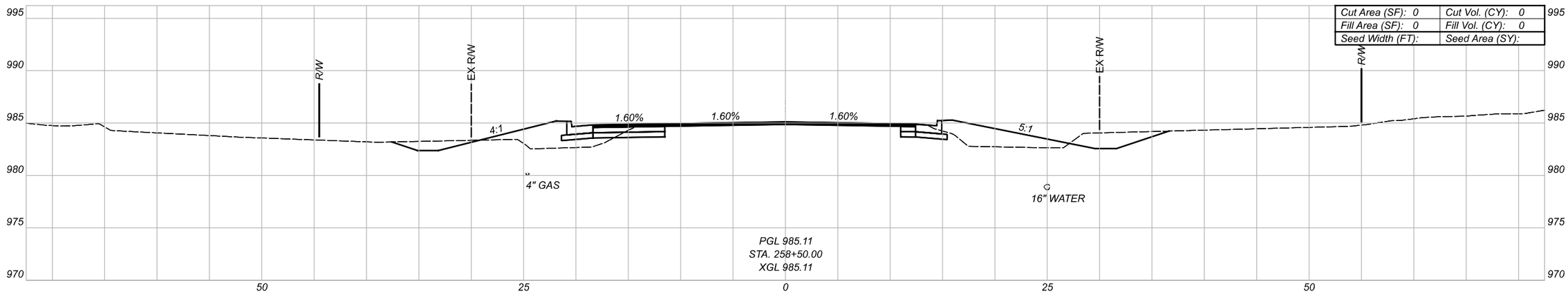
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P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




CROSS SECTIONS - S.R. 303
STA. 258+50.00 TO STA. 259+50.00

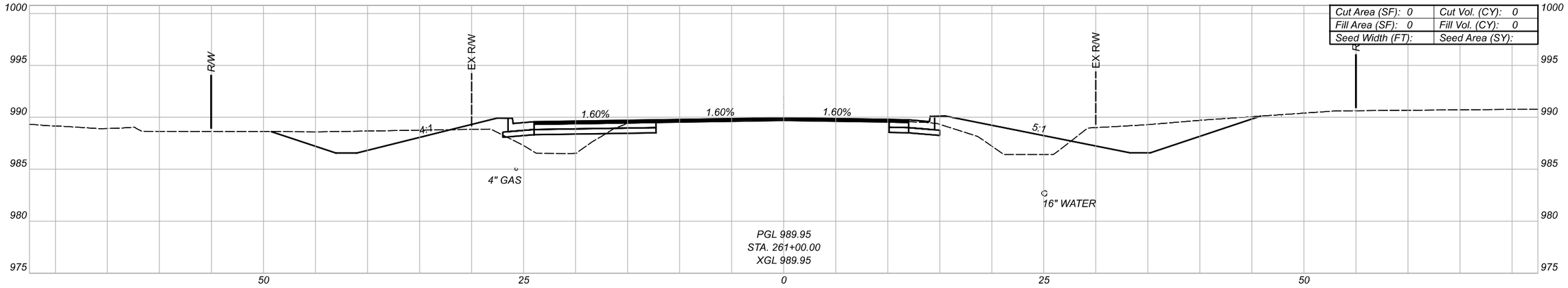
MED-303-4.85

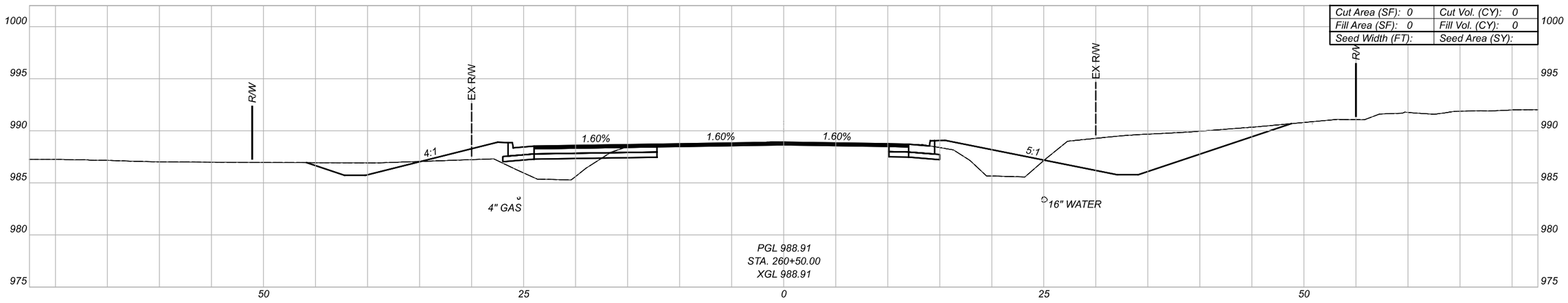
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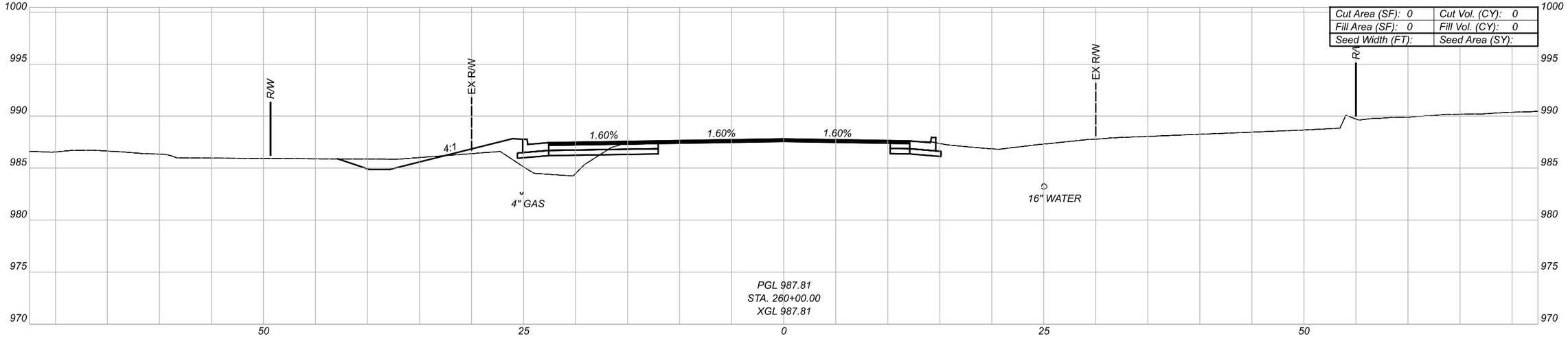
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 20 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




CROSS SECTIONS - S.R. 303
STA. 260+00.00 TO STA. 261+00.00

MED-303-4.85

MODEL: CLX_303 - 260+00.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:08:03 PM USER: dgohs
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DESIGN AGENCY
CARPENTER MARTY transportation

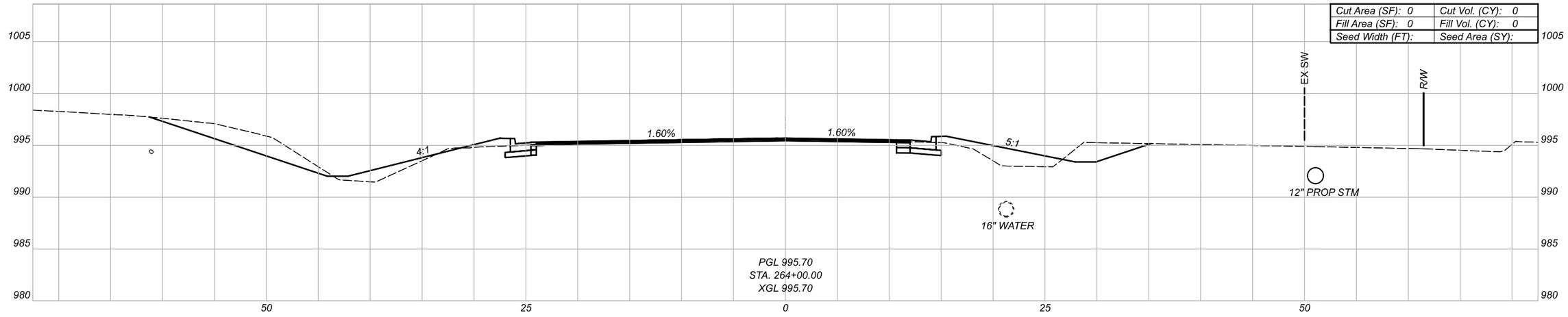
DESIGNER
DMG

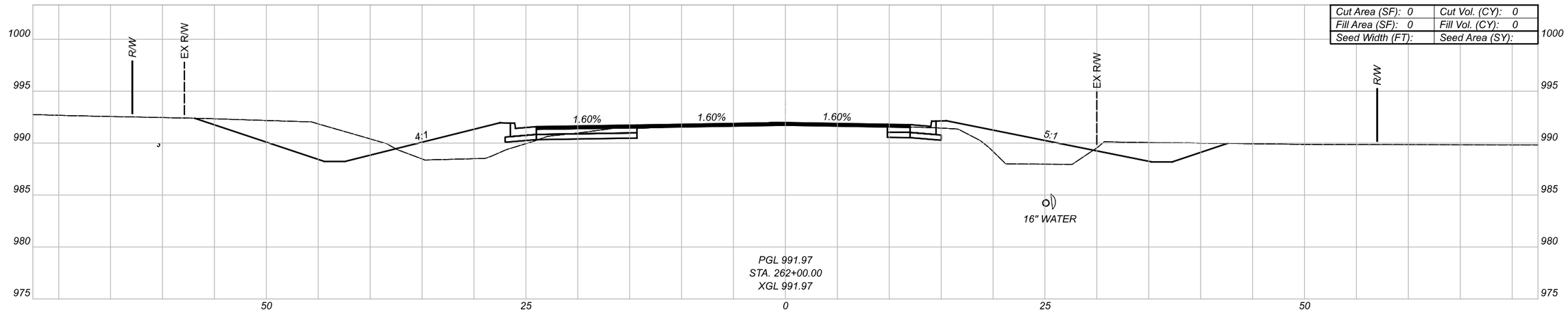
REVIEWER
MDW 09/15/21

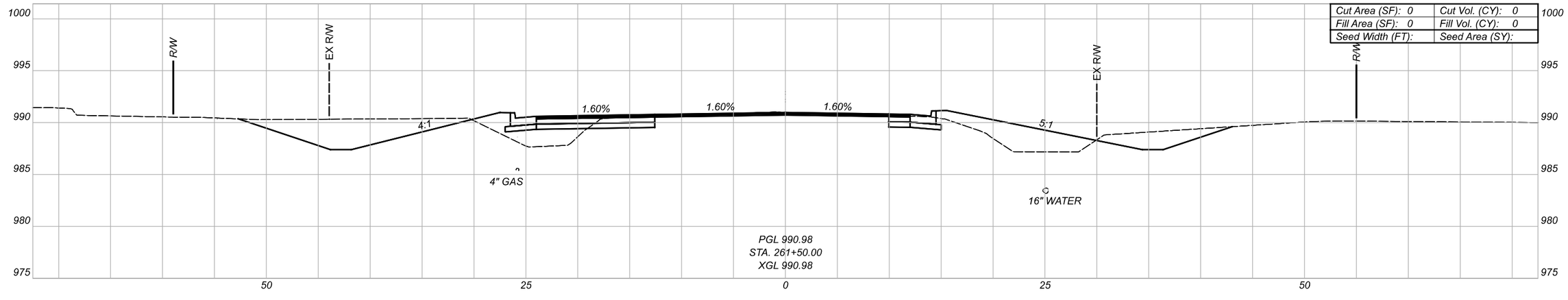
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 21 TOTAL 94




CROSS SECTIONS - S.R. 303
STA. 261+50.00 TO STA. 264+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

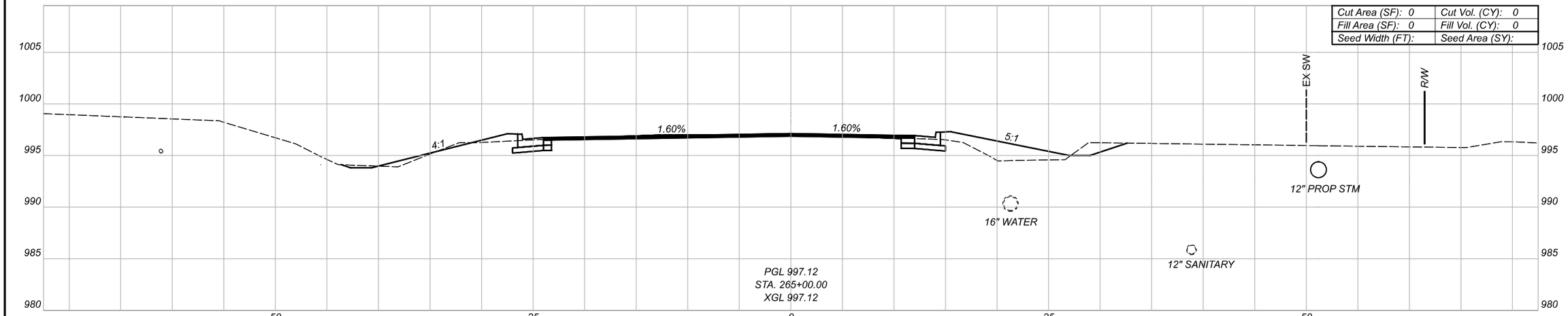
PROJECT ID
111150

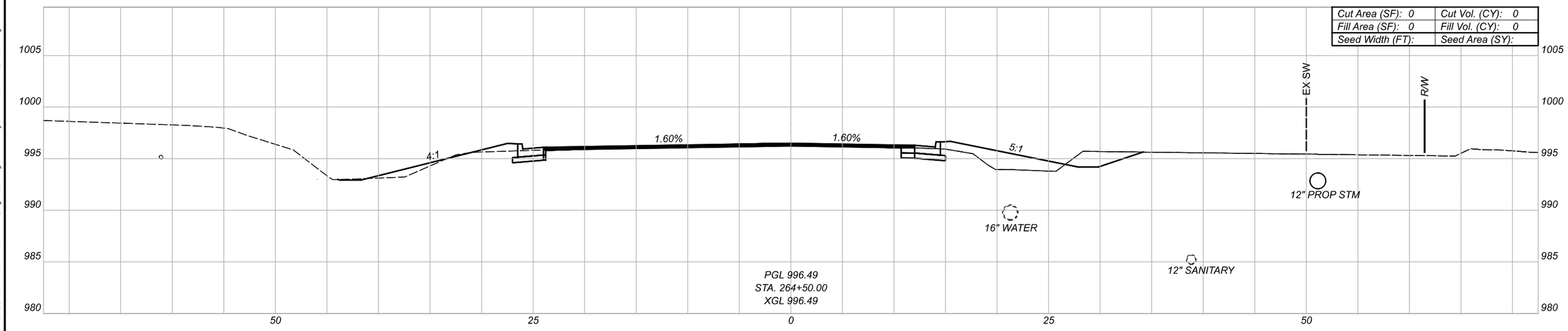
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 22 TOTAL 94

MED-303-4.85

MODEL: CLX_303 - 261+50.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:05 PM USER: dgohs
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CROSS SECTIONS - S.R. 303
STA. 264+50.00 TO STA. 265+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

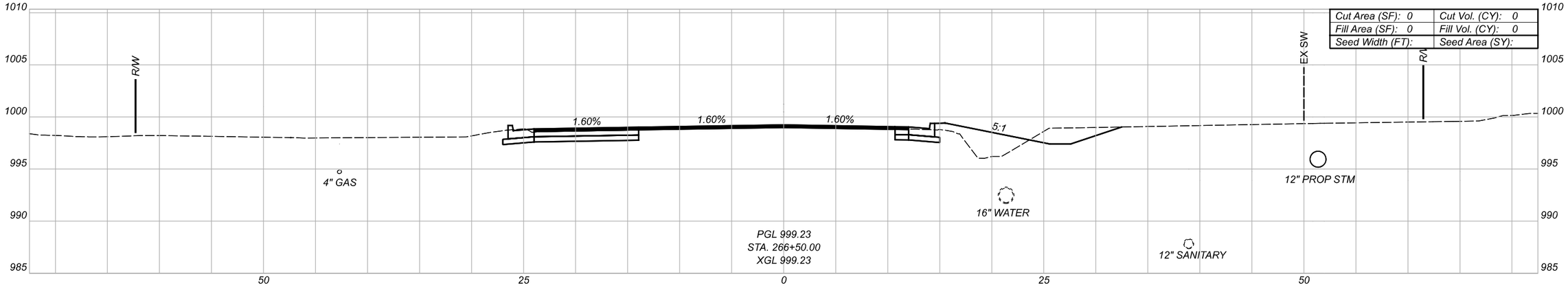
PROJECT ID
111150

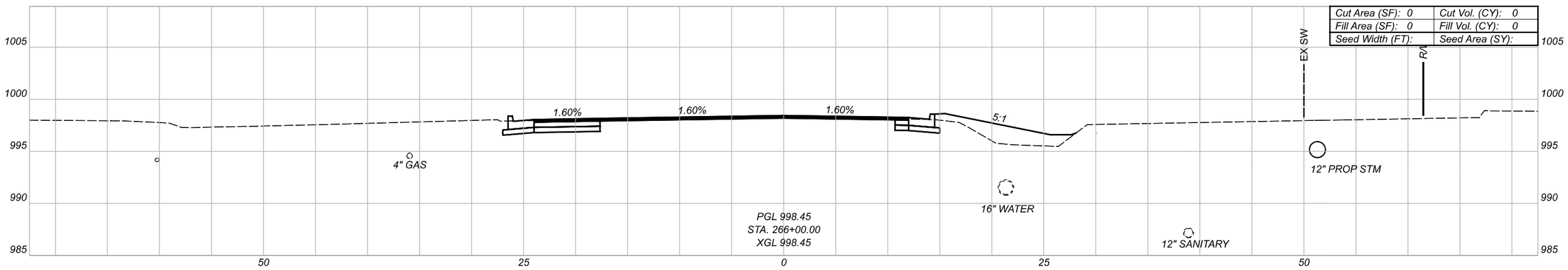
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|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

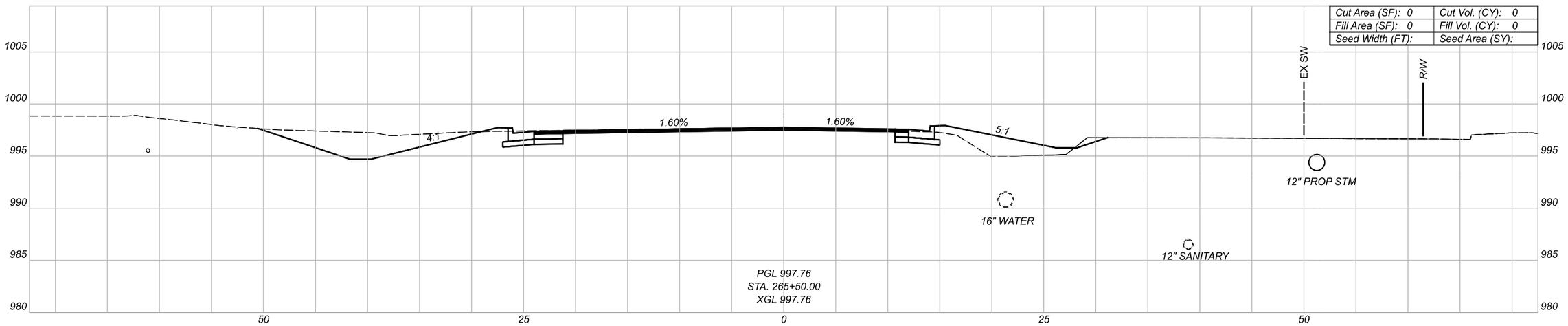
SHEET 23 TOTAL 94

MED-303-4.85

MODEL: CLX_303 - 264+50.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:07 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS00Ldgn




CROSS SECTIONS - S.R. 303
STA. 265+50.00 TO STA. 266+50.00

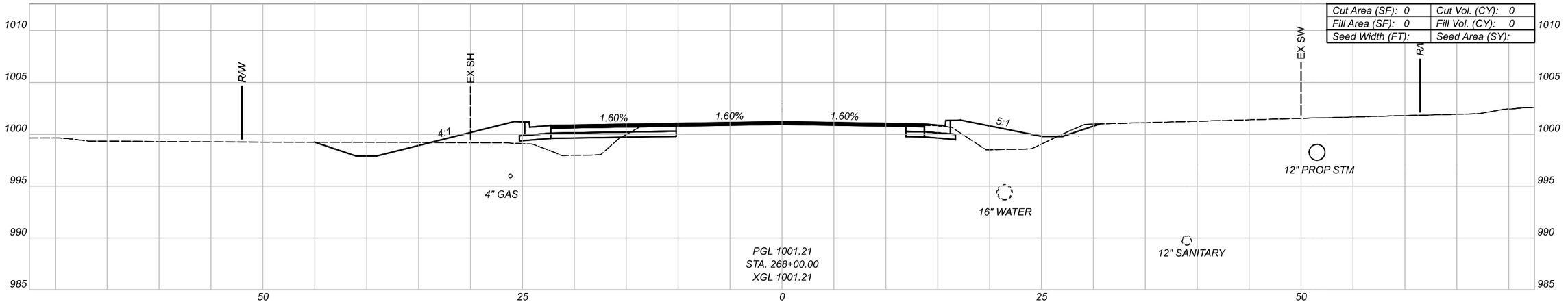
DESIGN AGENCY
CARPENTER MARTY transportation

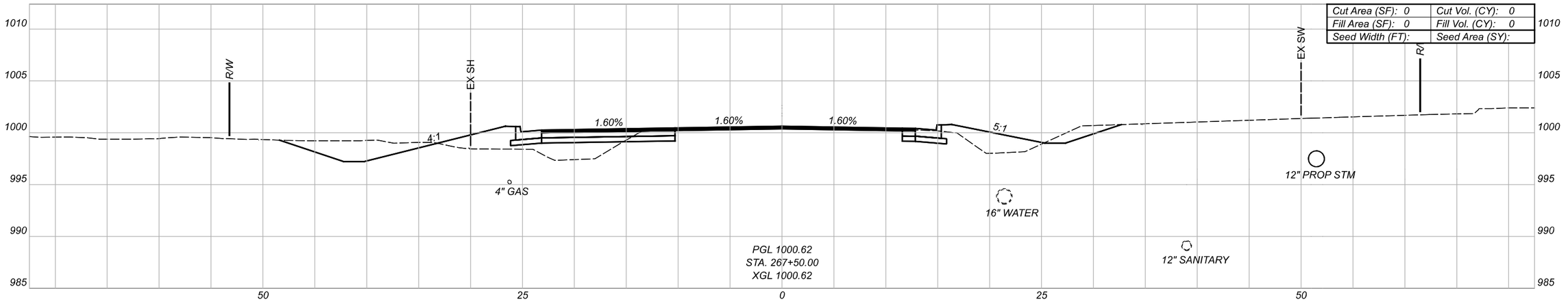
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 24 |
| TOTAL | 94 |

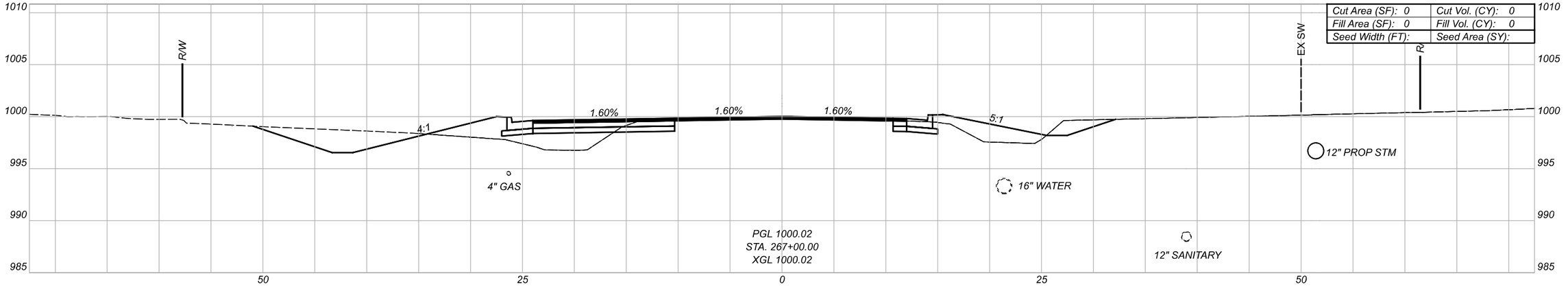
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

MODEL: CLX_303 - 265+50.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:09 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 267+00.00 TO STA. 268+00.00

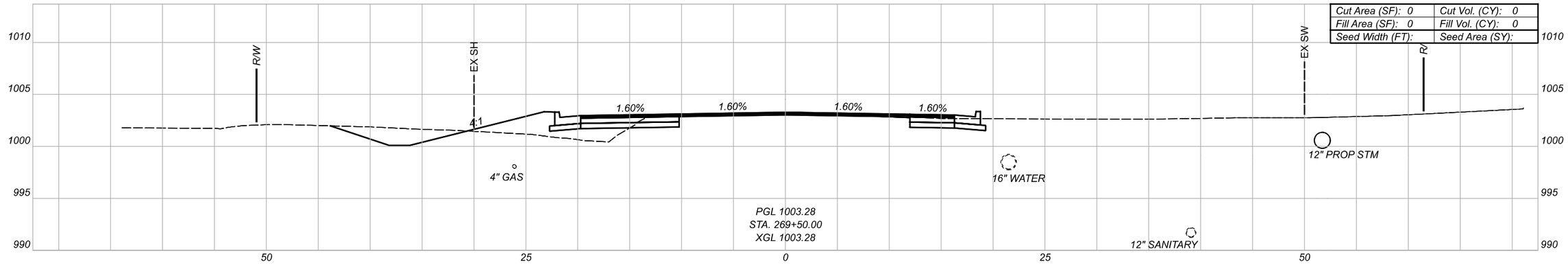
MED-303-4.85

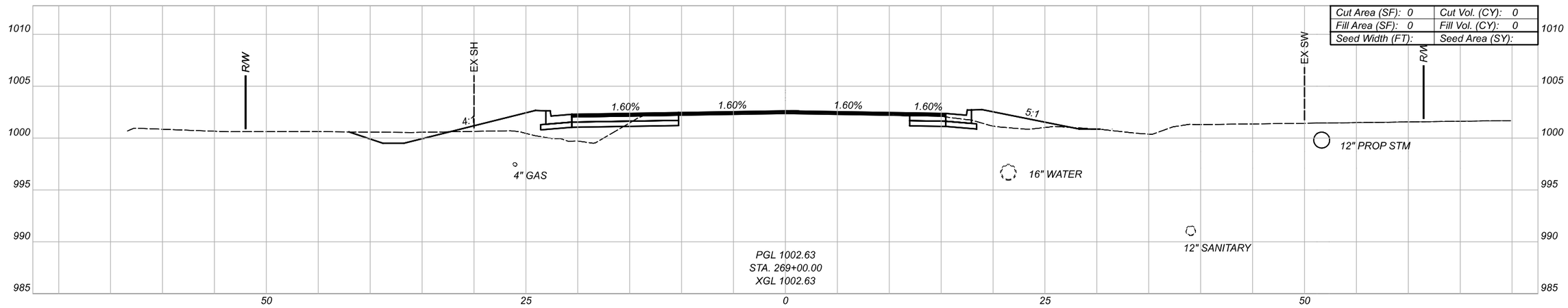
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P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn

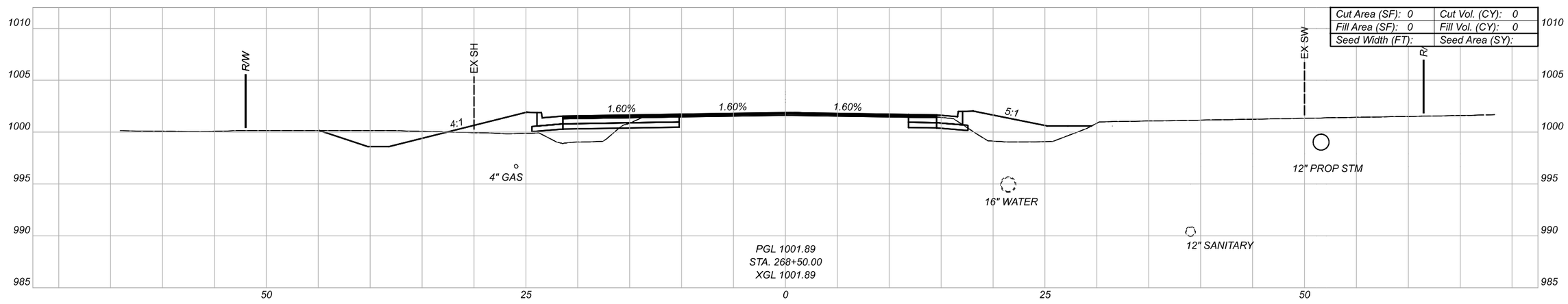
DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 25 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




CROSS SECTIONS - S.R. 303
STA. 268+50.00 TO STA. 269+50.00

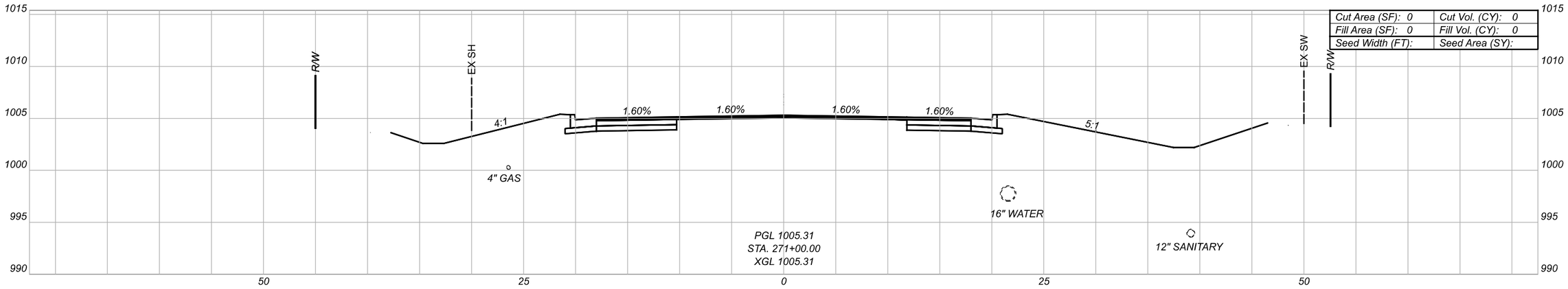
MED-303-4.85

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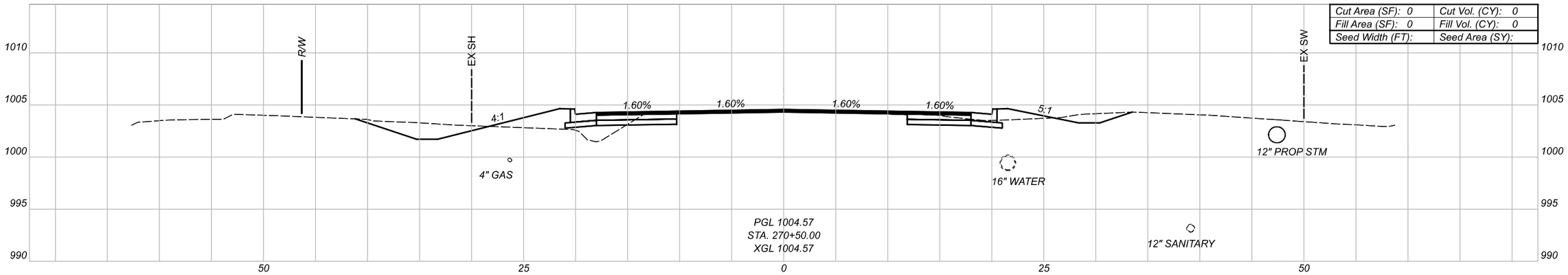
DESIGN AGENCY
CARPENTER MARTY transportation

| DESIGNER | |
|---|---|
| DMG | |
| REVIEWER | |
| MDW 09/15/21 | |
| PROJECT ID | |
| 111150 | |
| SHEET | TOTAL |
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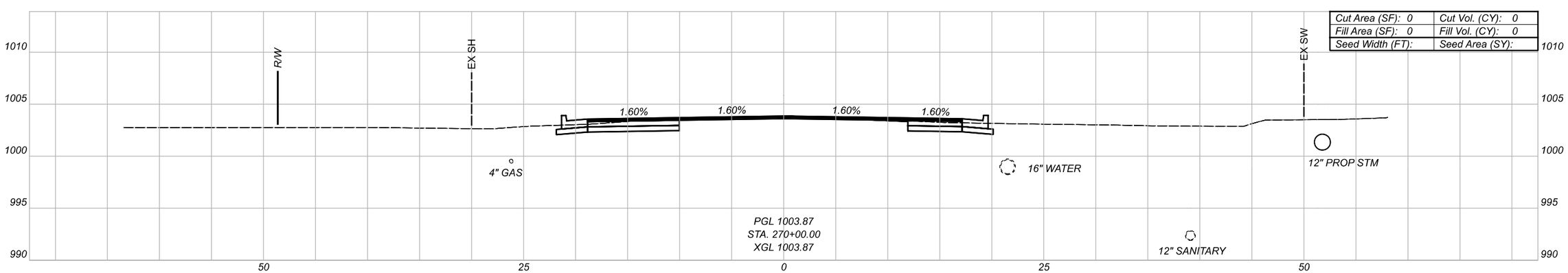
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|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




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| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




CROSS SECTIONS - S.R. 303
STA. 270+00.00 TO STA. 271+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

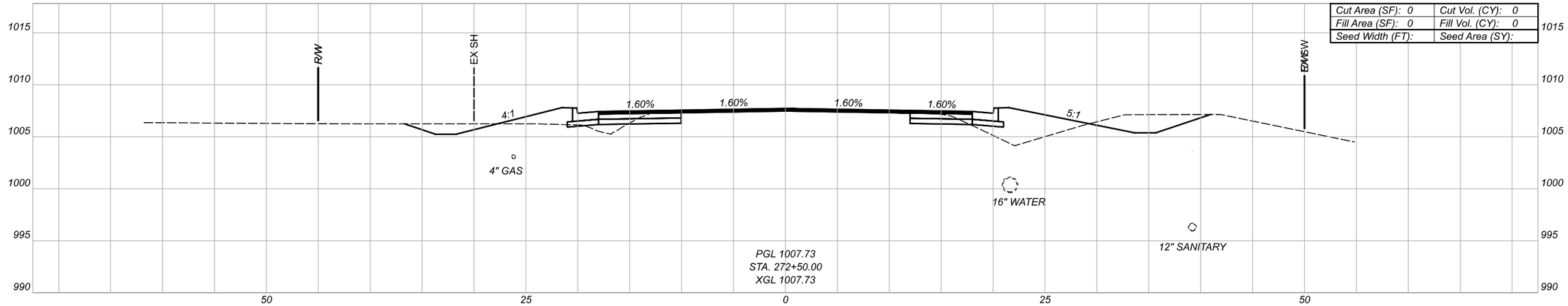
PROJECT ID
111150

| Sheet Totals | | |
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| - | - | - |

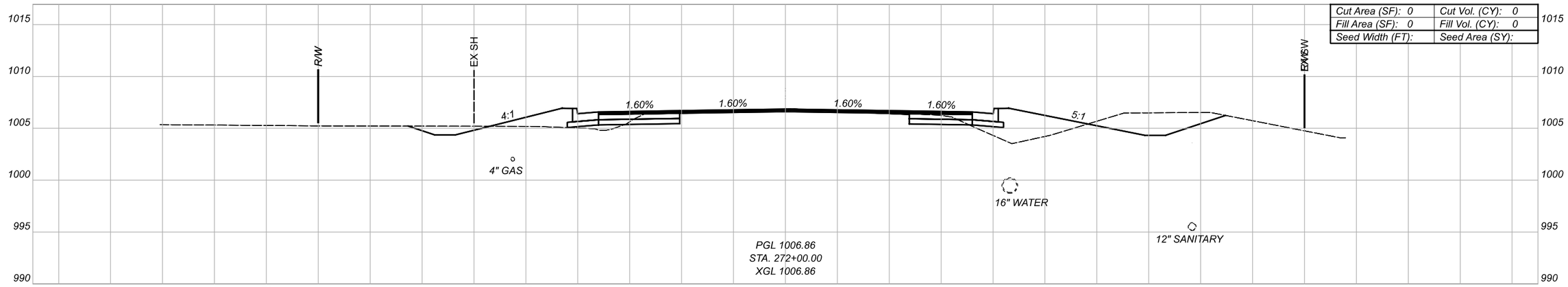
| SHEET | TOTAL |
|---|---|
| 27 | 94 |

MED-303-4.85

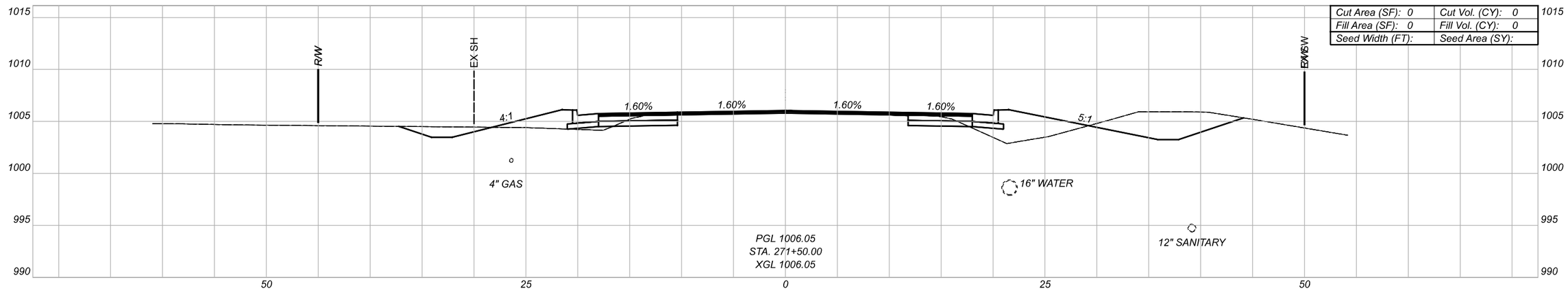
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P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
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| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 271+50.00 TO STA. 272+50.00

MED-303-4.85

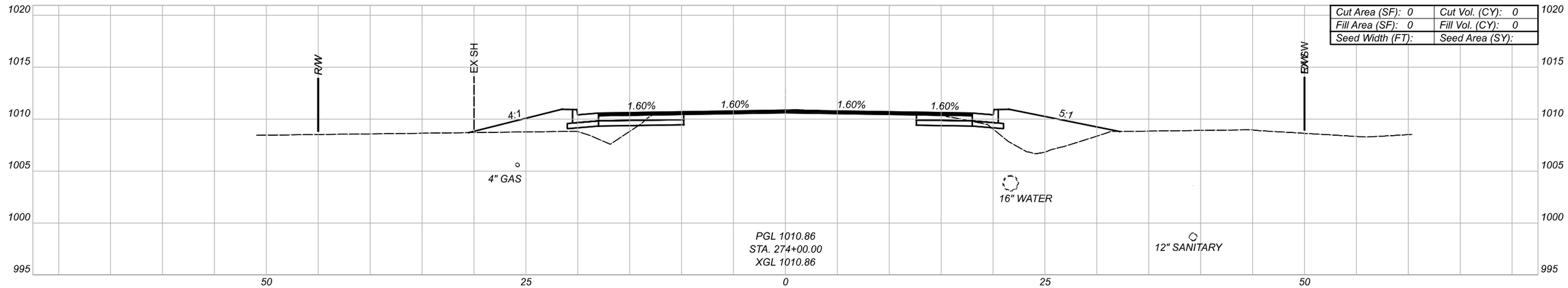
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DESIGN AGENCY
CARPENTER MARTY transportation

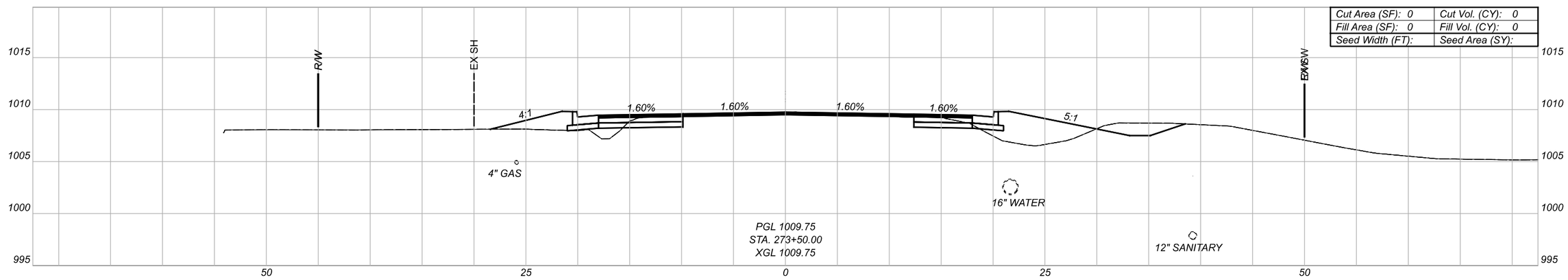
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|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

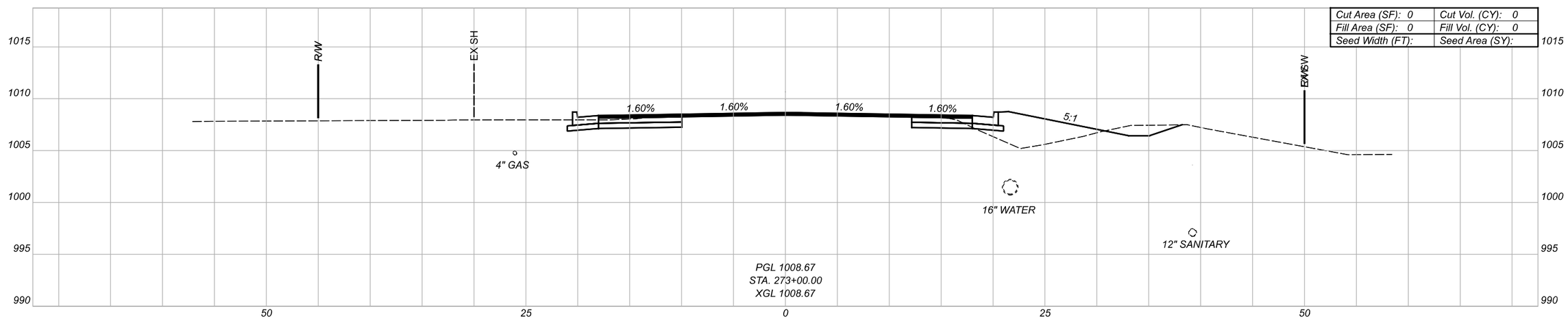
| SHEET | TOTAL |
|---|---|
| 28 | 94 |




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| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 273+00.00 TO STA. 274+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

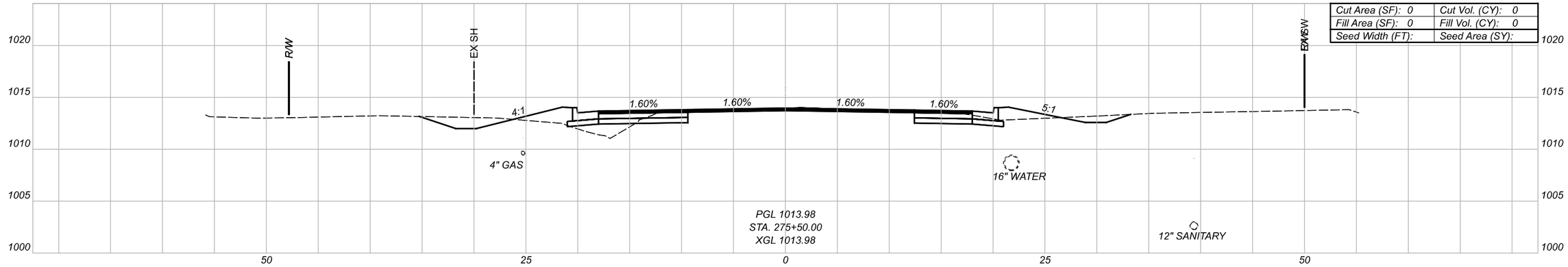
| DESIGNER | |
|---|---|
| DMG | |
| REVIEWER | |
| MDW 09/15/21 | |
| PROJECT ID | |
| 111150 | |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

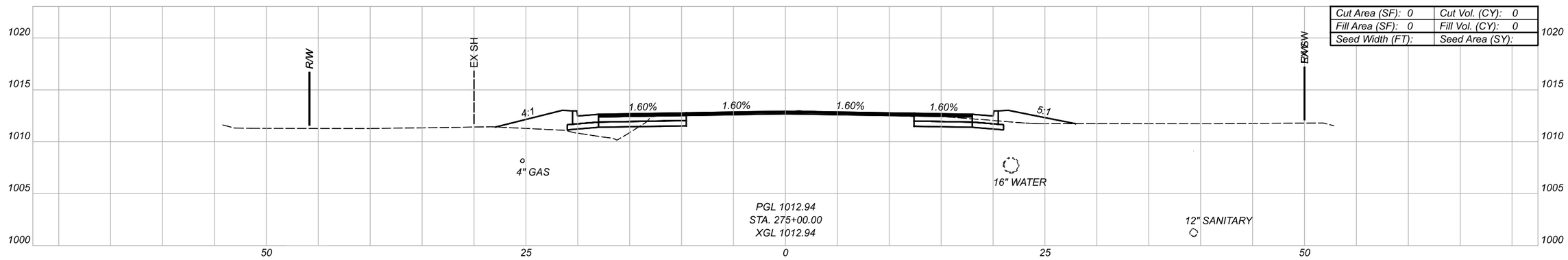
| SHEET | TOTAL |
|---|---|
| 29 | 94 |

MED-303-4.85

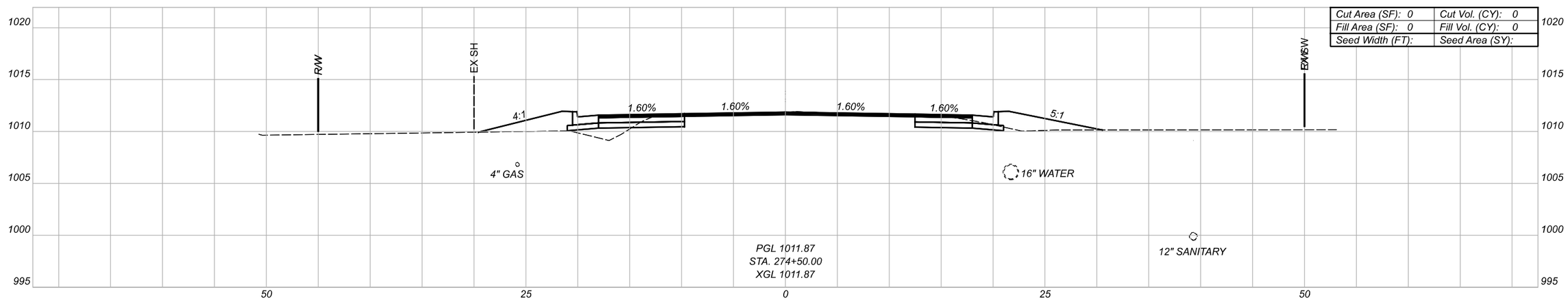
MODEL: CLX_303 - 273+00.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:21 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 274+50.00 TO STA. 275+50.00

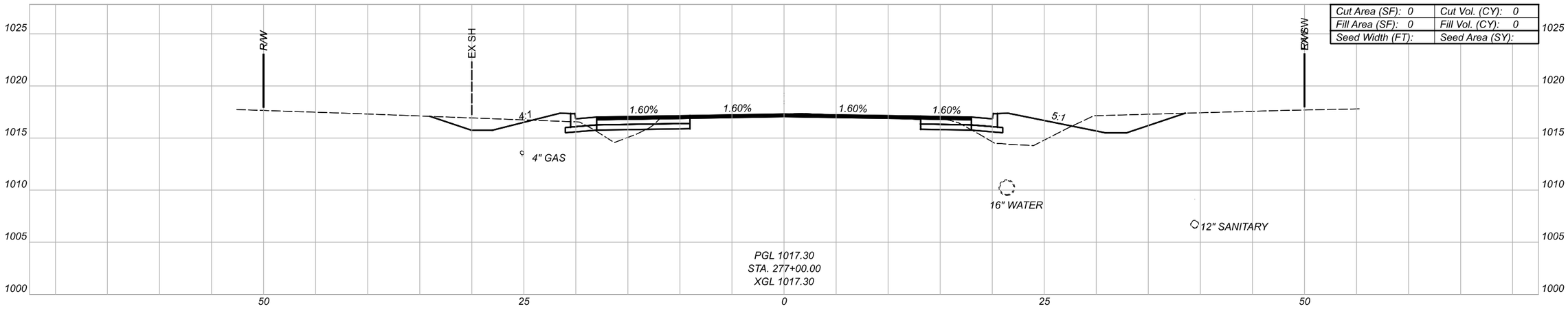
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 30 |
| TOTAL | 94 |

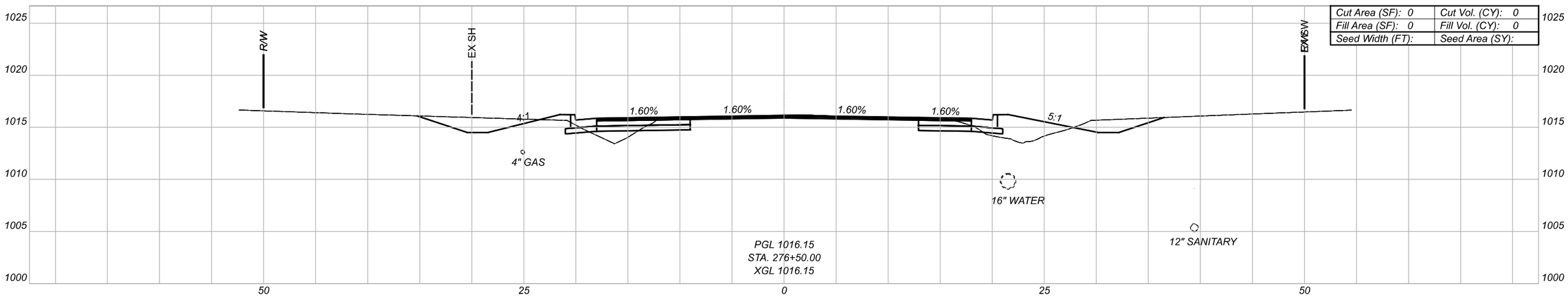
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| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

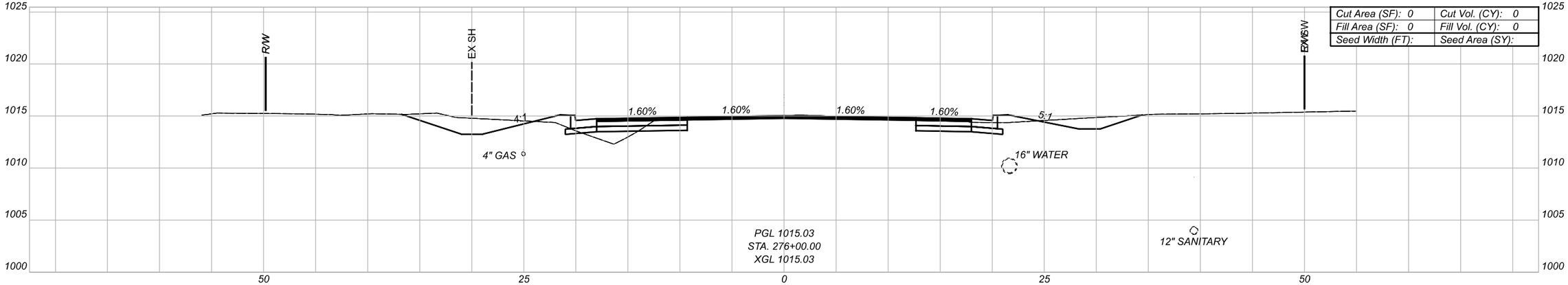
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P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 276+00.00 TO STA. 277+00.00

MED-303-4.85

MODEL: CLX_303 - 276+00.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:26 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn

DESIGN AGENCY
CARPENTER MARTY transportation

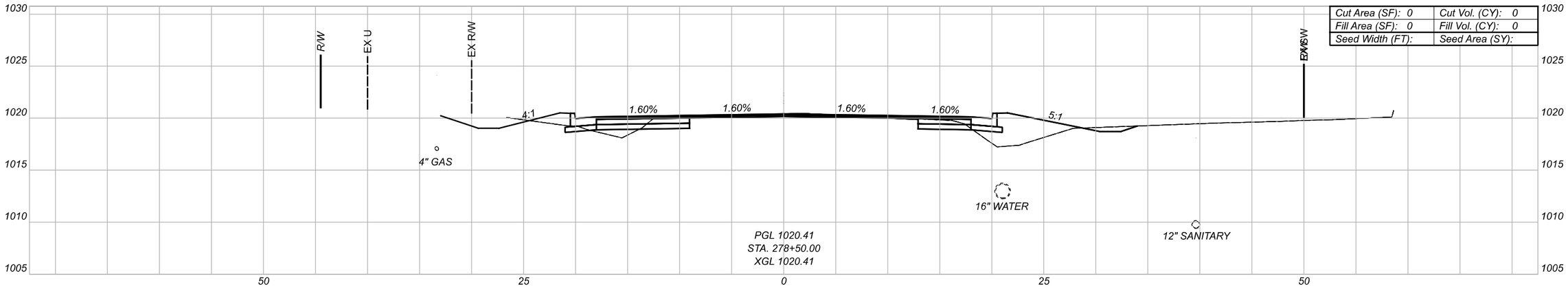
DESIGNER
DMG

REVIEWER
MDW 09/15/21

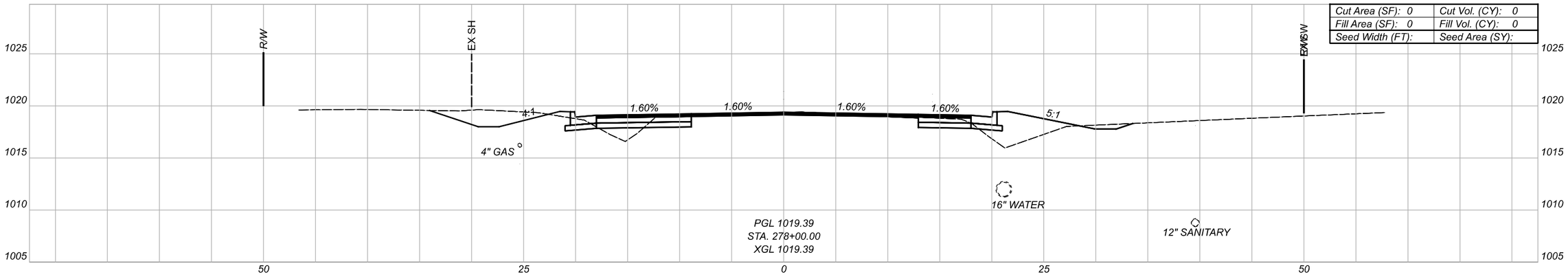
PROJECT ID
111150

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|---|---|---|
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| - | - | - |

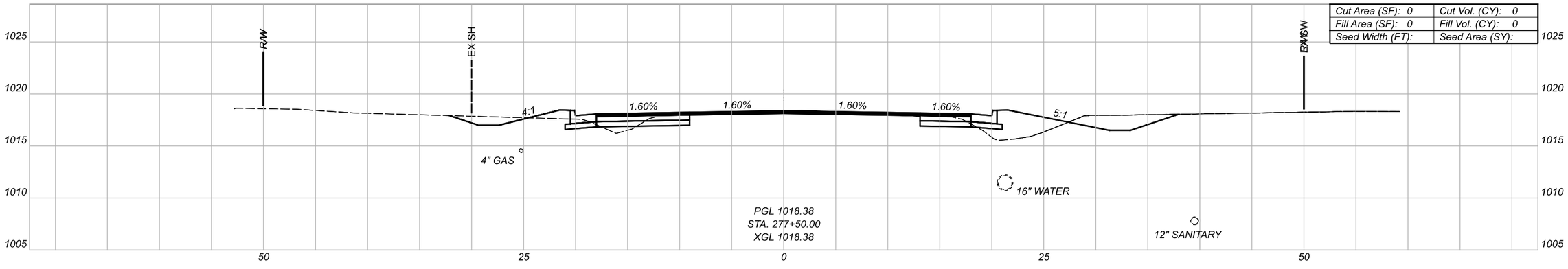
SHEET 31 TOTAL 94




| | |
|---|---|
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| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 277+50.00 TO STA. 278+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

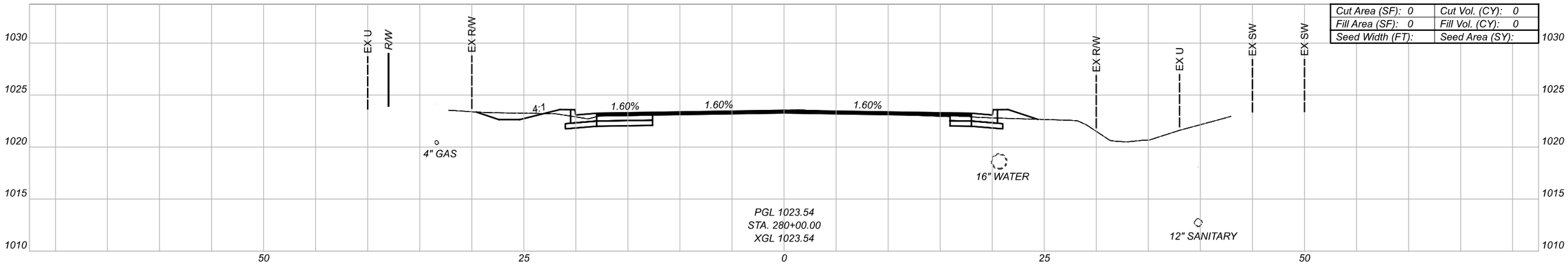
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

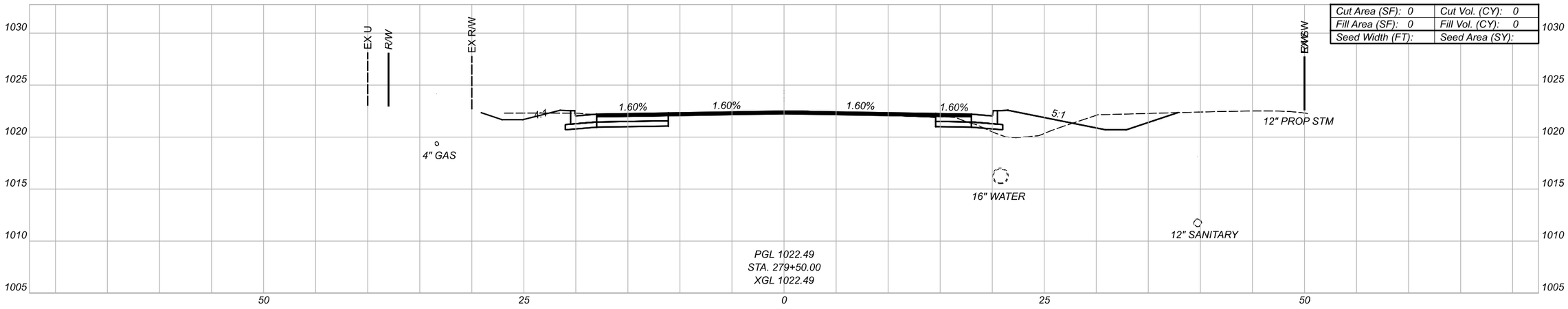
SHEET 32 TOTAL 94

MED-303-4.85

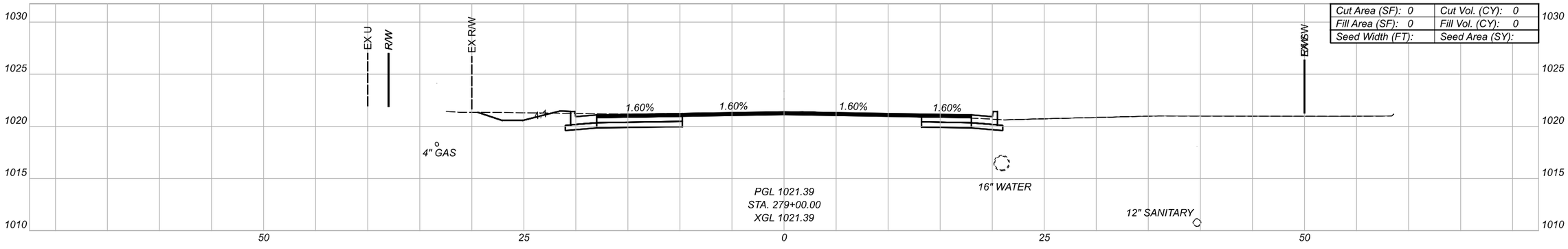
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P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
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| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 279+00.00 TO STA. 280+0.00

MED-303-4.85

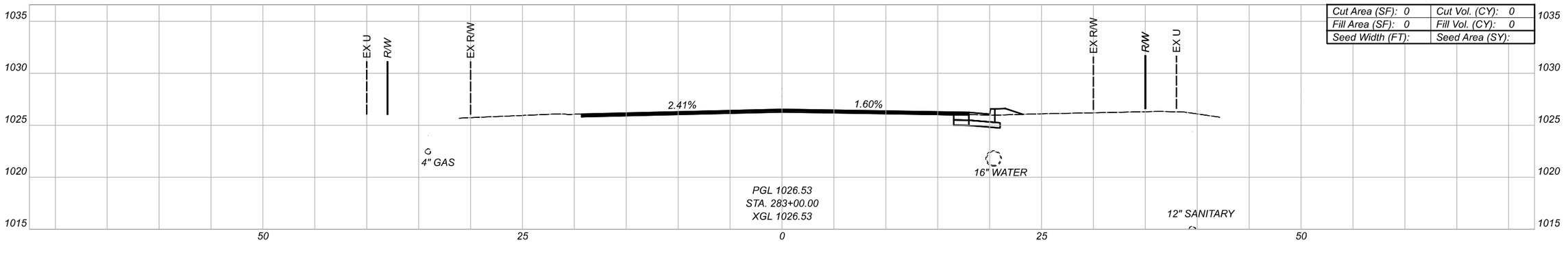
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P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn

DESIGN AGENCY
CARPENTER MARTY Transportation

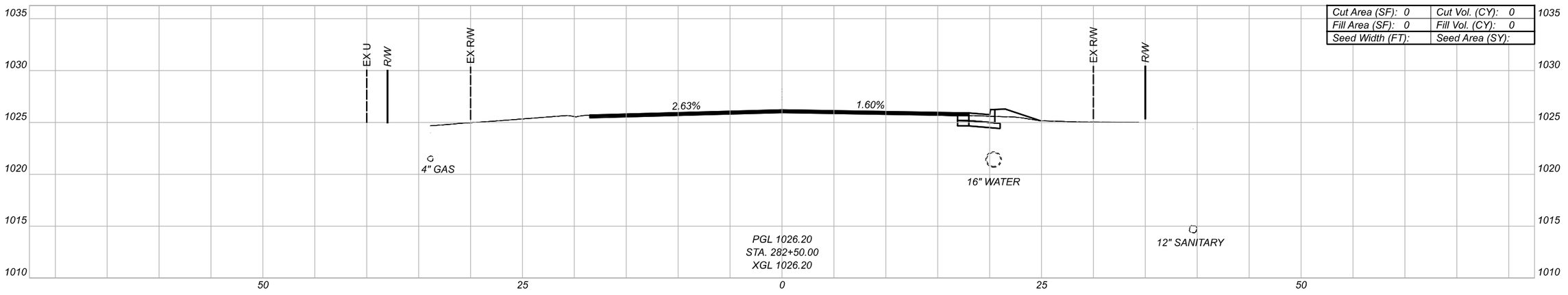
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

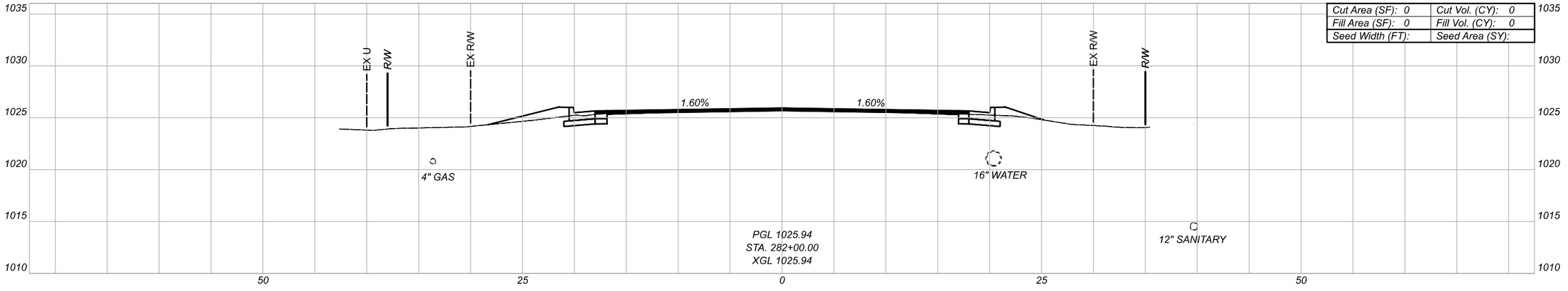
| SHEET | TOTAL |
|---|---|
| 33 | 94 |




| | |
|---|---|
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| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 282+00.00 TO STA. 283+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

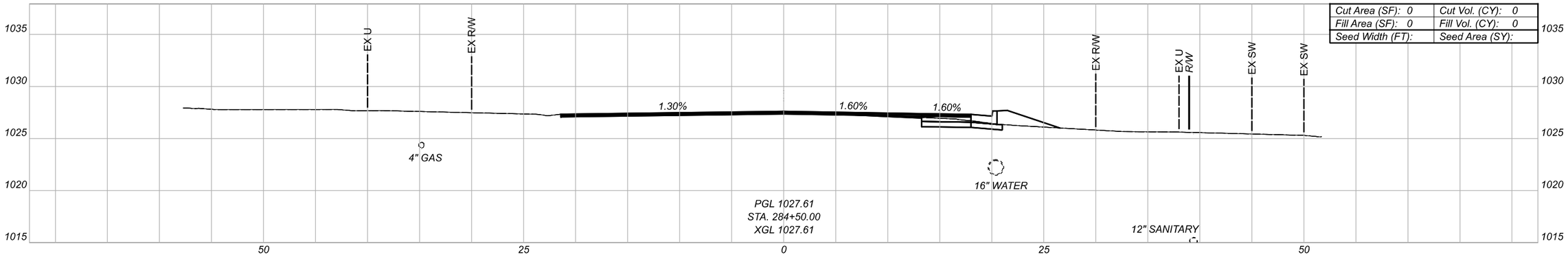
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

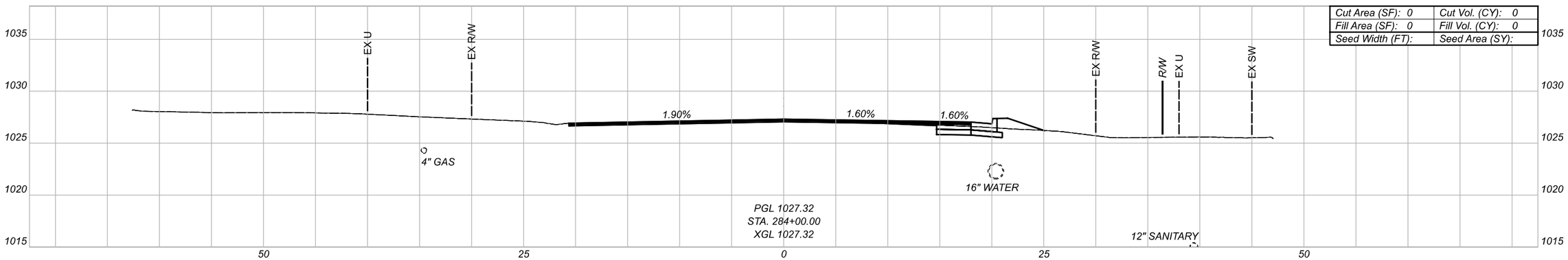
SHEET 34 TOTAL 94

MED-303-4.85

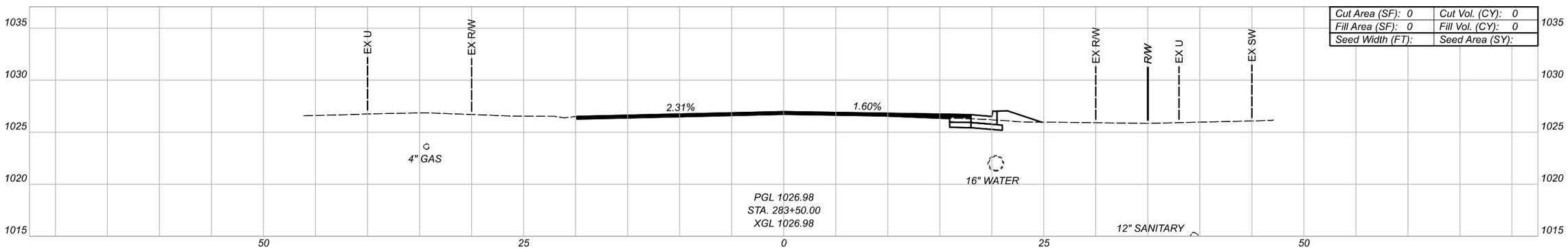
MODEL: CLX_303 - 282+00.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:33 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 283+50.00 TO STA. 284+50.00

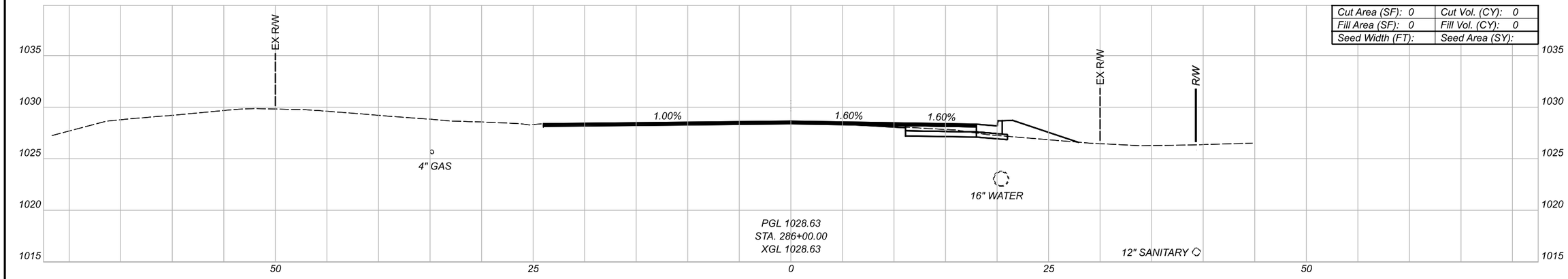
MED-303-4.85

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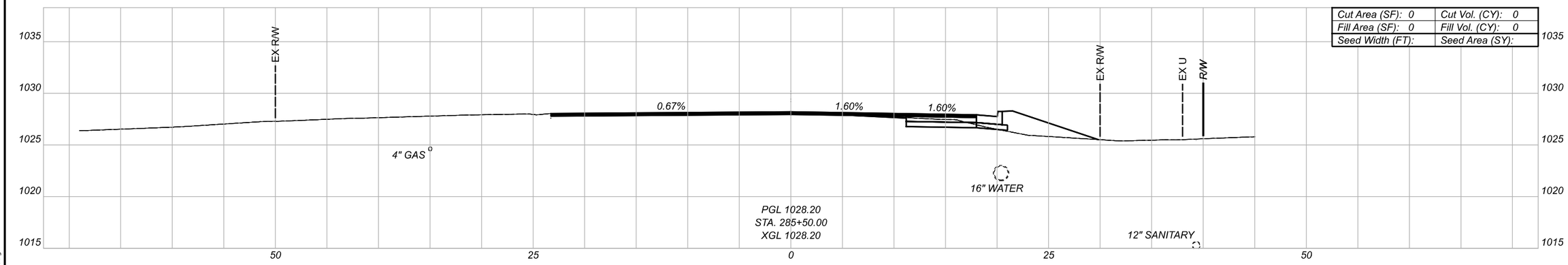
DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 35 |
| TOTAL | 94 |

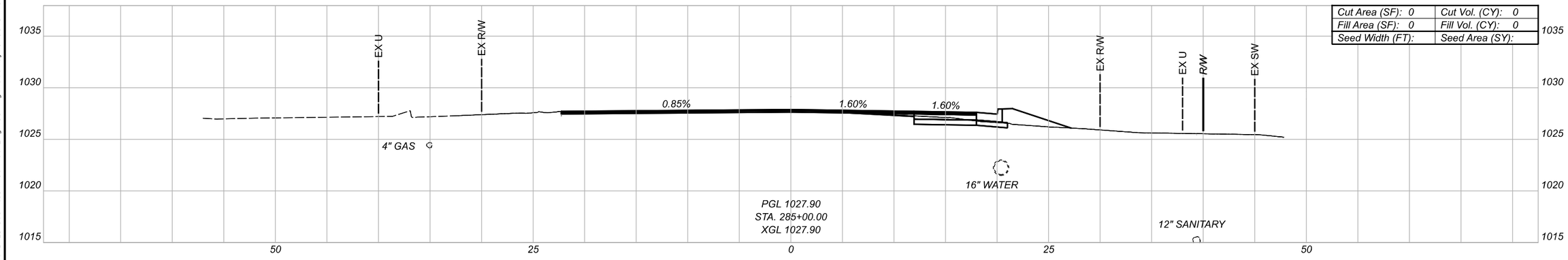
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

# CROSS SECTIONS - S.R. 303
## STA. 285+00.00 TO STA. 286+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

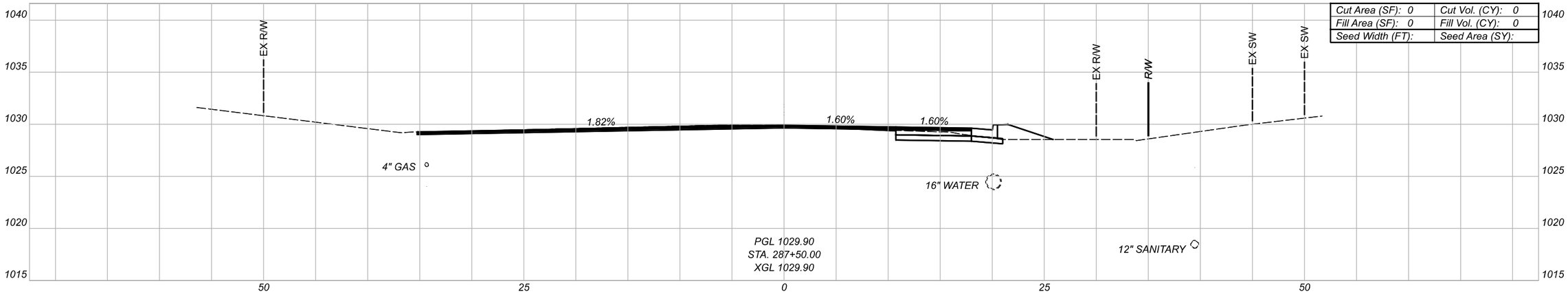
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

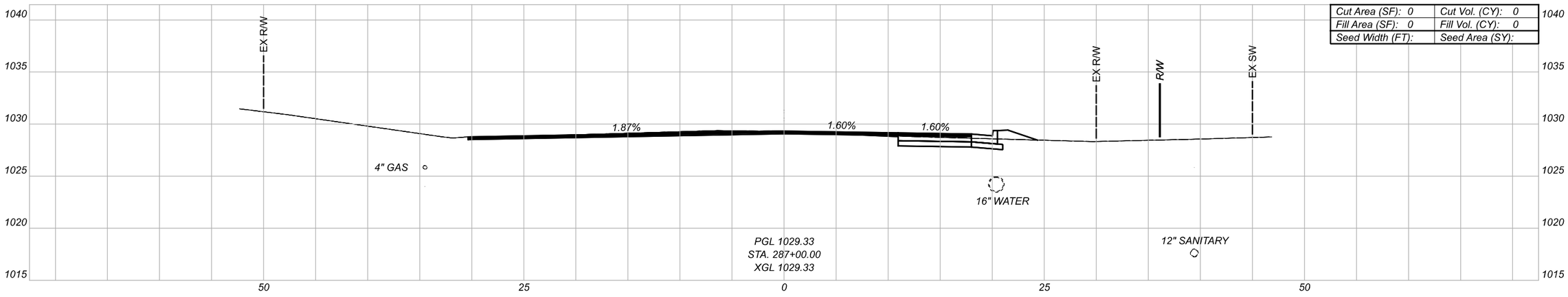
SHEET 36 TOTAL 94

MED-303-4.85

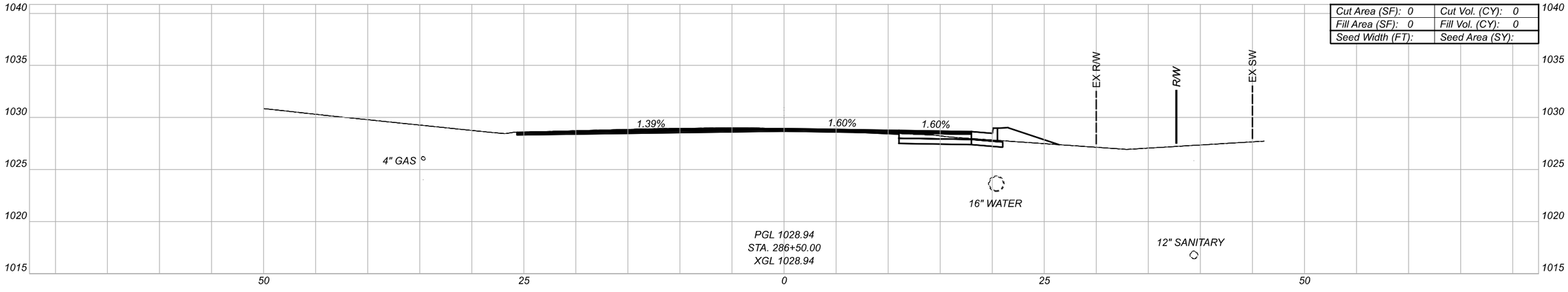
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P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 286+50.00 TO STA. 287+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

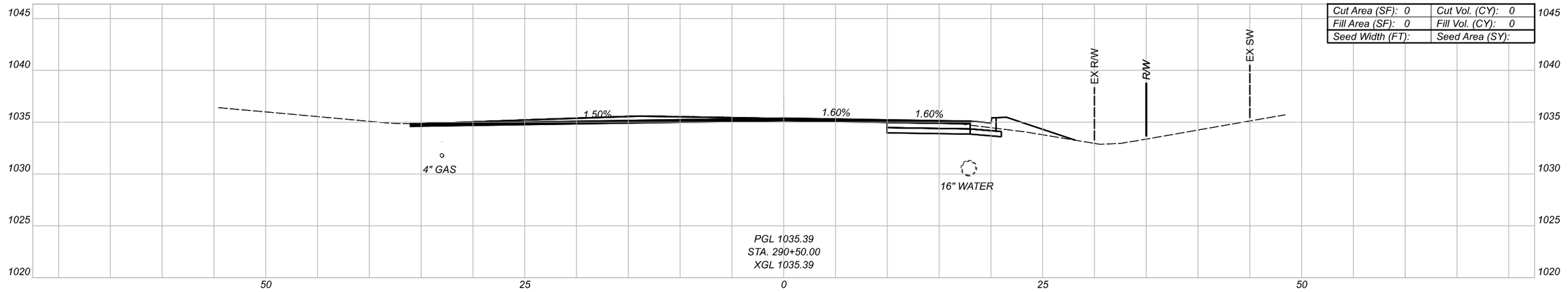
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

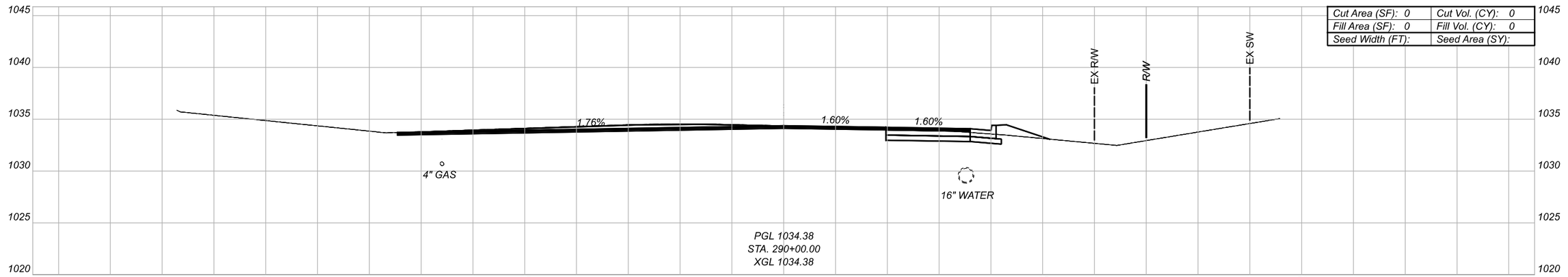
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|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

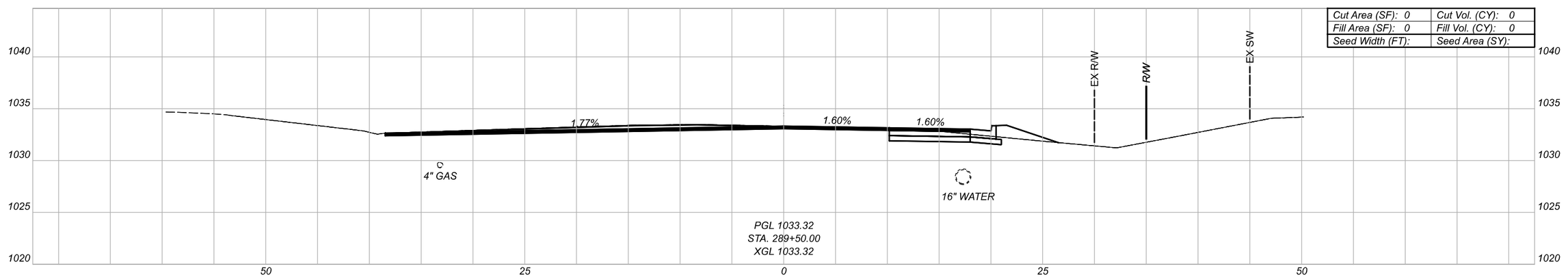
| SHEET | TOTAL |
|---|---|
| 37 | 94 |

MED-303-4.85

MODEL: CLX_303 - 286+50.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:08:41 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 289+50.00 TO STA. 290+50.00

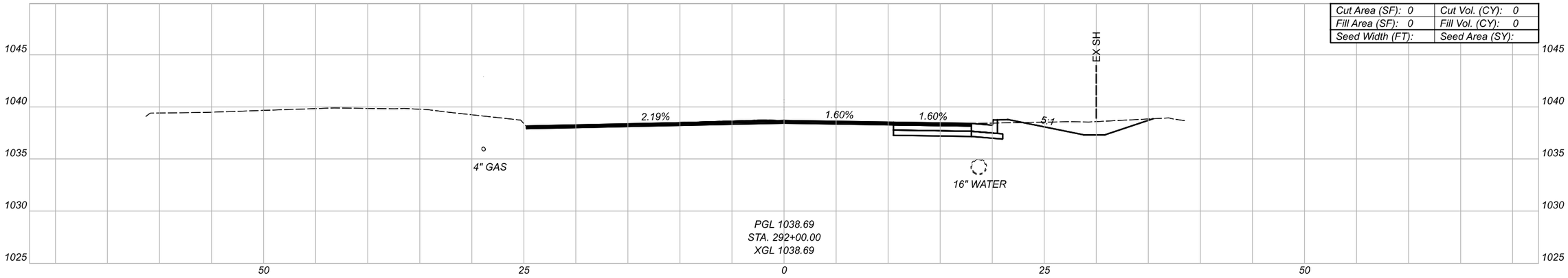
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 38 |
| TOTAL | 94 |

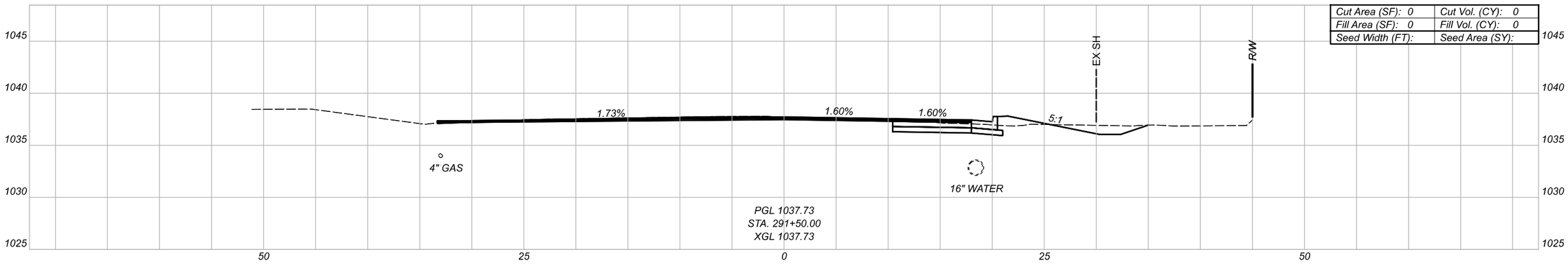
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|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

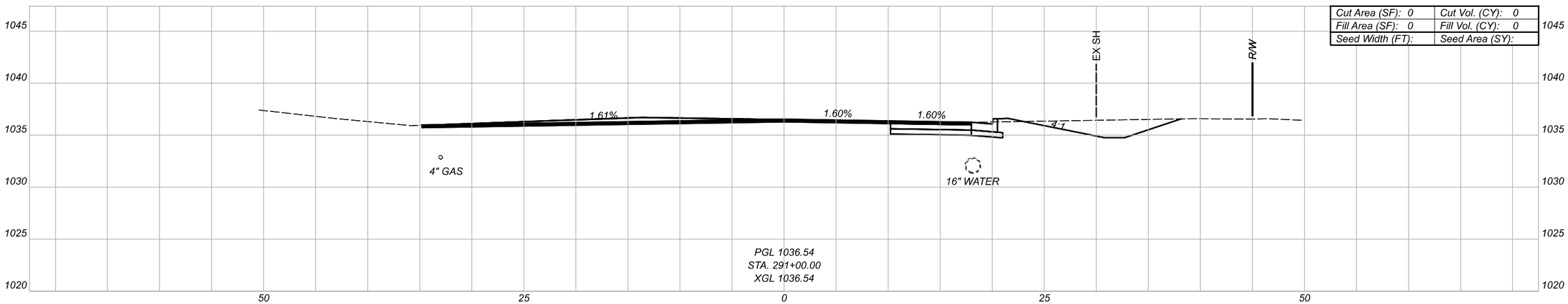
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P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
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| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 291+00.00 TO STA. 292+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

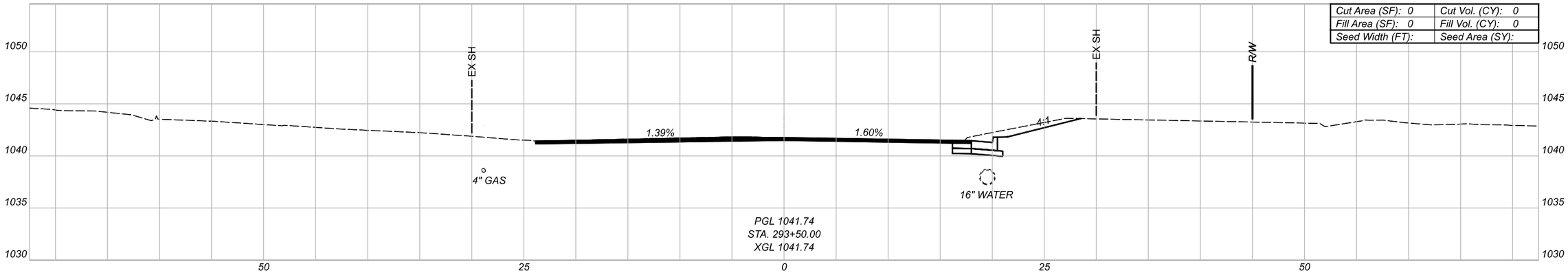
PROJECT ID
111150

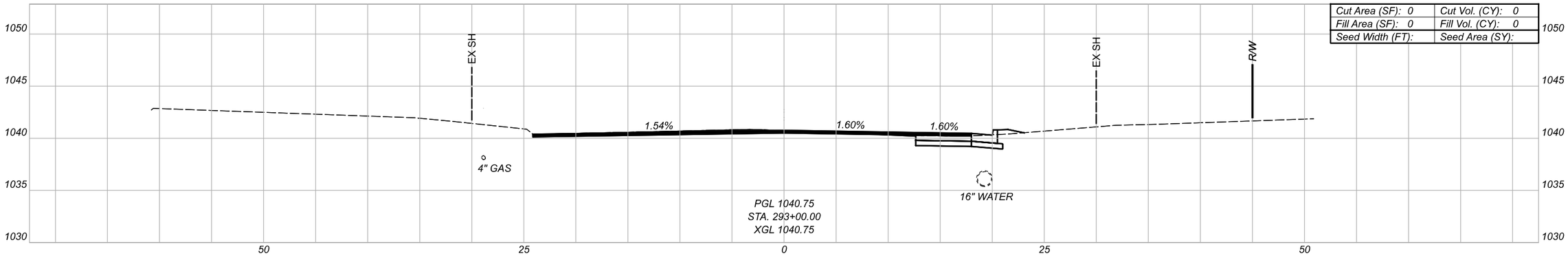
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

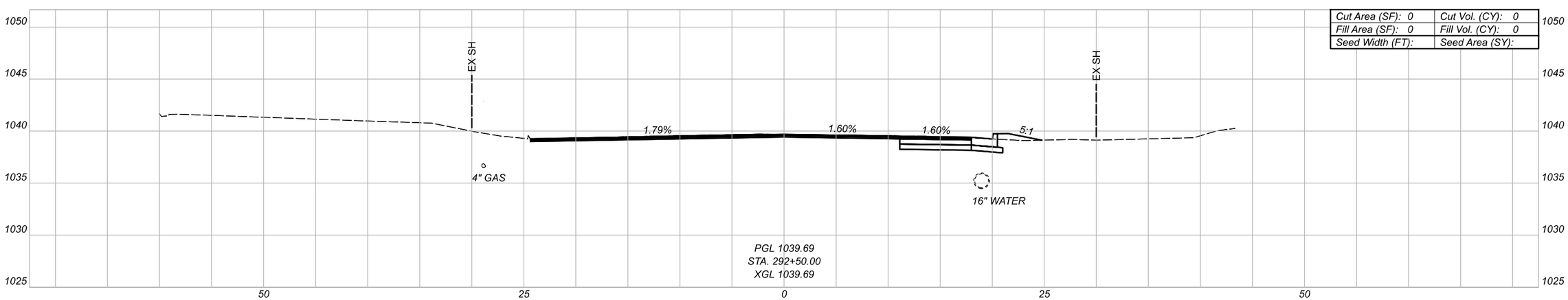
SHEET 39 TOTAL 94

MED-303-4.85

MODEL: CLX_303 - 291+00.00 R2 [Sheet1] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:47 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 292+50.00 TO STA. 293+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| DESIGNER | REVIEWER |
|---|---|
| DMG | MDW 09/15/21 |

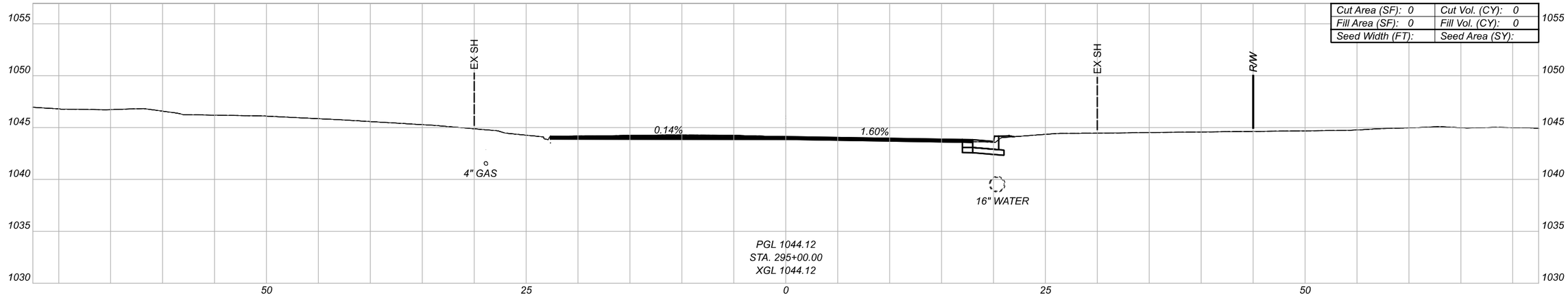
PROJECT ID 111150

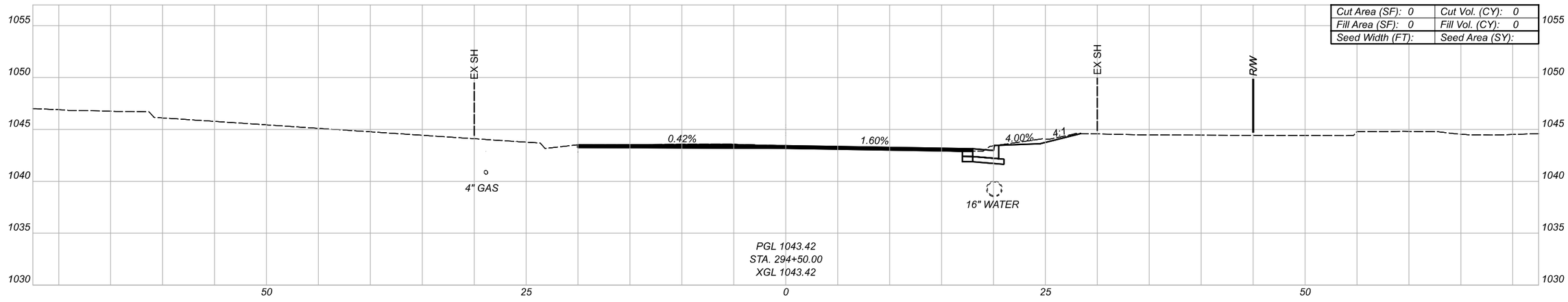
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

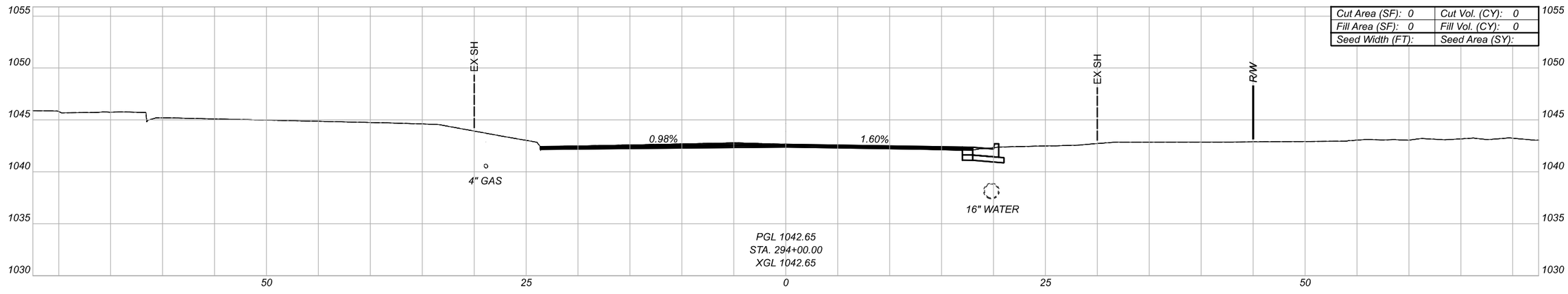
| SHEET | TOTAL |
|---|---|
| 40 | 94 |

MED-303-4.85

MODEL: CLX_303 - 292+50.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:08:49 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 294+00.00 TO STA. 295+00.00

MED-303-4.85

MODEL: CLX_303 - 294+00.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:08:52 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn

DESIGN AGENCY
CARPENTER MARTY transportation

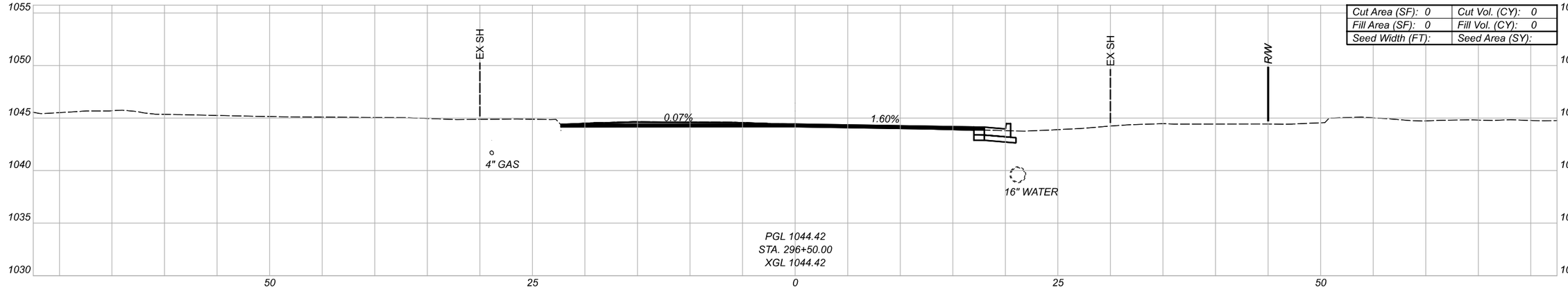
DESIGNER
DMG

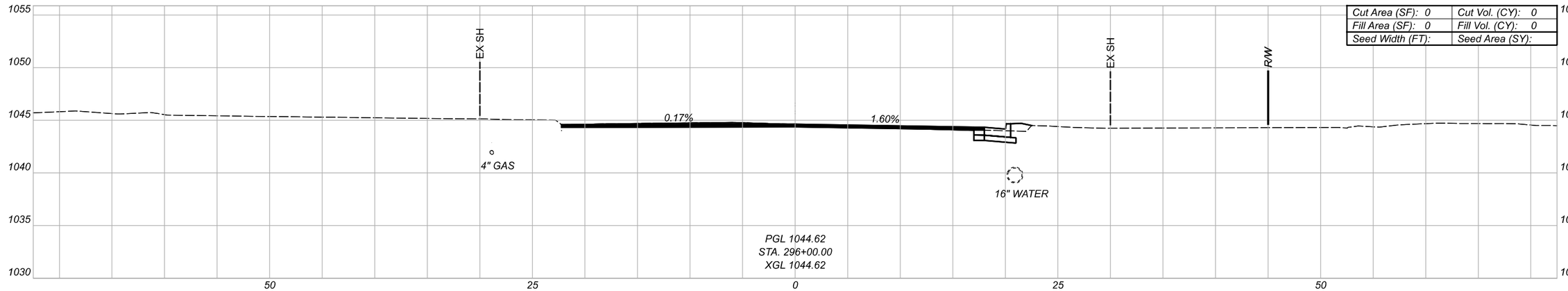
REVIEWER
MDW 09/15/21

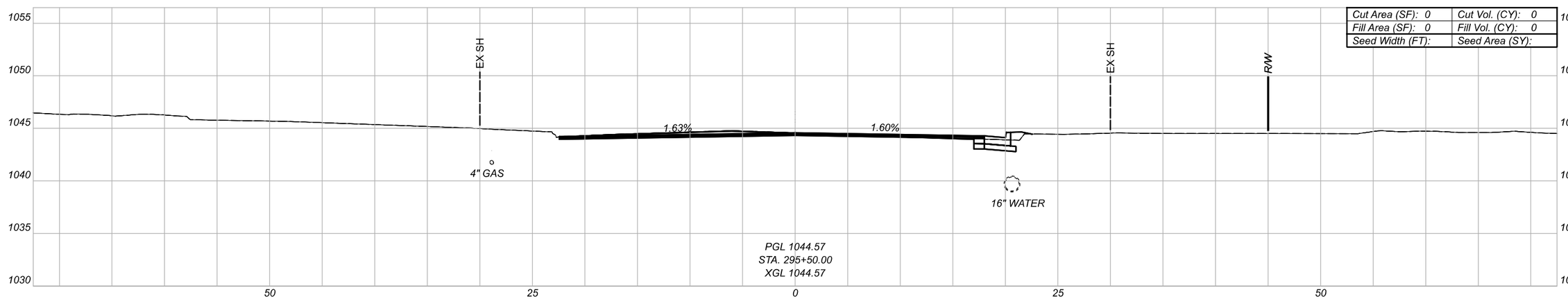
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 41 TOTAL 94




CROSS SECTIONS - S.R. 303
STA. 295+50.00 TO STA. 296+50.00

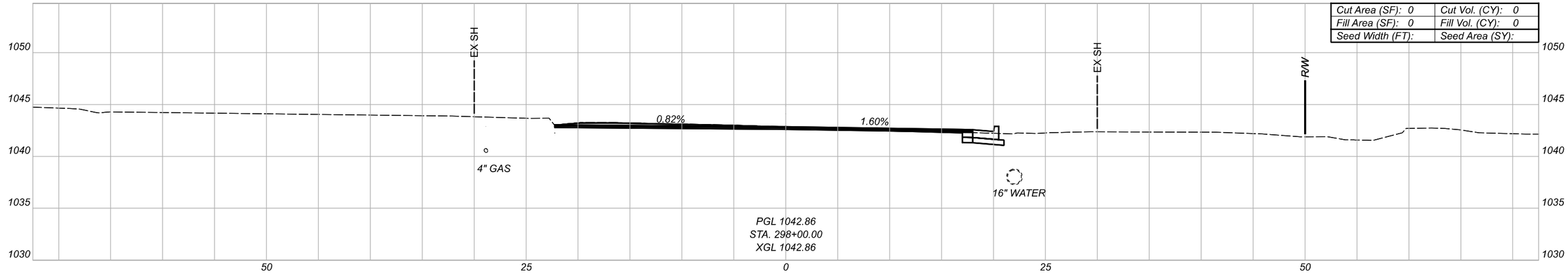
DESIGN AGENCY
CARPENTER MARTY transportation

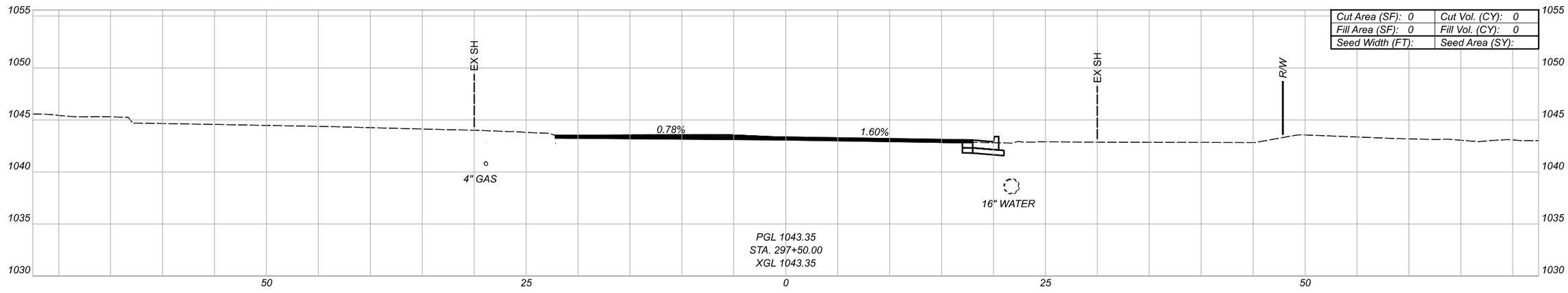
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|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 42 |
| TOTAL | 94 |

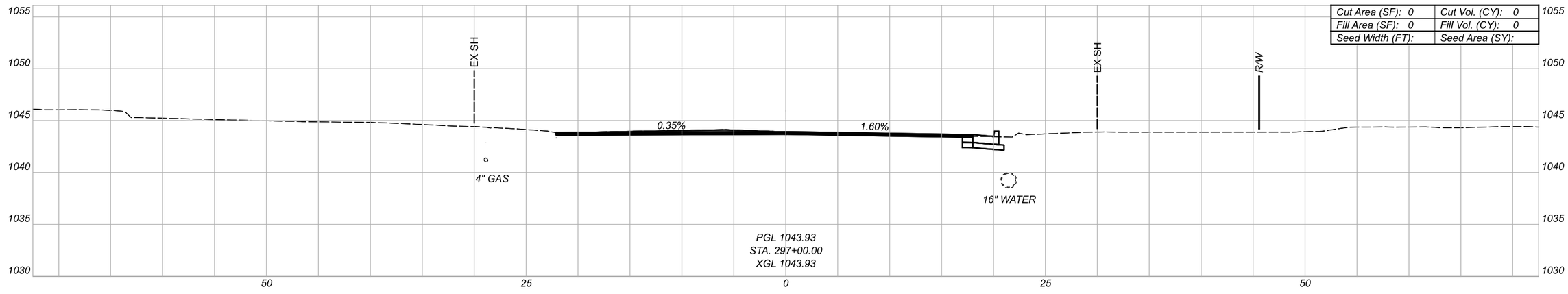
| Sheet Totals | | |
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| Seeding | Cut | Fill |
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MED-303-4.85

MODEL: CLX_303 - 295+50.00 R2 [Sheet] PAPERSIZE:17x11(in) DATE: 11/22/2021 TIME: 4:08:55 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 297+00.00 TO STA. 298+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

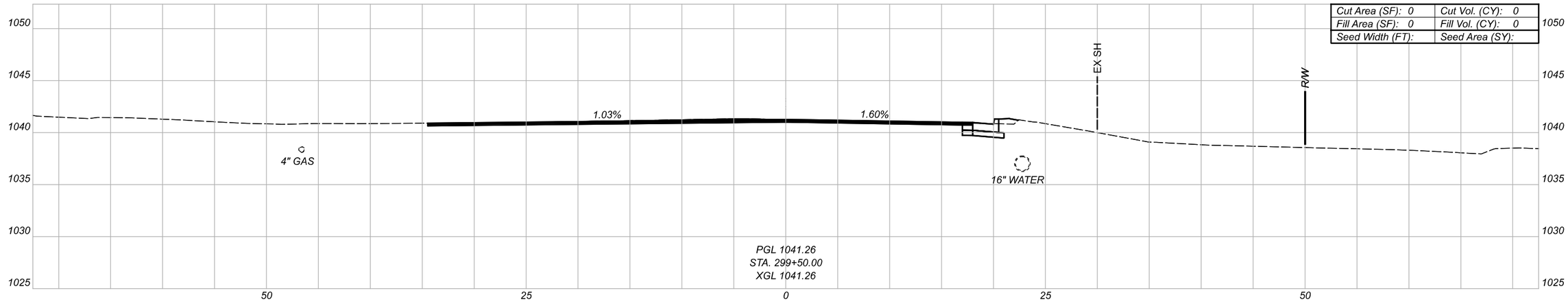
PROJECT ID
111150

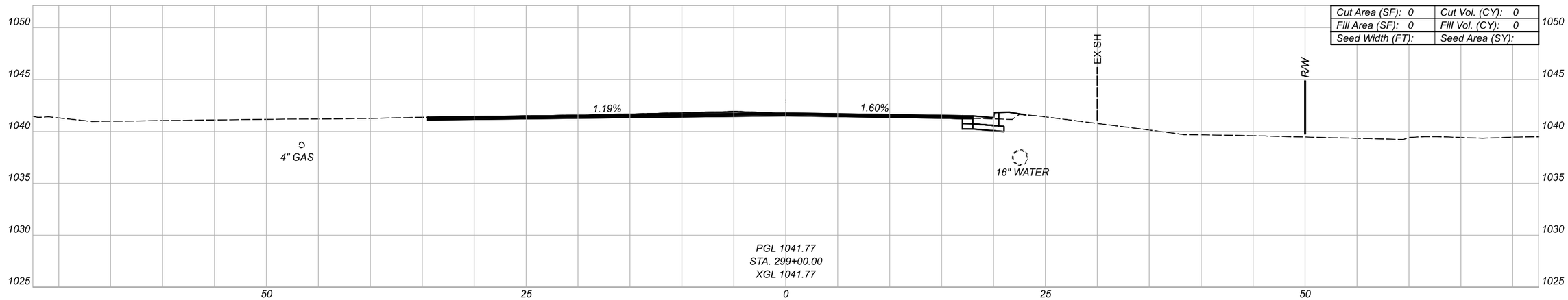
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

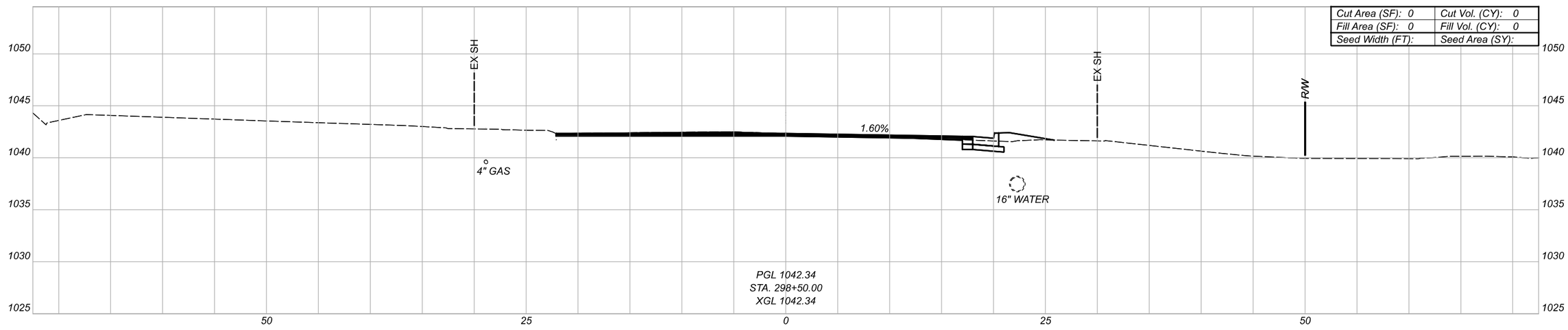
| SHEET | TOTAL |
|---|---|
| 43 | 94 |

MED-303-4.85

MODEL: CLX_303 - 297+00.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:08:58 PM USER: dgons
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 298+50.00 TO STA. 299+50.00

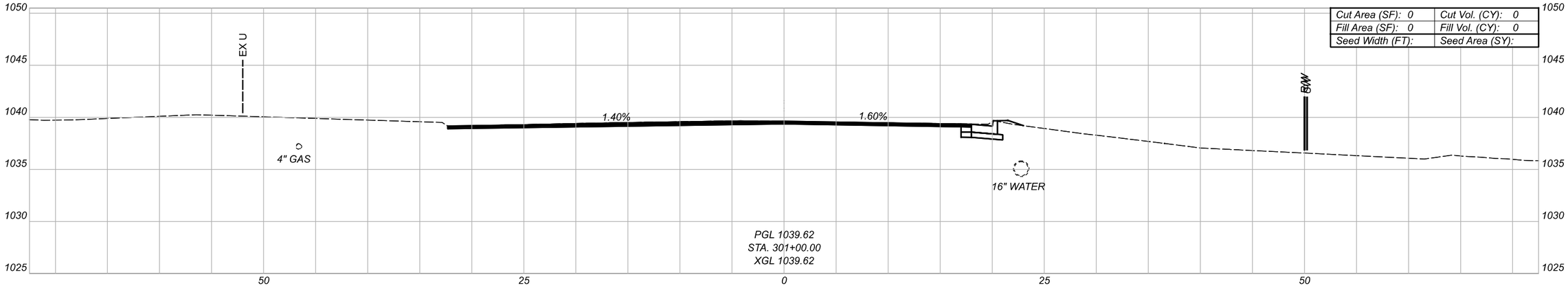
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 44 |
| TOTAL | 94 |

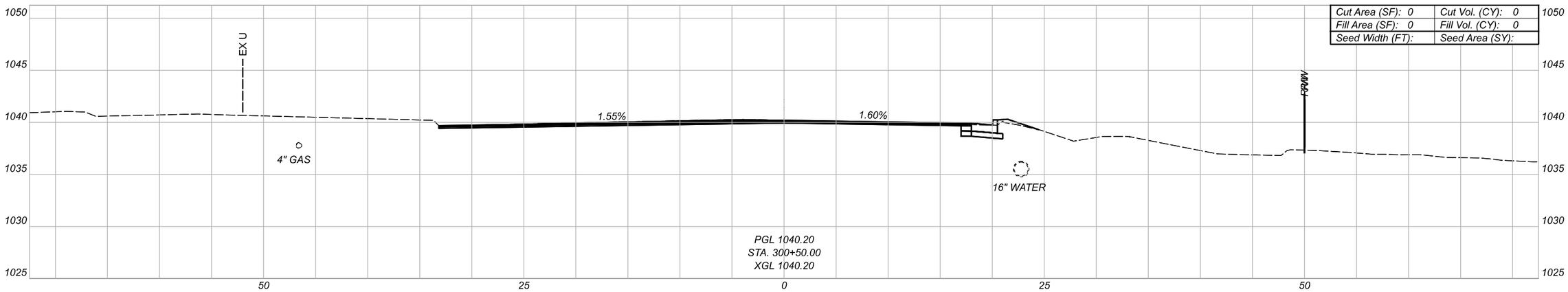
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|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

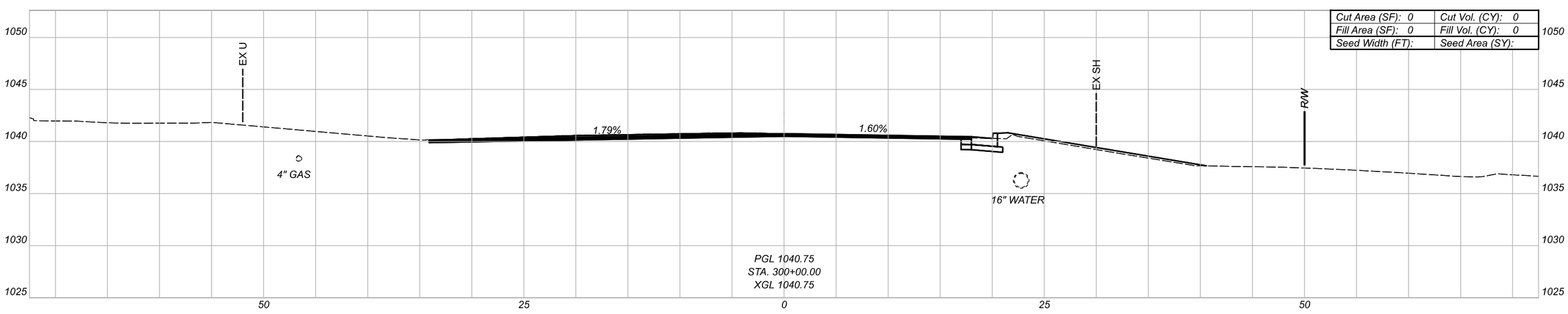
MODEL: CLX_303 - 298+50.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:09:01 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 300+00.00 TO STA. 301+00.00

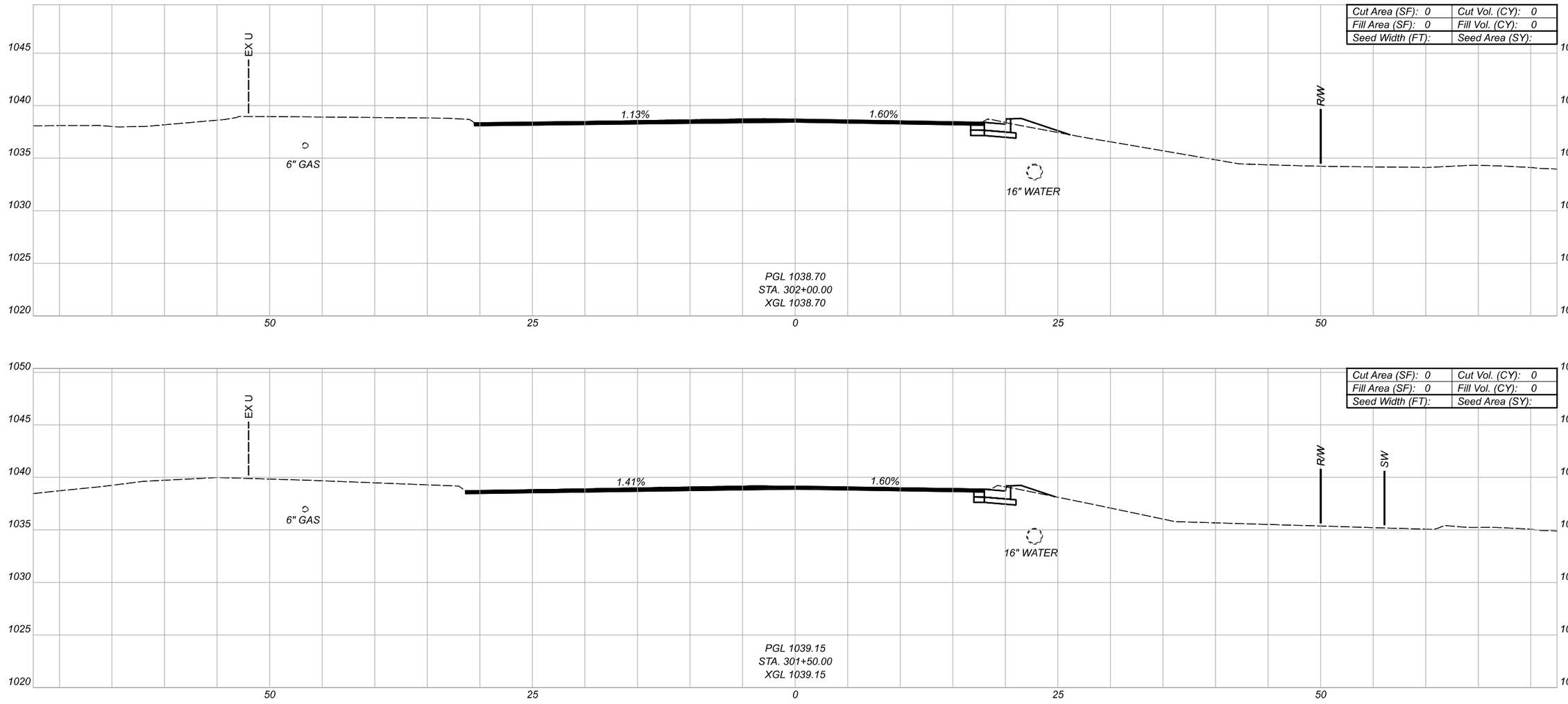
DESIGN AGENCY
CARPENTER MARTY transportation

| DESIGNER | DMG |
|---|---|
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 45 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

MODEL: CLX_303 - 300+00.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:03 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 301+50.00 TO STA. 302+00.00

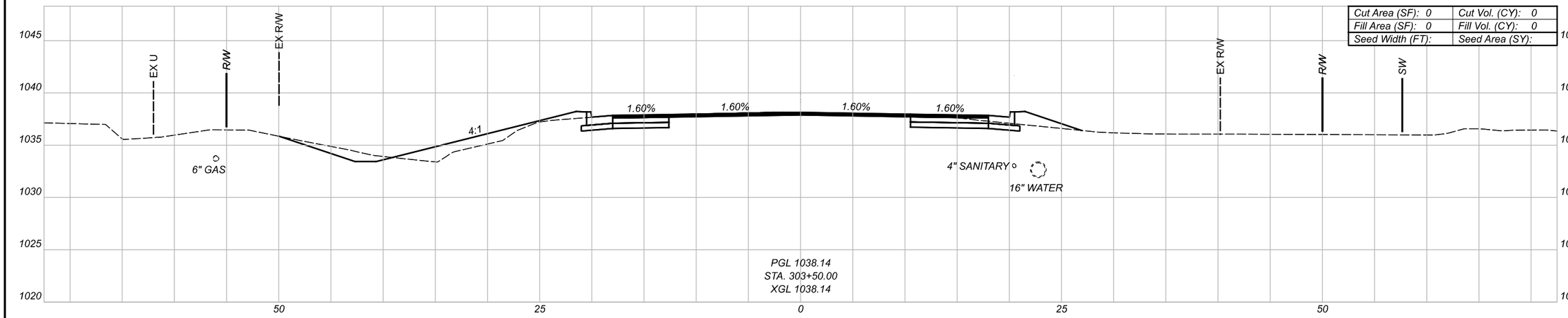
MED-303-4.85

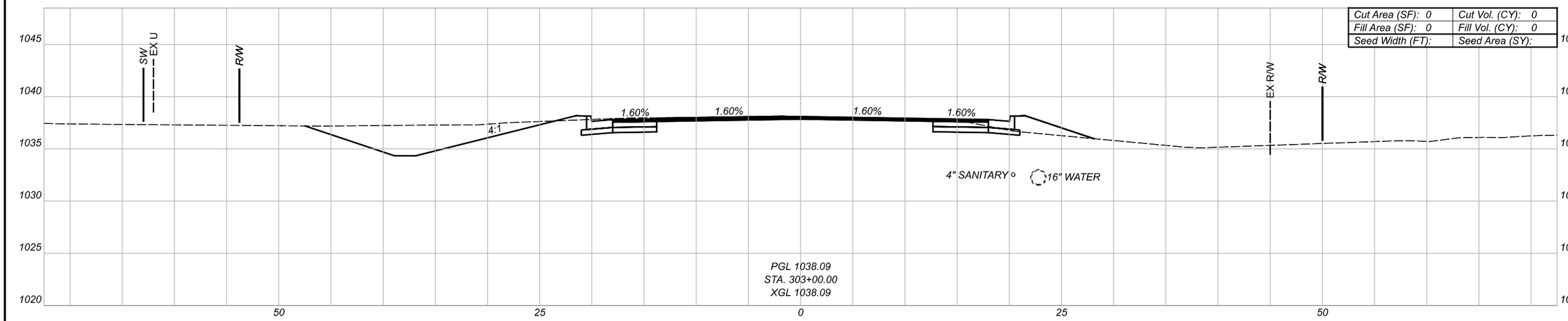
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P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn

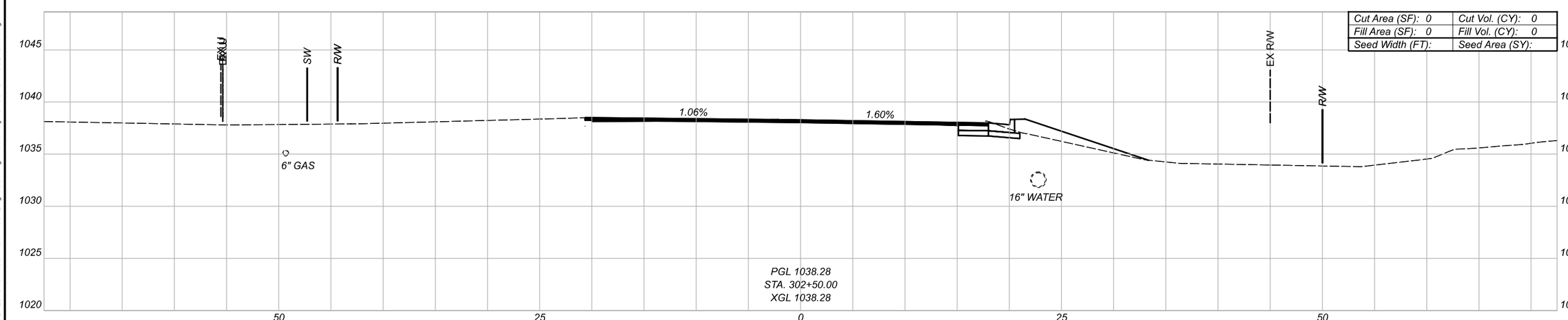
DESIGN AGENCY
CARPENTER MARTY transportation

| DESIGNER | |
|---|---|
| DMG | |
| REVIEWER | |
| MDW 09/15/21 | |
| PROJECT ID | |
| 111150 | |
| SHEET | TOTAL |
| 46 | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




CROSS SECTIONS - S.R. 303
STA. 302+50.00 TO STA. 303+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

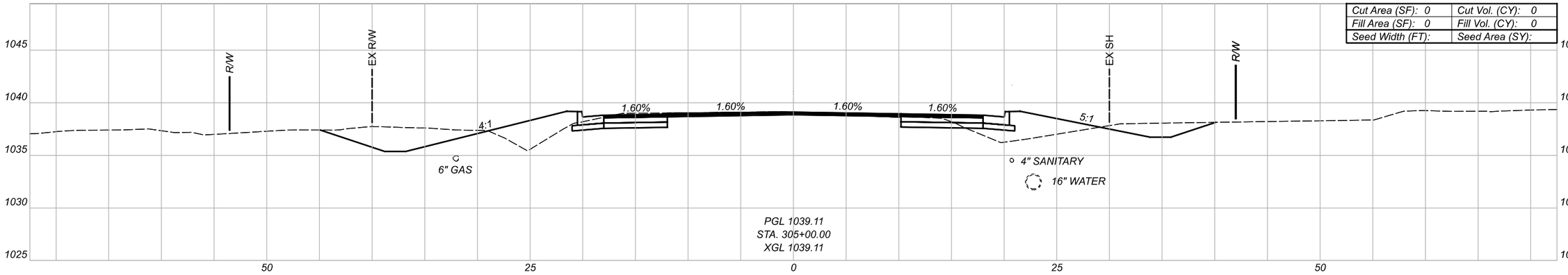
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|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

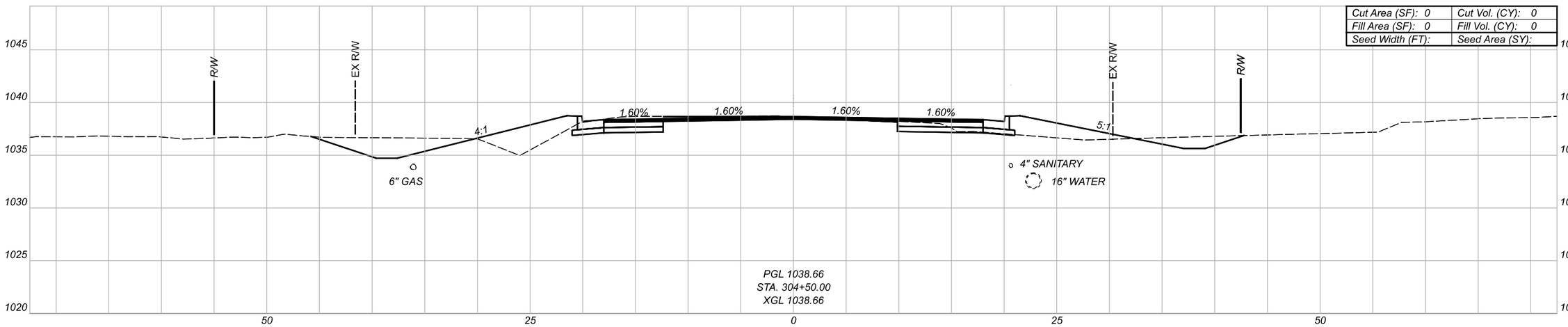
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

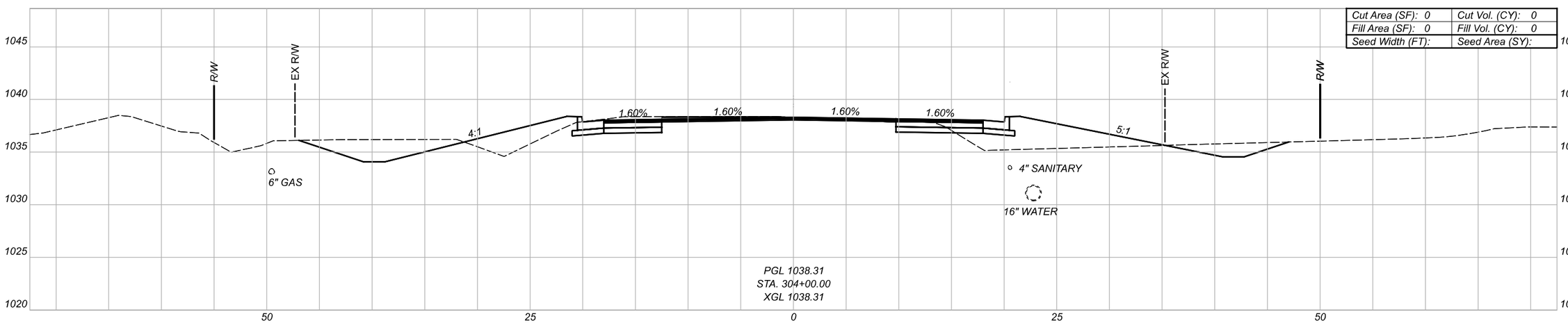
| SHEET | TOTAL |
|---|---|
| 47 | 94 |

MED-303-4.85

MODEL: CLX_303 - 302+50.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:09:08 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




# CROSS SECTIONS - S.R. 303
# STA. 304+00.00 TO STA. 305+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

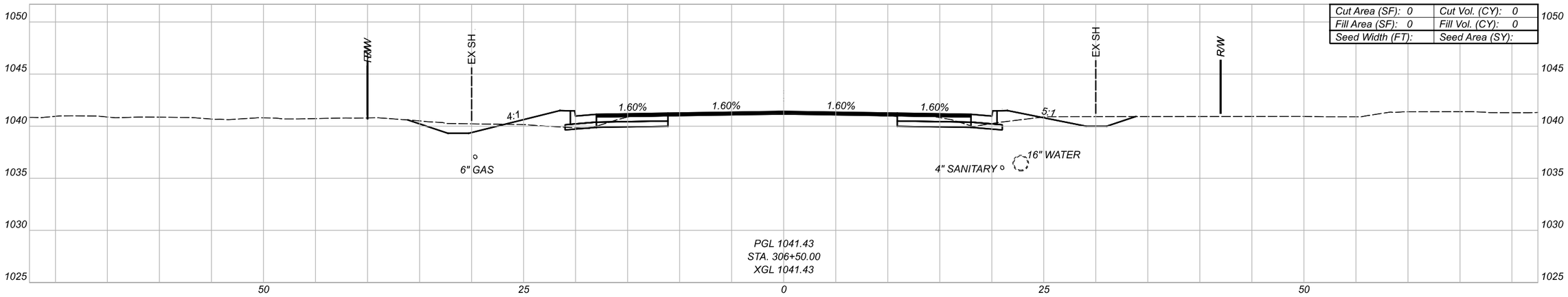
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

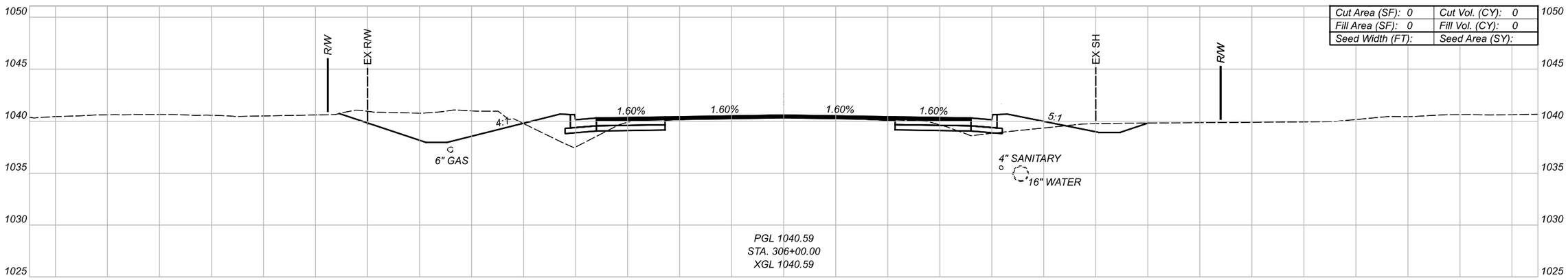
| SHEET | TOTAL |
|---|---|
| 48 | 94 |

MED-303-4.85

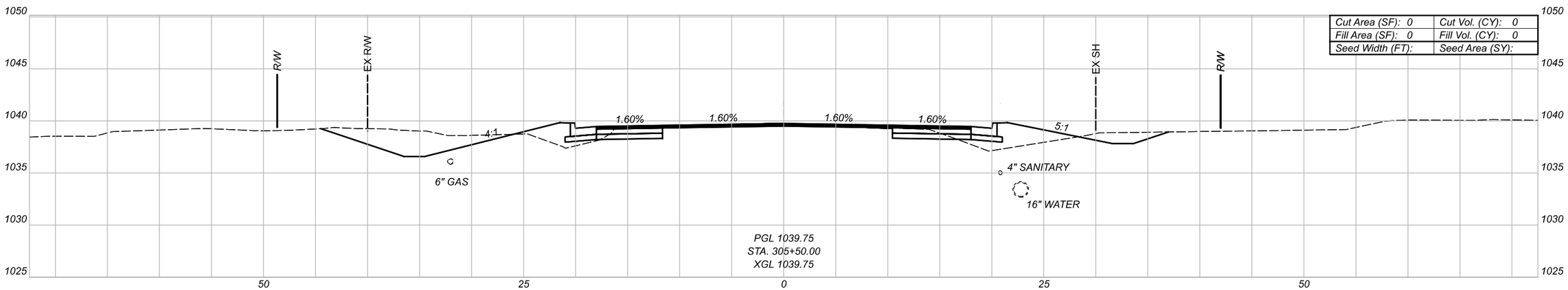
MODEL: CLX_303 - 304+00.00 R2 [Sheet] PAPERSIZE: 7x11(in.) DATE: 11/22/2021 TIME: 4:09:10 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 305+50.00 TO STA. 306+50.00

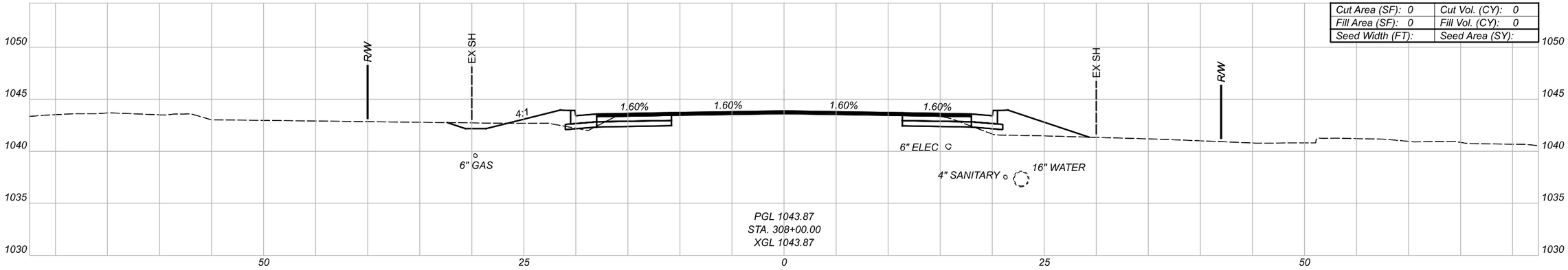
MED-303-4.85

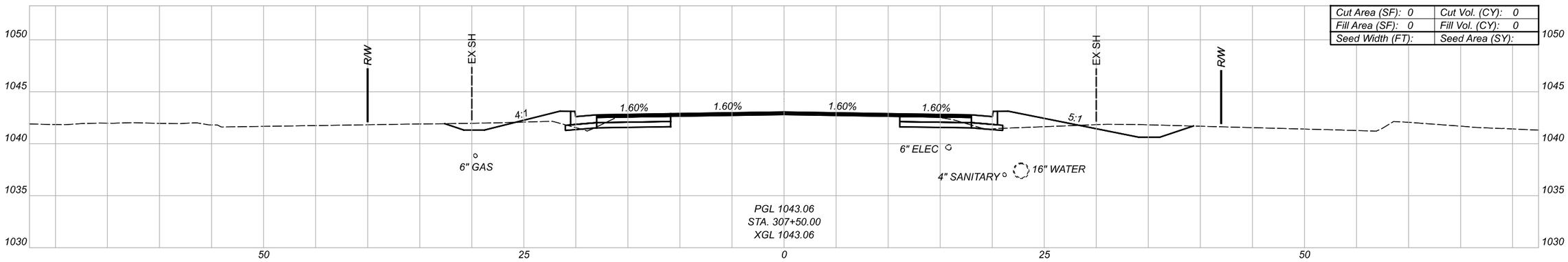
MODEL: CLX_303 - 305+50.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:13 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn

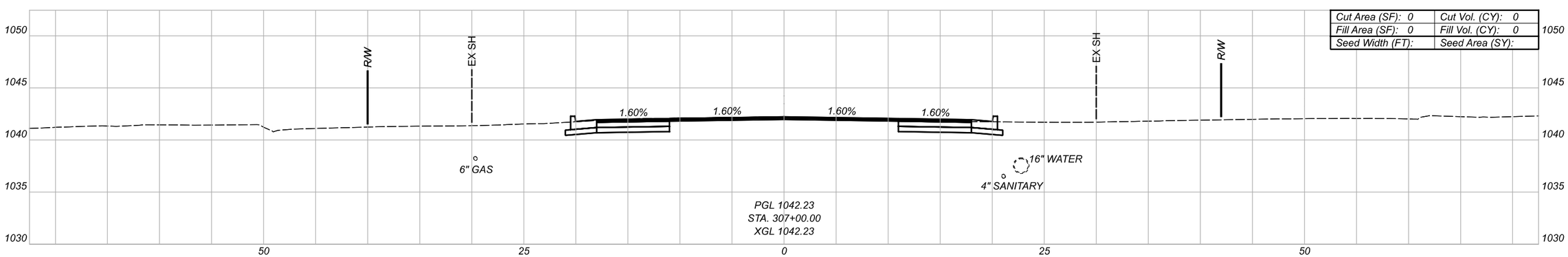
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 49 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




CROSS SECTIONS - S.R. 303
STA. 307+00.00 TO STA. 308+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

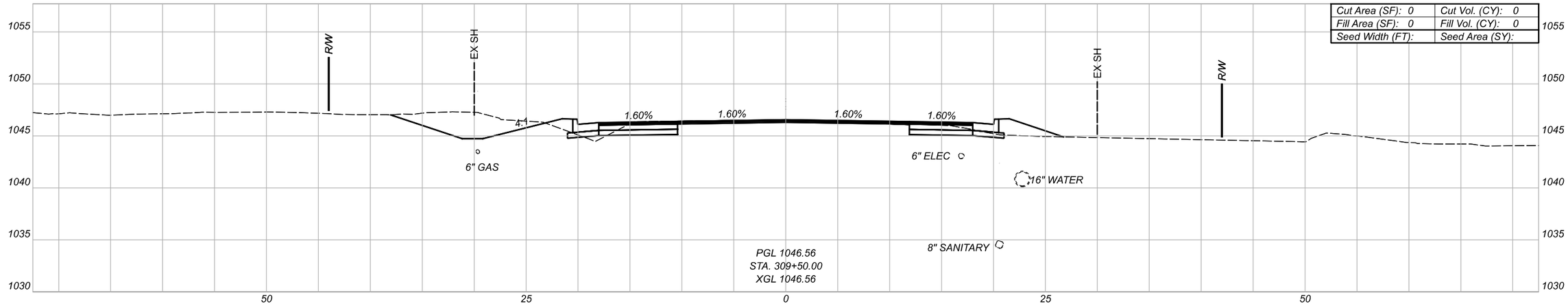
PROJECT ID
111150

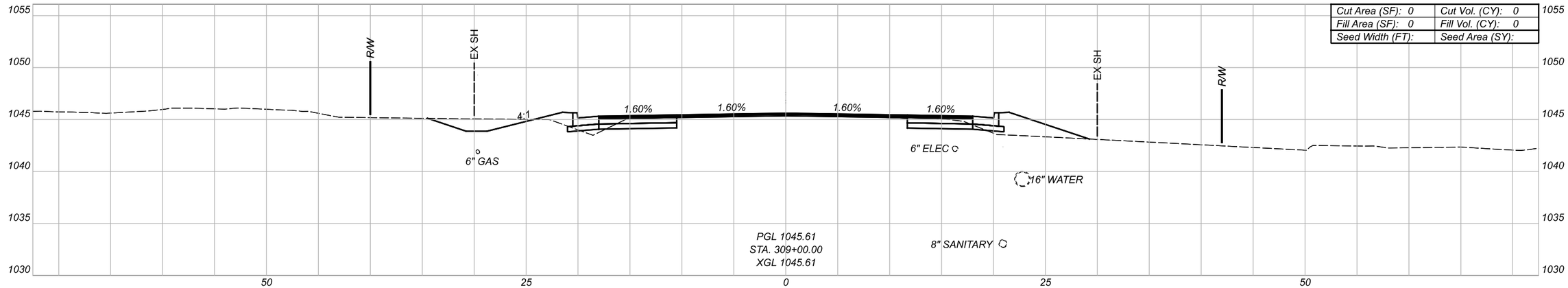
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

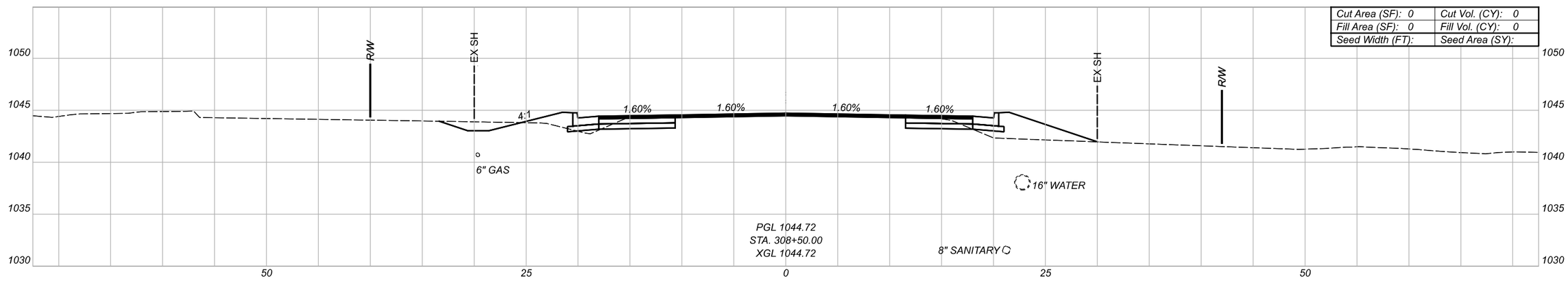
SHEET 50 TOTAL 94

MED-303-4.85

MODEL: CLX_303 - 307+00.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:09:15 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 308+50.00 TO STA. 309+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

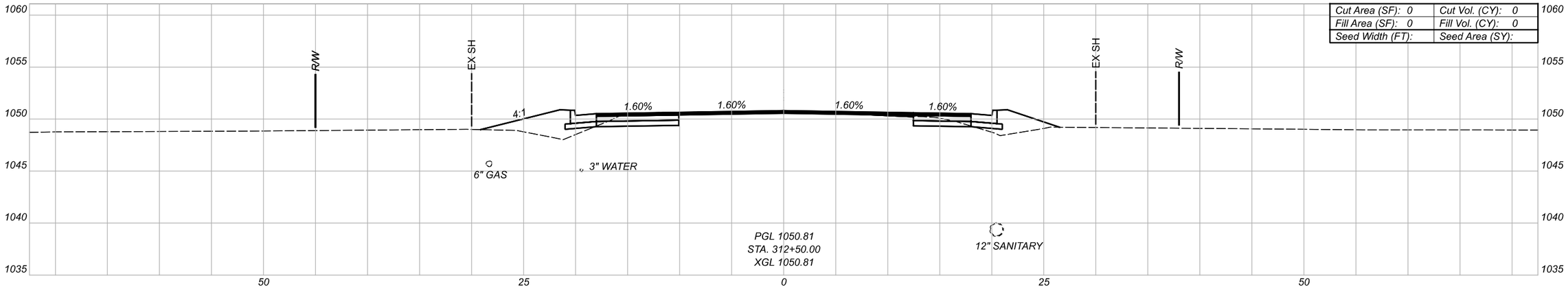
PROJECT ID
111150

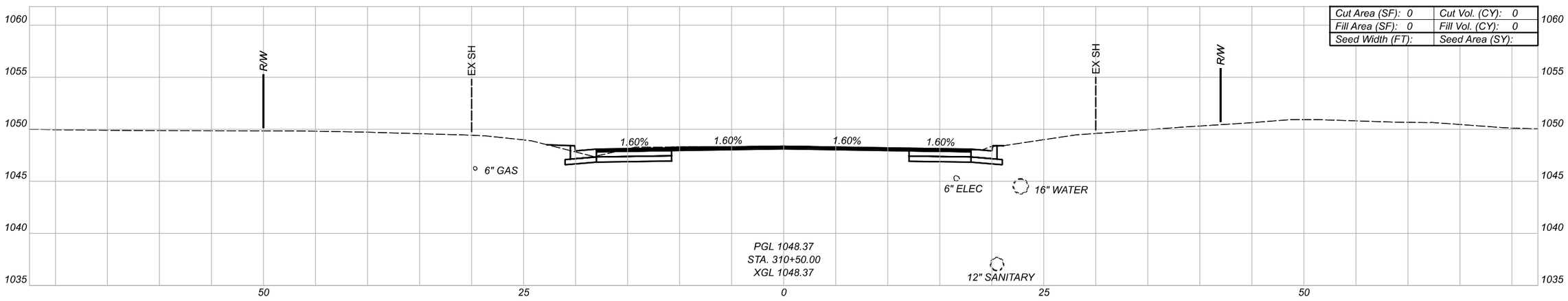
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

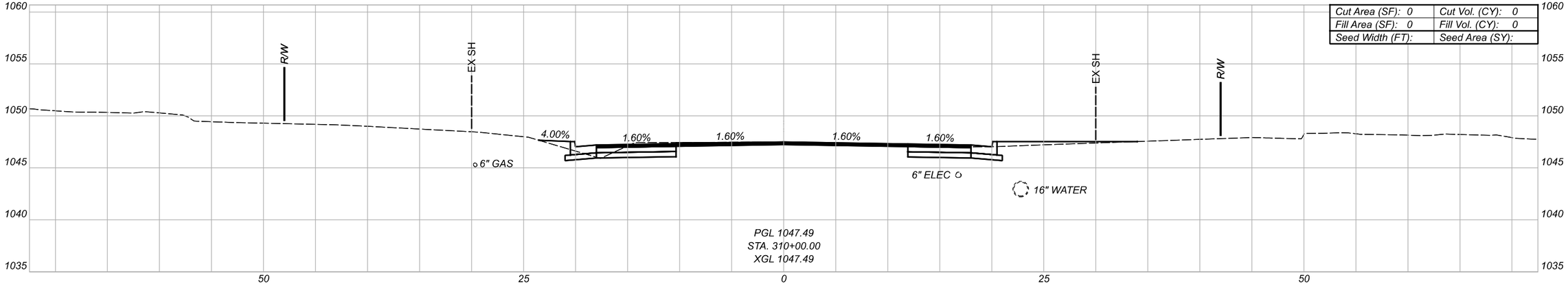
SHEET 51 TOTAL 94

MED-303-4.85

MODEL: CLX_303 - 308+50.00 R2 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:09:18 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




# CROSS SECTIONS - S.R. 303
## STA. 310+00.00 TO STA. 312+50.00

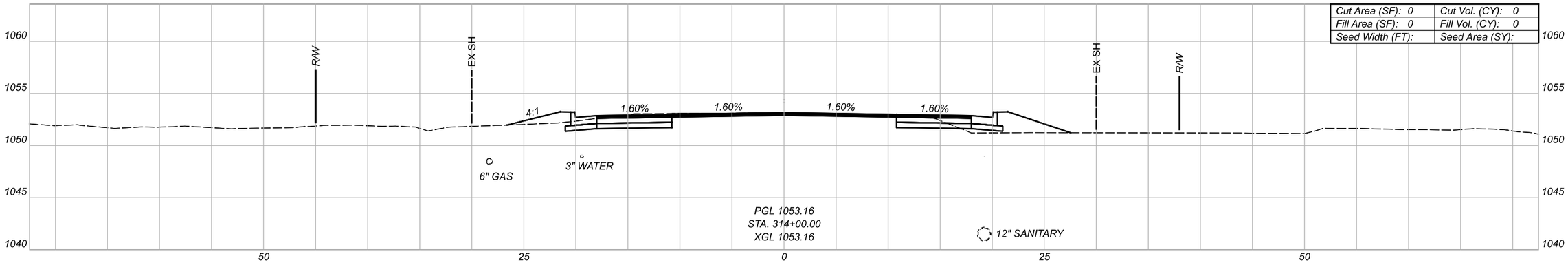
MED-303-4.85

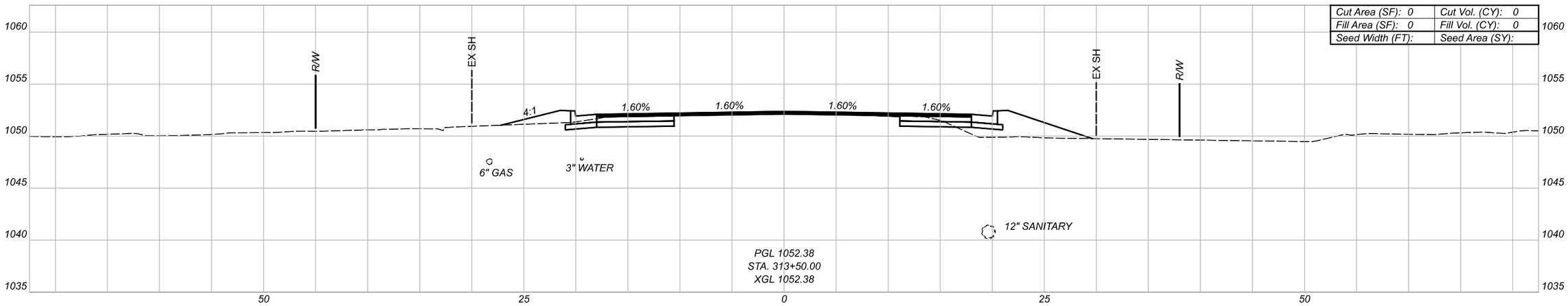
MODEL: CLX_303 - 310+00.00 R2 [Sheet] PAPERSIZE: 7x11 (in.) DATE: 11/22/2021 TIME: 4:09:20 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS00L.dgn

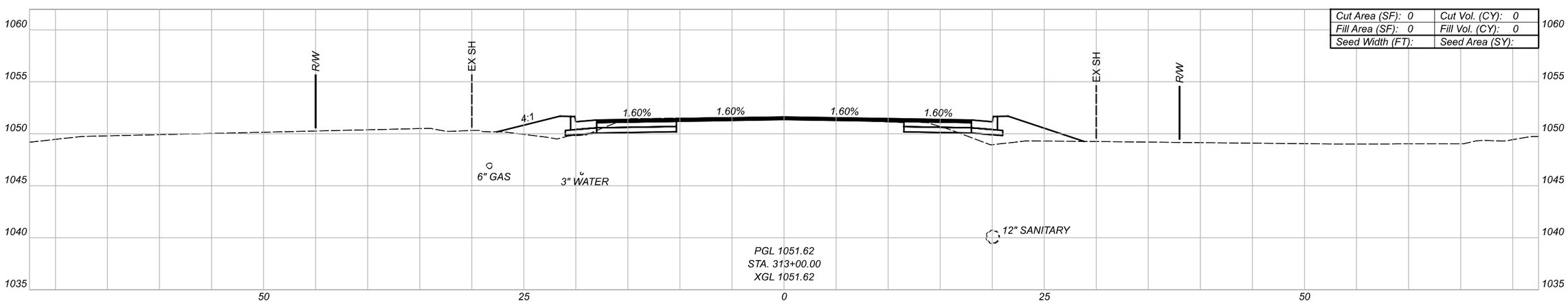
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 52 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




CROSS SECTIONS - S.R. 303
STA. 313+00.00 TO STA. 314+00.00

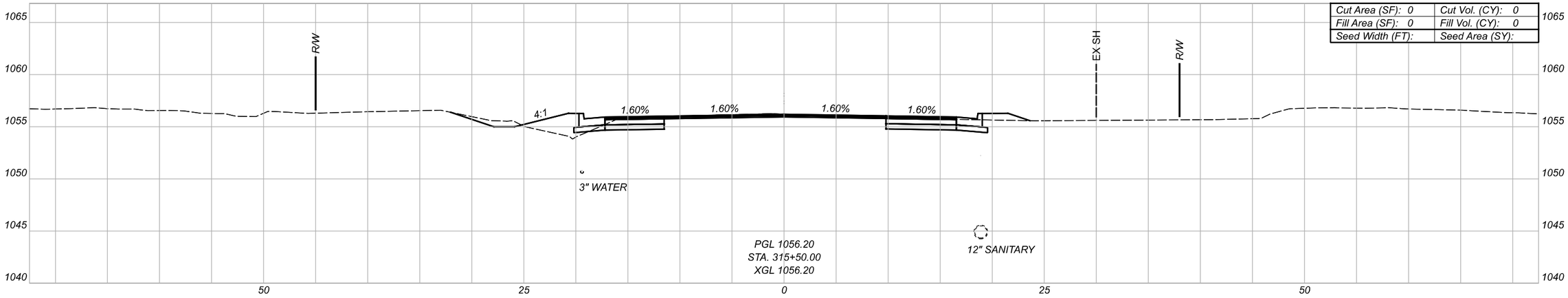
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 53 |
| TOTAL | 94 |

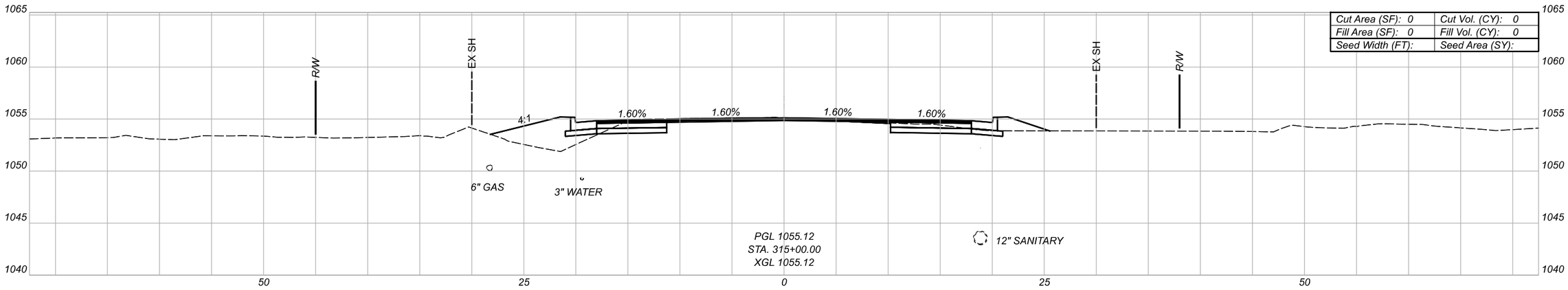
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

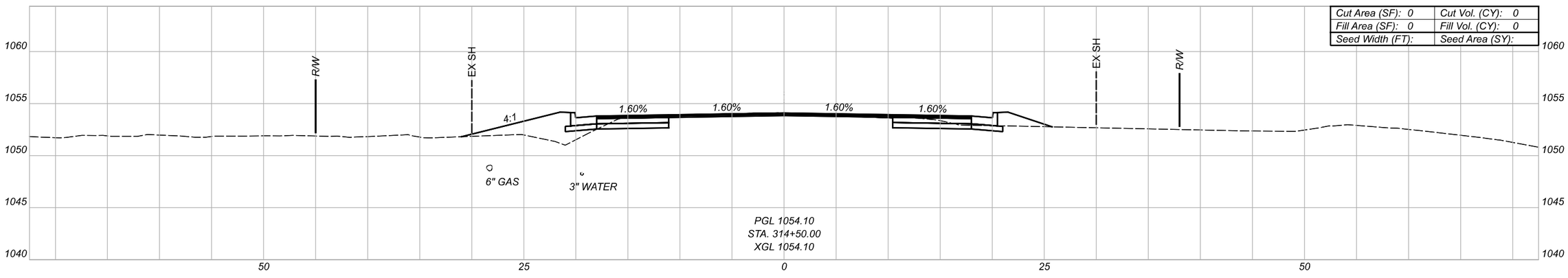
MODEL: CLX_303 - 313+00.00 R2 [Sheet] PAPERSIZE: 17x11(in) DATE: 11/22/2021 TIME: 4:09:22 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
|---|---|
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |

CROSS SECTIONS - S.R. 303
STA. 314+50.00 TO STA. 315+50.00

DESIGN AGENCY
CARPENTER MARTY Transportation

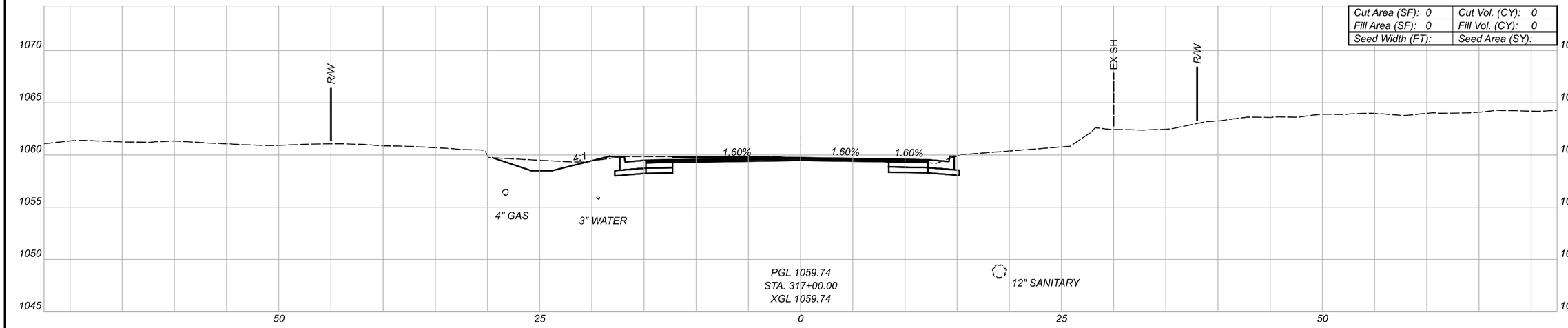
| DESIGNER | |
|---|---|
| DMG | |
| REVIEWER | |
| MDW 09/15/21 | |
| PROJECT ID | |
| 111150 | |

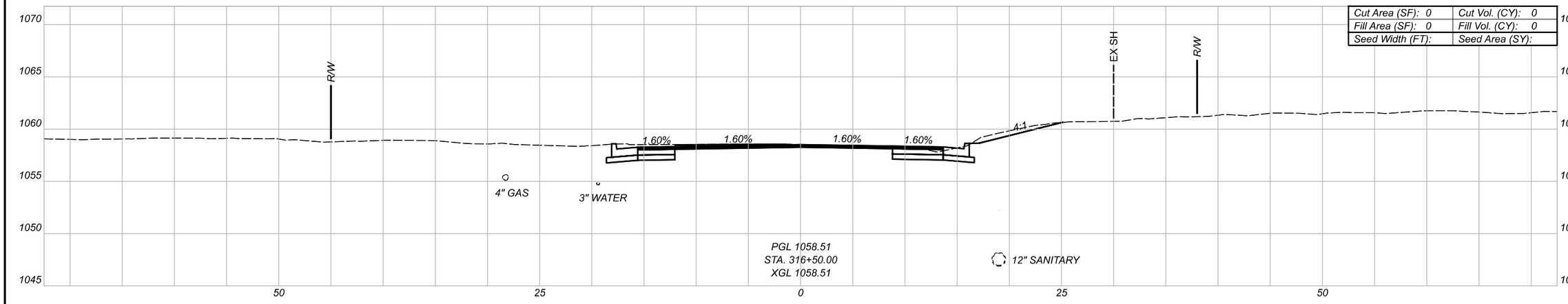
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

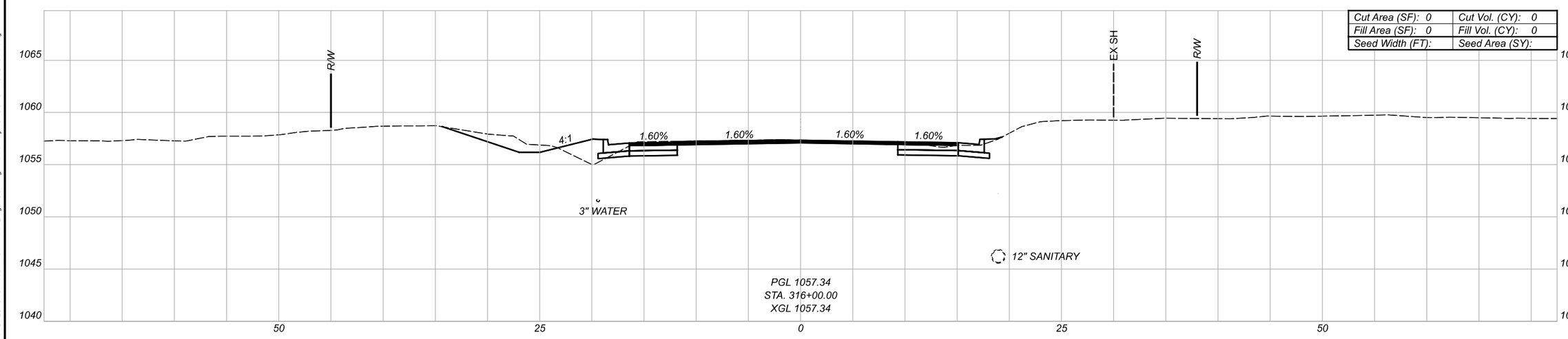
| SHEET | TOTAL |
|---|---|
| 54 | 94 |

MED-303-4.85

MODEL: CLX_303 - 314+50.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:25 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 316+00.00 TO STA. 317+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

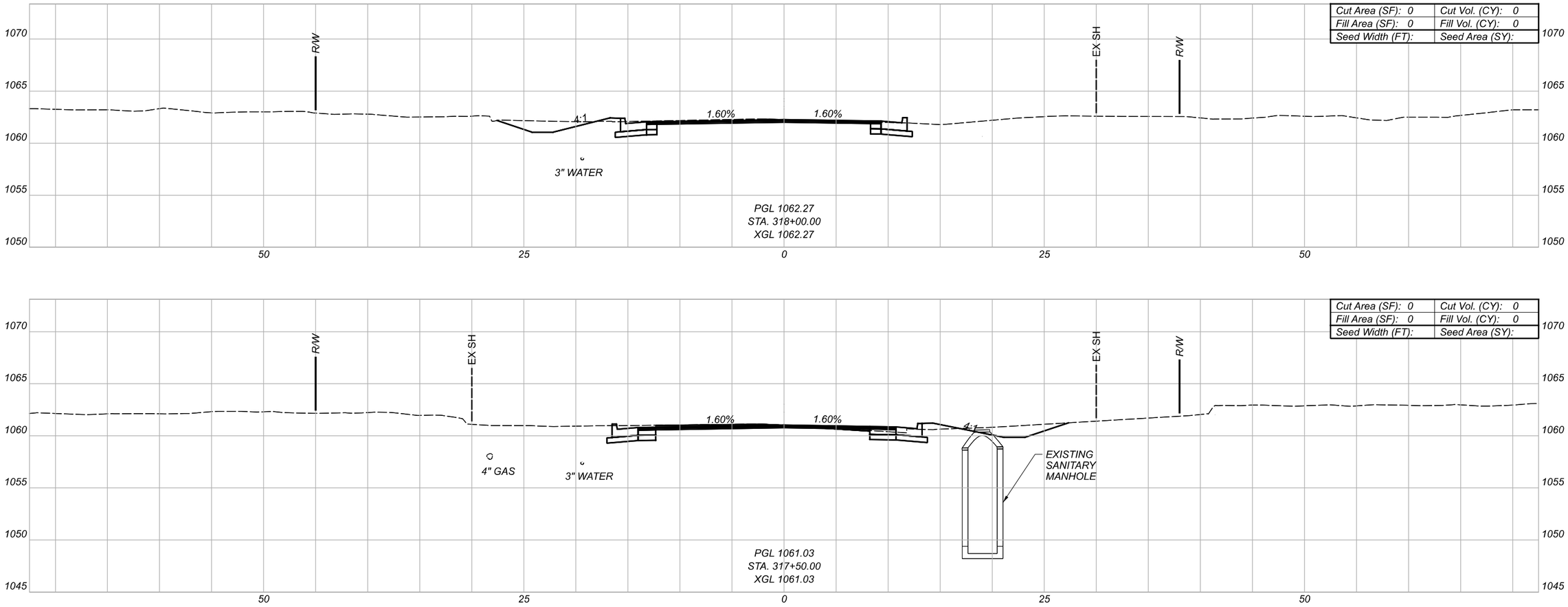
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 55 TOTAL 94

MED-303-4.85

MODEL: CLX_303 - 316+00.00 R2 [Sheet] PAPERSIZE: 17x11(in) DATE: 11/22/2021 TIME: 4:09:27 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




CROSS SECTIONS - S.R. 303
STA. 317+50.00 TO STA. 318+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

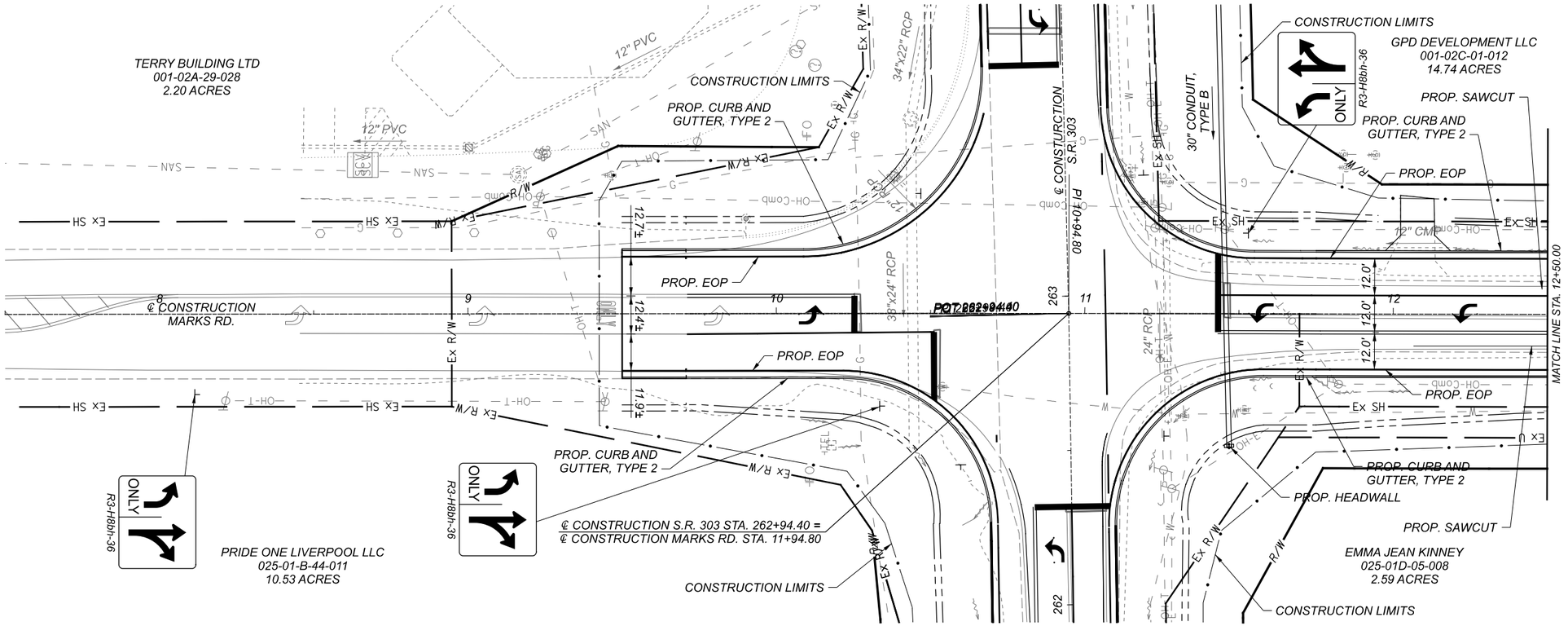
| DESIGNER | REVIEWER | PROJECT ID |
|---|---|---|
| DMG | MDW 09/15/21 | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

| SHEET | TOTAL |
|---|---|
| 56 | 94 |

MED-303-4.85

MODEL: CLX_303 - 317+50.00 R2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:29 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS001.dgn




HORIZONTAL SCALE IN FEET
0 10 20 40

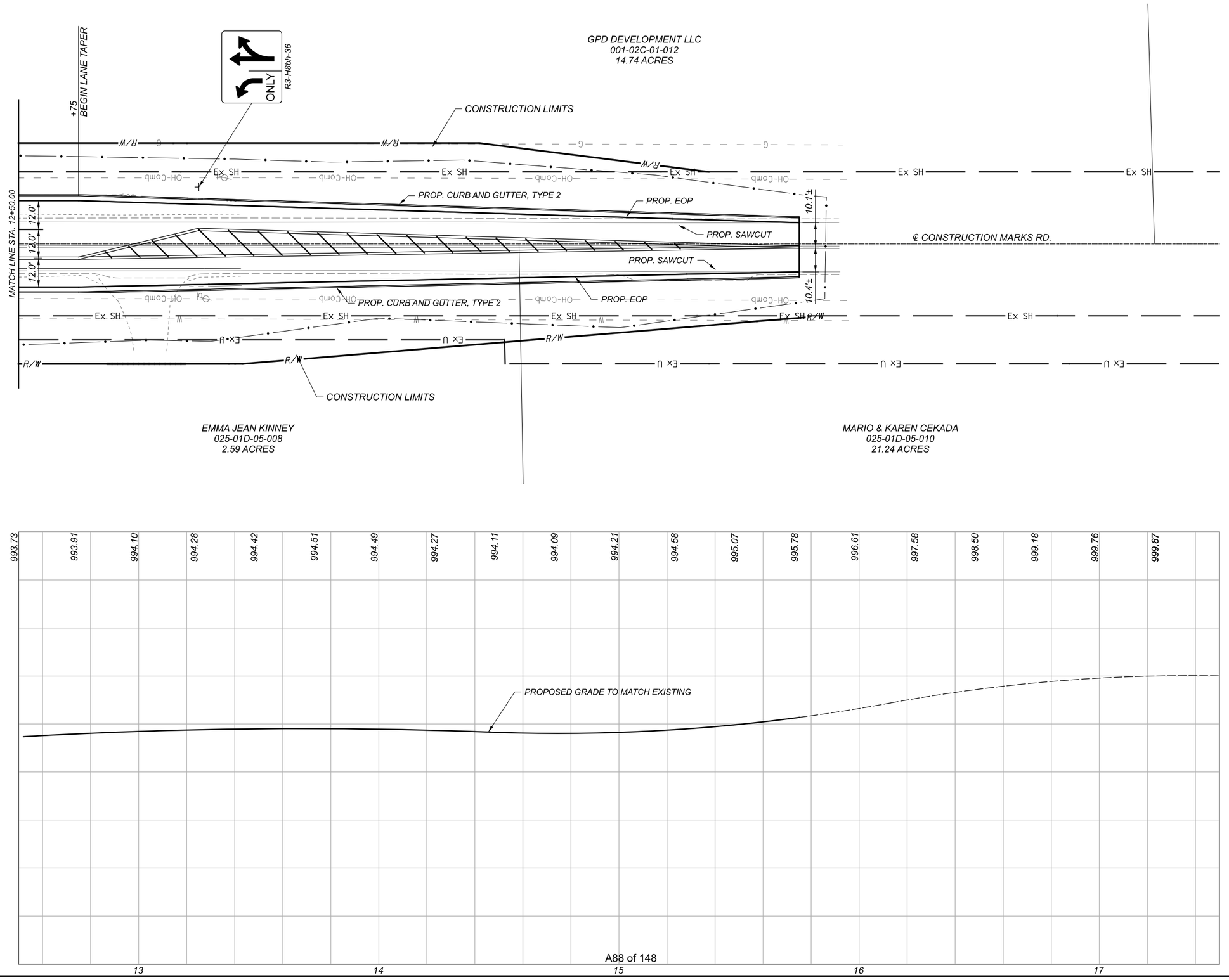
# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 1
## STA. 7+50.00 TO STA. 12+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 11/17/21 |
| PROJECT ID | 111150 |
| SHEET | 57 |
| TOTAL | 94 |

MED-303-4.85

MODEL: CLP_MARKS ROAD-1 - Marks Plan[Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:34 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP101.dgn




HORIZONTAL SCALE IN FEET
0 10 20 40

# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 1
## STA. 12+50.00 TO STA. 17+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

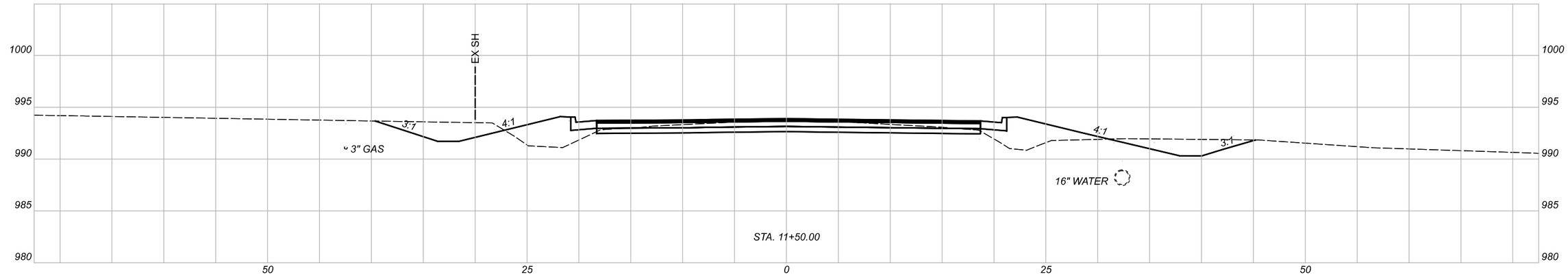
REVIEWER
MDW 11/17/21

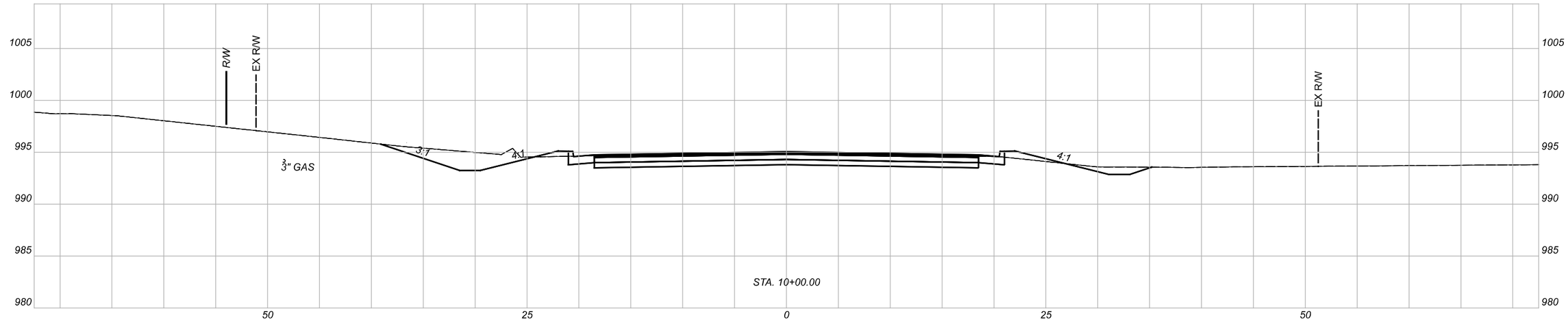
PROJECT ID
111150

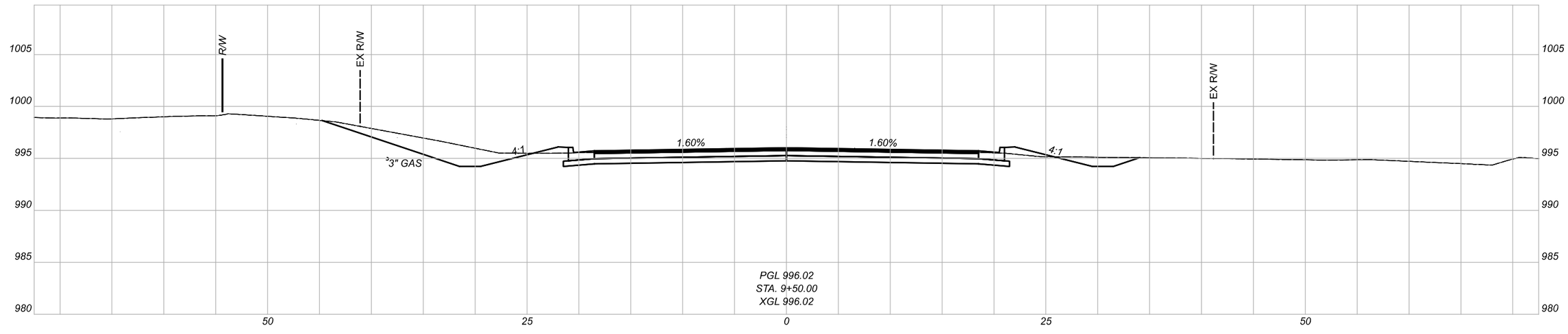
SHEET 58 TOTAL 94

MED-303-4.85

MODEL: CLP_MARKS ROAD-1 - Marks Plan2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:35 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP101.dgn




MARKS ROAD CROSS SECTIONS ALT. 1
STA. 9+50.00 TO STA. 11+50.00

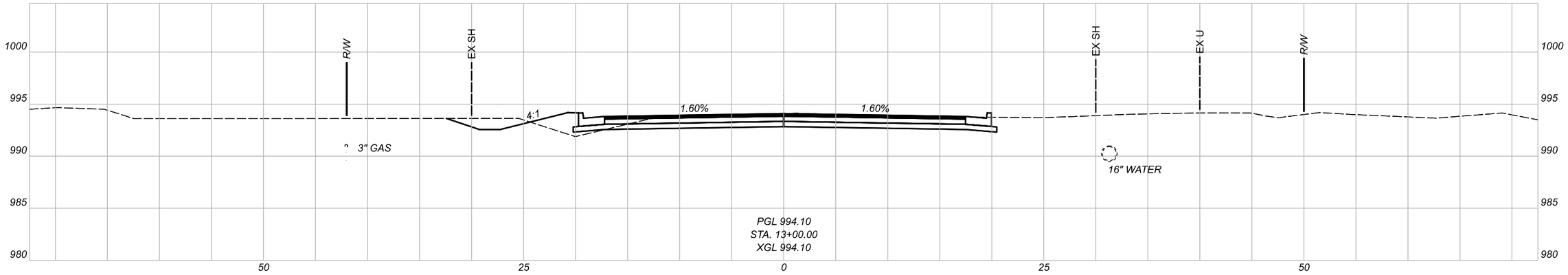
MED-303-4.85

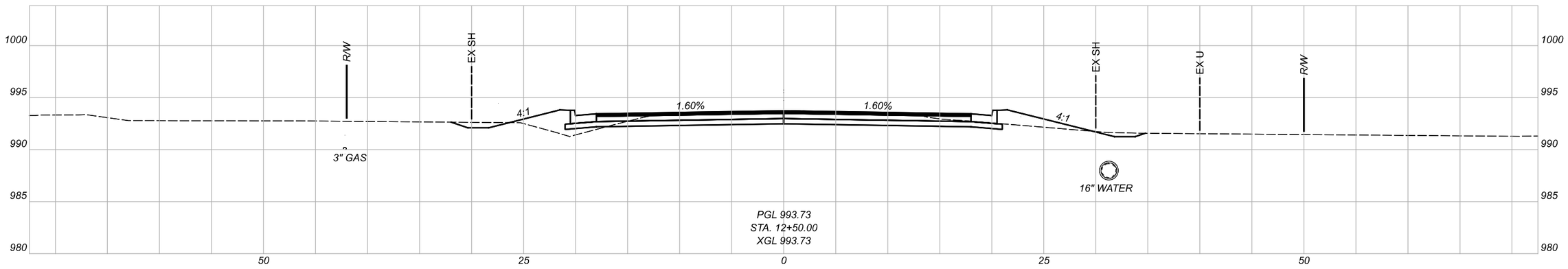
MODEL: CLP_MARKS ROAD - 9+50.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:09:39 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS120.dgn

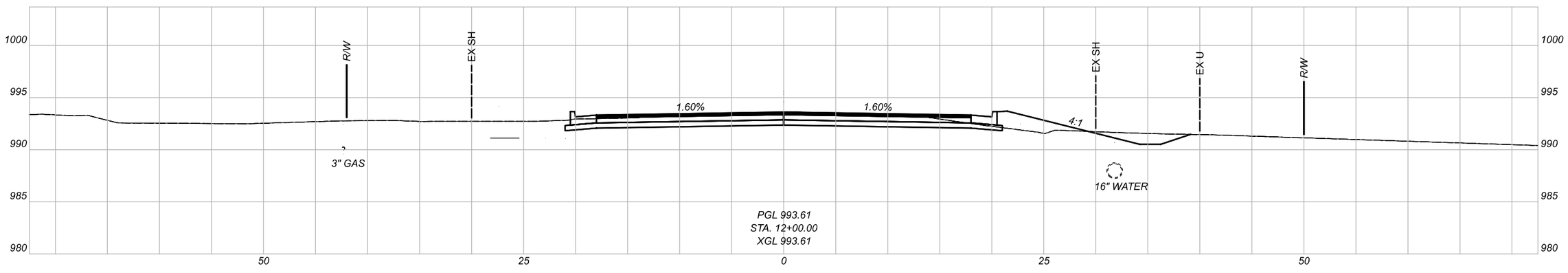
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | BAA 11/17/21 |
| PROJECT ID | 111150 |
| SHEET | 59 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




MARKS ROAD CROSS SECTIONS ALT. 1
STA. 12+00.00 TO STA 13+00.00

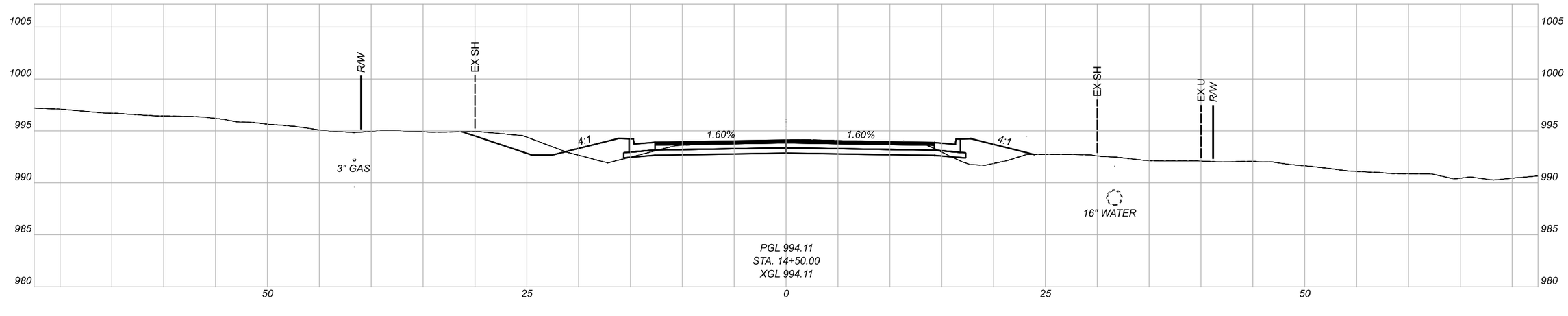
DESIGN AGENCY
CARPENTER MARTY transportation

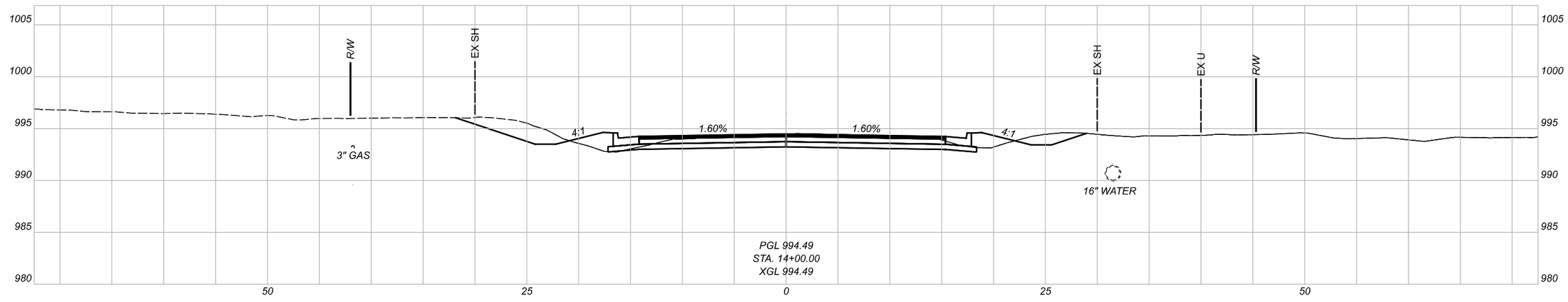
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | BAA 11/17/21 |
| PROJECT ID | 111150 |
| SHEET | 60 |
| TOTAL | 94 |

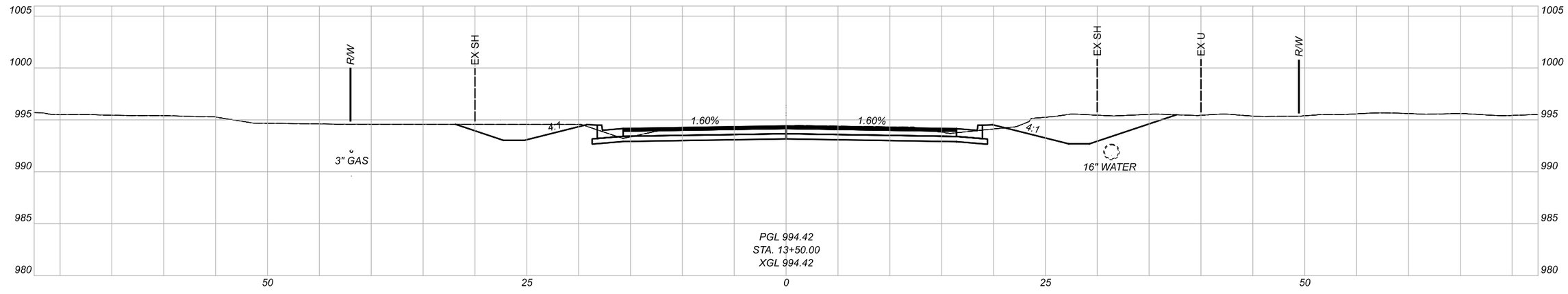
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

MODEL: CLP_MARKS ROAD - 12+00.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:09:42 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS120.dgn




MARKS ROAD CROSS SECTIONS ALT. 1
STA. 13+50.00 TO STA. 14+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
BAA 11/17/21

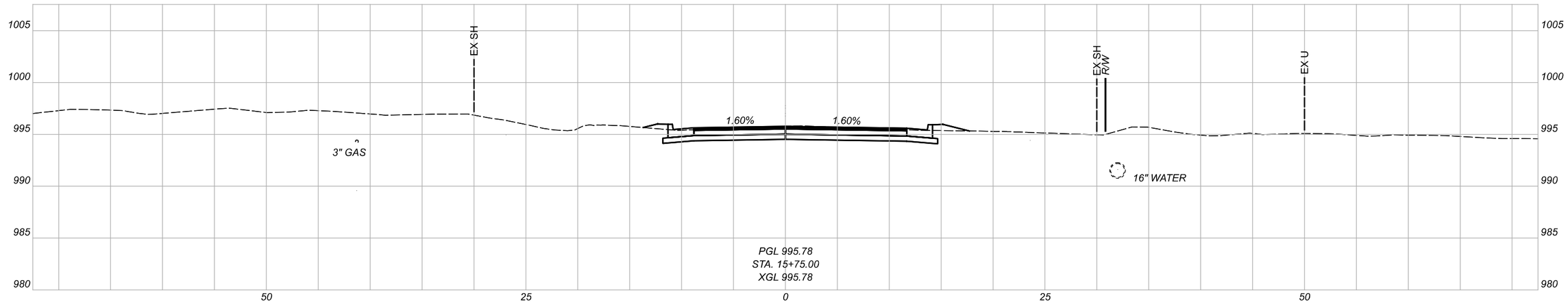
PROJECT ID
111150

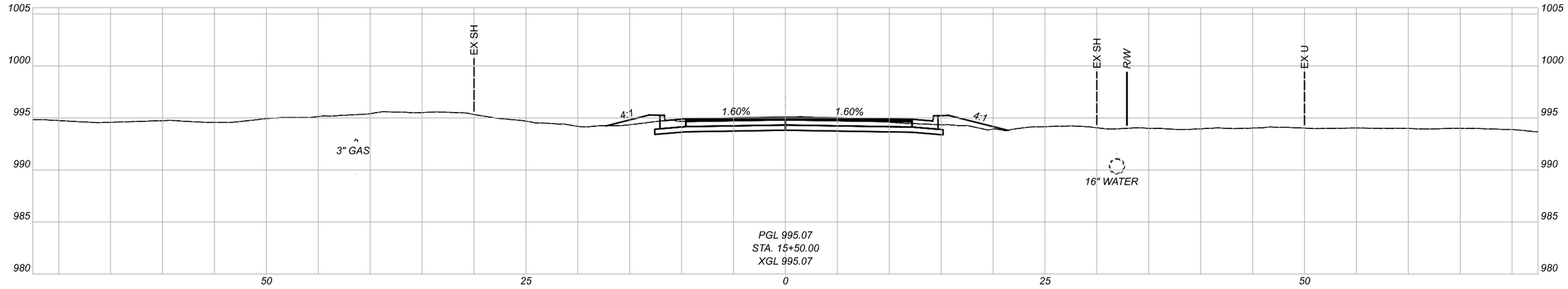
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

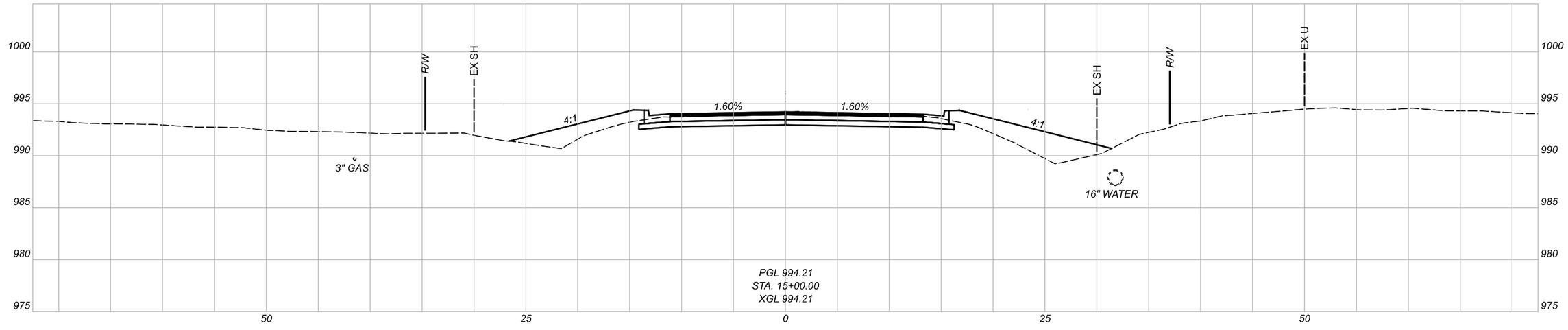
SHEET 61 TOTAL 94

MED-303-4.85

MODEL: CLP_MARKS ROAD - 13+50.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:09:43 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS120.dgn




MED-303-4.85

MODEL: CLP_MARKS ROAD - I5+00.00 [Sheet] PAPERSIZE: ITxII (in.) DATE: 11/22/2021 TIME: 4:09:45 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XSI20.dgn

MARKS ROAD CROSS SECTIONS ALT. 1
STA. 15+00.00 TO STA. 15+75.00

DESIGN AGENCY
CARPENTER MARTY transportation

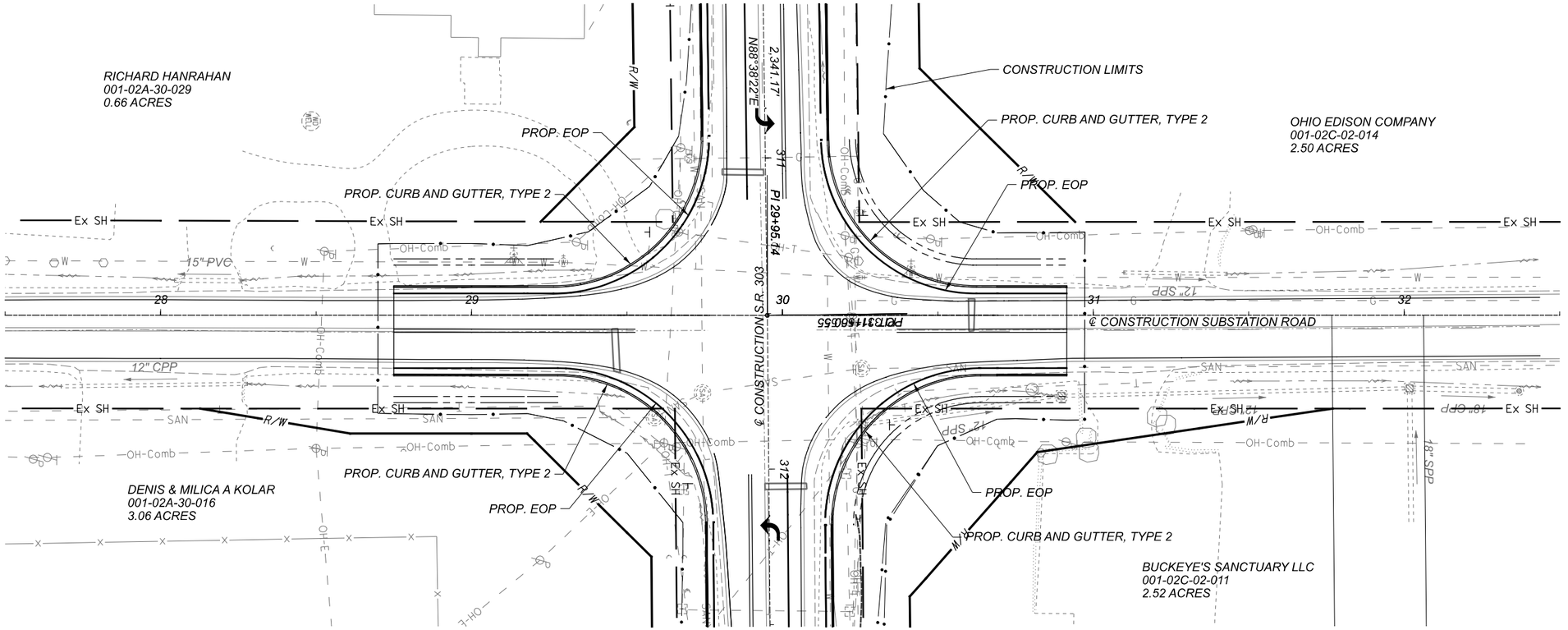
DESIGNER
DMG

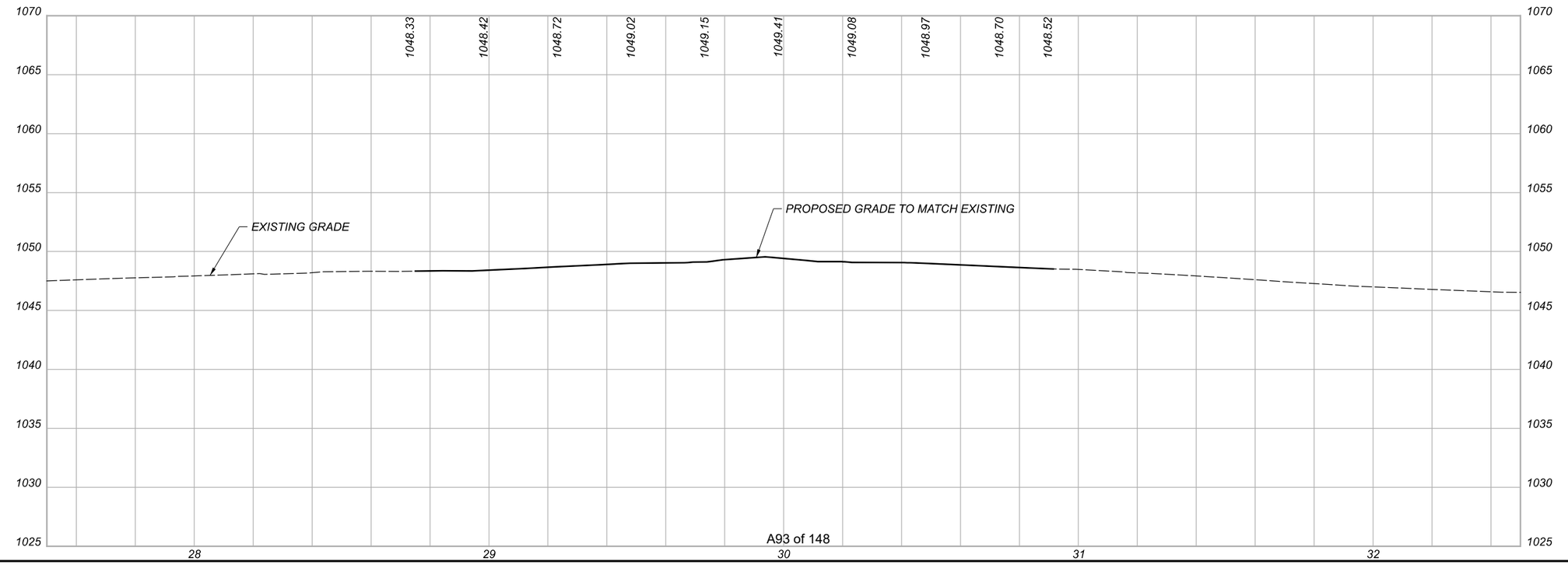
REVIEWER
BAA 11/17/21

PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 62 TOTAL 94




HORIZONTAL SCALE IN FEET
0 10 20 40

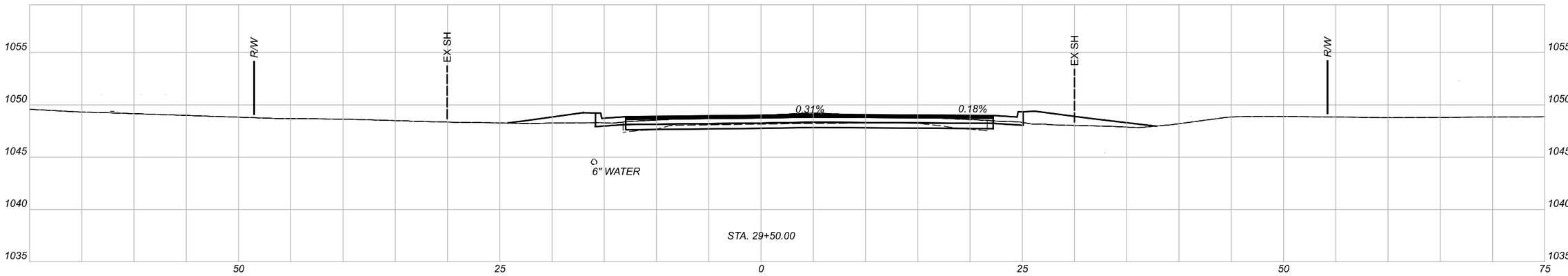
# PLAN AND PROFILE - SUBSTATION ROAD - ALTERNATE 1
## STA. 27+50.00 TO STA. 32+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

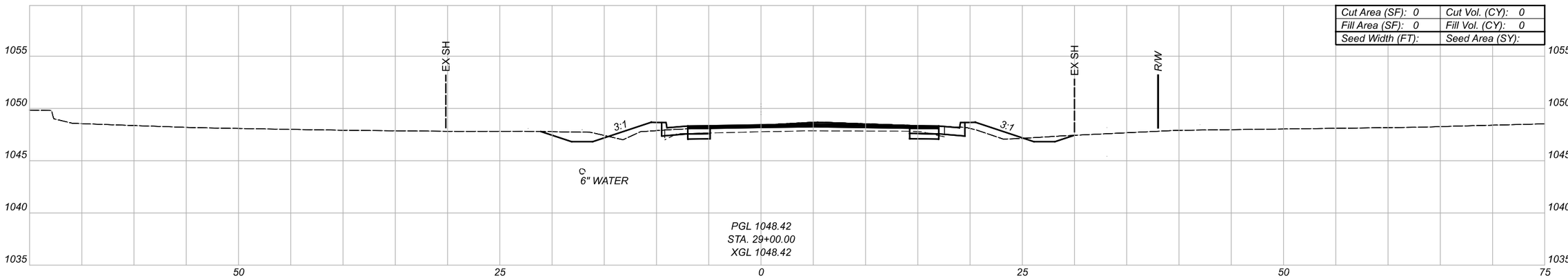
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 63 |
| TOTAL | 94 |

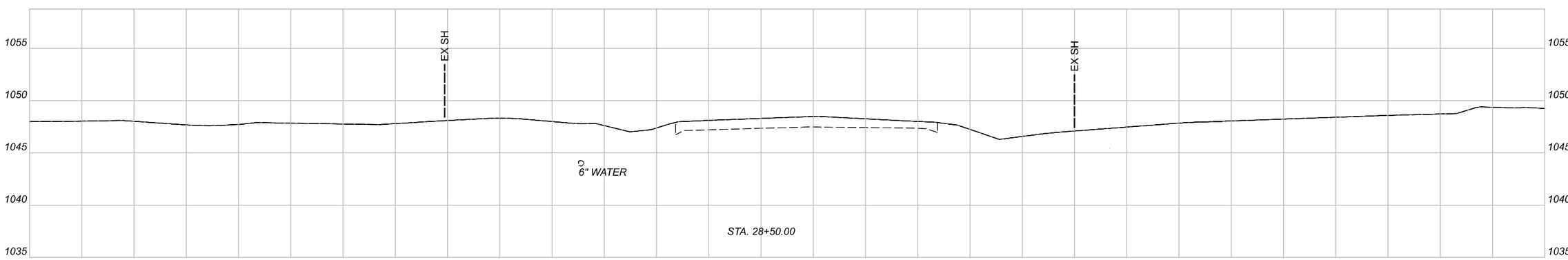
MED-303-4.85

MODEL: CLP_Substation Plan (Sheet) PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:48 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP101.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




# CROSS SECTIONS - SUBSTATION ROAD STA. 28+50.00 TO STA. 29+50.00

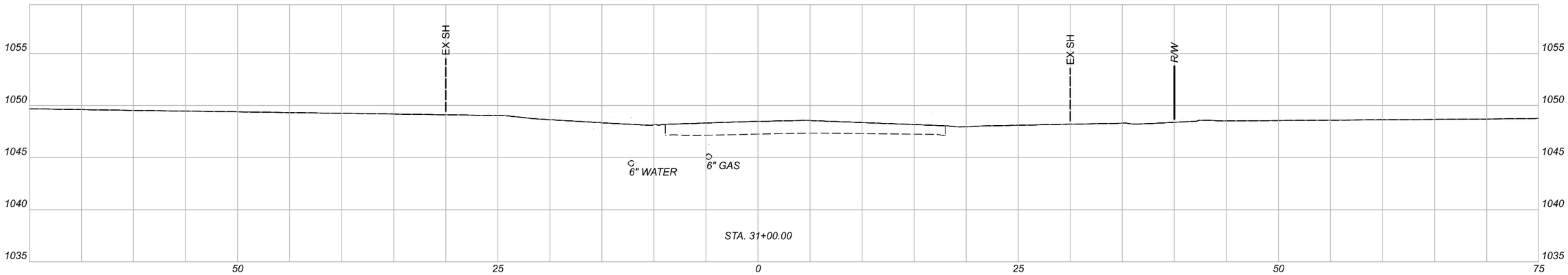
DESIGN AGENCY
CARPENTER MARTY transportation

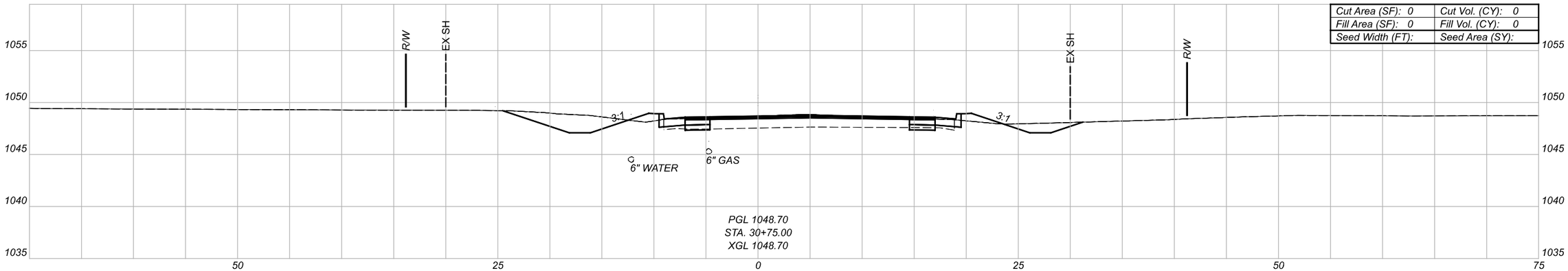
| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 64 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

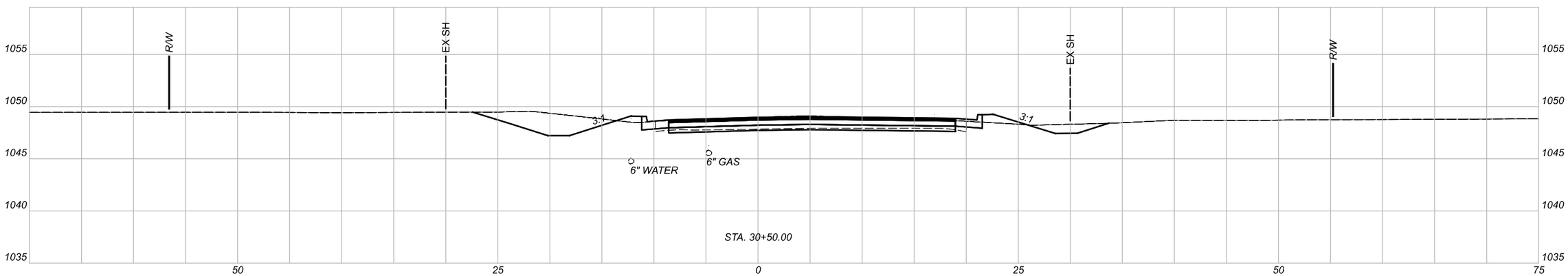
MED-303-4.85

MODEL: CLP_SUBSTATION - 28+50.00 (Sheet) PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:09:53 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS30.dgn




| | |
|---|---|
| Cut Area (SF): 0 | Cut Vol. (CY): 0 |
| Fill Area (SF): 0 | Fill Vol. (CY): 0 |
| Seed Width (FT): | Seed Area (SY): |




# CROSS SECTIONS - SUBSTATION ROAD
## STA. 30+50.00 TO STA. 31+00.00

DESIGN AGENCY
CARPENTER MARTY Transportation

DESIGNER
BTP

REVIEWER
MDW 09/15/21

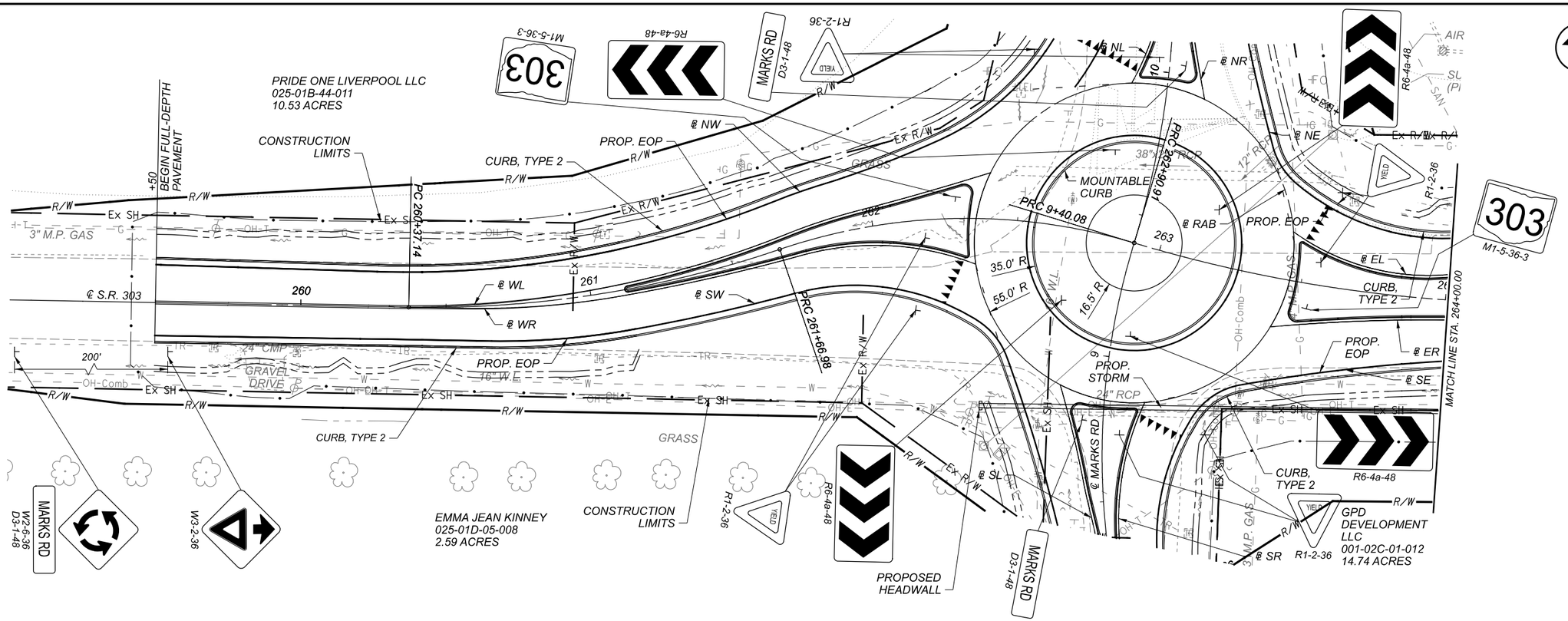
PROJECT ID
111150

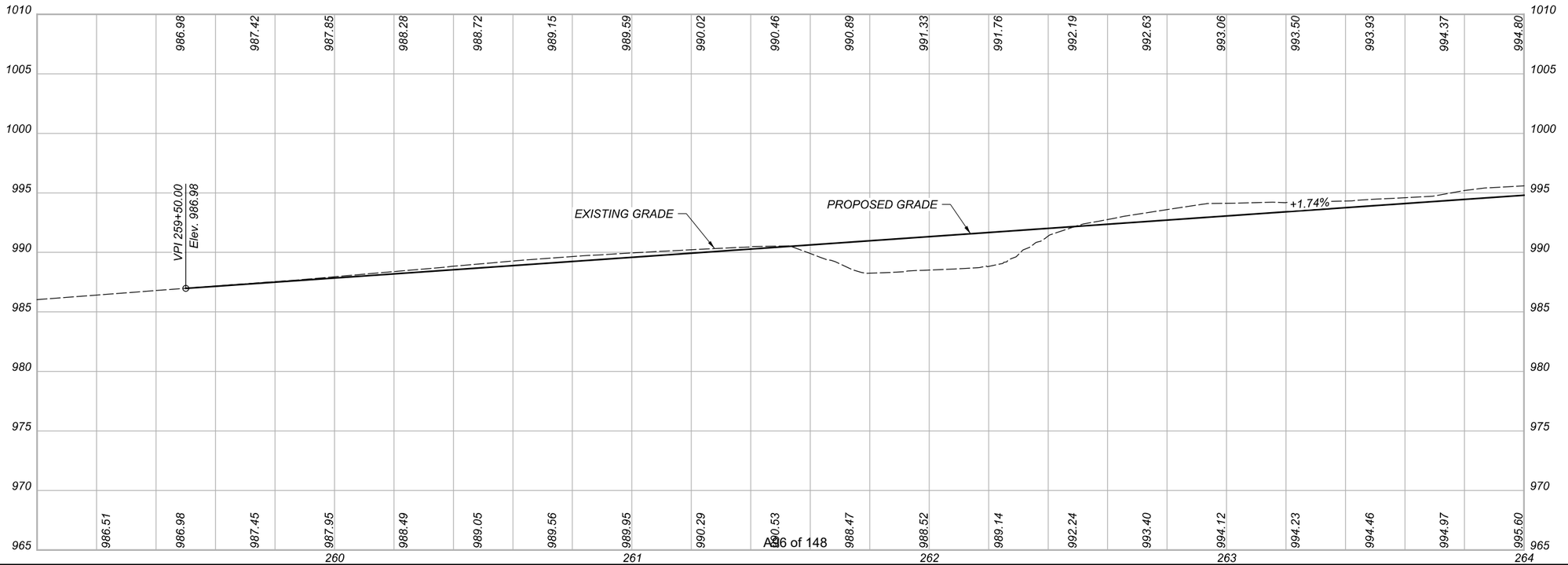
| SHEET | TOTAL |
|---|---|
| 65 | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

MODEL: CLP_SUBSTATION - 30+50.00 [Sheet] PAPERSIZE: 17x11in.) DATE: 11/22/2021 TIME: 4:09:58 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS30.dgn






MED-303-4.85

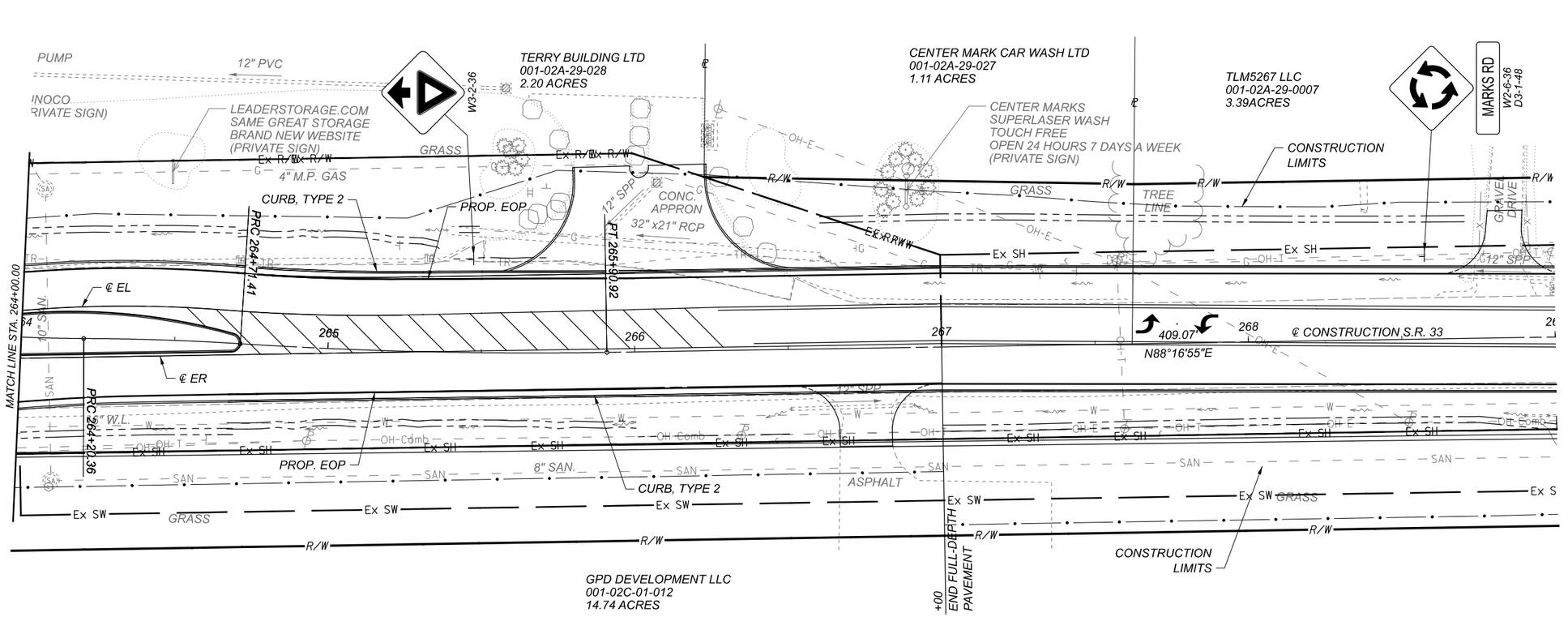
MODEL: III50_GP3ii PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:10:04 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\III50\400-Engineering\Roadway\Sheets\III50_GP3ii.dgn

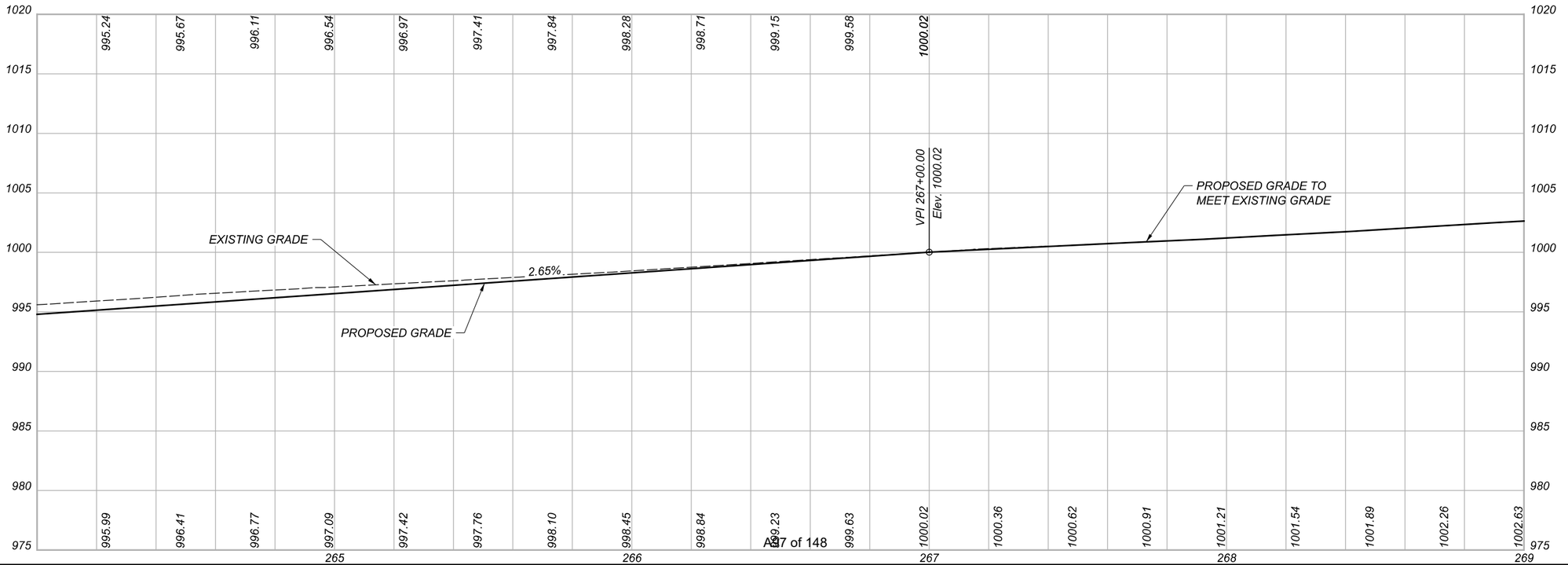
HORIZONTAL SCALE IN FEET
0 10 20 40

PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
STA. 259+00.00 TO STA. 264+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 66 |
| TOTAL | 94 |






HORIZONTAL
SCALE IN FEET
0 10 20 40

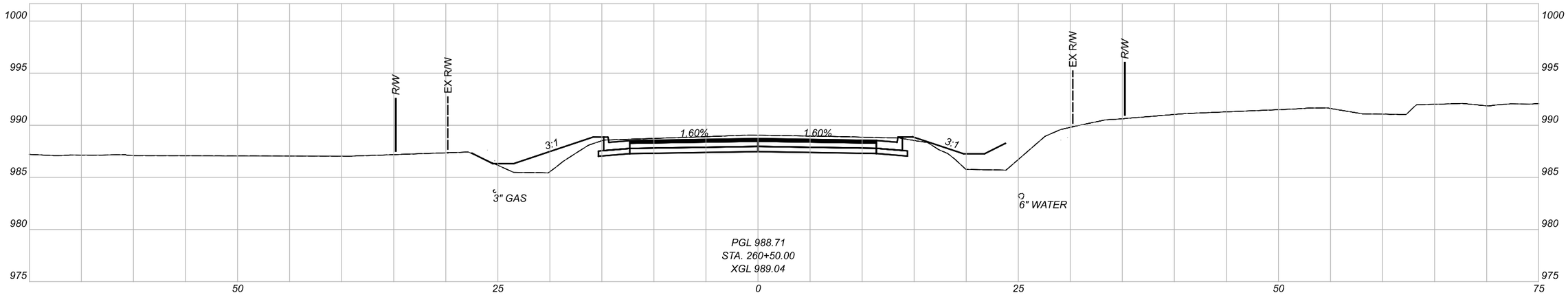
# PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
## STA. 264+00.00 TO STA. 269+00.00

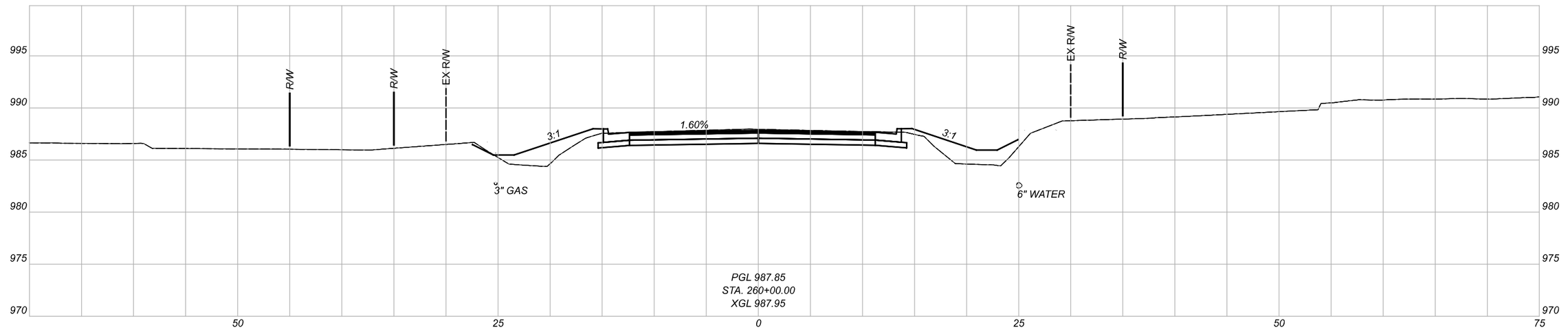
DESIGN AGENCY
CARPENTER MARTY Transportation

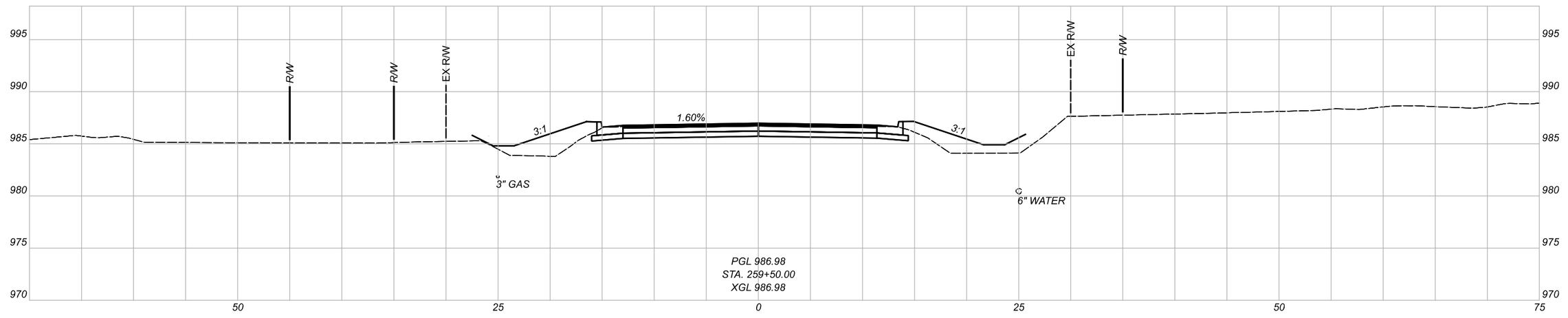
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 67 |
| TOTAL | 94 |

MED-303-4.85

MODEL: 111150.GP3I2 PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:10:06 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP3I2.dgn




# CROSS SECTIONS - S.R. 303 - ALTERNATE 2
# STA. 259+50.00 TO STA. 260+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

| SHEET | TOTAL |
|---|---|
| 68 | 94 |

MED-303-4.85

MODEL: SR303 Alt 2 (Alt Marks) - 259+50.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:08 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS3il.dgn

CROSS SECTIONS - S.R. 303 - ALTERNATE 2
STA. 261+00.00 TO STA. 262+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
BTP

REVIEWER
MDW 09/15/21

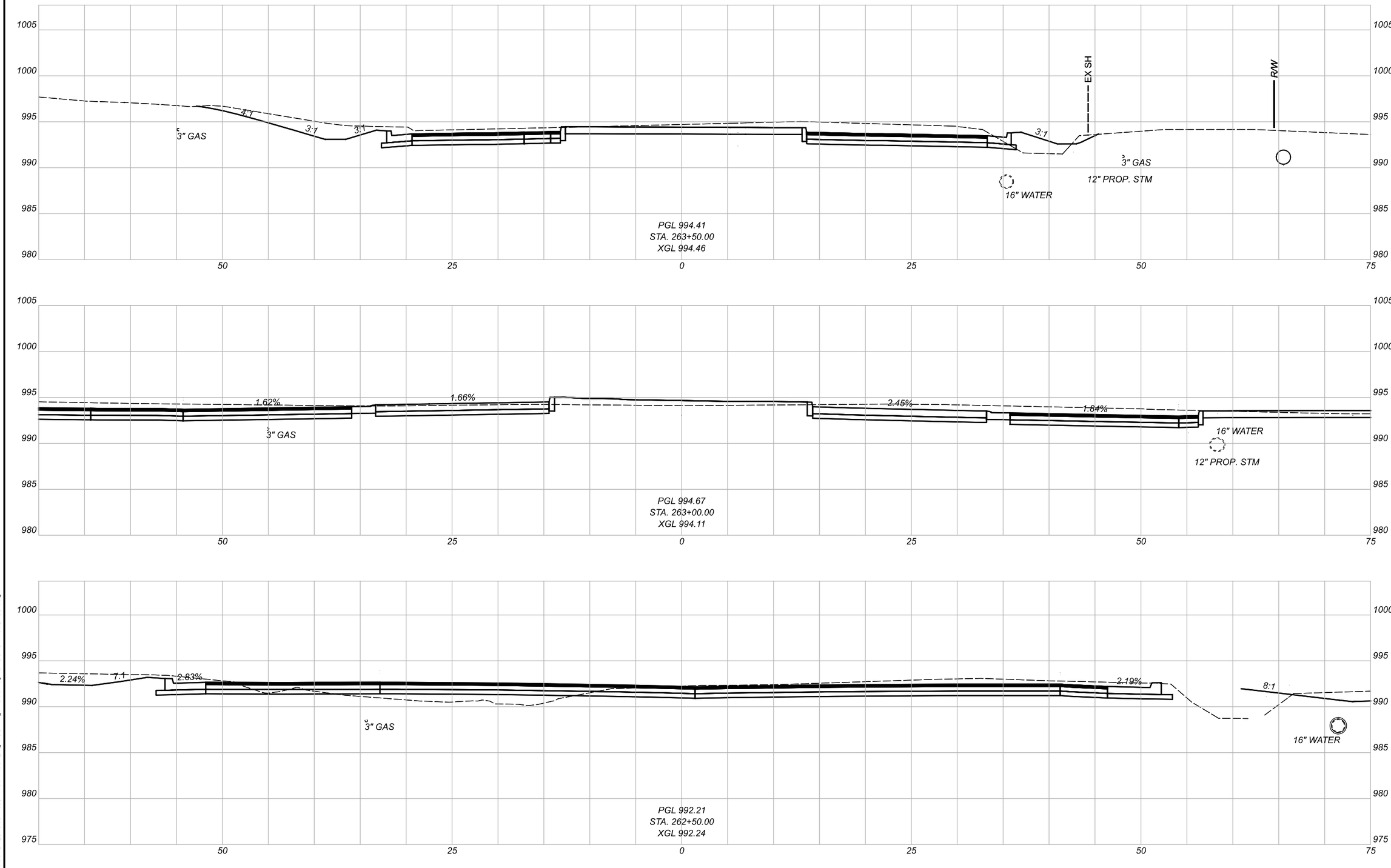
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 69 TOTAL 94

MED-303-4.85

MODEL: SR303 Alt 2 (A+ Marks) - 261+00.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:11 PM USER: dgohs
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CROSS SECTIONS - S.R. 303 - ALTERNATE 2
STA. 262+50.00 TO STA. 263+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

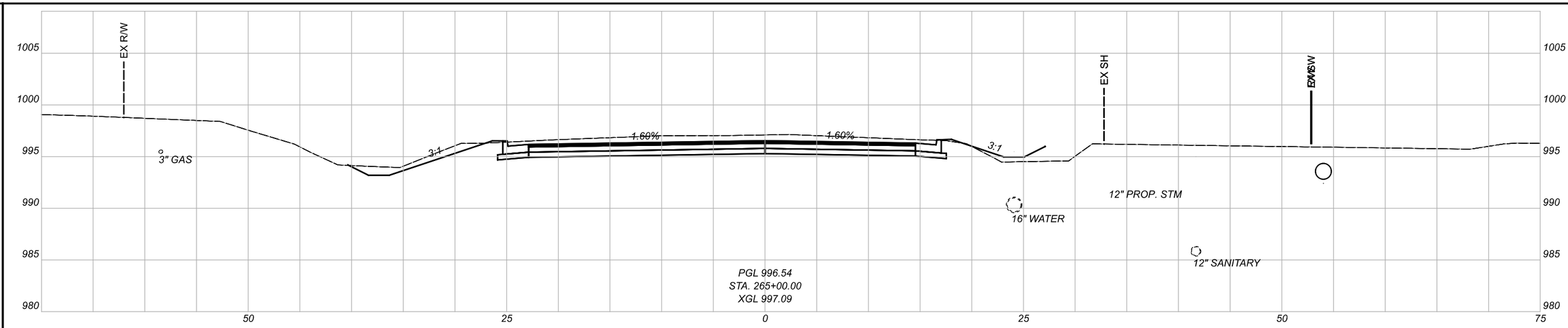
| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

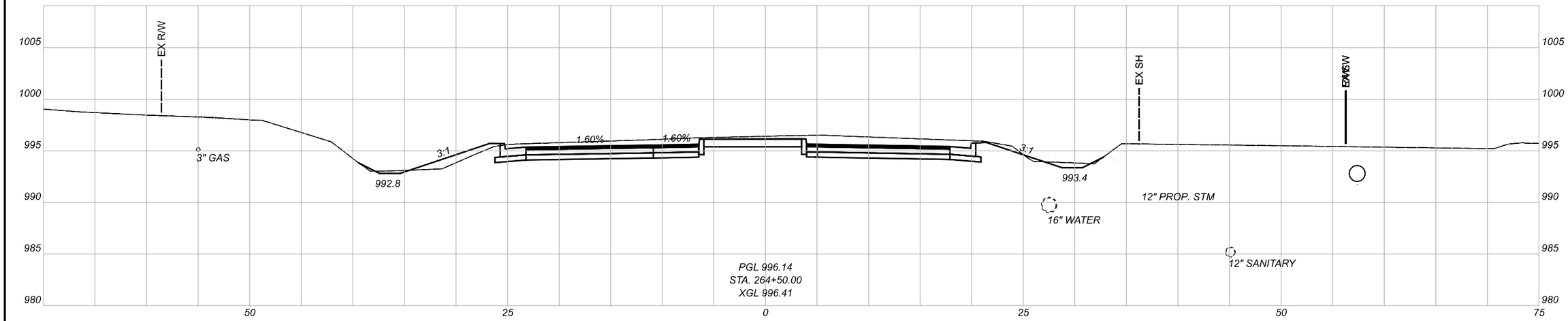
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
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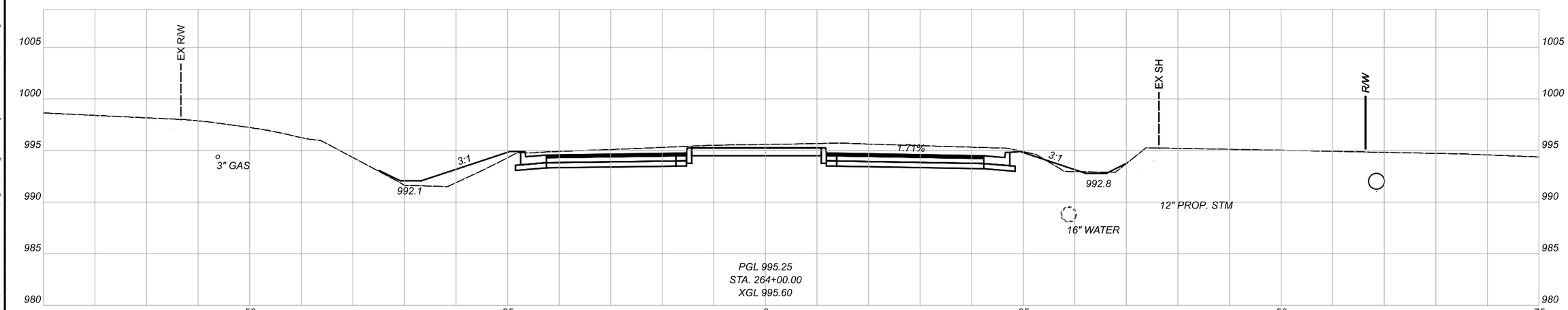
| SHEET | TOTAL |
|---|---|
| 70 | 94 |

MED-303-4.85

MODEL: SR303 Alt 2 (A+ Marks) - 262+50.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:01:13 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS3IL.dgn




CROSS SECTIONS - S.R. 303 - ALTERNATE 2
STA. 264+00.00 TO STA. 265+00.00

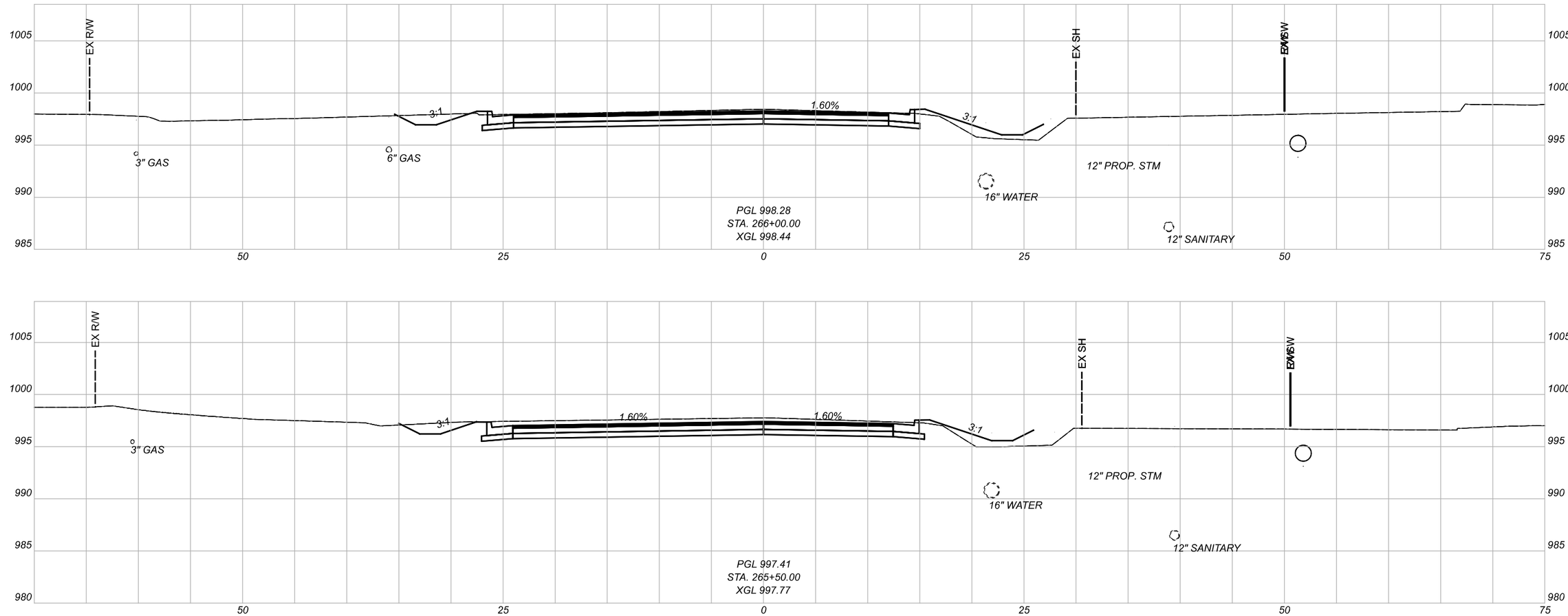
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | | SHEET | TOTAL |
|---|---|---|---|---|
| Seeding | Cut | Fill | 71 | 94 |
| - | - | - | | |

MED-303-4.85

MODEL: SR303 Alt 2 (Alt Marks) - 264+00.00 [Sheet] PAPERSIZE: 17x11 (in) DATE: 11/22/2021 TIME: 4:06:16 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS3IL.dgn




# CROSS SECTIONS - S.R. 303 - ALTERNATE 2
## STA. 265+50.00 TO STA. 266+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

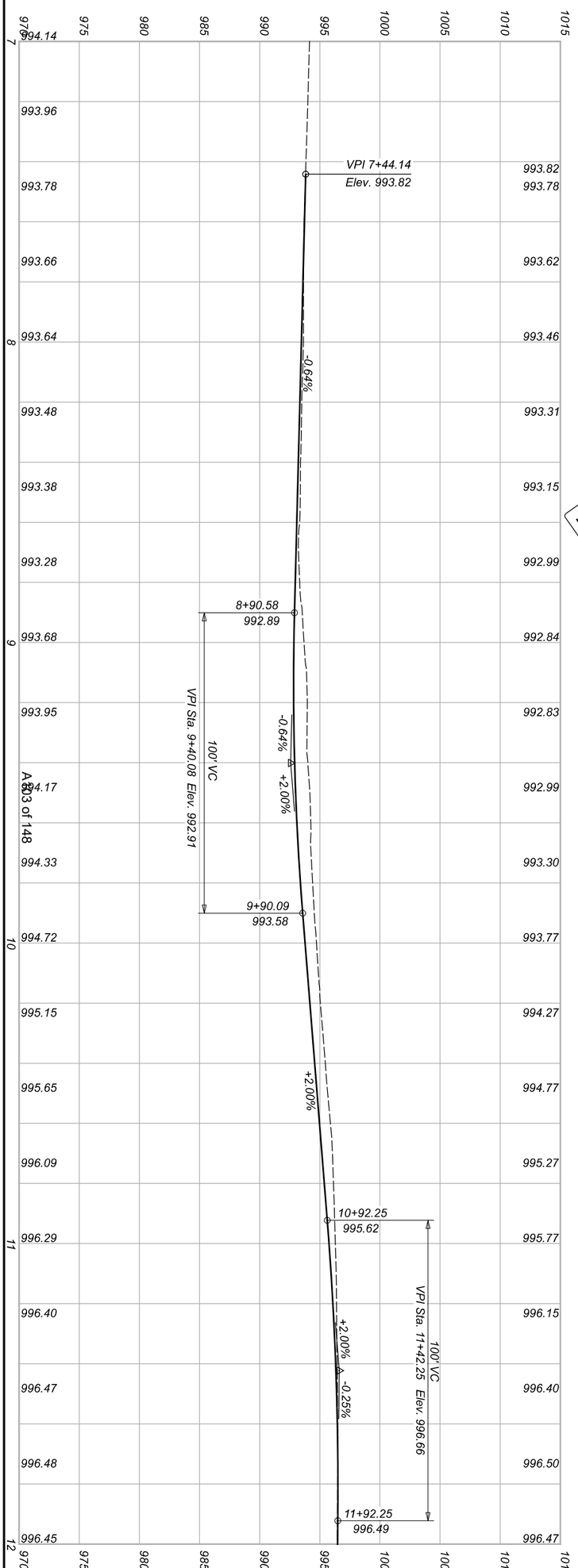
| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 72 |
| TOTAL | 94 |

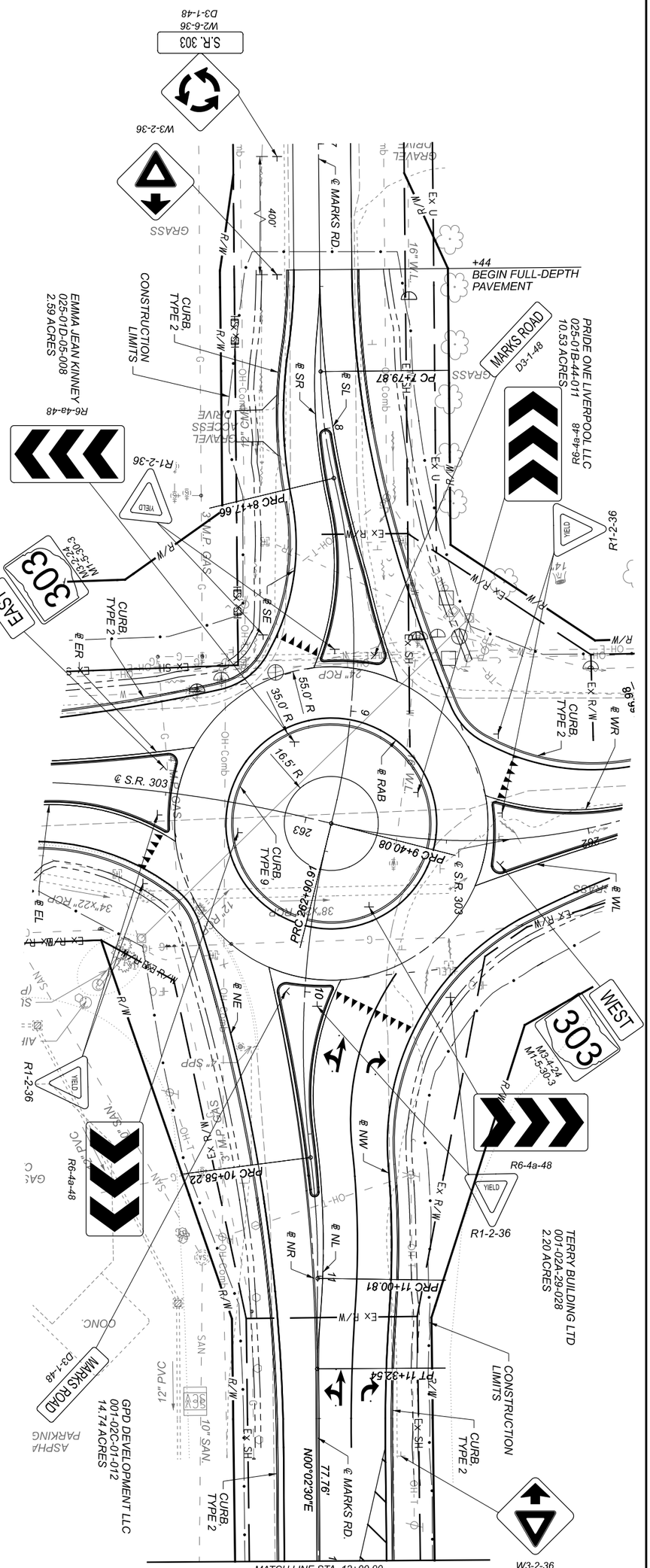
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

MODEL: SR303 Alt 2 (Alt Marks) - 265+50.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:10:18 PM USER: dgohs
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MODEL: 111150_GP33I PAPERSIZE: 17x11(In.) DATE: 11/22/2021 TIME: 4:10:20 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP33I.dgn



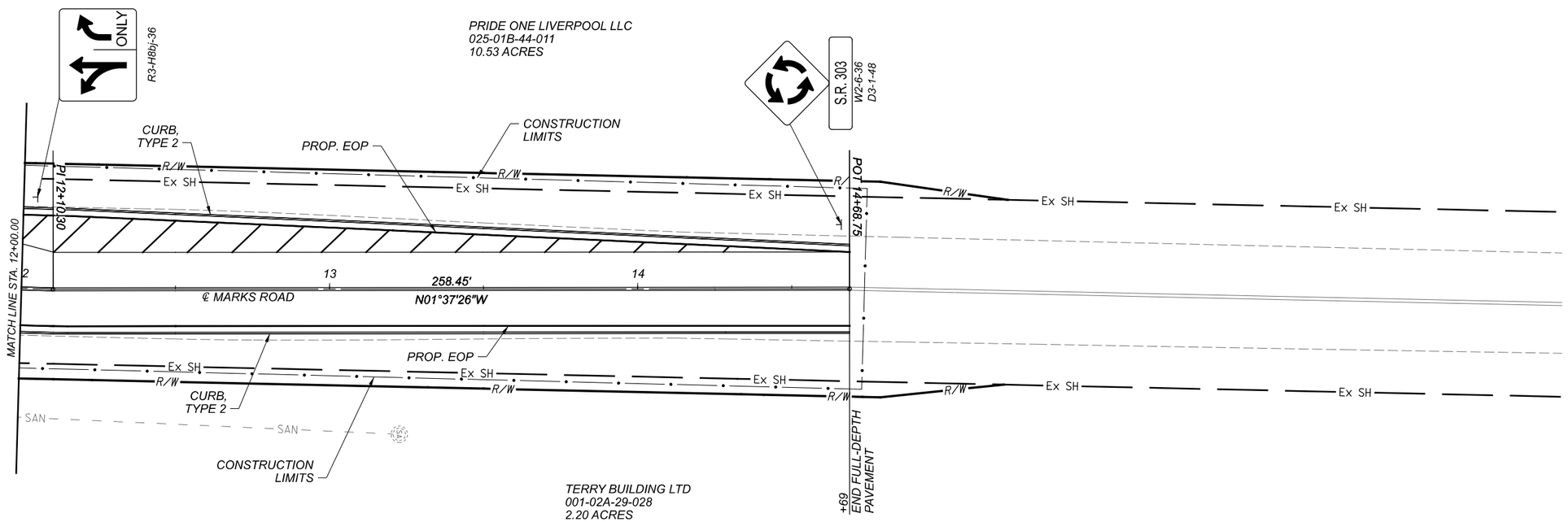


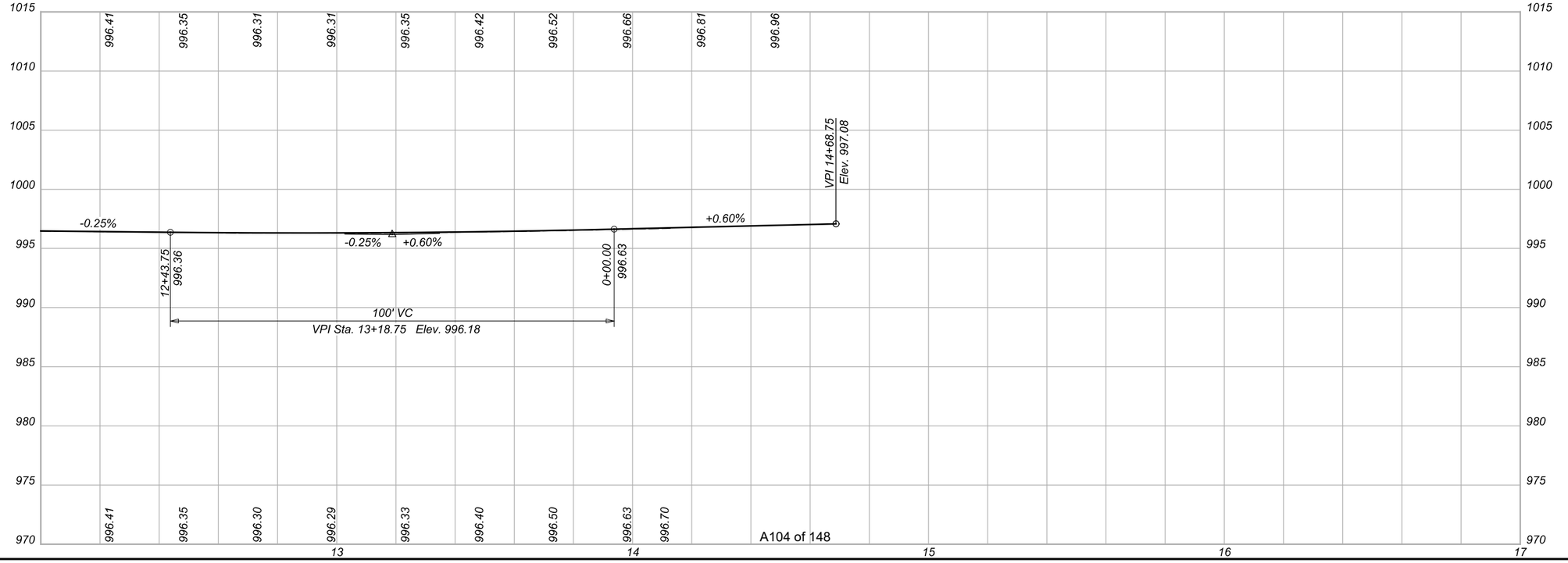

| DESIGNER | DESIGN AGENCY |
|---|---|
| DMG | CARPENTER MARTY transportation |

| REVIEWER | PROJECT ID | SHEET | TOTAL |
|---|---|---|---|
| MDW 09/15/21 | 111150 | 73 | 94 |

# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 2
## STA. 7+00.00 TO STA. 12+00.00

HORIZONTAL SCALE IN FEET
0 20
10 40






HORIZONTAL SCALE IN FEET
0 10 20 40

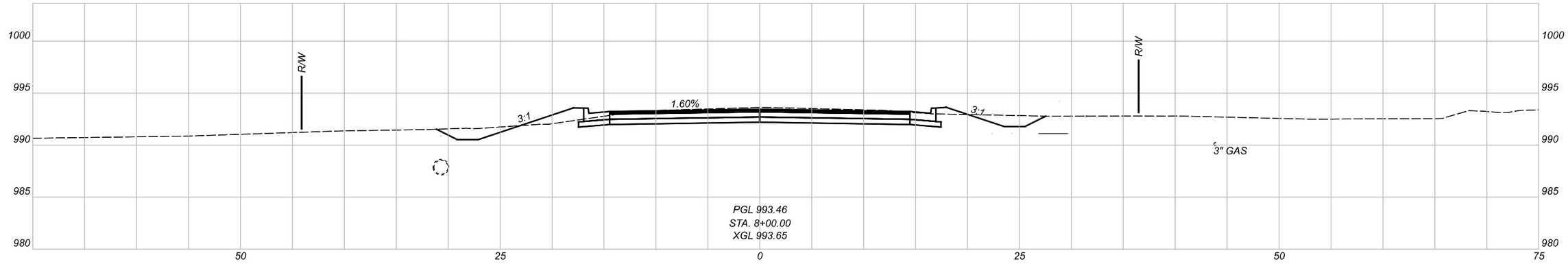
# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 2
STA. 12+00.00 TO STA. 14+68.75

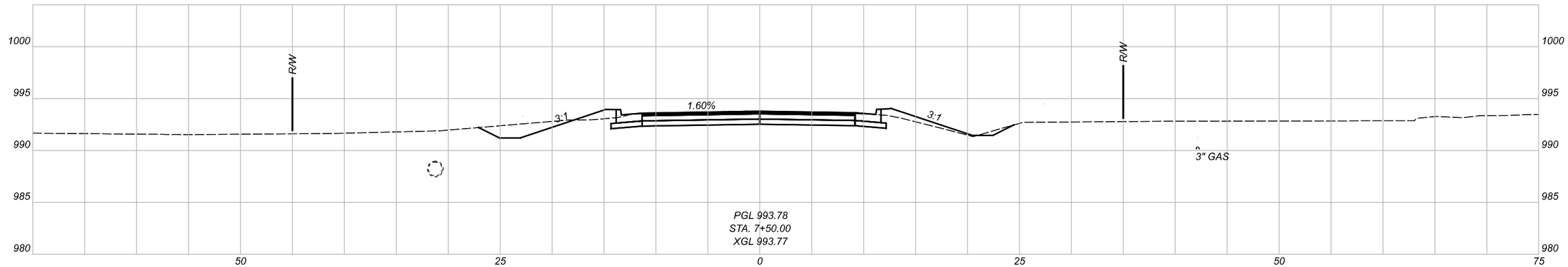
DESIGN AGENCY
CARPENTER MARTY transportation

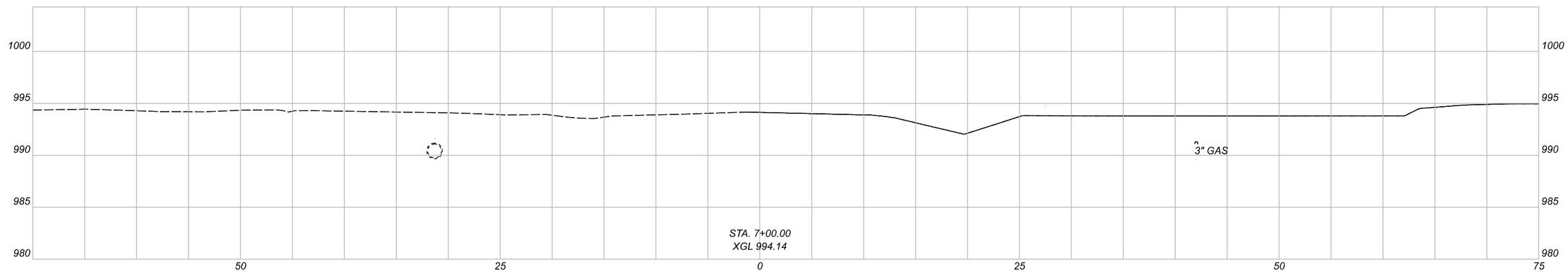
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 74 |
| TOTAL | 94 |

MED-303-4.85

MODEL: 111150_GP332 PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:10:22 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP332.dgn




# CROSS SECTIONS - MARKS ROAD - ALTERNATE 2
## STA. 7+00.00 TO STA. 8+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
BTP

REVIEWER
MDW 09/15/21

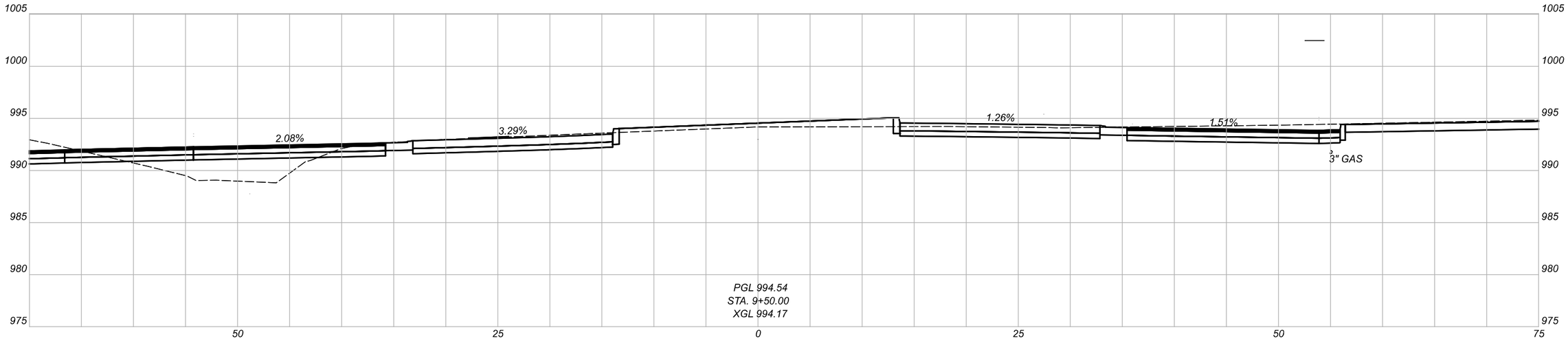
PROJECT ID
111150

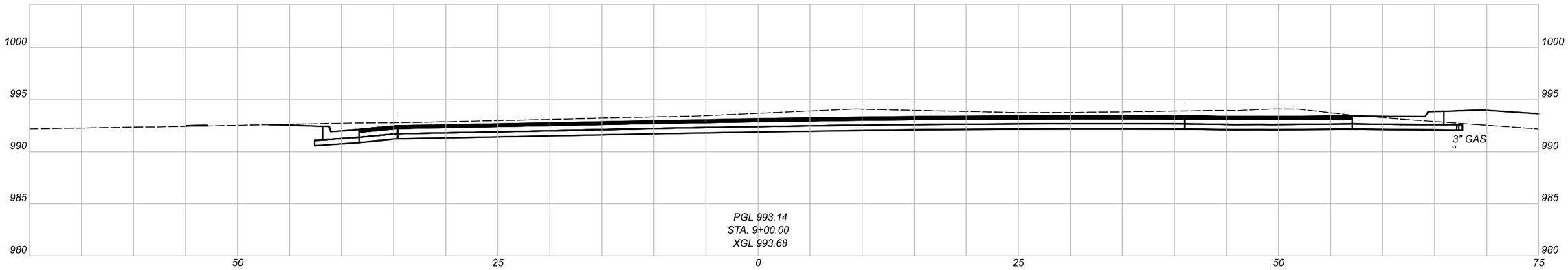
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

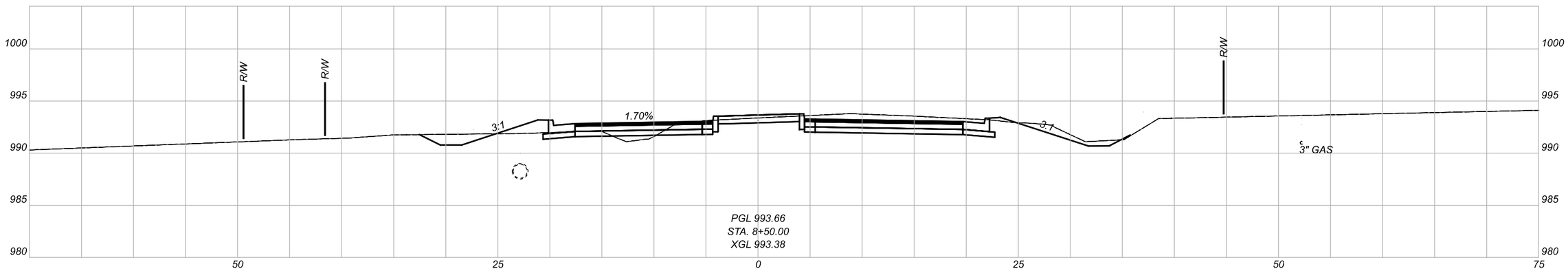
| SHEET | TOTAL |
|---|---|
| 75 | 94 |

MED-303-4.85

MODEL: CLP_MARKS Alt 2 (RAB) - 7+00.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:10:23 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS330.dgn




# CROSS SECTIONS - MARKS ROAD - ALTERNATE 2
## STA. 8+50.00 TO STA. 9+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

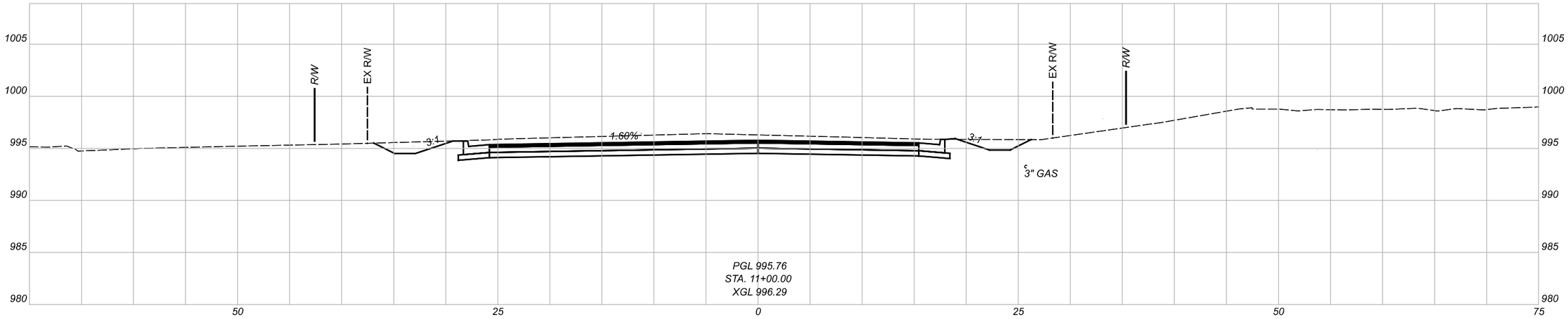
| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

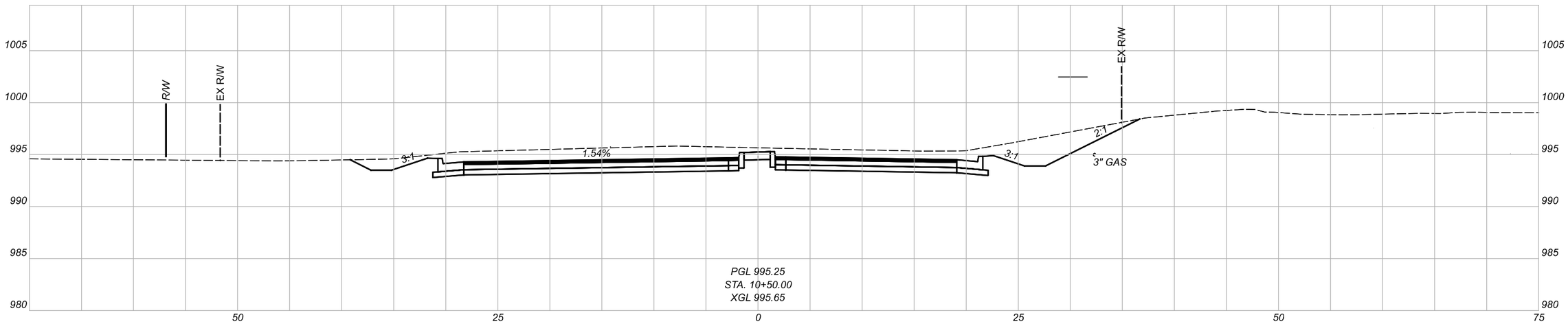
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

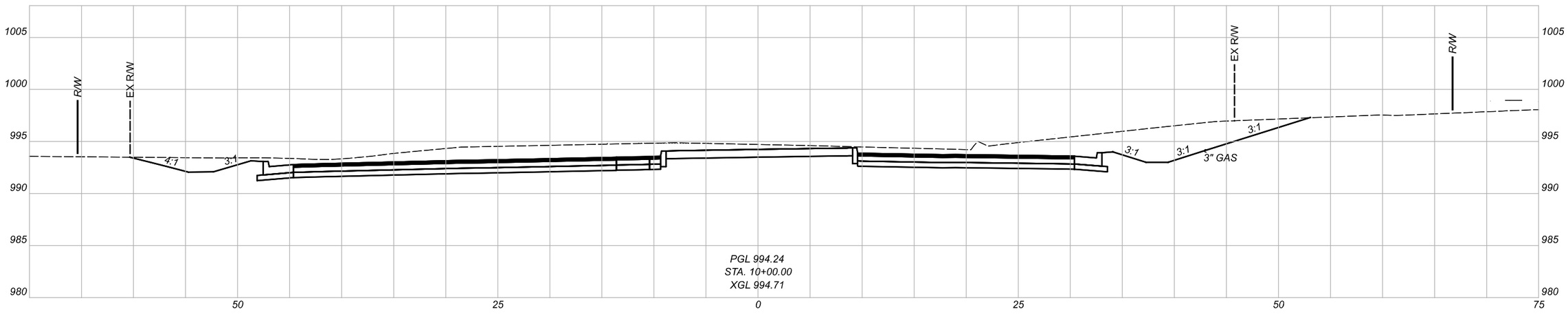
| SHEET | TOTAL |
|---|---|
| 76 | 94 |

MED-303-4.85

MODEL: CLP_MARKS Alt 2 (RAB) - 8+50.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:27 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS330.dgn




# CROSS SECTIONS - MARKS ROAD - ALTERNATE 2
## STA. 10+00.00 TO STA. 11+00.00

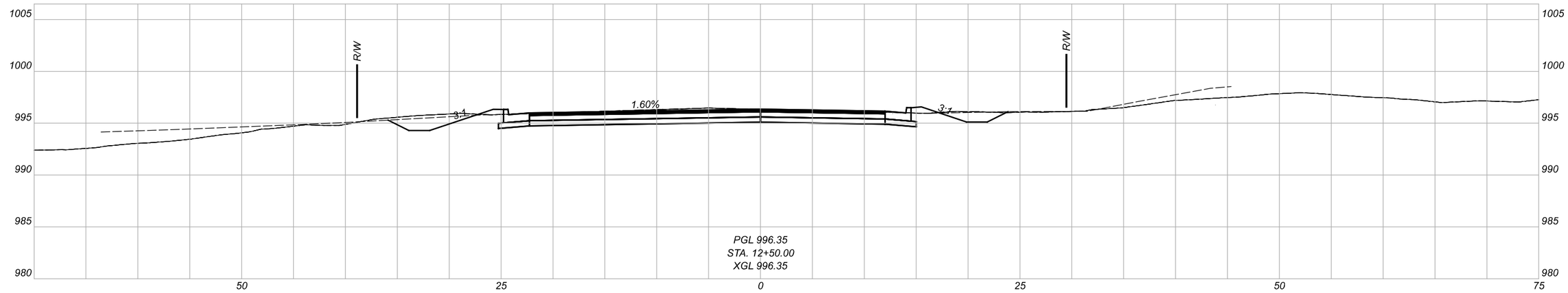
MED-303-4.85

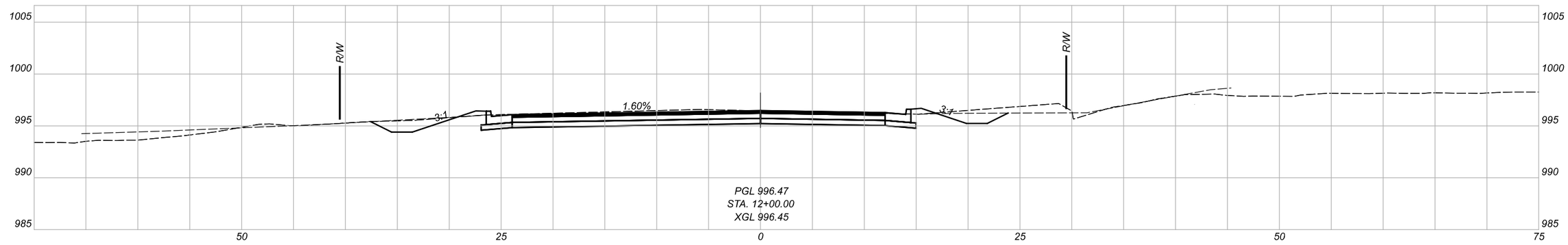
MODEL: CLP_MARKS Alt 2 (RAB) - 10+00.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:29 PM USER: dgohs
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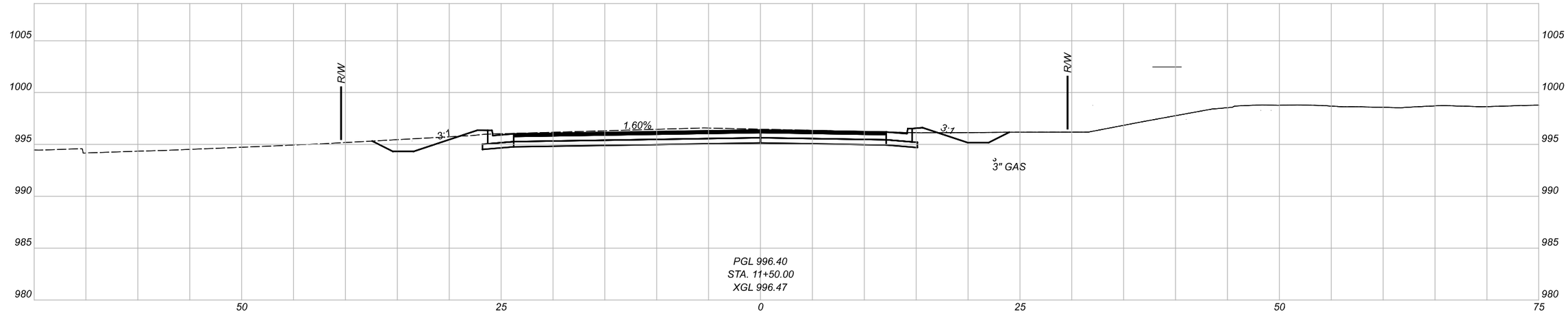
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 77 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |




CROSS SECTIONS - MARKS ROAD - ALTERNATE 2
STA. 11+50.00 TO STA. 12+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
BTP

REVIEWER
MDW 09/15/21

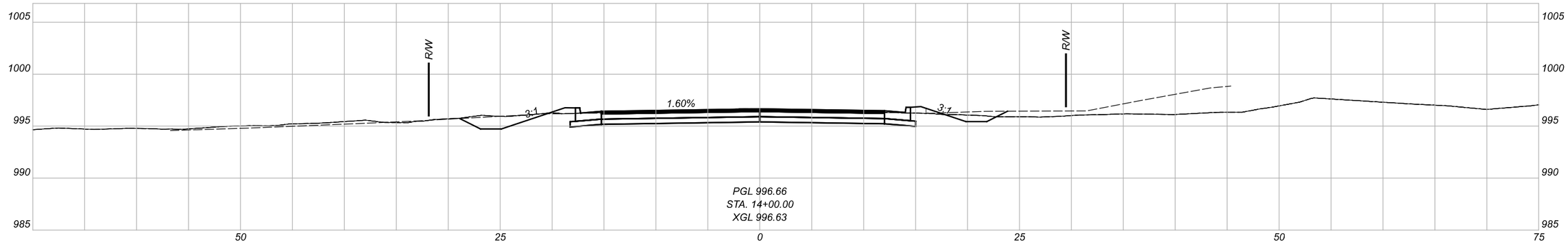
PROJECT ID
111150

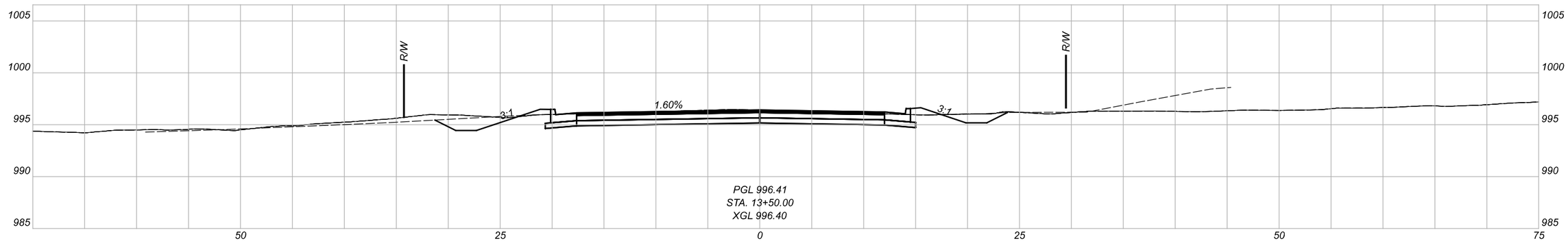
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|---|---|---|
| Seeding | Cut | Fill |
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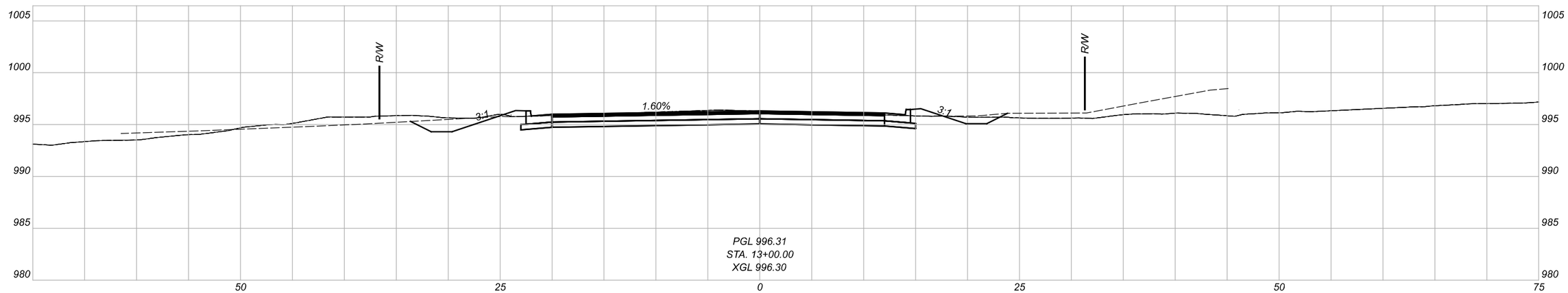
SHEET 78 TOTAL 94

MED-303-4.85

MODEL: CLP_MARKS Alt 2 (RAB) - 11+50.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:31 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS330.dgn




# CROSS SECTIONS - MARKS ROAD - ALTERNATE 2
## STA. 13+00.00 TO STA. 14+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
BTP

REVIEWER
MDW 09/15/21

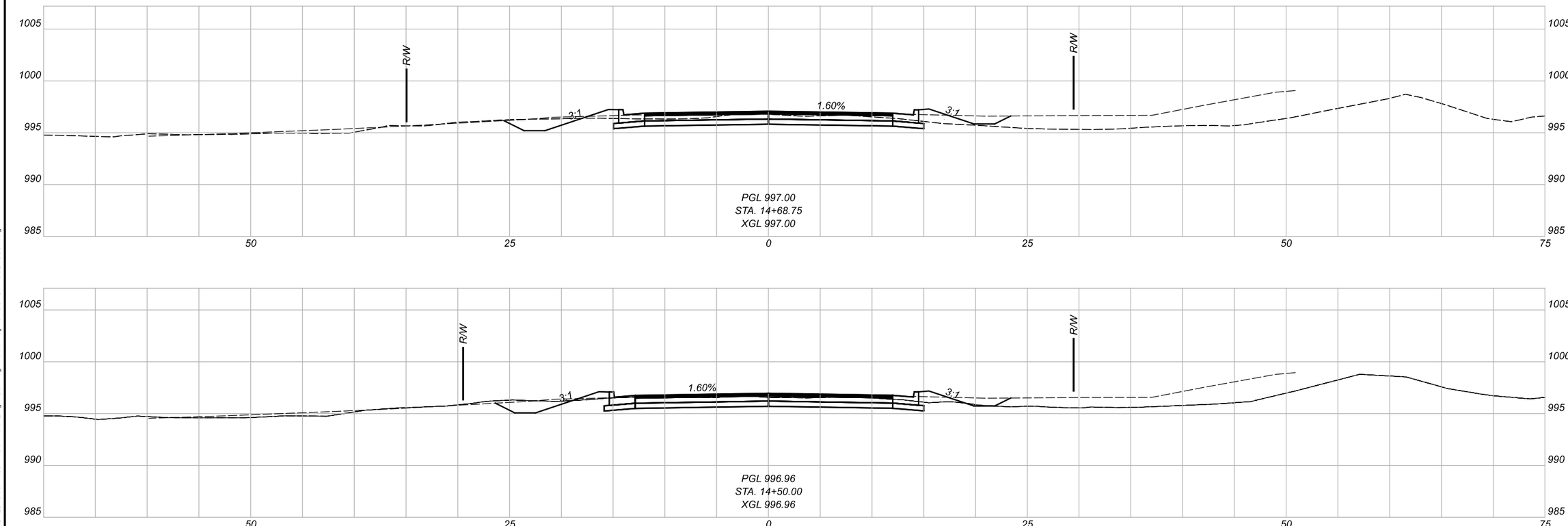
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 79 TOTAL 94

MED-303-4.85

MODEL: CLP_MARKS ALT 2 (RAB) - 13+00.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:33 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS330.dgn




CROSS SECTIONS - MARKS ROAD - ALTERNATE 2
STA. 14+50.00 TO STA. 14+68.75

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
BTP

REVIEWER
MDW 09/15/21

PROJECT ID
111150

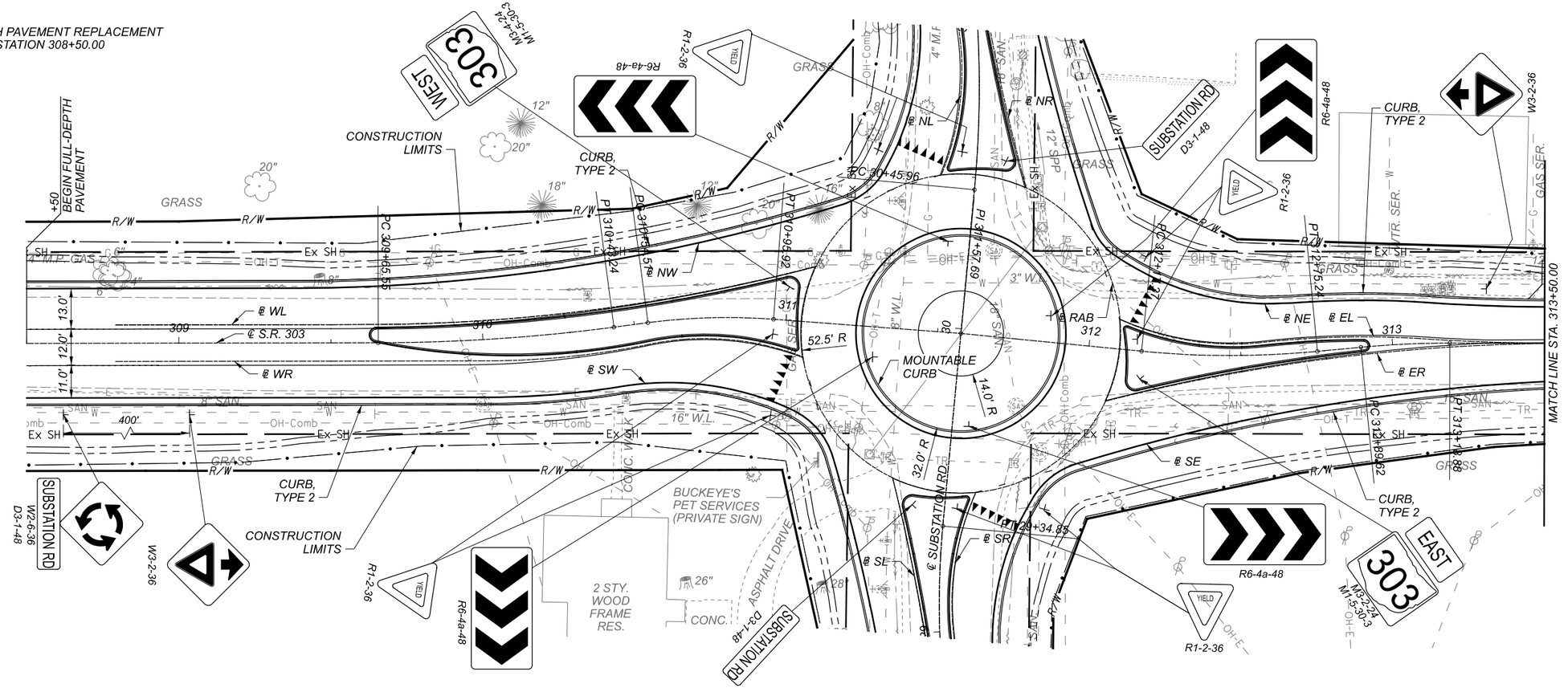
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

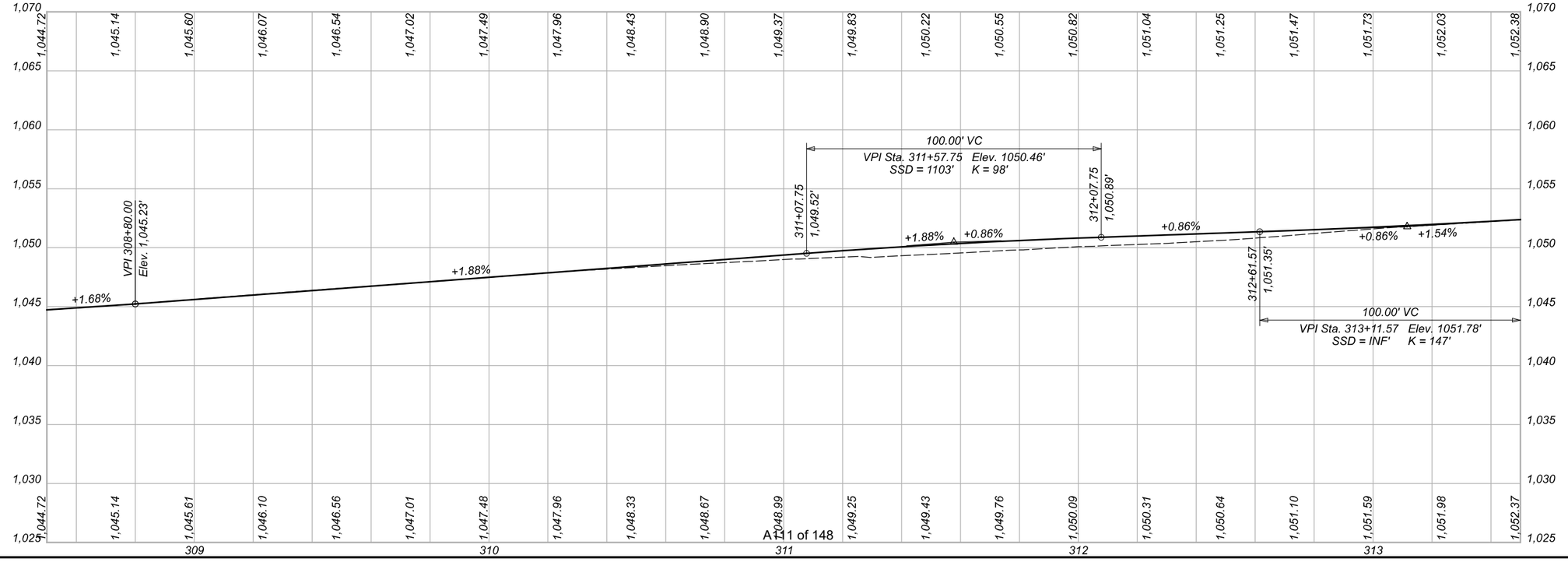
SHEET 80 TOTAL 94

MED-303-4.85

MODEL: CLP_MARKS Alt 2 (RAB) - 14+50.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:35 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS330.dgn

NOTES:
1. FULL-DEPTH PAVEMENT REPLACEMENT BEGINS AT STATION 308+50.00




HORIZONTAL SCALE IN FEET
0 10 20 40

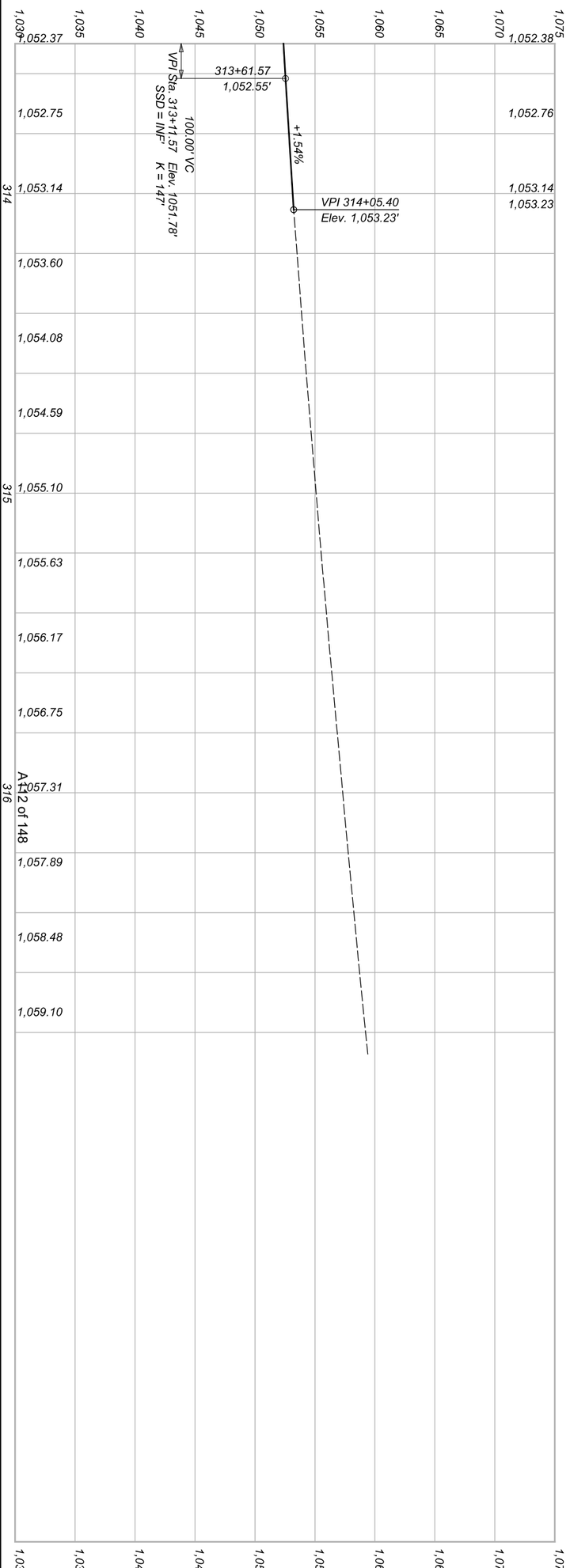
# PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
## STA. 308+50.00 TO STA. 313+50.00

DESIGN AGENCY
CARPENTER MARTY Transportation

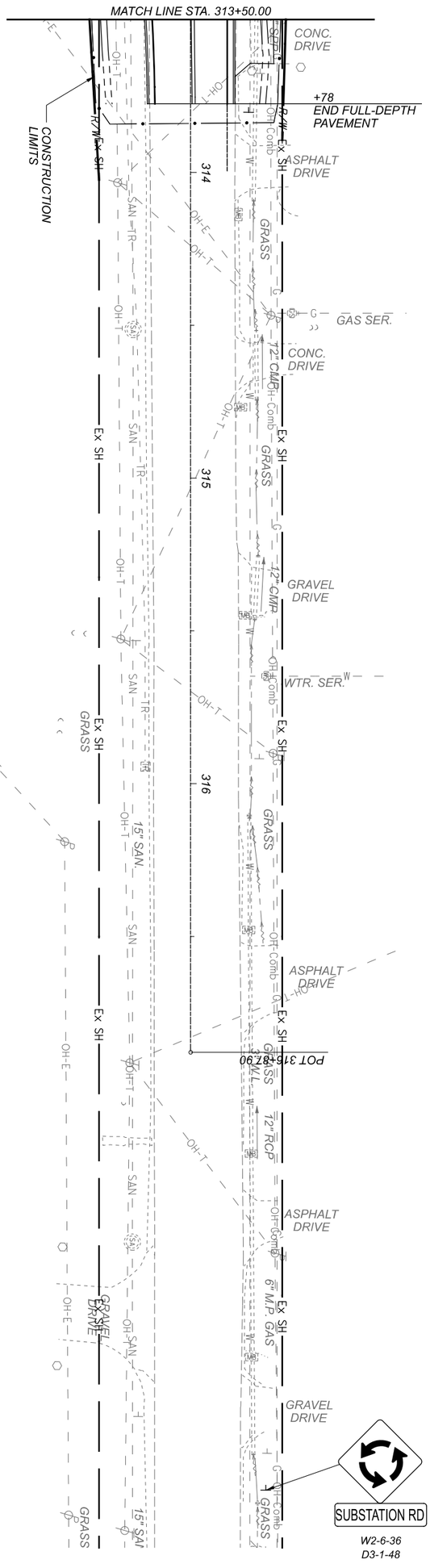
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 81 |
| TOTAL | 94 |

MED-303-4.85

MODEL: 111150_GP2ll PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:40 PM USER: dgohs
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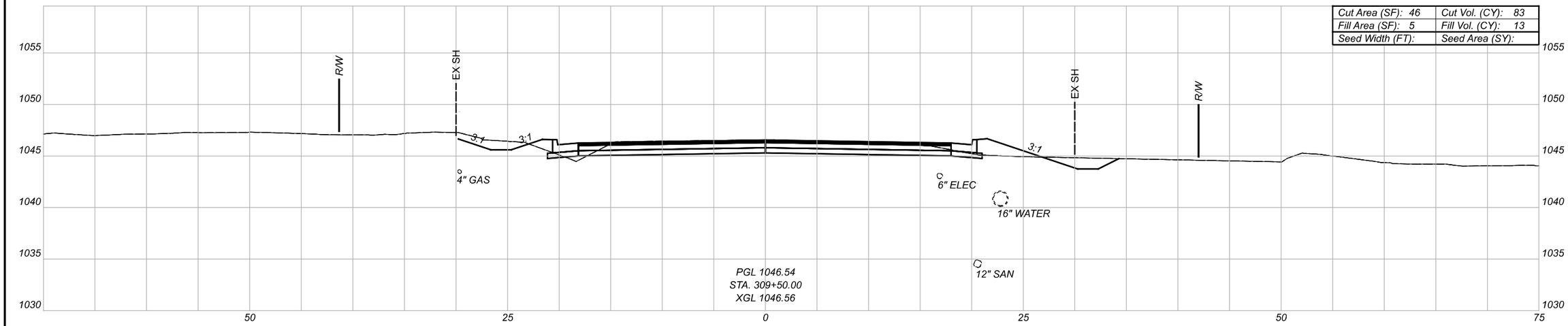


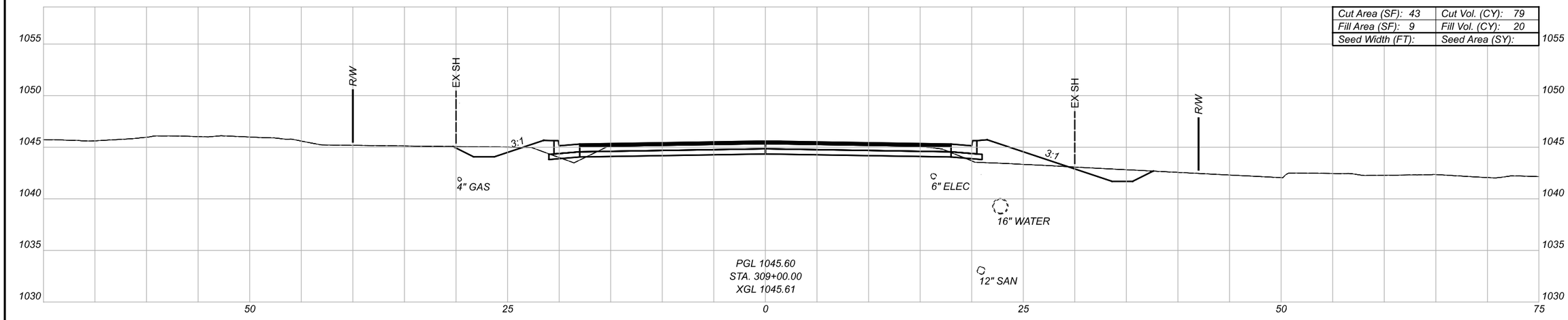



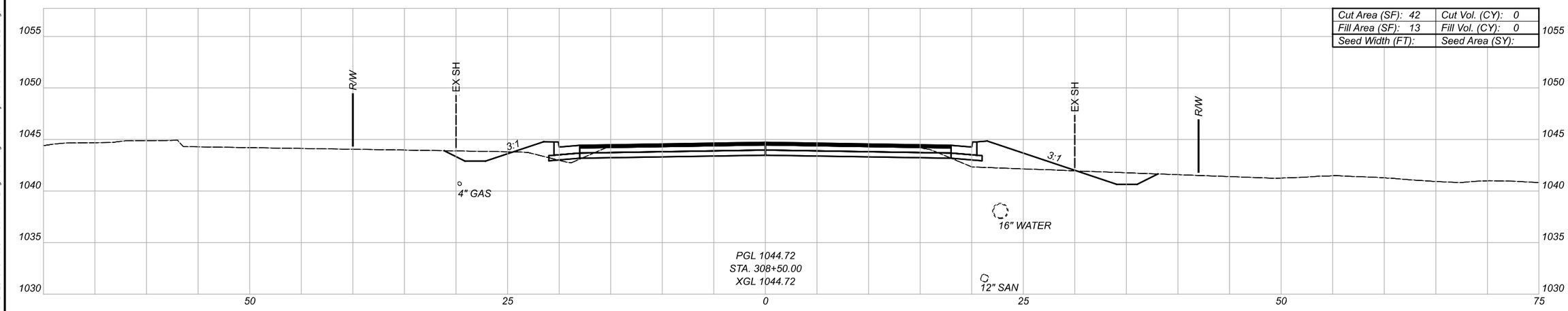



PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
STA. 313+50.00 TO STA. 318+50.00

HORIZONTAL SCALE IN FEET
0 20
10 40




CROSS SECTIONS - S.R. 303 - ALTERNATE 2
STA. 308+50.00 TO STA. 309+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

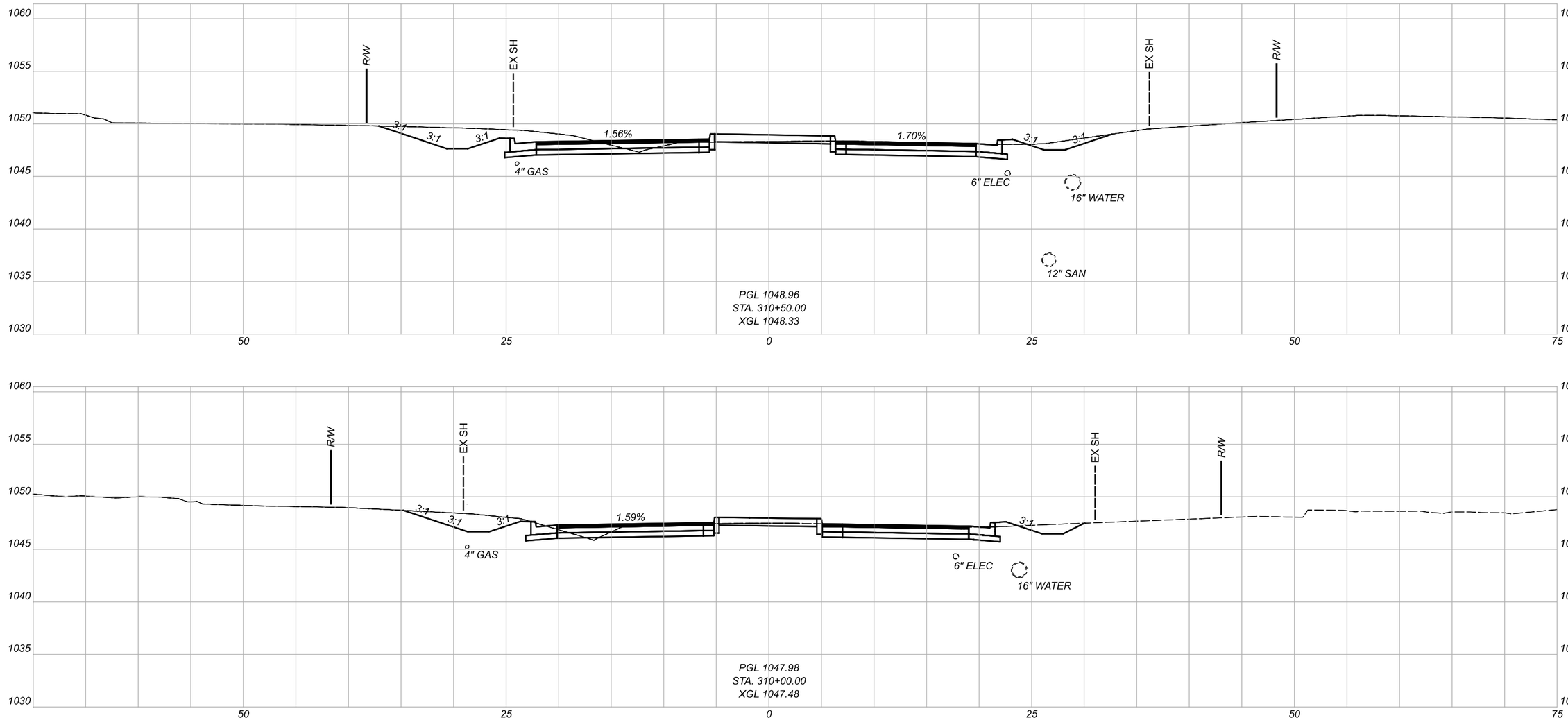
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

| SHEET | TOTAL |
|---|---|
| 83 | 94 |

MED-303-4.85

MODEL: SR303 ALT 2 (SUBSTATION RAB) - 308+50.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:06:44 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS2ILdgn




# CROSS SECTIONS - S.R. 303 - ALTERNATE 2
# STA. 310+00.00 TO STA. 310+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

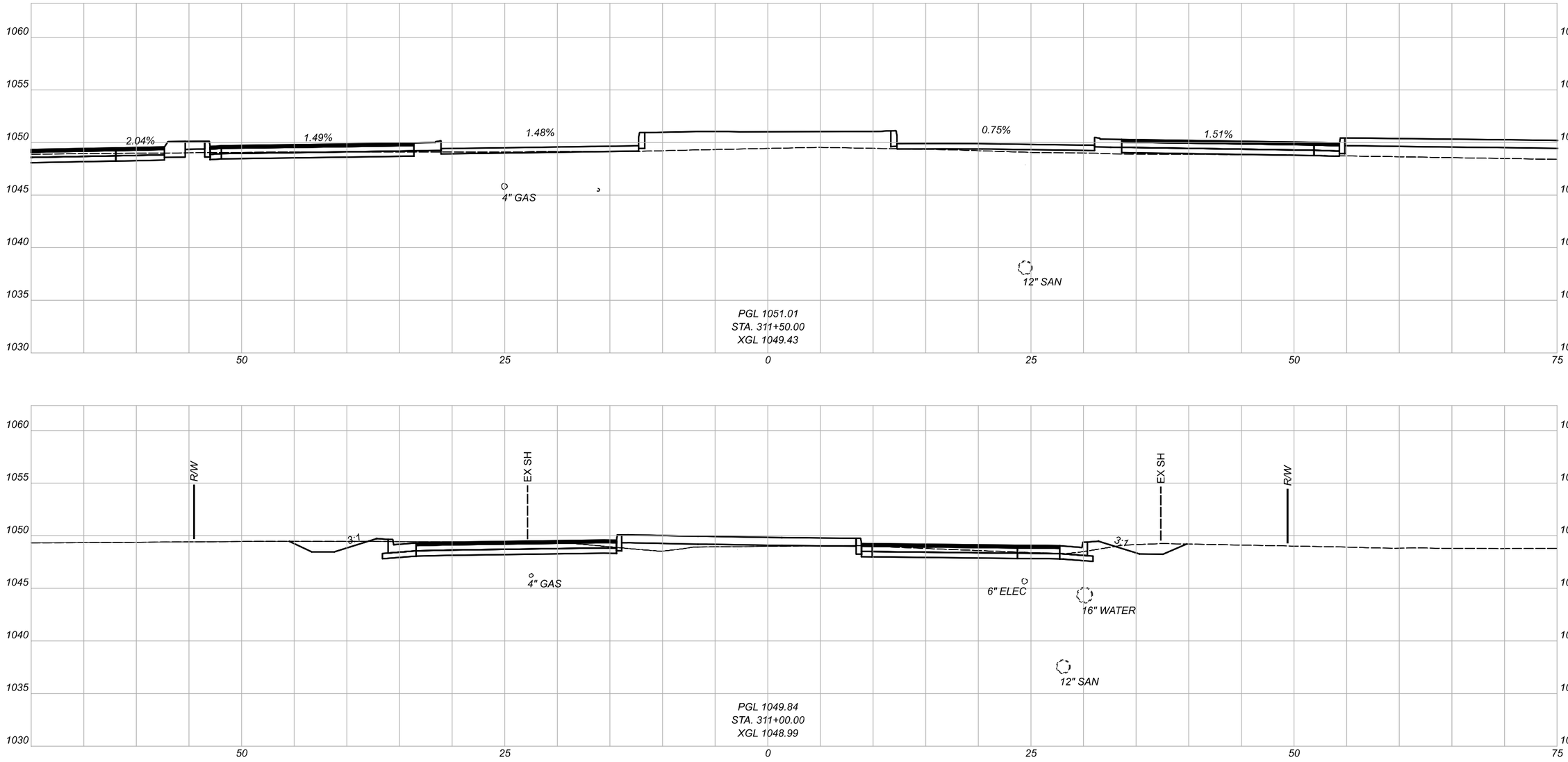
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 84 TOTAL 94

MED-303-4.85

MODEL: SR303 ALT 2 (SUBSTATION RAB) - 310+00.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:46 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS2ll.dgn




# CROSS SECTIONS - S.R. 303 - ALTERNATE 2
## STA. 311+00.00 TO STA. 311+50.00

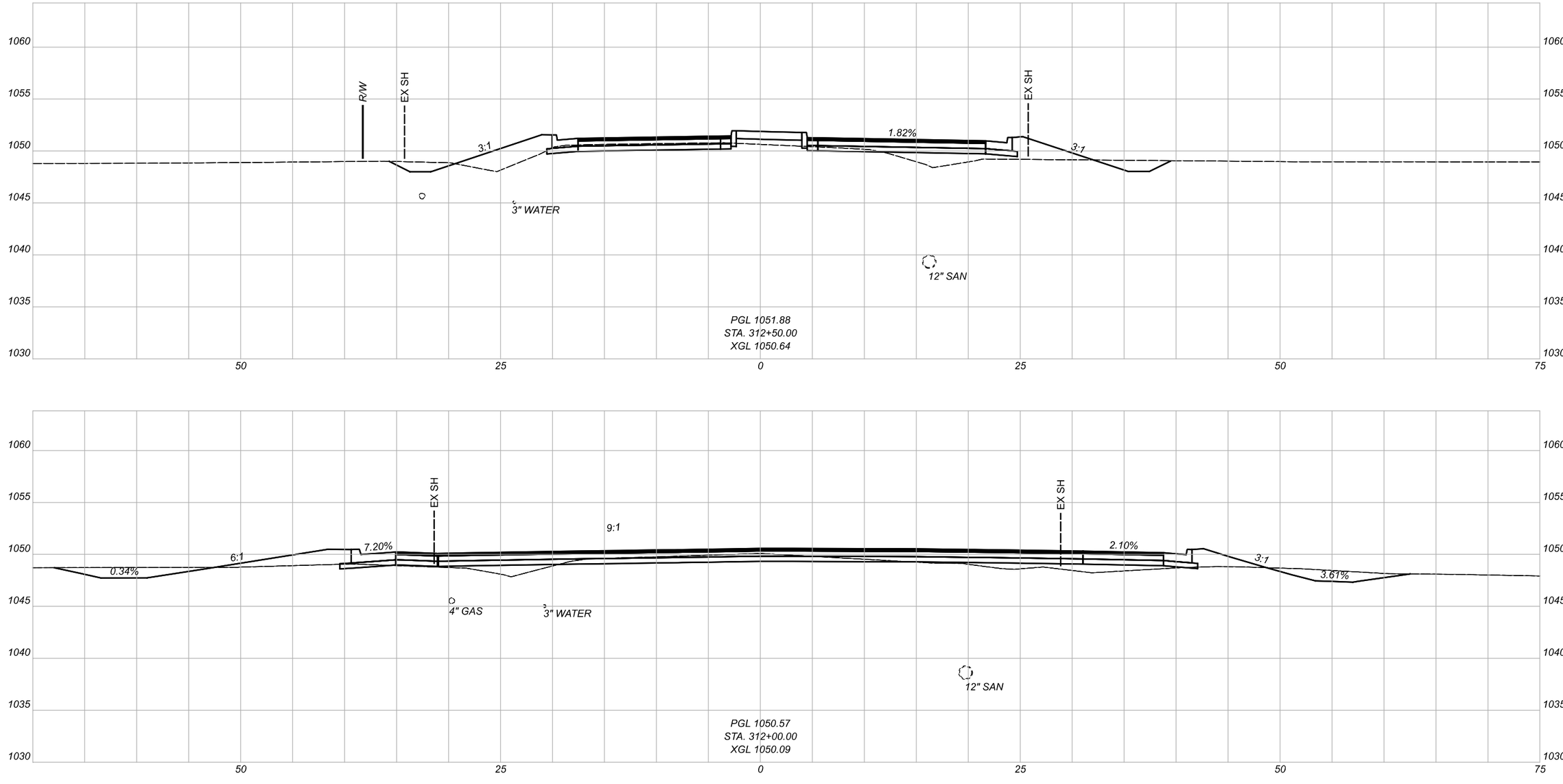
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 85 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

MODEL: SR303 ALT 2 (SUBSTATION RAB) - 311+00.00 [Sheet] PAPERSIZE: 11x17 (in.) DATE: 11/22/2021 TIME: 4:10:47 PM USER: dgohs
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# CROSS SECTIONS - S.R. 303 - ALTERNATE 2
## STA. 312+00.00 TO STA. 312+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

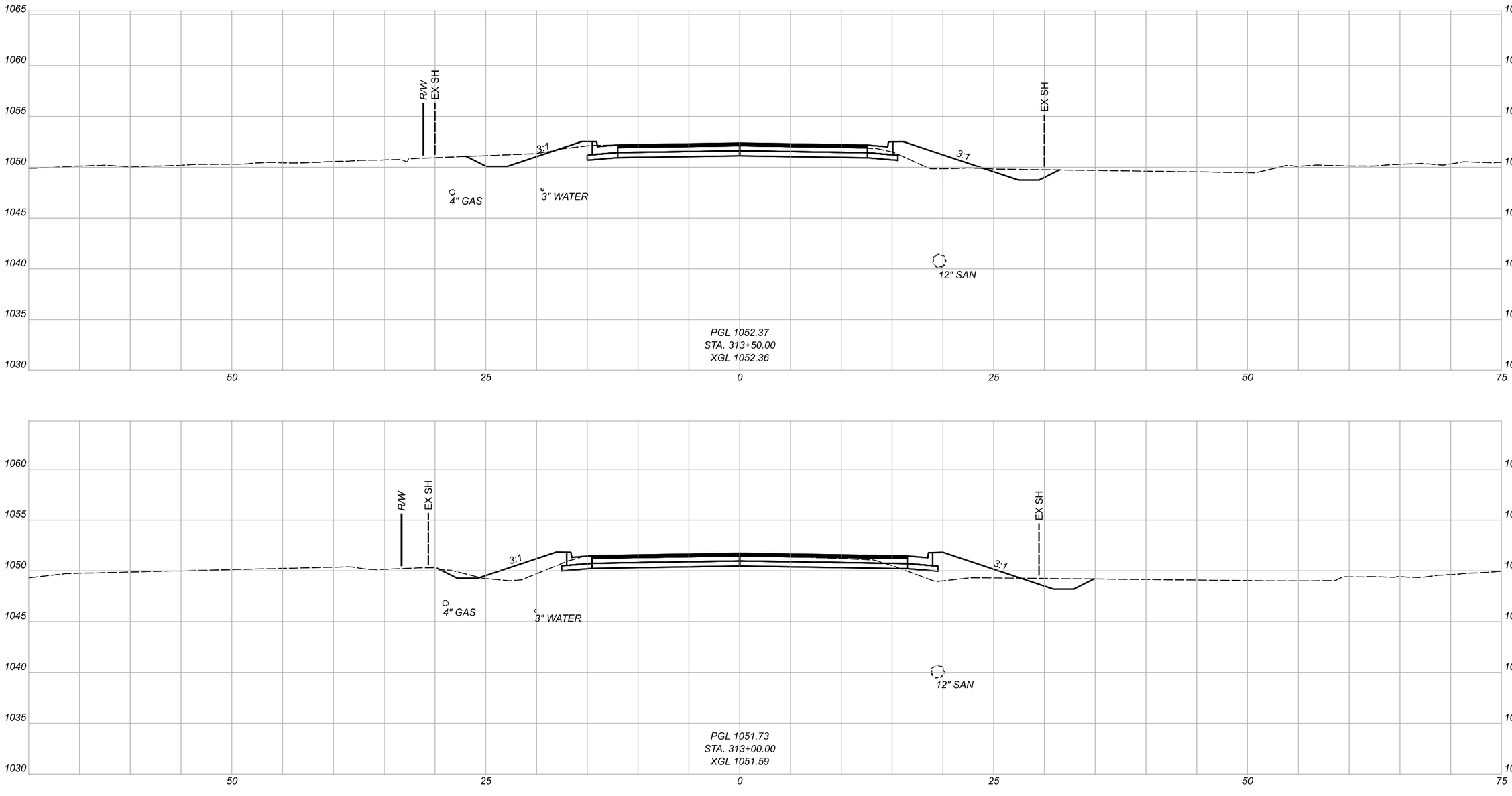
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

| SHEET | TOTAL |
|---|---|
| 86 | 94 |

MED-303-4.85

MODEL: SR303 ALT 2 (SUBSTATION RAB) - 312+00.00 [Sheet] PAPERSIZE: 17x11in.] DATE: 11/22/2021 TIME: 4:10:48 PM USER: dgohs
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# CROSS SECTIONS - S.R. 303 - ALTERNATE 2
# STA. 313+00.00 STA. STA. 313+50.00

MED-303-4.85

MODEL: SR303 ALT 2 (SUBSTATION RAB) - 313+00.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:50 PM USER: dgohs
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DESIGN AGENCY
CARPENTER MARTY Transportation

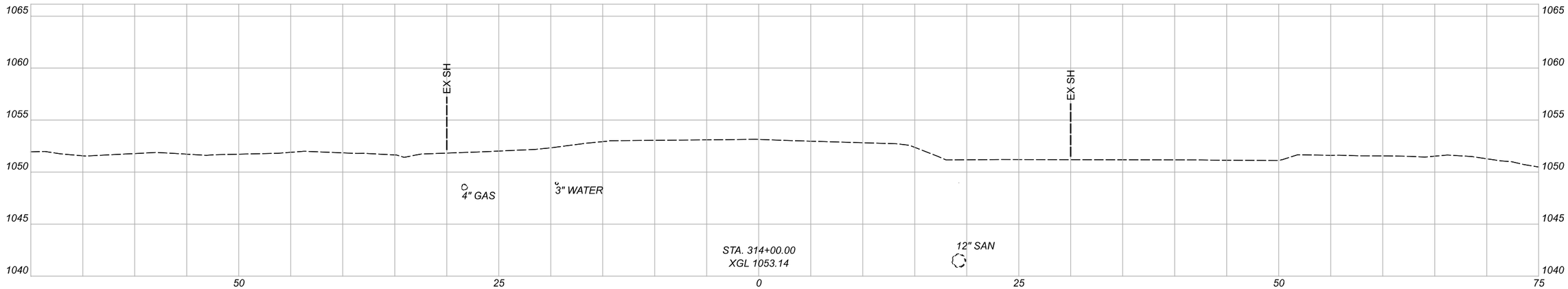
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|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |

| Sheet Totals | | | SHEET | TOTAL |
|---|---|---|---|---|
| Seeding | Cut | Fill | 87 | 94 |
| - | - | - | | |

MED-303-4.85

MODEL: SR303 ALT 2 (SUBSTATION RAB) - 314+00.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:10:51 PM USER: dgohs
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# CROSS SECTIONS - S.R. 303 - ALTERNATE 2
## STA. 314+00.00




DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

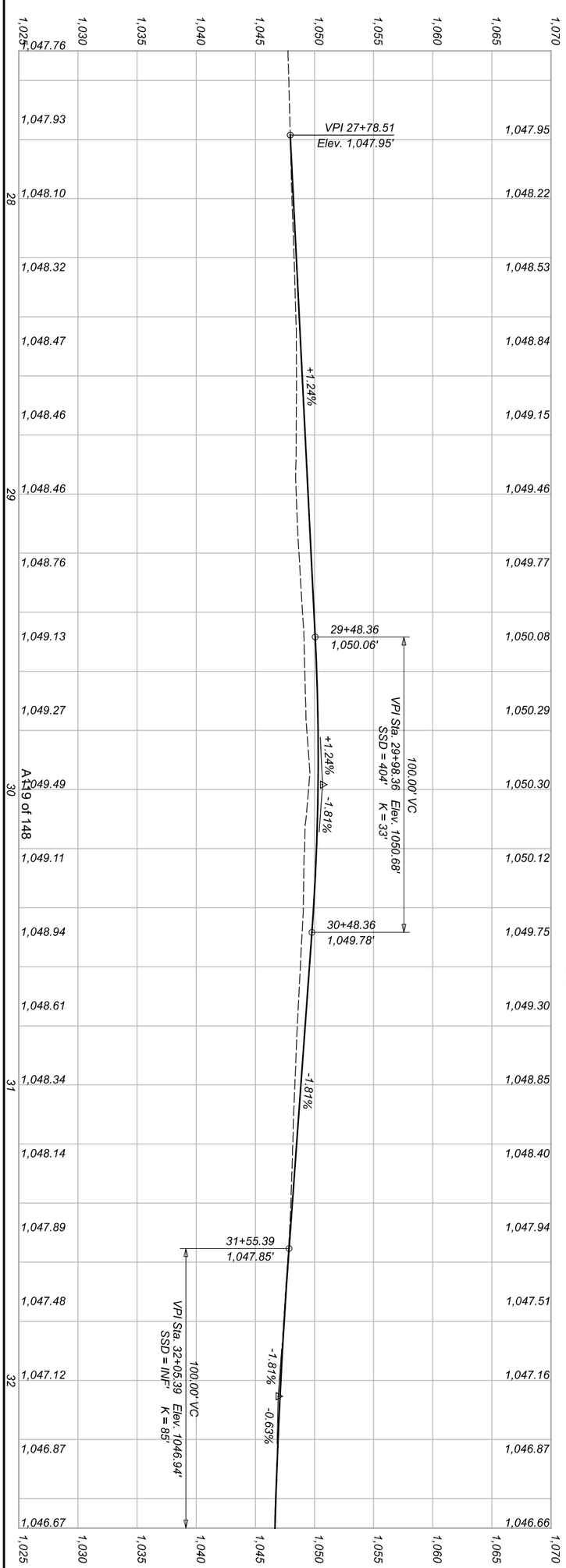
REVIEWER
MDW 09/15/21

PROJECT ID
111150

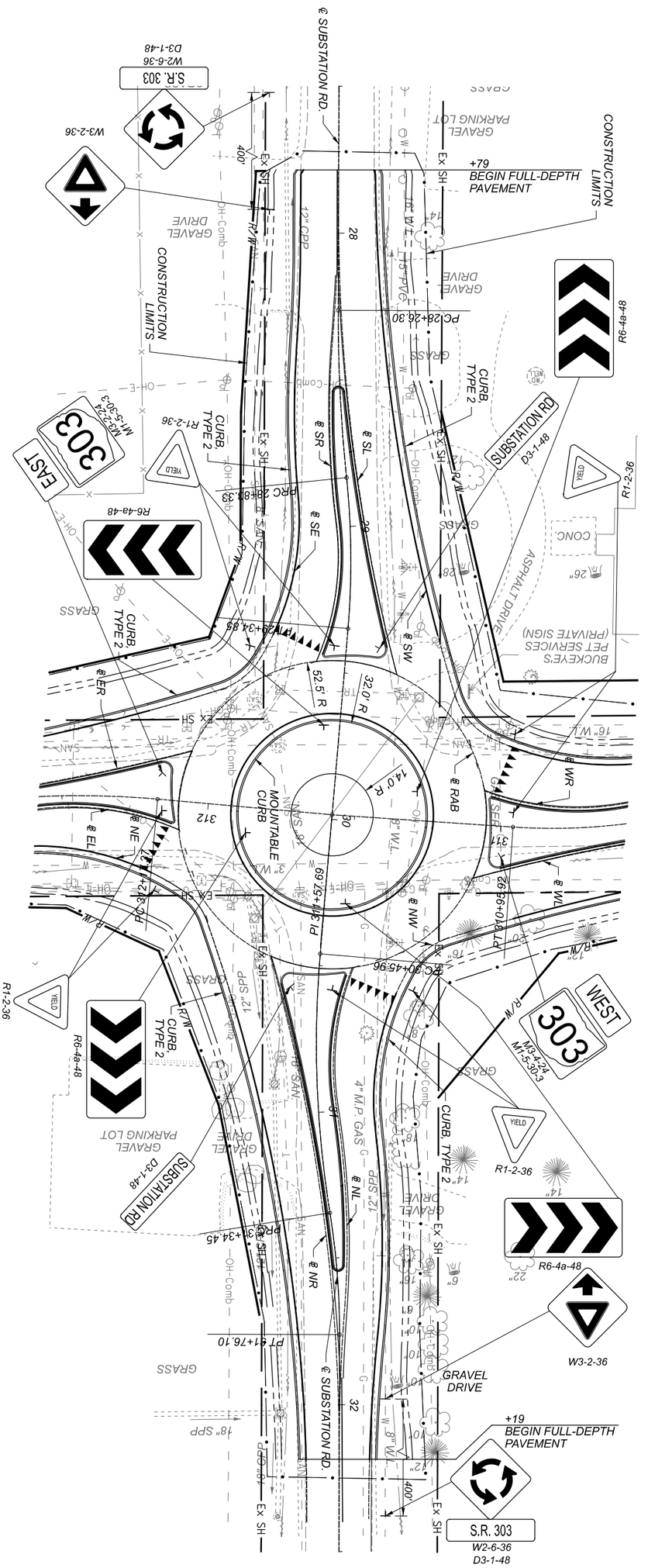
| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 88 TOTAL 94

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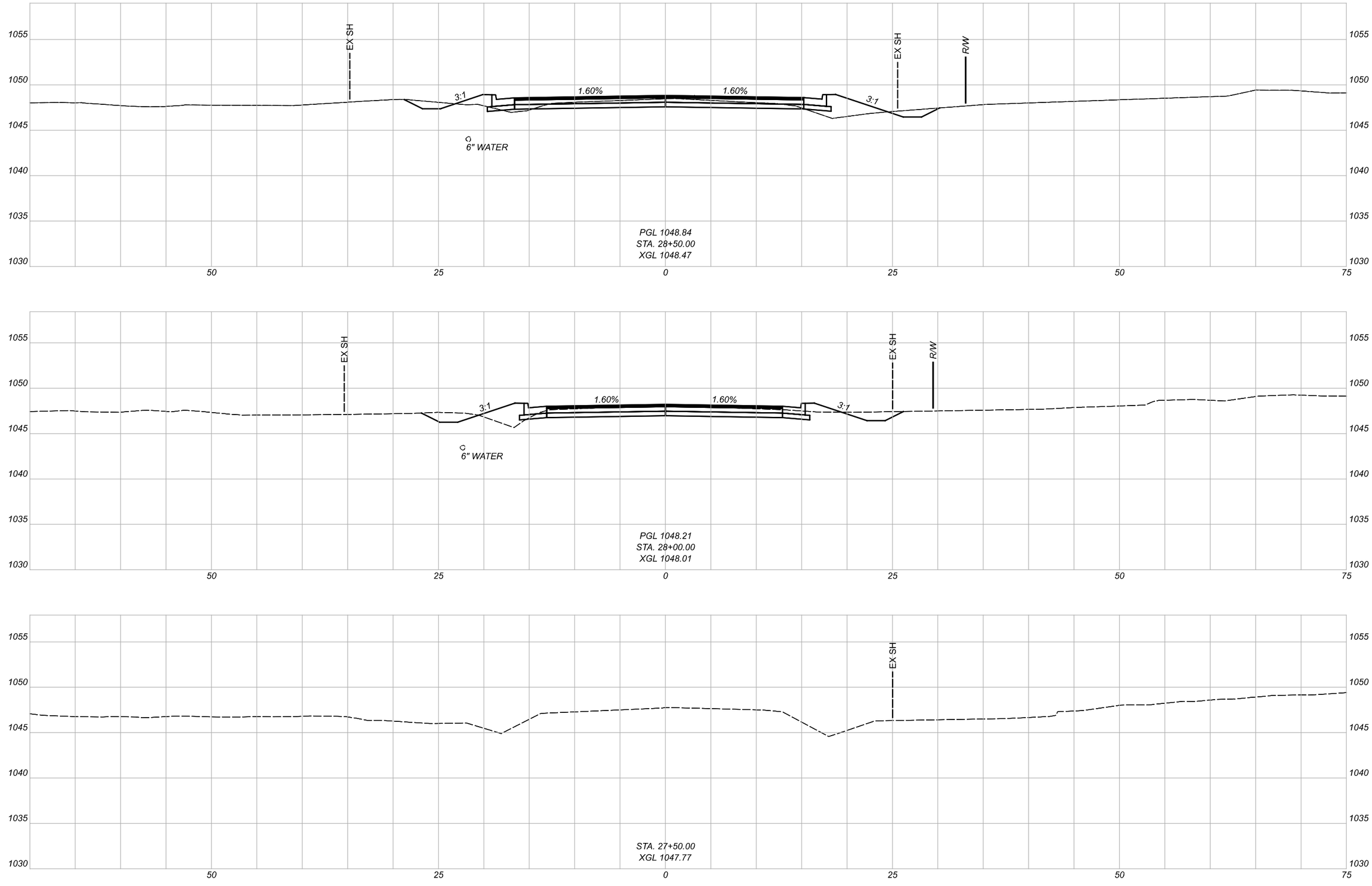





PLAN AND PROFILE - SUBSTATION RD. - ALTERNATE 2
STA. 27+50.00 TO STA. 32+50.00

HORIZONTAL SCALE IN FEET
0 20
10 40










# CROSS SECTIONS - SUBSTATION RD. - ALTERNATE 2
## STA. 27+50.00 TO STA. 28+50.00

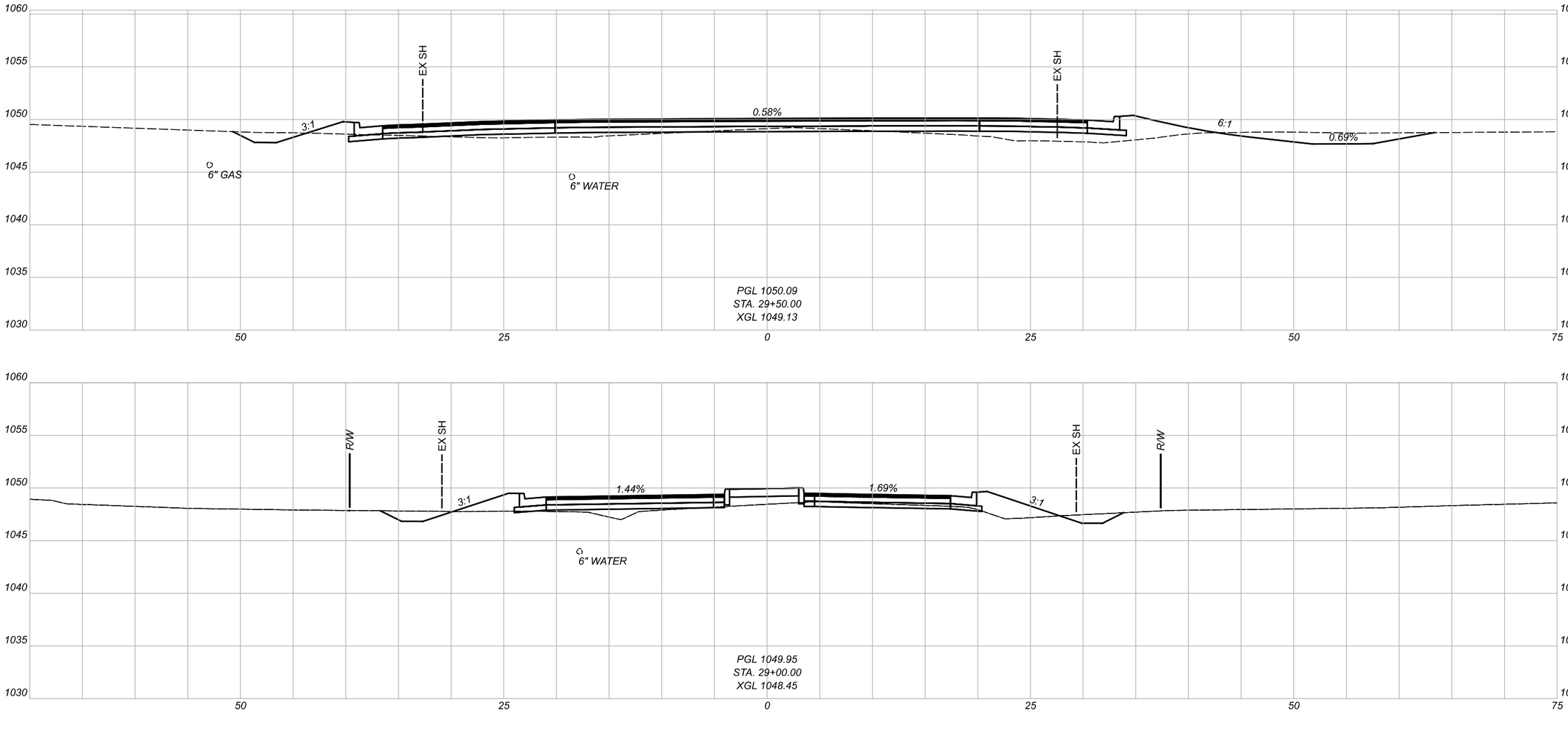
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 90 |
| TOTAL | 94 |

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

MODEL: 27+50.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:05:55 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS230.dgn




CROSS SECTIONS - SUBSTATION RD. - ALTERNATE 2
STA. 29+00.00 TO STA. 29+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

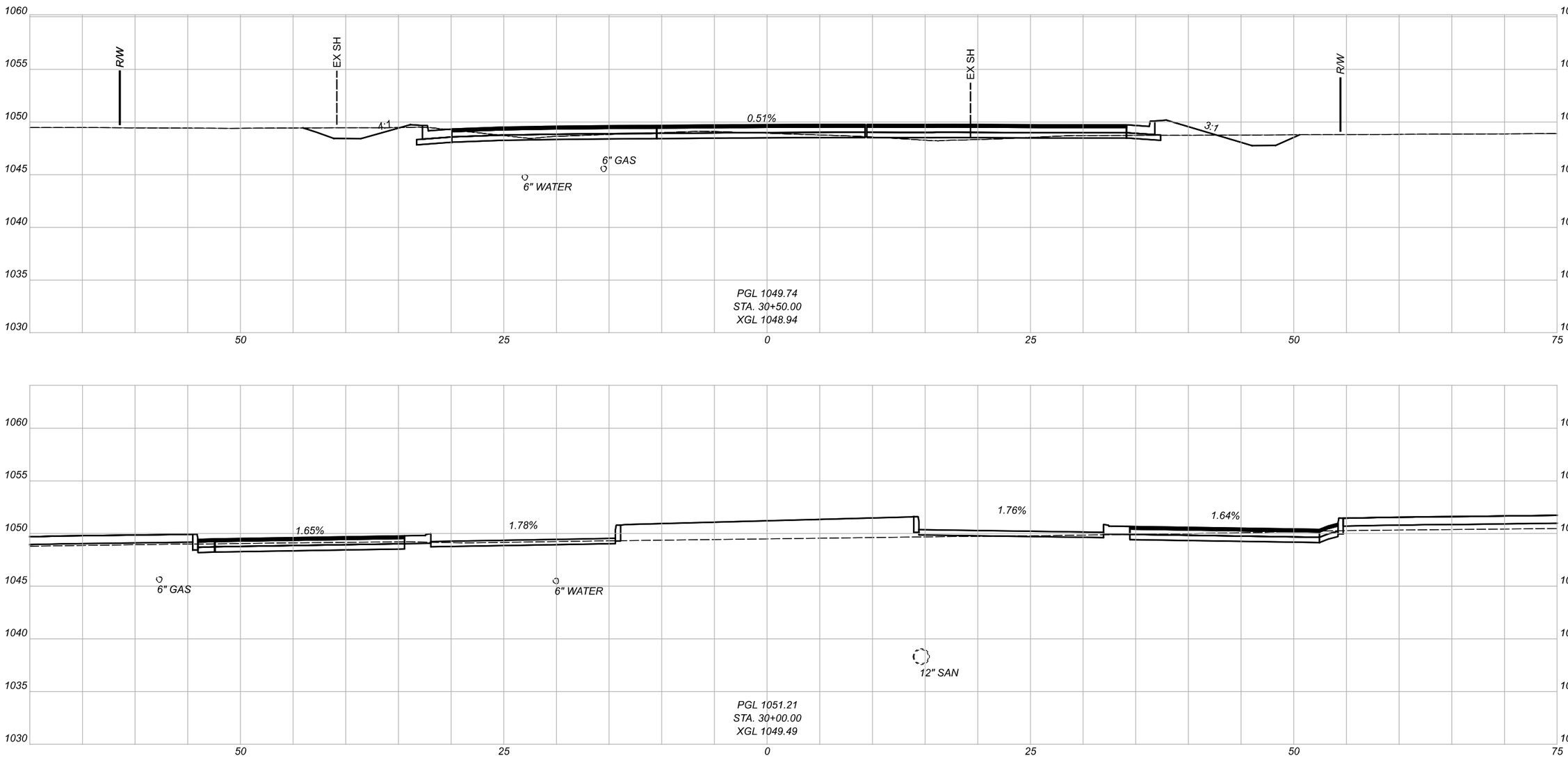
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 91 TOTAL 94

MED-303-4.85

MODEL: 29+00.00 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 4:10:58 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS230.dgn




# CROSS SECTIONS - SUBSTATION RD. - ALTERNATE 2
STA. 30+00.00 TO STA. 30+50.00

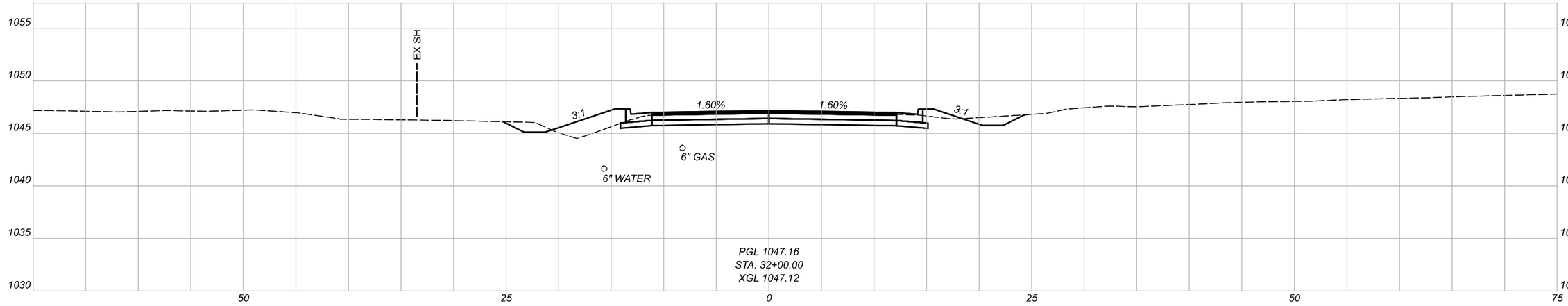
DESIGN AGENCY
CARPENTER MARTY transportation

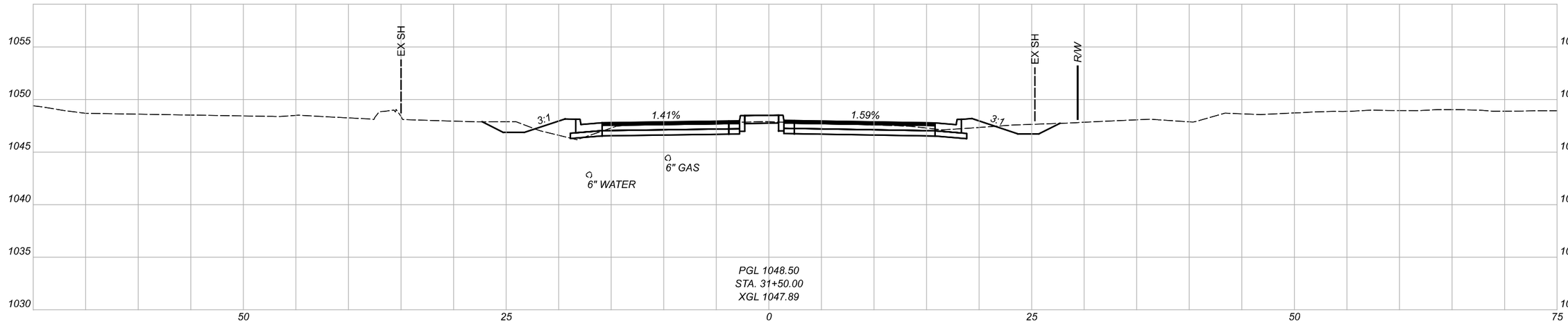
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 92 |
| TOTAL | 94 |

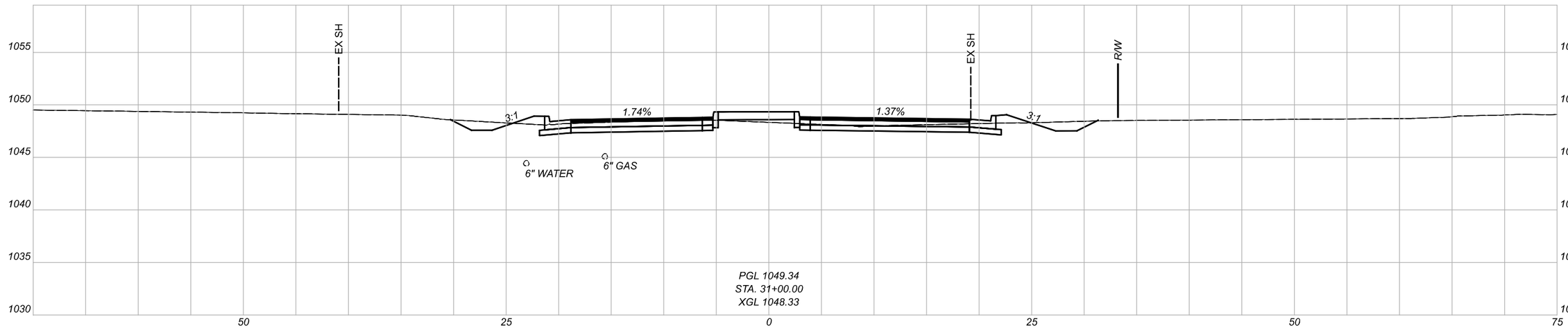
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|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

MED-303-4.85

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# CROSS SECTIONS - SUBSTATION RD. - ALTERNATE 2
## STA. 31+00.00 TO STA. 32+00.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

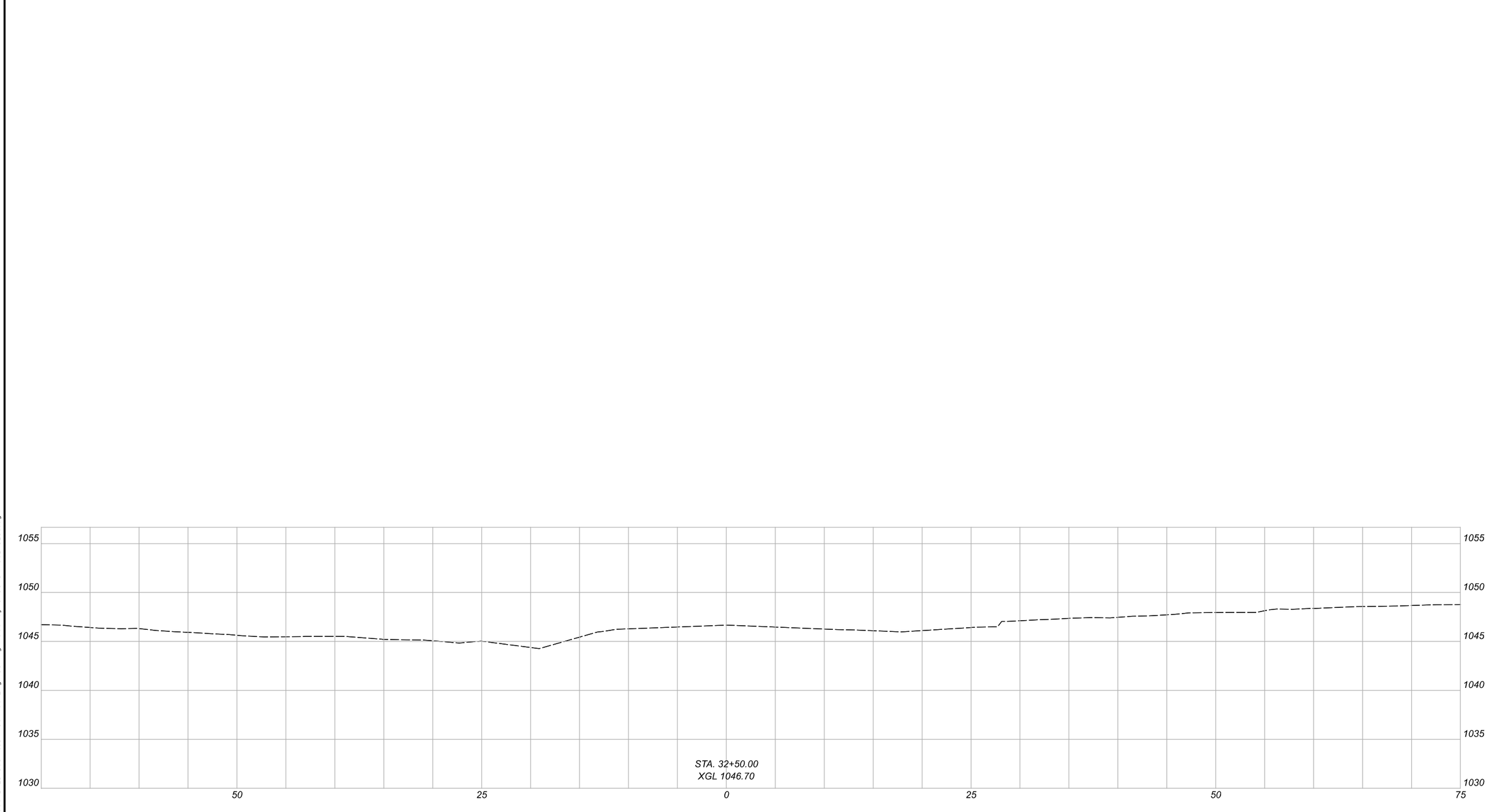
| SHEET | TOTAL |
|---|---|
| 93 | 94 |

MED-303-4.85

MODEL: 31+00.00 [Sheet1] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:11:01 PM USER: dgohs
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MED-303-4.85

MODEL: 32+50.00 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 4:11:03 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_XS230.dgn




# CROSS SECTIONS - SUBSTATION RD. - ALTERNATE 2
STA. 32+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

REVIEWER
MDW 09/15/21

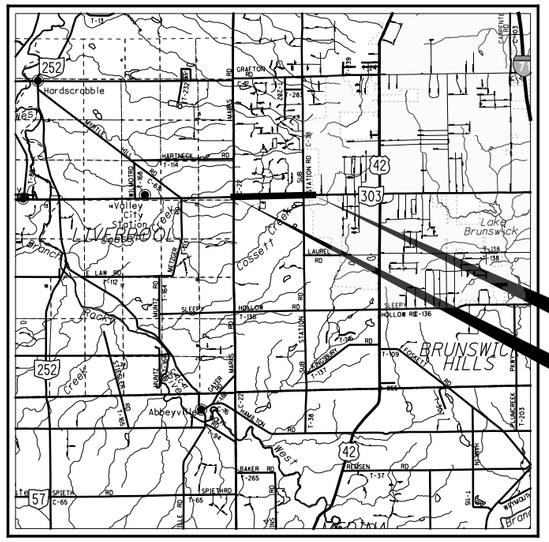
PROJECT ID
111150

| Sheet Totals | | |
|---|---|---|
| Seeding | Cut | Fill |
| - | - | - |

SHEET 94 | TOTAL 94

# STATE OF OHIO
# DEPARTMENT OF TRANSPORTATION

# MED-303-4.85




**LOCATION MAP**

LATITUDE: 41°14'17" LONGITUDE: 81°52'8"

PORTION TO BE IMPROVED
INTERSTATE HIGHWAY
FEDERAL ROUTES
STATE ROUTES
COUNTY & TOWNSHIP ROADS
OTHER ROADS

## DESIGN DESIGNATION

CURRENT ADT (20 )
DESIGN YEAR ADT (20 )
DESIGN HOURLY VOLUME (20 )
DIRECTIONAL DISTRIBUTION
TRUCKS (24 HOUR B&C)
DESIGN SPEED
LEGAL SPEED
DESIGN FUNCTIONAL CLASSIFICATION:

NHS PROJECT

## DESIGN EXCEPTIONS

## ADA DESIGN WAIVERS

**UNDERGROUND UTILITIES**
Contact Two Working Days Before You Dig
OHIO811.org Before You Dig
OHIO811, 8-1-1, or 1-800-362-2764
(Non members must be called directly)

PLAN PREPARED BY:
CARPENTER MARTY transportation
6612 SINGLETREE DRIVE COLUMBUS, OH 43229
614.656.2424 * WWW.CMTRAN.COM

ENGINEER'S SEAL:
SIGNED:
DATE:

ENGINEER'S SEAL:
SIGNED:
DATE:

## INDEX OF SHEETS:


| | |
|---|---|
| TITLE SHEET | 1 |
| TYPICAL SECTIONS | 2-4 |
| ALTERNATE 1 - S.R. 303 | |
| PLAN AND PROFILE | 5-17 |
| CROSS SECTIONS | 18-56 |
| ALTERNATE 1 - MARKS ROAD | |
| PLAN AND PROFILE | 57-58 |
| CROSS SECTIONS | 59-62 |
| ALTERNATE 1 - SUBSTATION ROAD | |
| PLAN AND PROFILE | 63 |
| CROSS SECTIONS | 64-65 |
| ALTERNATE 2 - S.R. 303 (WEST) | |
| PLAN AND PROFILE | 66-67 |
| CROSS SECTIONS | 68-72 |
| ALTERNATE 2 - MARKS ROAD | |
| PLAN AND PROFILE | 73-74 |
| CROSS SECTIONS | 75-80 |
| ALTERNATE 2 - S.R. 303 (EAST) | |
| PLAN AND PROFILE | 81-82 |
| CROSS SECTIONS | 83-88 |
| ALTERNATE 2 - SUBSTATION ROAD | |
| PLAN AND PROFILE | 89 |
| CROSS SECTIONS | 90-94 |


AER SUBMITTAL 9/16/2021

| STANDARD CONSTRUCTION DRAWINGS | | | | | SUPPLEMENTAL SPECIFICATIONS | SPECIAL PROVISIONS |
|---|---|---|---|---|---|---|
| | | | | | | |
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**FEDERAL PROJECT NUMBER**

**RAILROAD INVOLVEMENT**

NONE

**PROJECT DESCRIPTION**

THIS PROJECT CONSISTS OF TWO ALTERNATES FOR THE WIDENING OF S.R. 303 FROM EAST OF MARKS ROAD THROUGH SUBSTATION ROAD. ALTERNATE 1 CONSISTS OF PROPOSED INTERSECTION WIDENING AT SUBSTATION ROAD. ALTERNATE 2 CONSISTS OF A PROPOSED ROUNDABOUT AT SUBSTATION ROAD.

**EARTH DISTURBED AREAS**

| | |
|---|---|
| PROJECT EARTH DISTURBED AREA: | ACRES |
| ESTIMATED CONTRACTOR EARTH DISTURBED AREA: | ACRES |
| NOTICE OF INTENT EARTH DISTURBED AREA: | ACRES |

**2019 SPECIFICATIONS**

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PLANS AND CHANGES LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

APPROVED
DATE _____ DISTRICT DEPUTY DIRECTOR

APPROVED
DATE _____ DIRECTOR, DEPARTMENT OF TRANSPORTATION

TITLE SHEET

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER BTP
REVIEWER MDW 09/15/21
PROJECT ID 111150
SHEET 1 TOTAL 94



MED-303-4.85

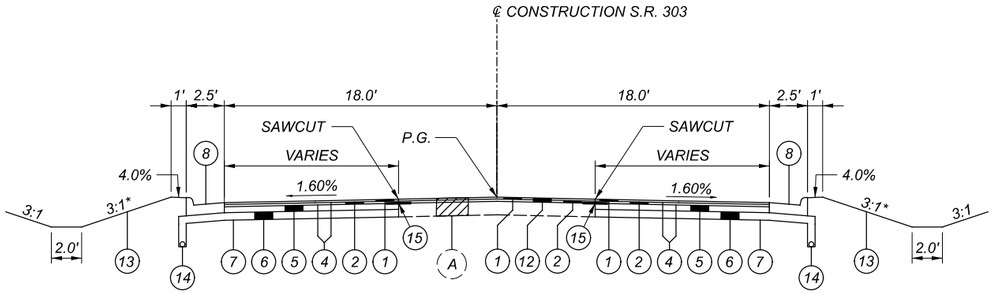
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P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GT001.dgn

## LEGEND

| | | |
|---|---|---|
| (1) | ITEM 441 | 1.25" ASPHALT CONCRETE SURFACE COURSE, TYPE 1 |
| (2) | ITEM 441 | 1.75" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 1 |
| (3) | ITEM 452 | 10" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC 1P |
| (4) | ITEM 407 | TACK COAT |
| (5) | ITEM 302 | 6" ASPHALT CONCRETE BASE |
| (6) | ITEM 304 | 6" AGGREGATE BASE |
| (7) | ITEM 204 | SUBGRADE COMPACTION |
| (8) | ITEM 609 | COMBINATION CURB AND GUTTER, TYPE 2 |
| (9) | ITEM 609 | CURB, TYPE 6 |
| (10) | ITEM 609 | CURB, MISC.: MOUNTABLE TRUCK APRON |
| (11) | ITEM 609 | 6" CONCRETE TRAFFIC ISLAND |
| (12) | ITEM 254 | PAVEMENT PLANING, ASPHALT CONCRETE |
| (13) | ITEM 659 | SEEDING AND MULCHING |
| (14) | ITEM 605 | BASE PIPE UNDERDRAIN WITH GEOTEXTILE FABRIC |
| (15) | SPECIAL | PAVEMENT CRACK AND JOINT REINFORCING FABRIC |
| (16) | ITEM 304 | VARIABLE THICKNESS AGGREGATE BASE (MIN. 4") |

(A) EXISTING ASPHALT CONCRETE PAVEMENT

*3:1 FORESLOPE UNLESS NOTED OTHERWISE IN CROSS SECTIONS

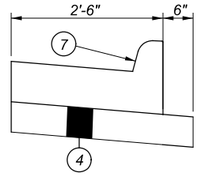



### NORMAL SECTION - PROPOSED S.R. 303

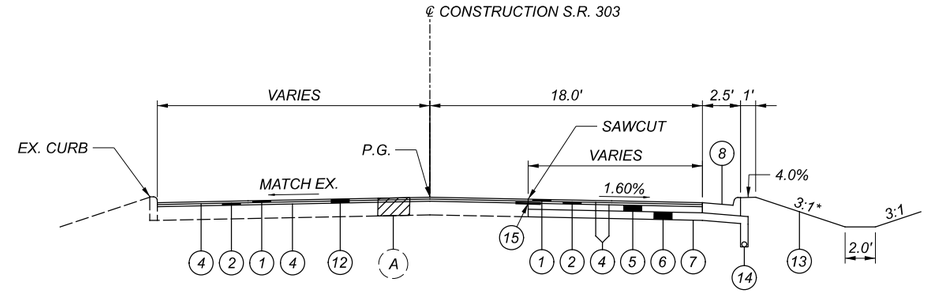
SECTION APPLIES:

ALTERNATE 1
STA. 256+00.00 TO STA. 282+10.64
STA. 302+57.71 TO STA. 318+00.00

ALTERNATE 2
STA. 267+00.00 TO STA. 282+10.64
STA. 302+57.71 TO STA. 308+50.00



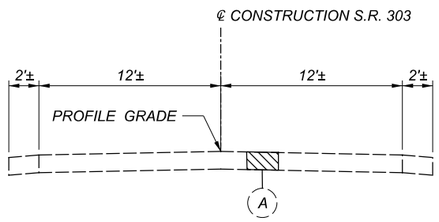

### STEP DETAIL



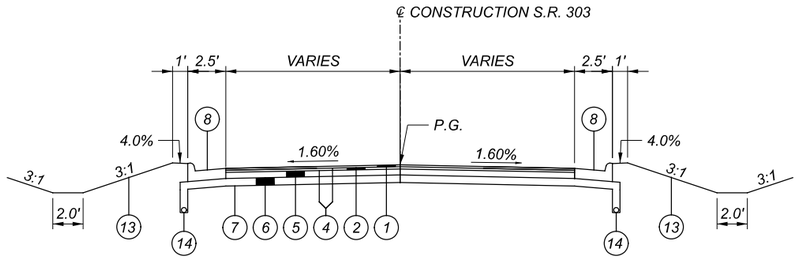

### NORMAL SECTION - PROPOSED S.R. 303

SECTION APPLIES:

ALTERNATE 1 & ALTERNATE 2
STA. 282+10.64 TO STA. 302+57.71



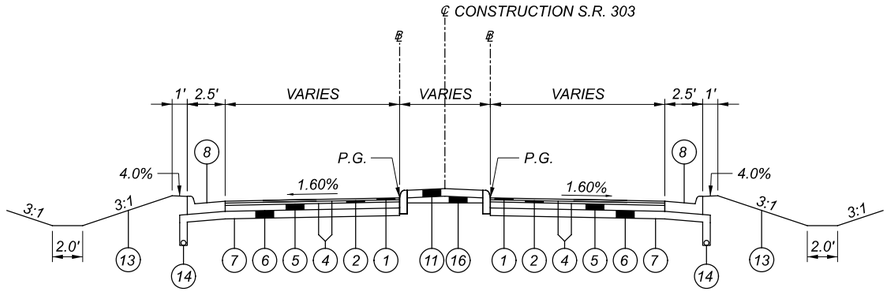

### NORMAL SECTION - EXISTING S.R. 303




### NORMAL SECTION - PROPOSED S.R. 303

SECTION APPLIES:

ALTERNATE 2
STA. 259+50.00 TO STA. 261+11.89
STA. 264+71.41 TO STA. 267+00.00
STA. 308+50.00 TO STA. 309+62.67
STA. 312+92.56 TO STA. 313+77.54




### NORMAL SECTION - PROPOSED S.R. 303

SECTION APPLIES:

ALTERNATE 2
STA. 261+11.89 TO STA. 262+33.39
STA. 263+48.17 TO STA. 264+71.41
STA. 309+62.67 TO STA. 311+03.83
STA. 312+12.20 TO STA. 312+92.56

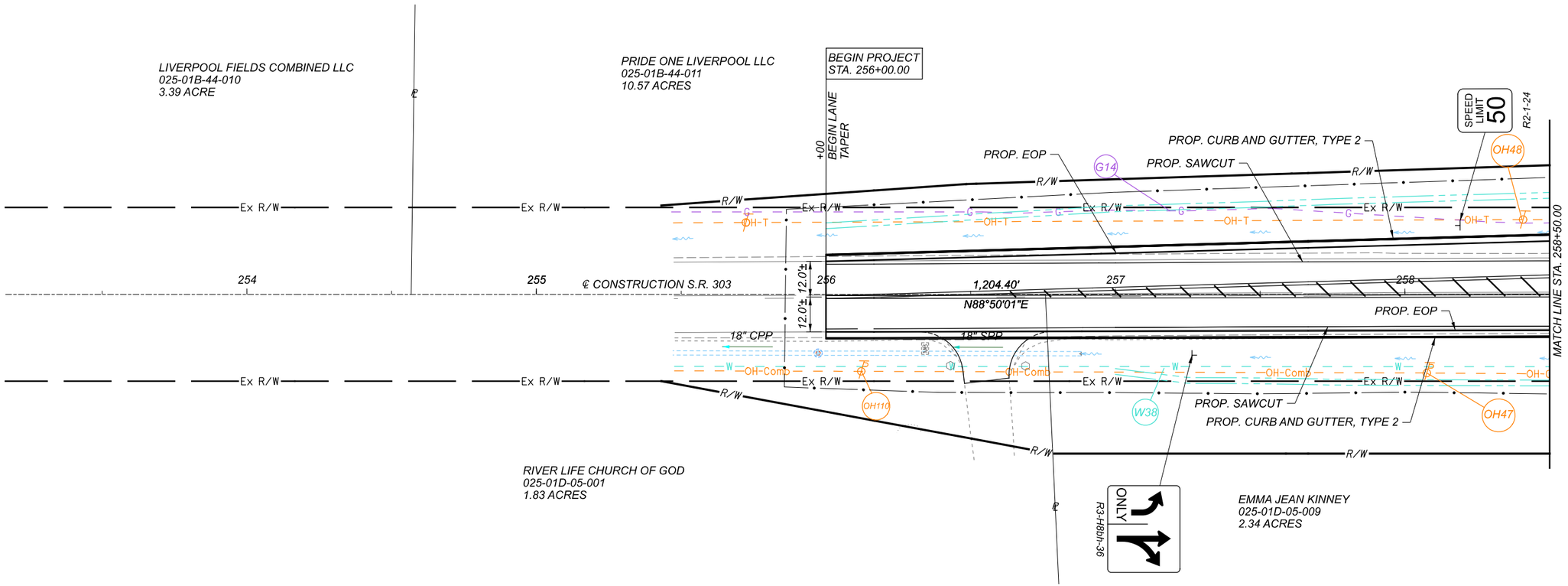
TYPICAL SECTIONS

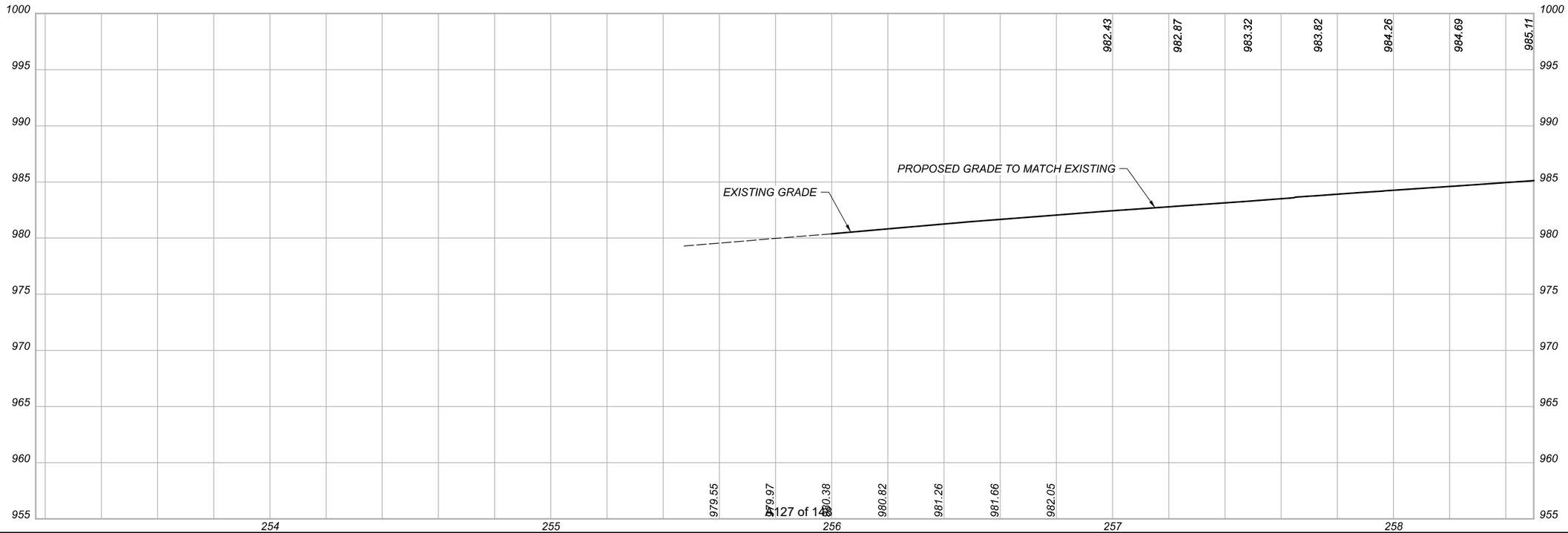
DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | WCS |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 2 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Sheet PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:09:53 PM USER: dgoits
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GY001.dgn




HORIZONTAL SCALE IN FEET
0 10 20 40

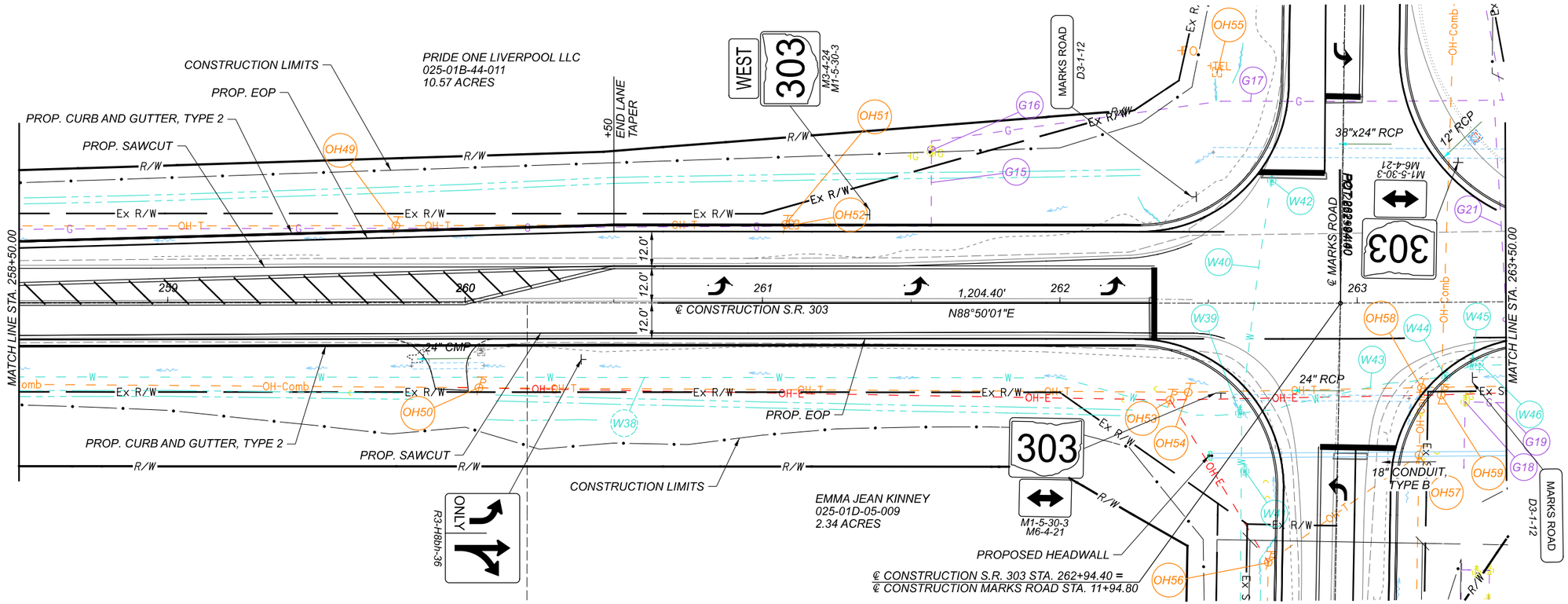
# PLAN AND PROFILE - S.R. 303
## STA. 253+00.00 TO STA. 258+50.00

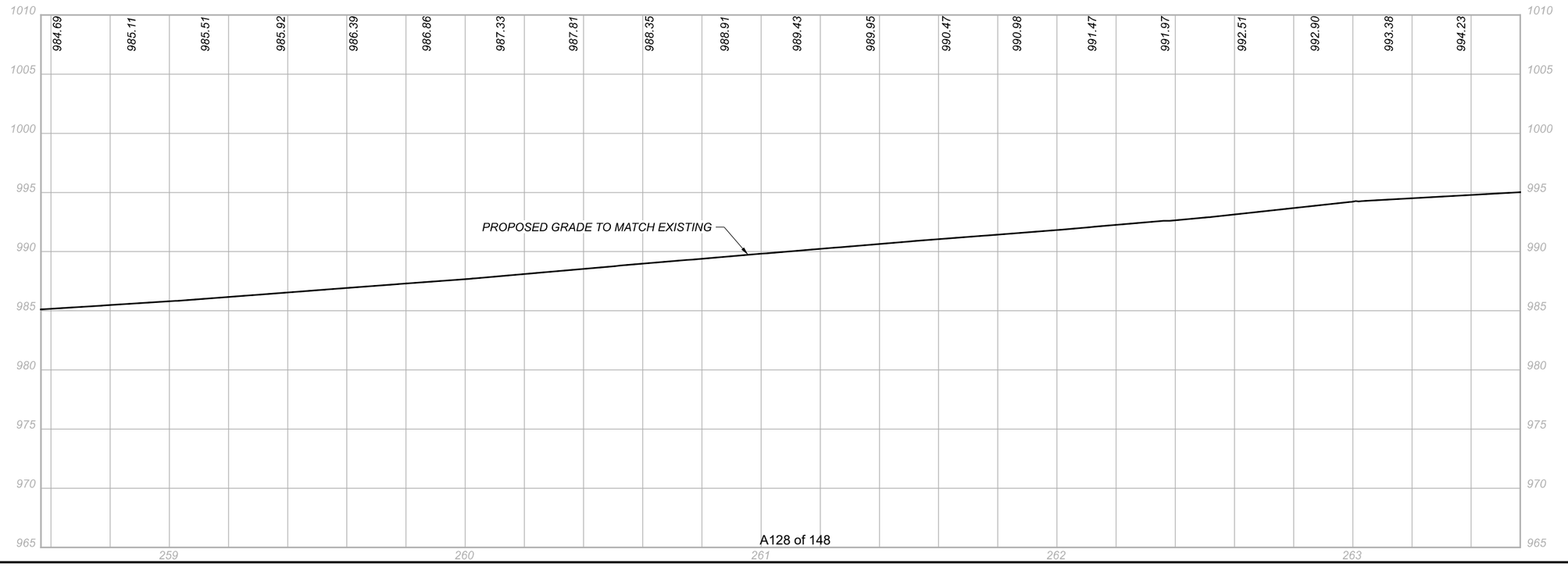
DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 5 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 12 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:11 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP101.dgn




HORIZONTAL SCALE IN FEET
0 10 20 40

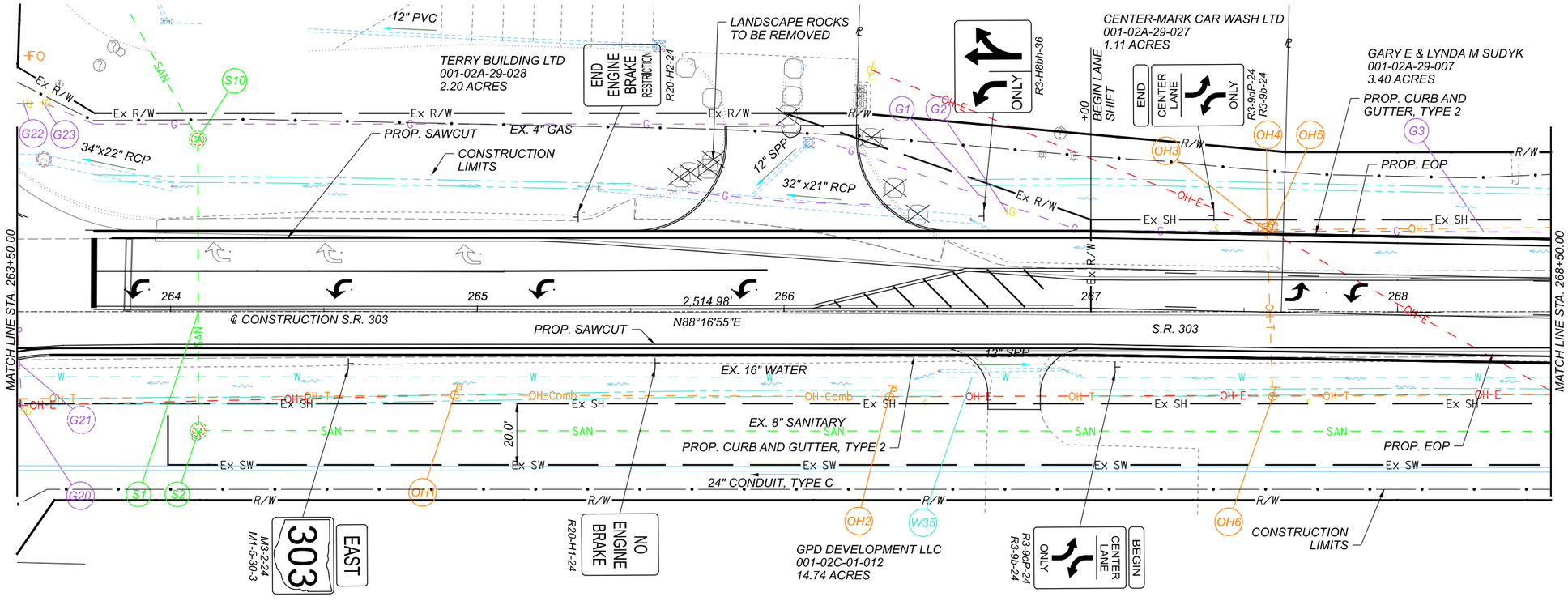
# PLAN AND PROFILE - S.R. 303
# STA. 258+50.00 TO STA. 263+50.00

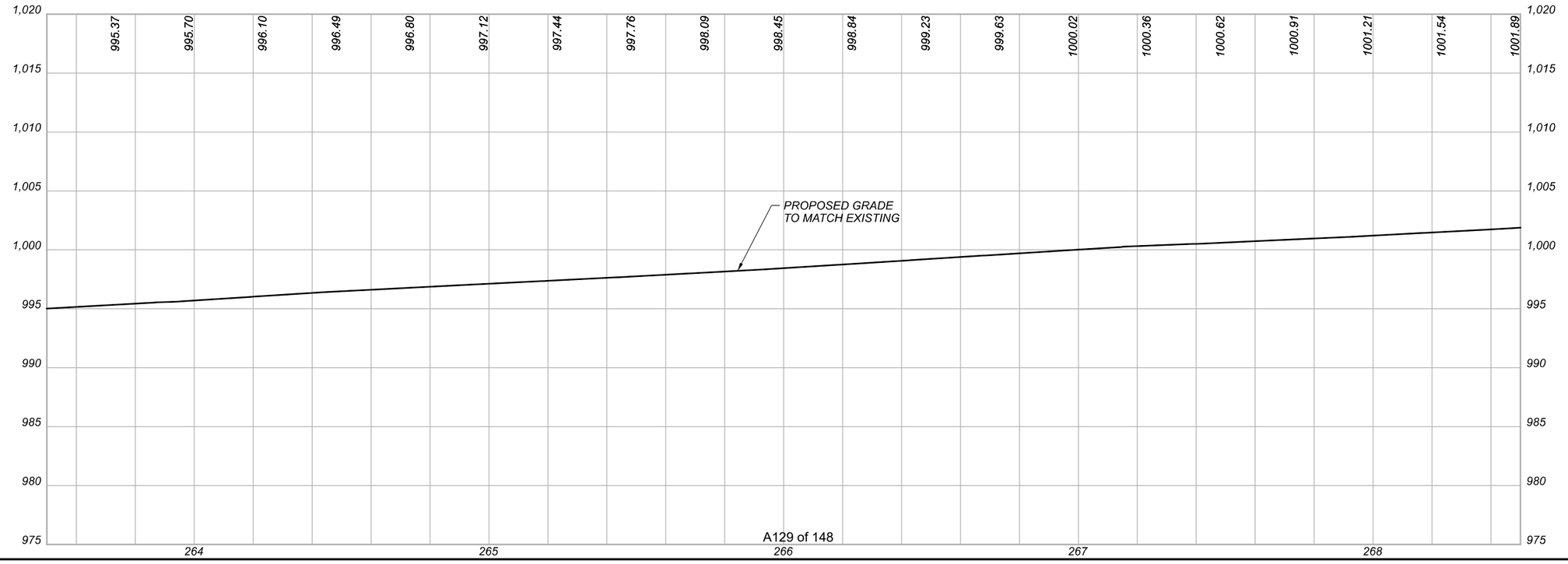
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 6 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan (3 [Sheet]) PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:12 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

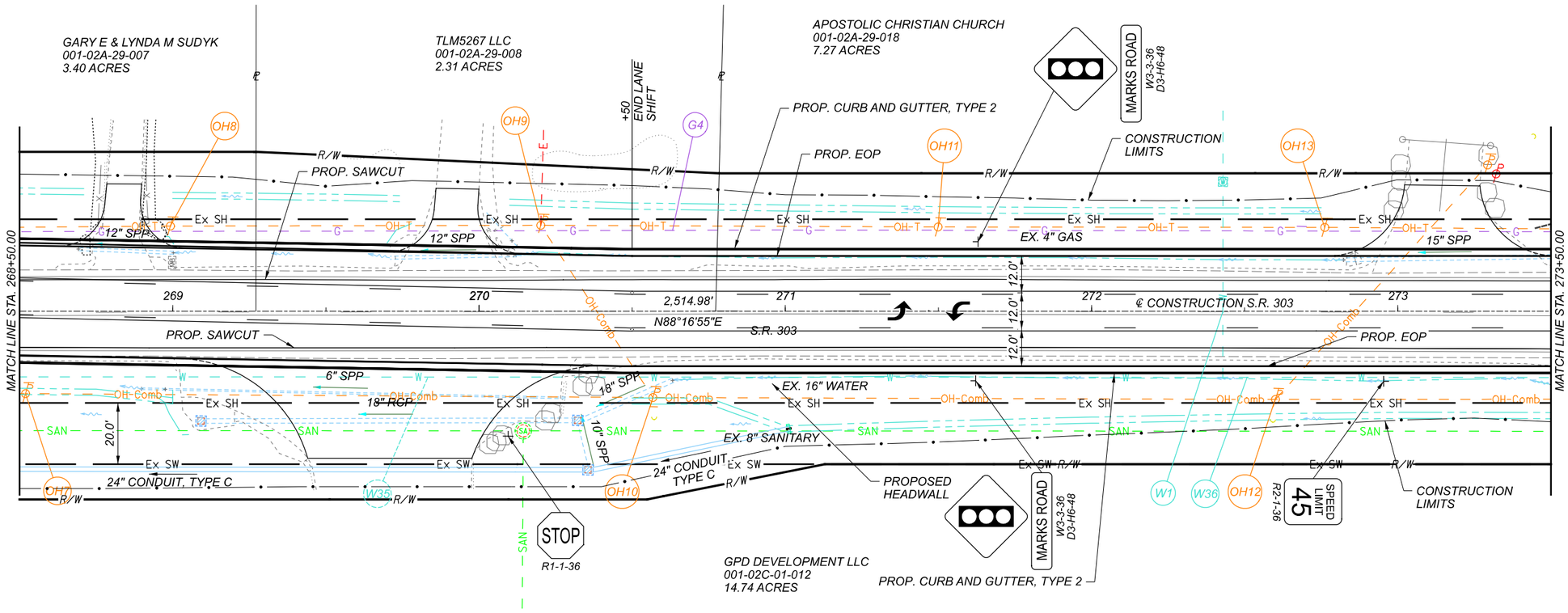
PLAN AND PROFILE - S.R. 303
STA. 263+95.14 TO STA. 268+50.00

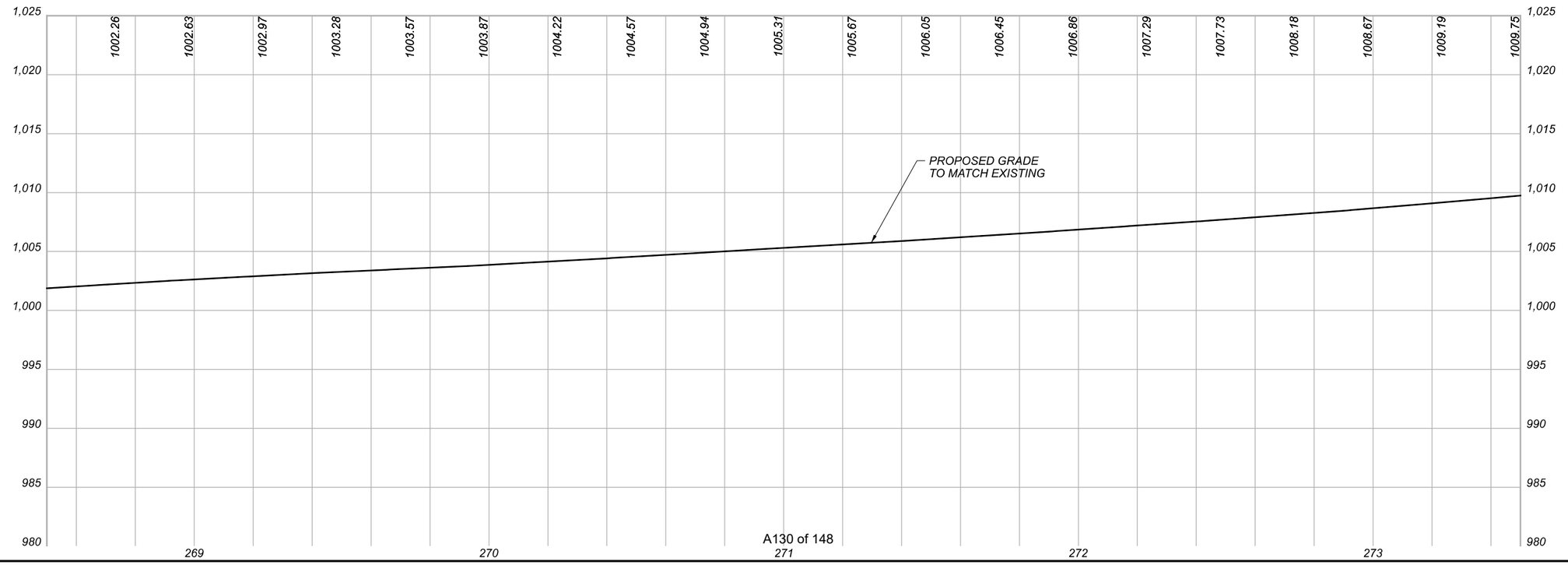
DESIGN AGENCY
CARPENTER MARTY Transportation

DESIGNER BTP
REVIEWER MDW 09/15/21
PROJECT ID 111150
SHEET 7 TOTAL 94

MED-303-4.85

MODEL: Plan [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:13 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

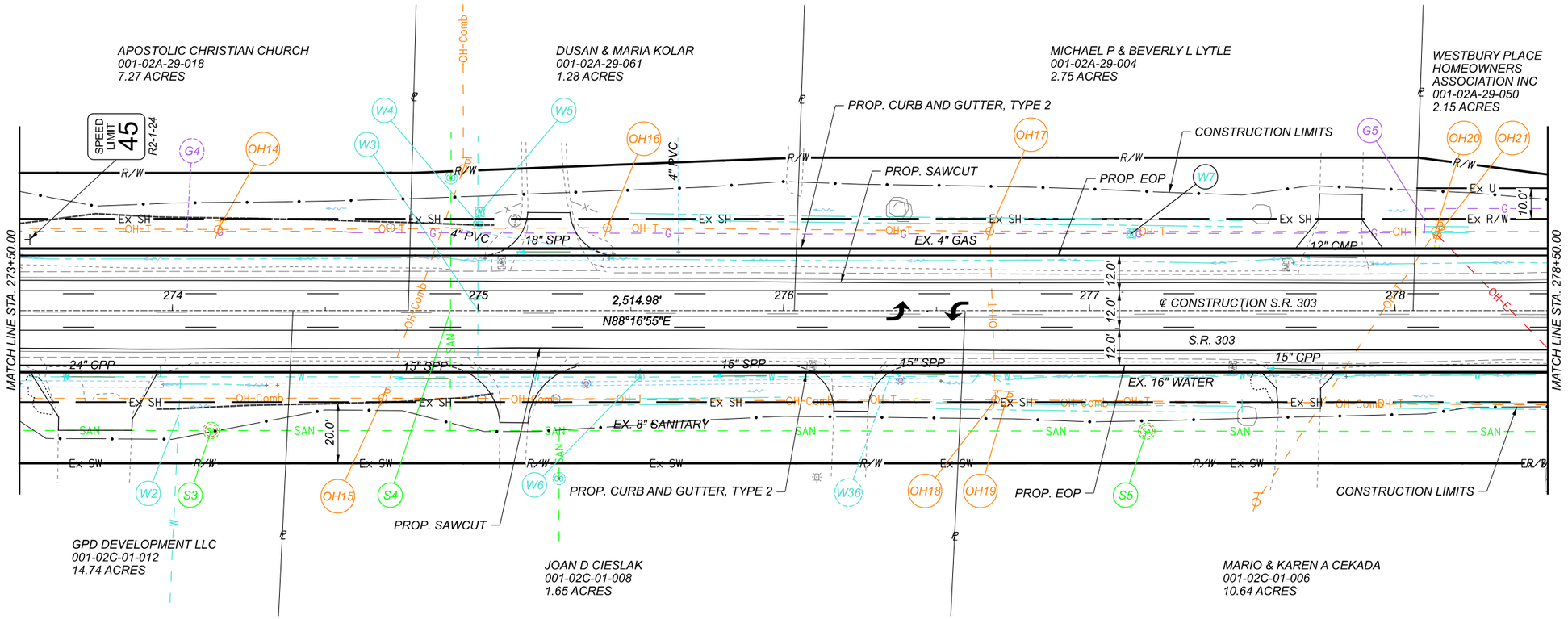
# PLAN AND PROFILE
# STA. 268+50.00 TO STA. 273+50.00

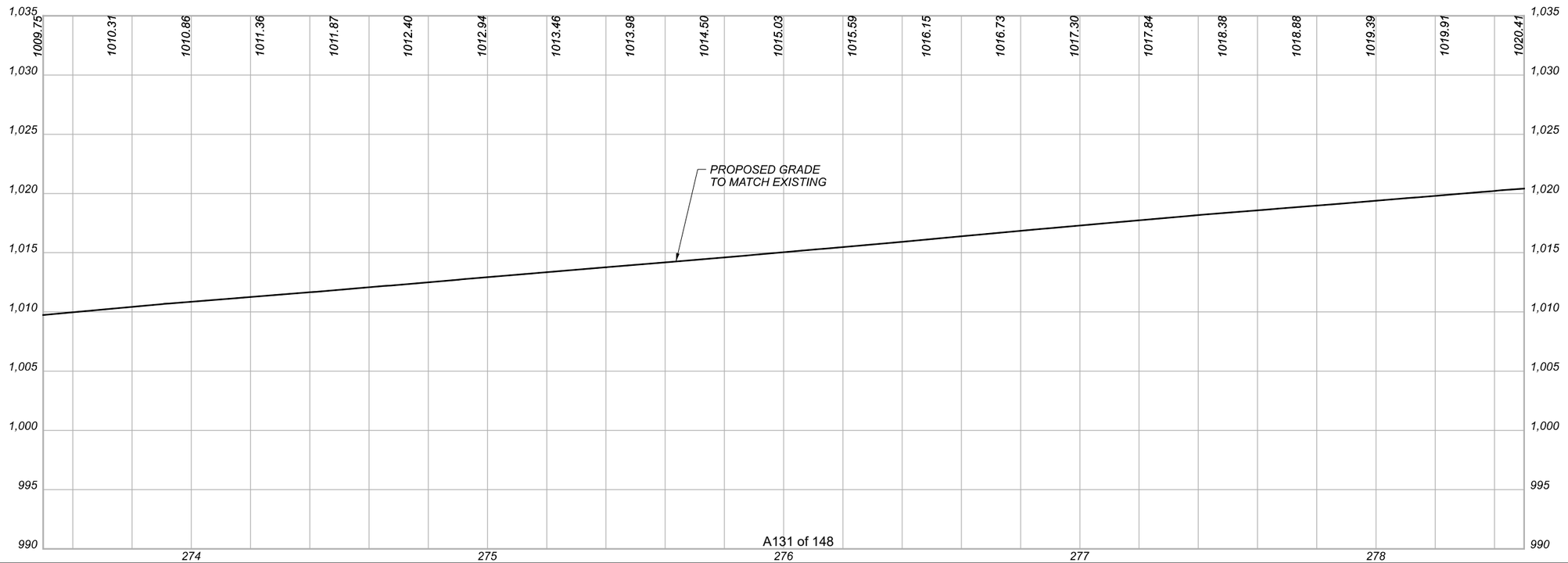
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 8 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:14 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

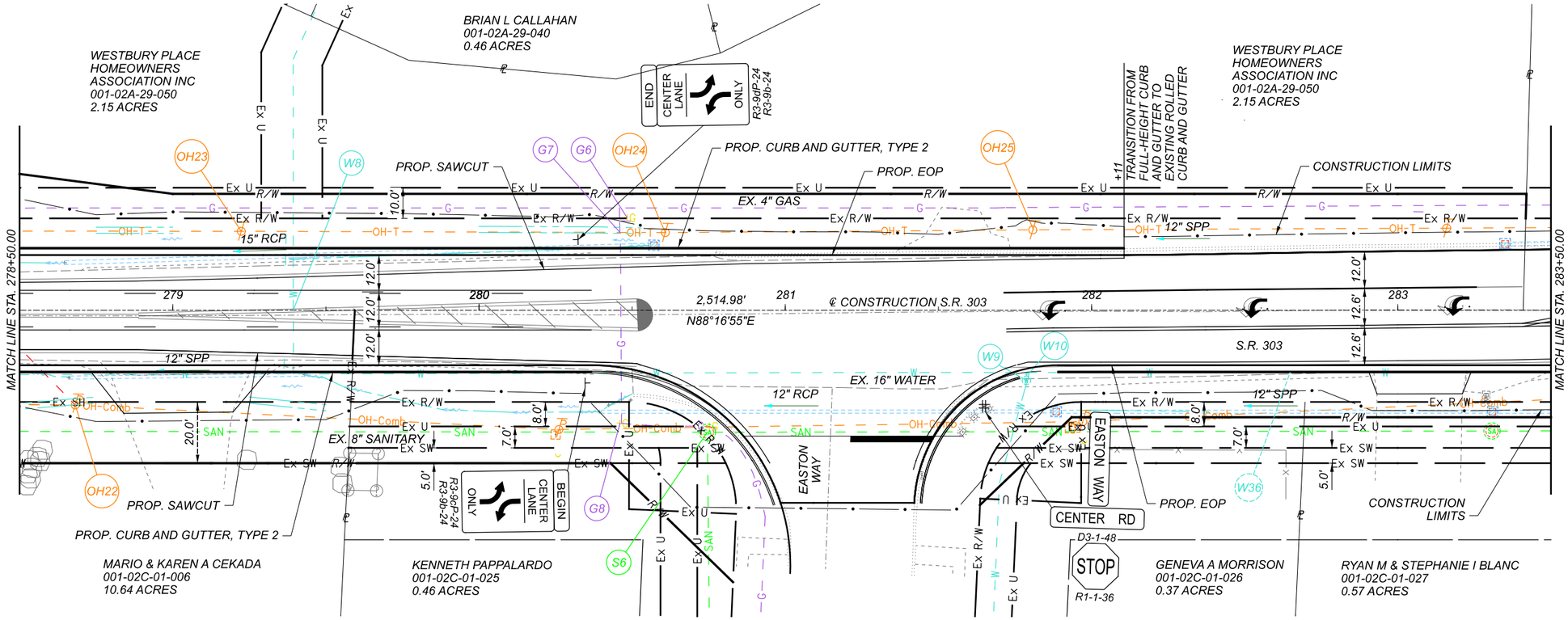
PLAN AND PROFILE - S.R. 303
STA. 273+50.00 TO STA. 278+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 9 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan 3 [Sheet] PAPERSIZE: 11x17 (in.) DATE: 11/22/2021 TIME: 3:10:14 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

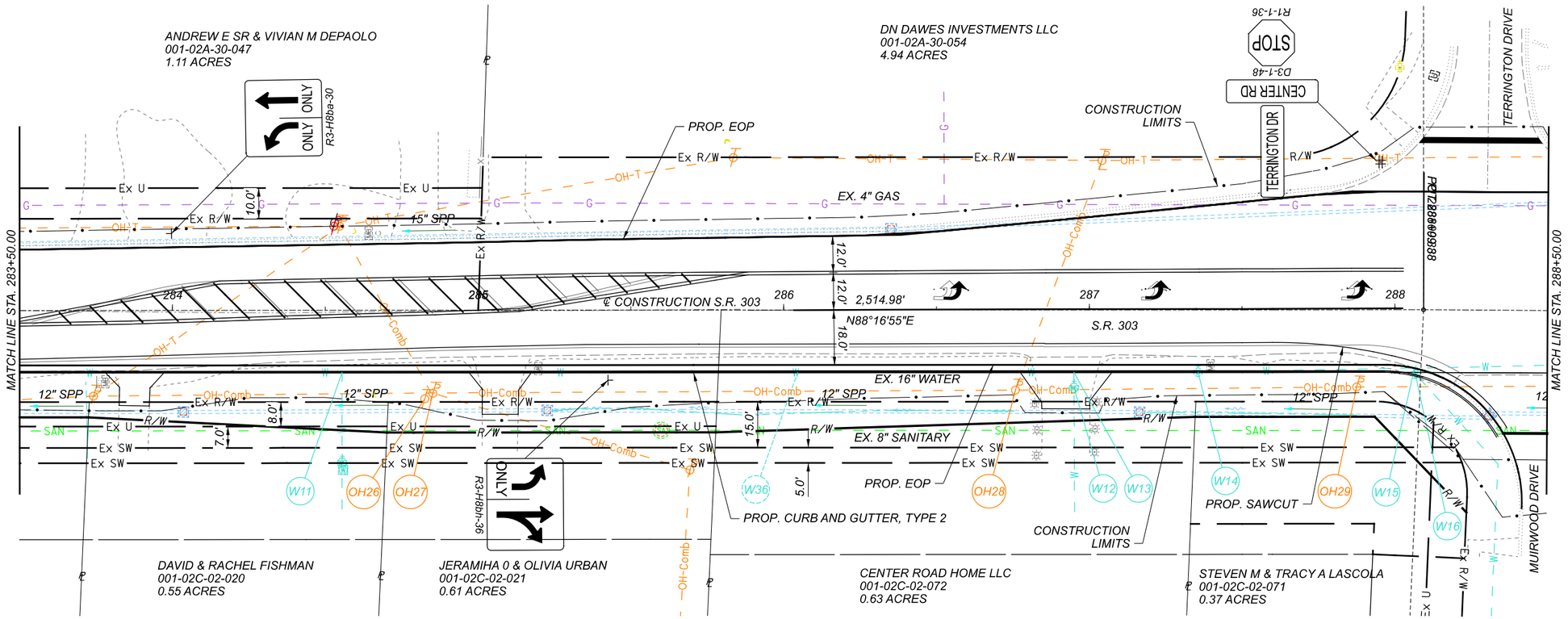
# PLAN AND PROFILE - S.R. 303
# STA. 278+50.00 TO STA. 283+50.00

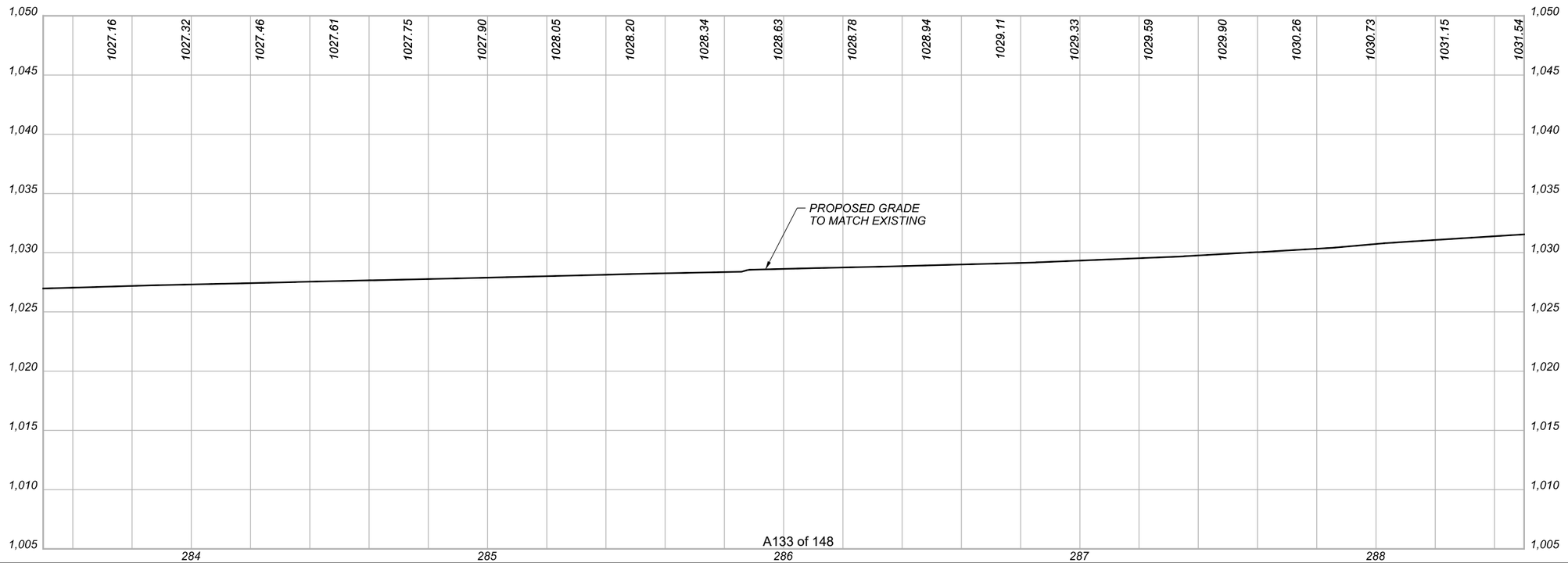
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 10 |
| TOTAL | 94 |

MED-303-4.85

MODEL: Plan 4 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:5 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

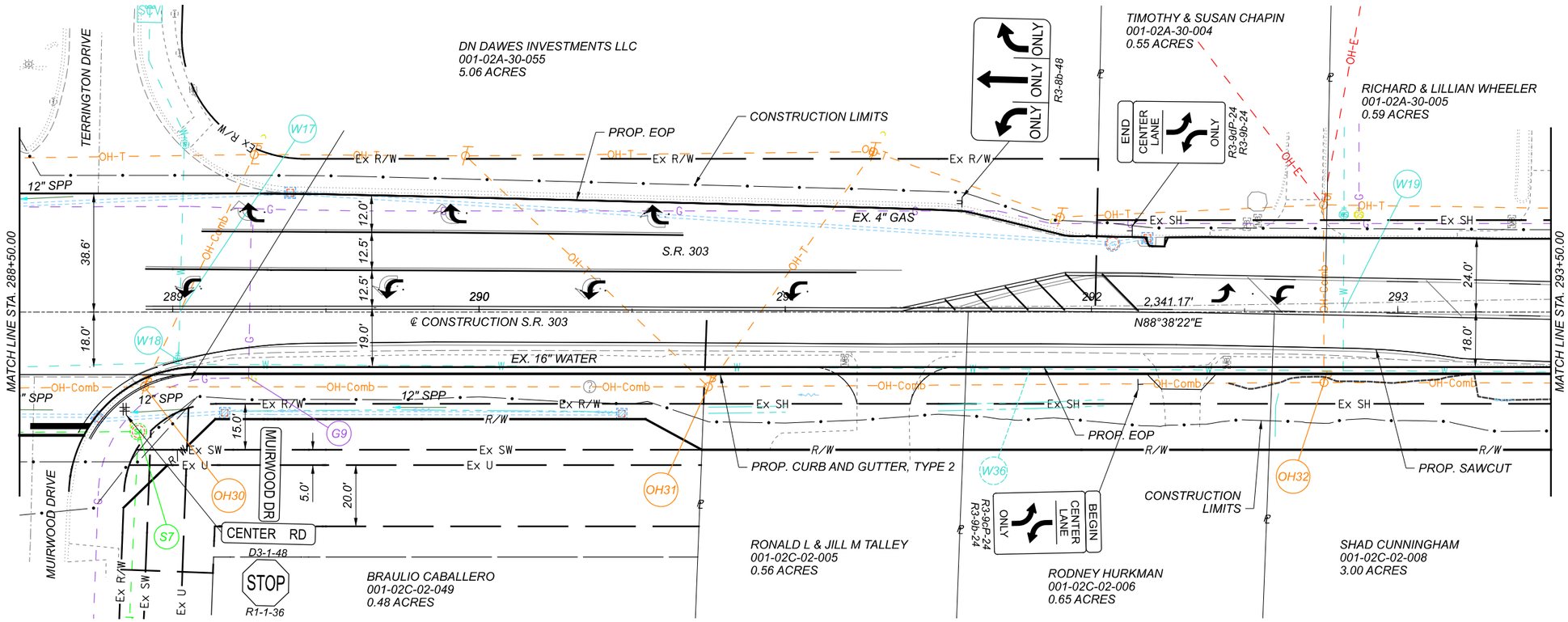
# PLAN AND PROFILE - S.R. 303
# STA. 283+50.00 TO STA. 288+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 11 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan 5 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:16 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

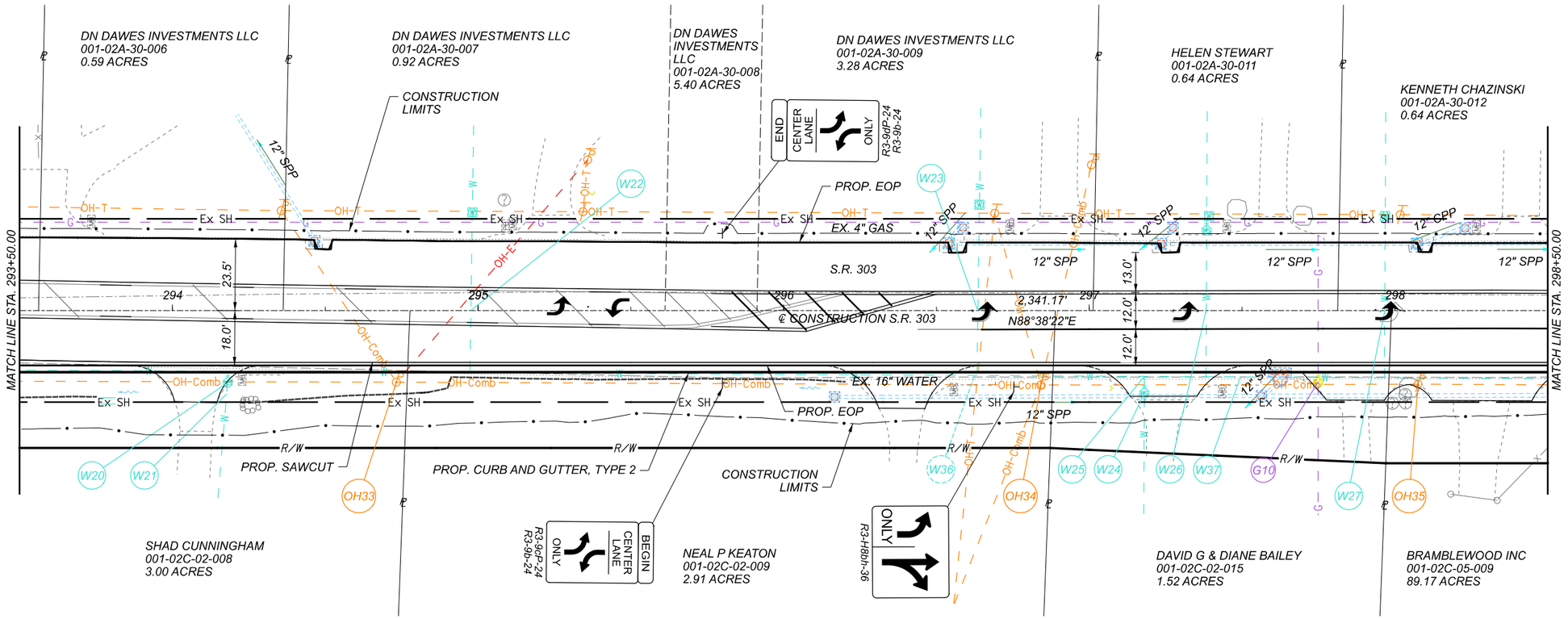
# PLAN AND PROFILE - S.R. 303
# STA. 288+50.00 TO STA. 293+50.00

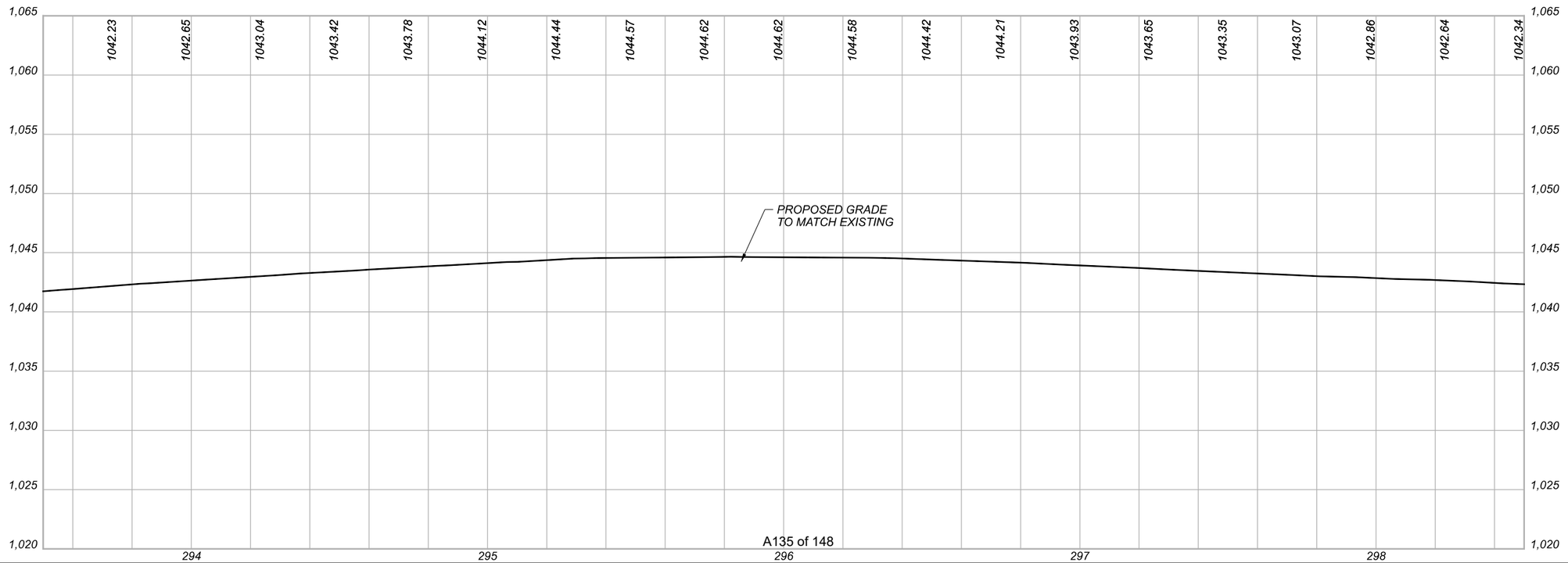
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 12 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan 6 (Sheet1) PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:17 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

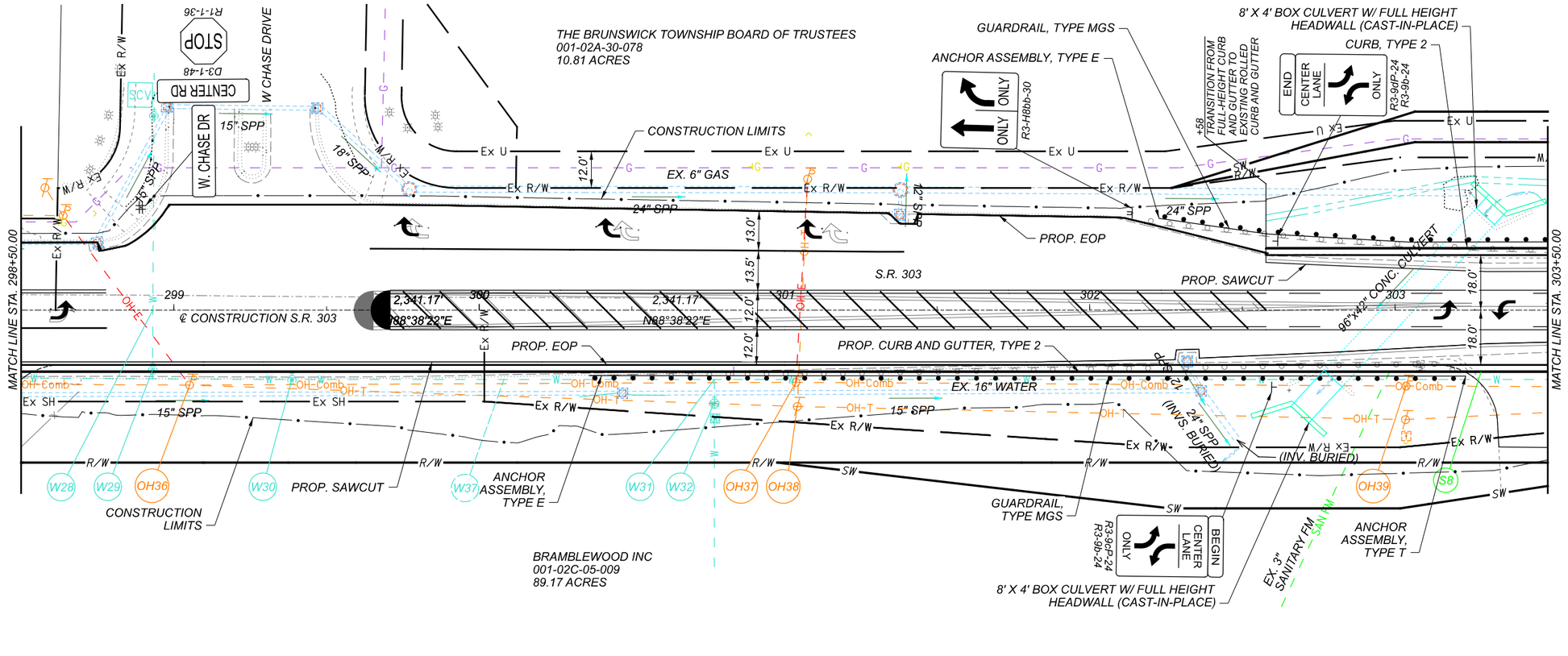
# PLAN AND PROFILE - S.R. 303
# STA. 293+50.00 TO STA. 298+50.00

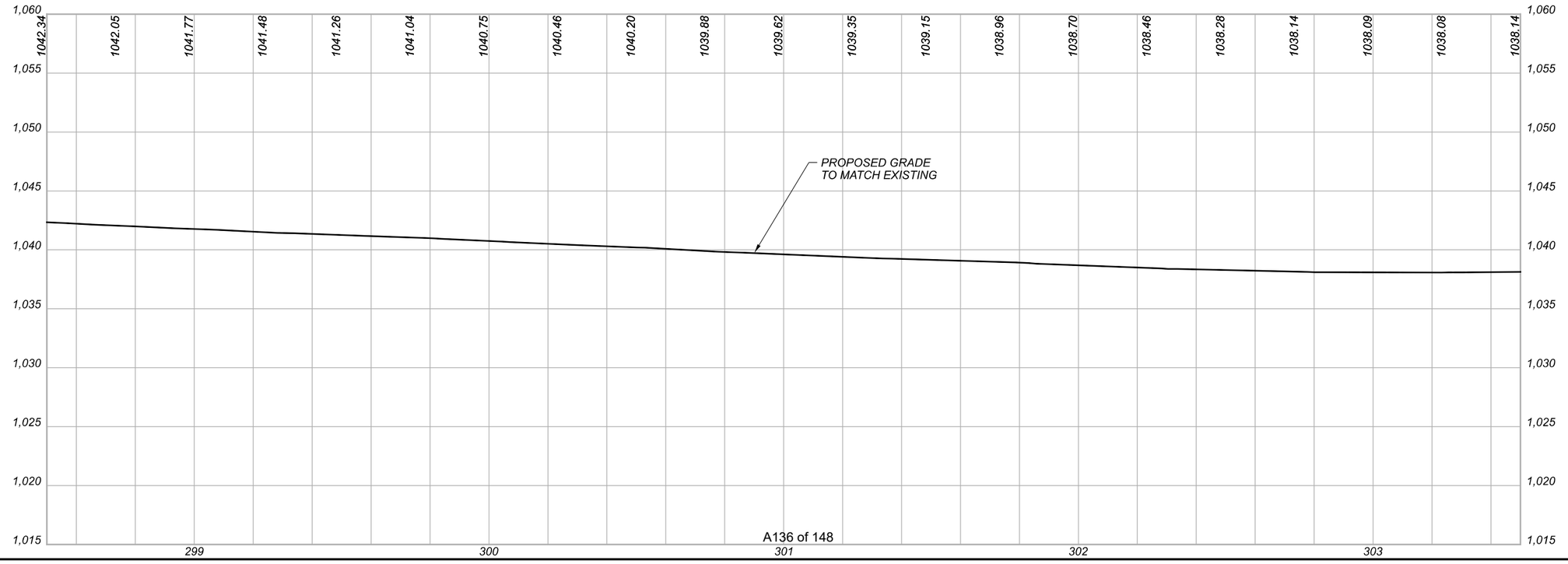
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 13 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan 7 [Sheet] PAPERSIZE: 11x17 (in.) DATE: 11/22/2021 TIME: 3:10:18 PM USER: dgohs
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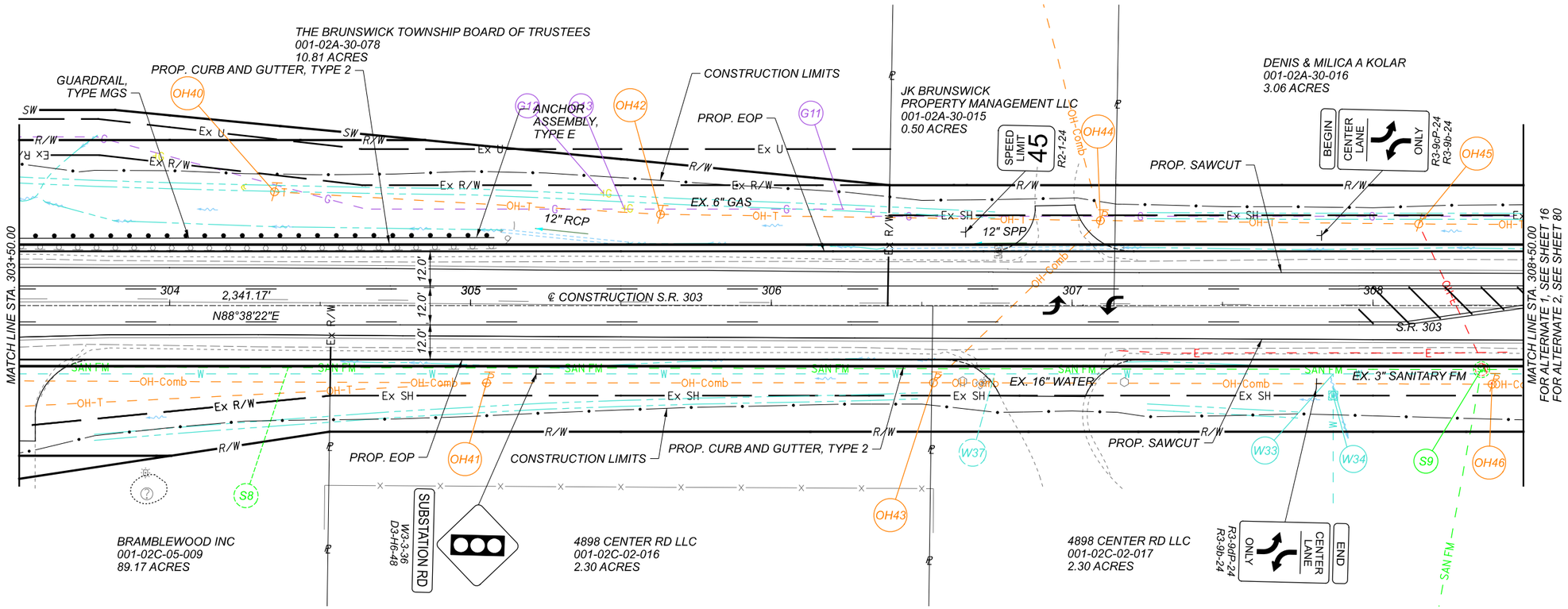

PLAN AND PROFILE - S.R. 303
STA. 298+50.00 TO STA. 303+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 14 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan 8 [Sheet] PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:19 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP101.dgn




HORIZONTAL SCALE IN FEET
0 10 20 40

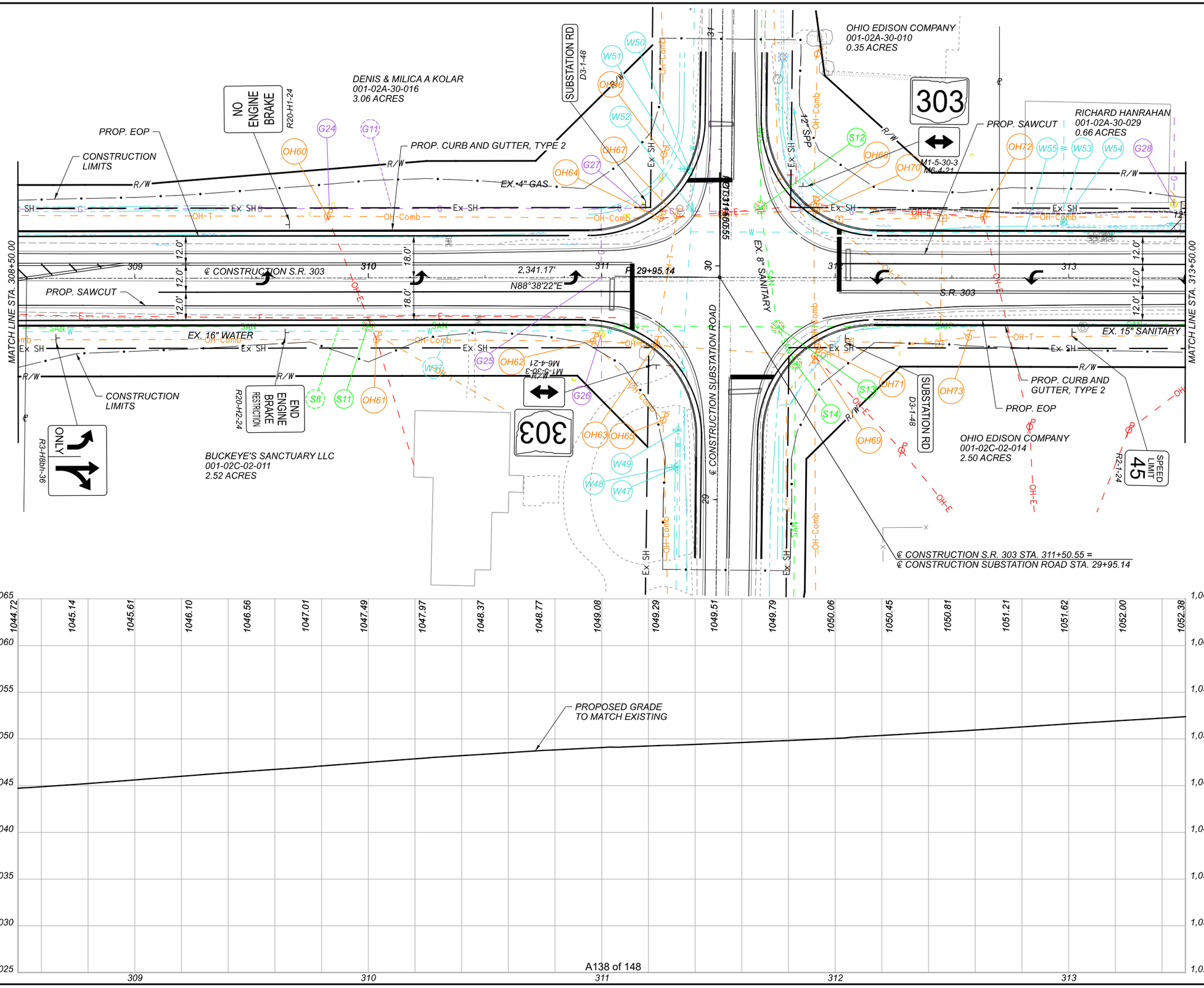
# PLAN AND PROFILE - S.R. 303
# STA. 303+50.00 TO STA. 308+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 15 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan 9 [Sheet] PAPERSIZE: 11x17 (in.) DATE: 11/22/2021 TIME: 3:10:20 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

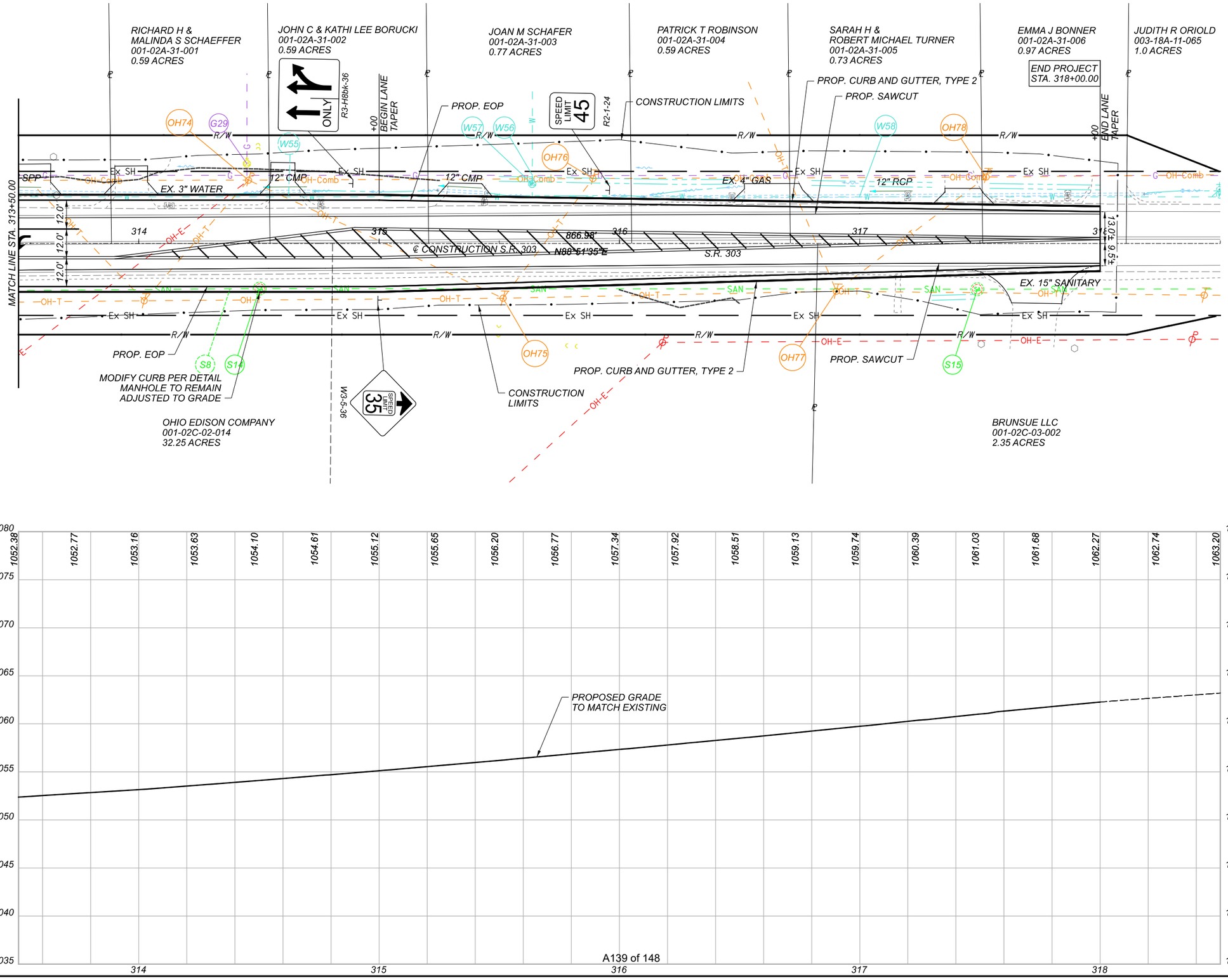
# PLAN AND PROFILE - S.R. 303 - ALTERNATE 1
## STA. 308+50.00 TO STA. 313+50.00

DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 16 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan 10 (Sheet) PAPERSIZE: 17x11in) DATE: 11/22/2021 TIME: 3:10:20 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

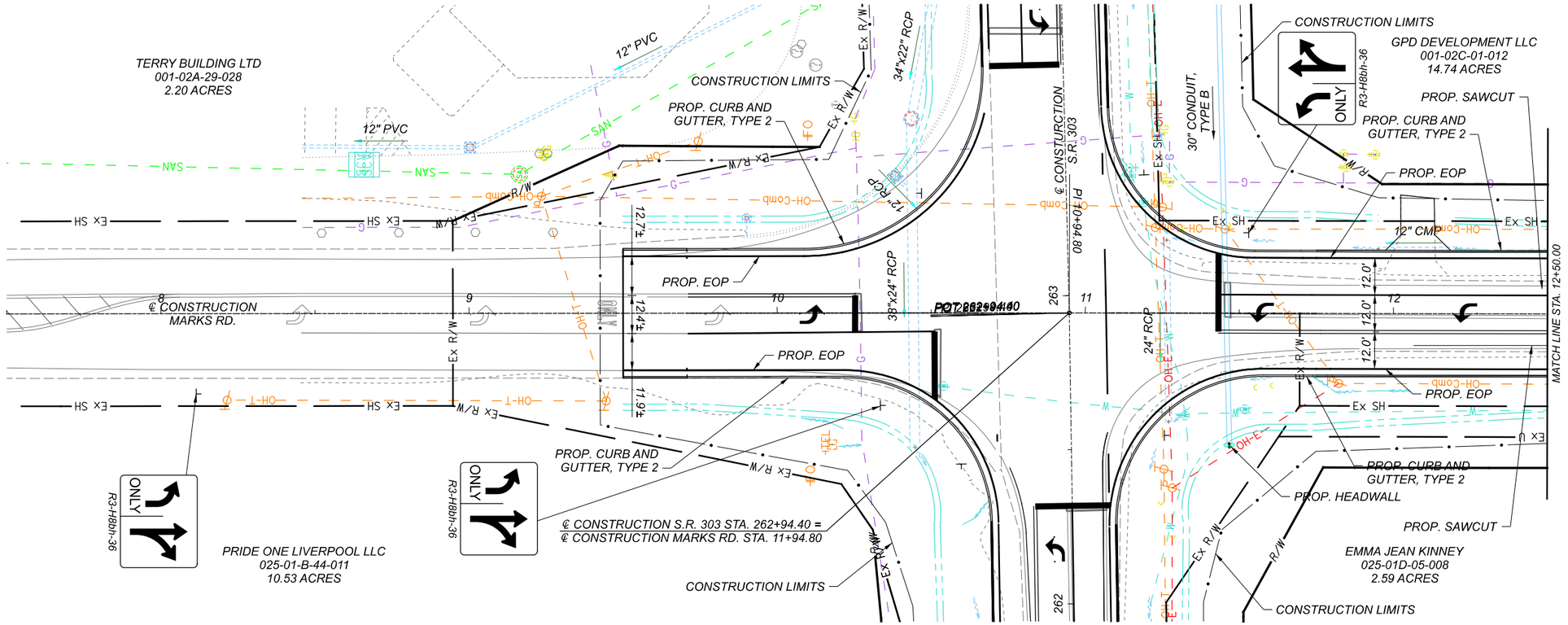
# PLAN AND PROFILE - S.R. 303 - ALTERNATE 1
## STA. 313+50.00 TO STA. 318+00.00

DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | BTP |
| REVIEWER | DMG 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 17 |
| TOTAL | 93 |

MED-303-4.85

MODEL: Plan II(Sheet) PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:21 PM USER: dgohs
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HORIZONTAL SCALE IN FEET
0 10 20 40

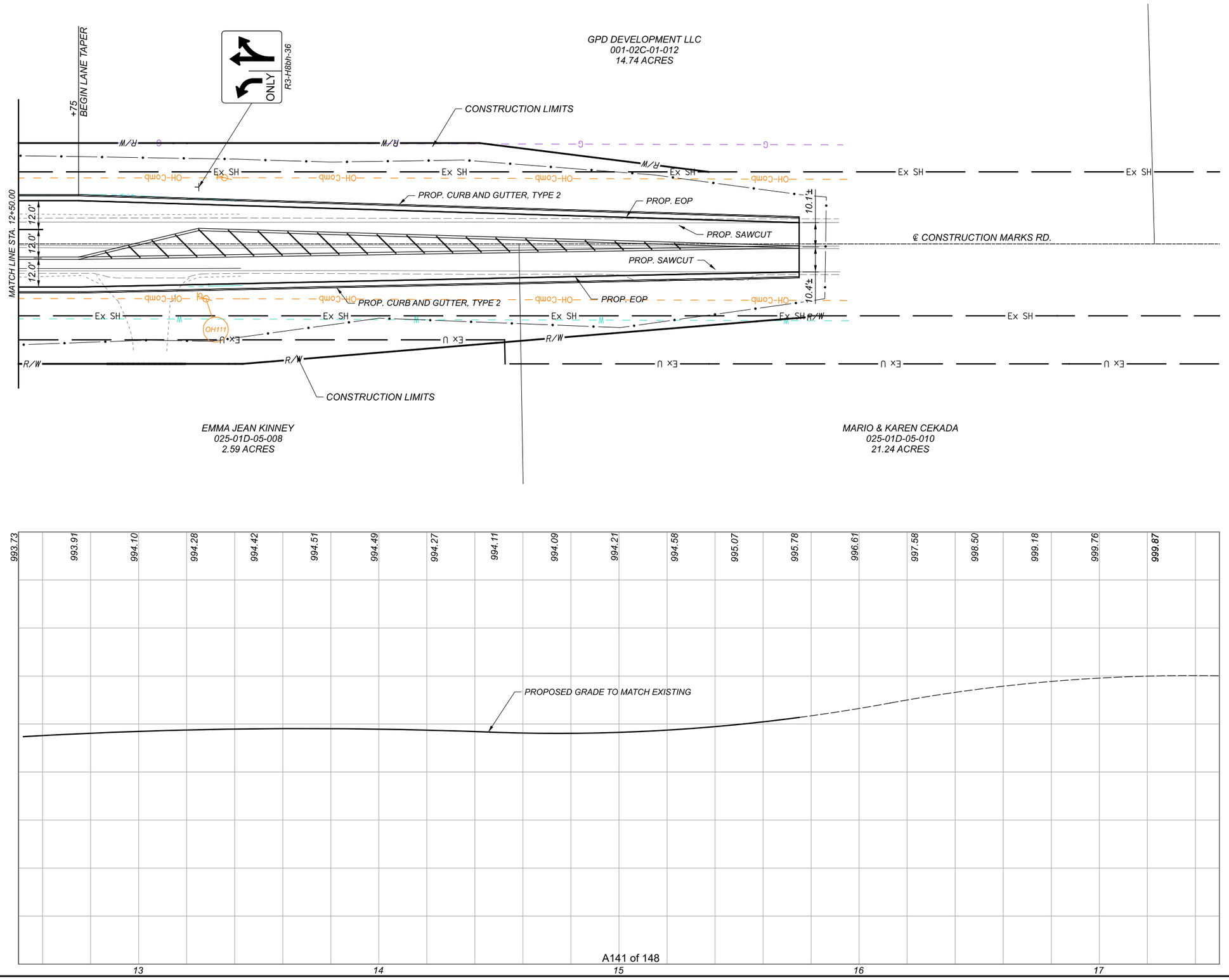
# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 1
## STA. 7+50.00 TO STA. 12+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 11/17/21 |
| PROJECT ID | 111150 |
| SHEET | 57 |
| TOTAL | 94 |

MED-303-4.85

MODEL: CLP_MARKS ROAD-1 - Marks Plan[Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:22 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP101.dgn




HORIZONTAL SCALE IN FEET
0 10 20 40

# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 1
## STA. 12+50.00 TO STA. 17+50.00

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
DMG

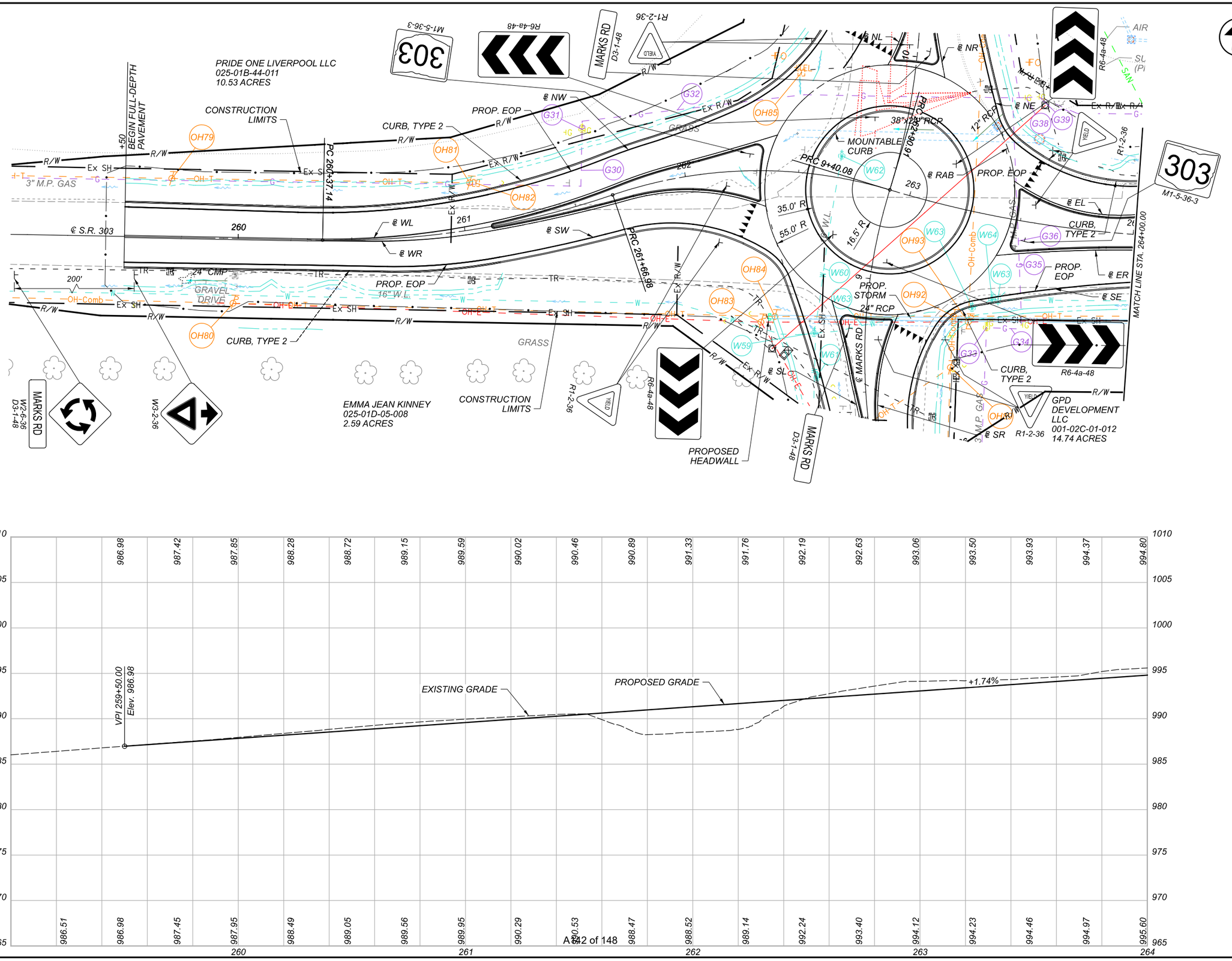
REVIEWER
MDW 11/17/21

PROJECT ID
111150

SHEET 58 TOTAL 94

MED-303-4.85

MODEL: CLP_MARKS ROAD-1- Marks Plan2 [Sheet] PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:23 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP101.dgn









HORIZONTAL SCALE IN FEET
0 10 20 40

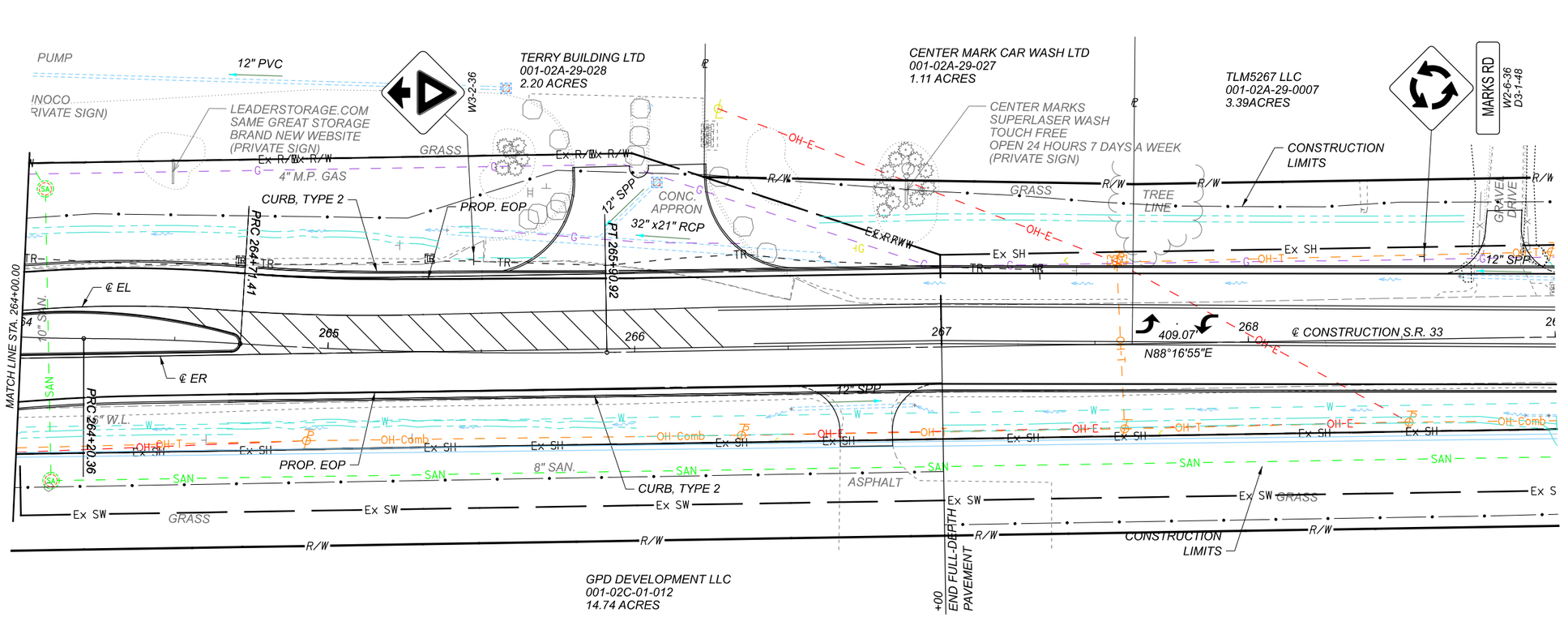
# PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
## STA. 259+00.00 TO STA. 264+00.00

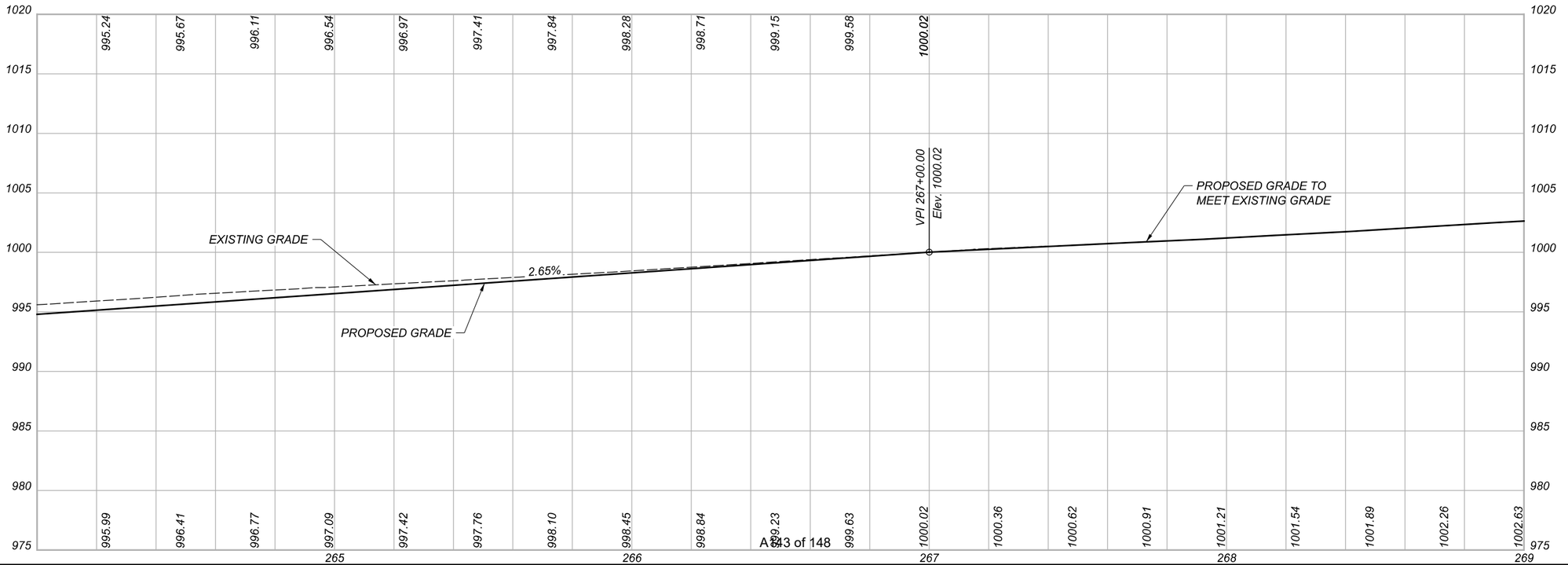
DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 66 |
| TOTAL | 94 |

MED-303-4.85

MODEL: III50_GP3ii PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:31 PM USER: dgohs
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MED-303-4.85

MODEL: 111150.GP3I2 PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:35 PM USER: dgohs
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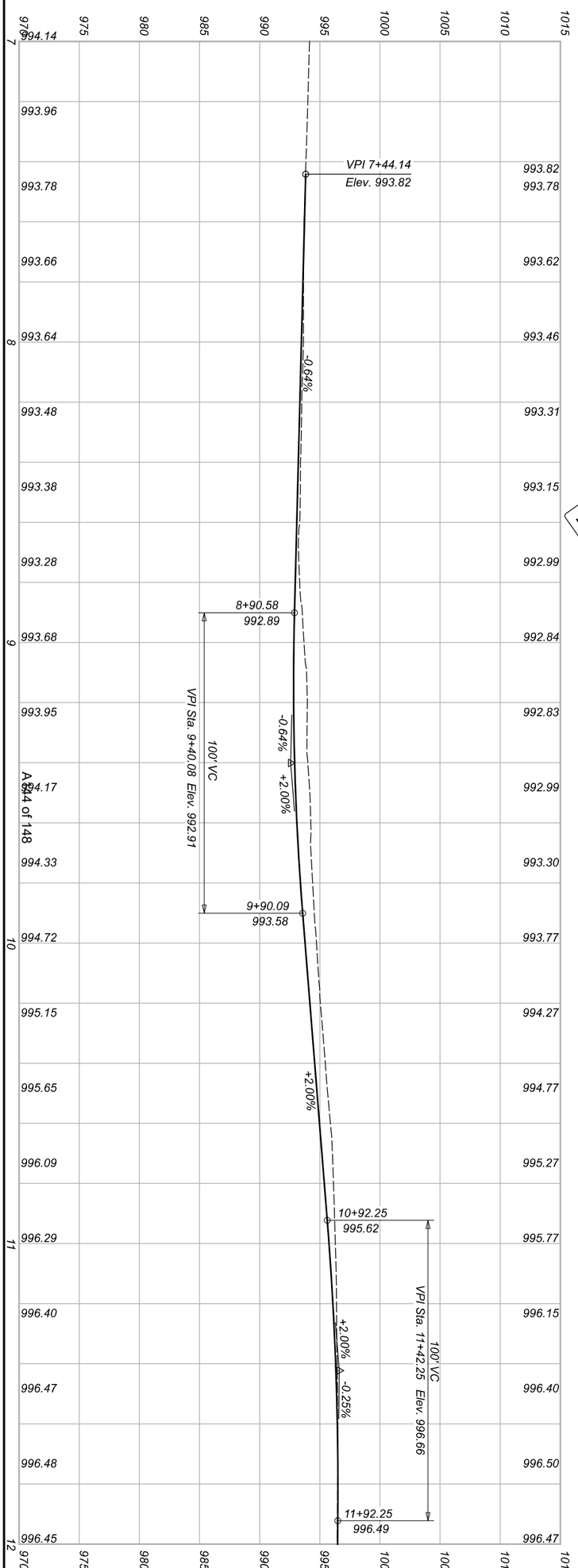
HORIZONTAL
SCALE IN FEET
0 10 20 40

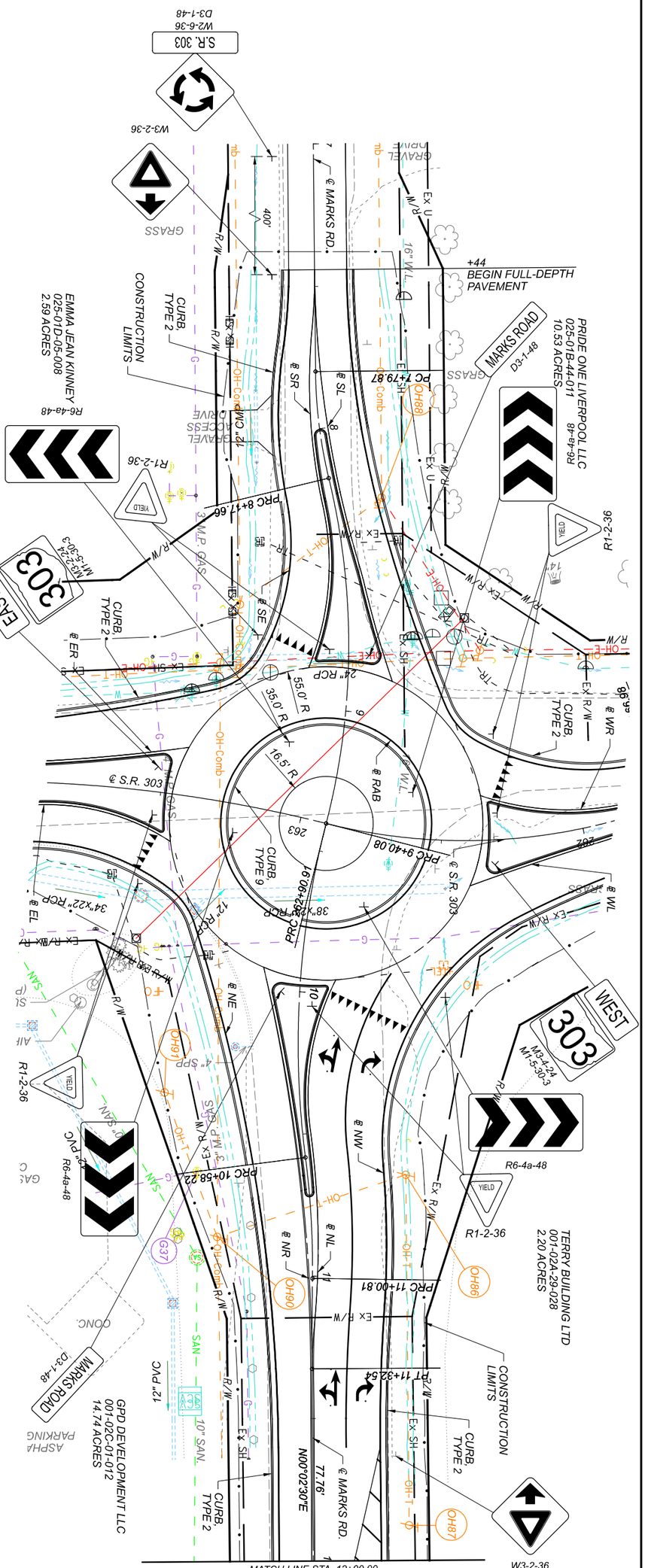
PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
STA. 264+00.00 TO STA. 269+00.00

DESIGN AGENCY
CARPENTER MARTY Transportation

| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 67 |
| TOTAL | 94 |

MODEL: 111150_GP33I PAPERSIZE: 17x11 (In.) DATE: 11/22/2021 TIME: 3:10:36 PM USER: dgahs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP33I.dgn






| SHEET | TOTAL |
|---|---|
| 73 | 94 |

PROJECT ID 111150

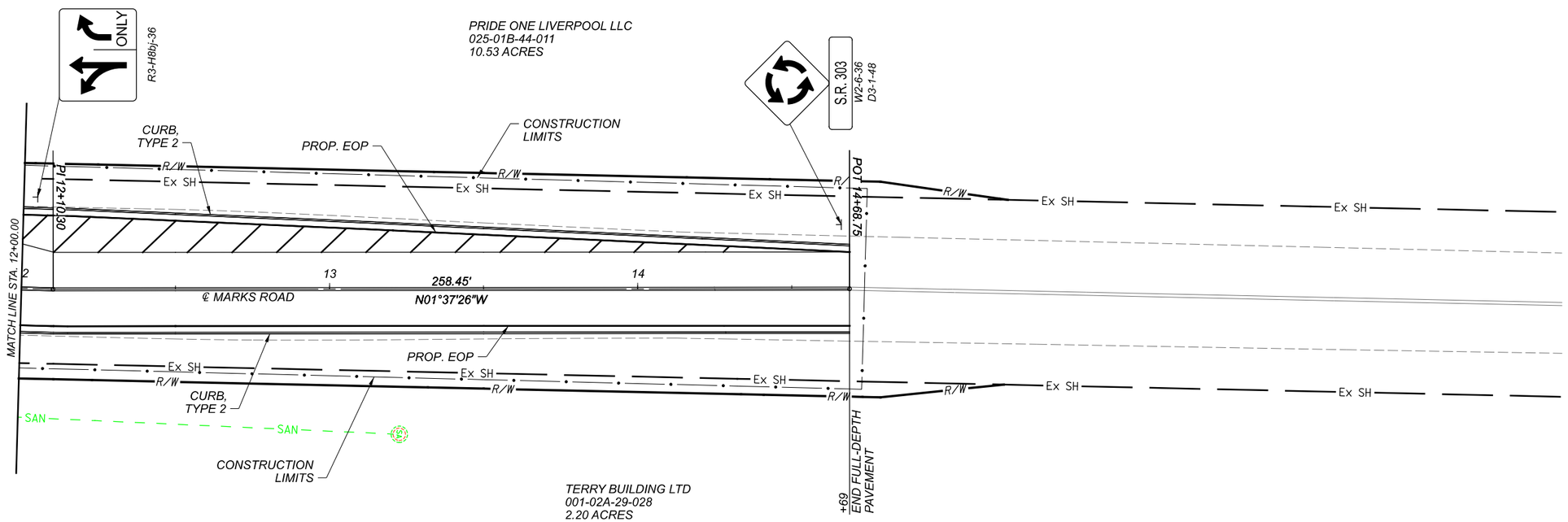
REVIEWER MDW 09/15/21

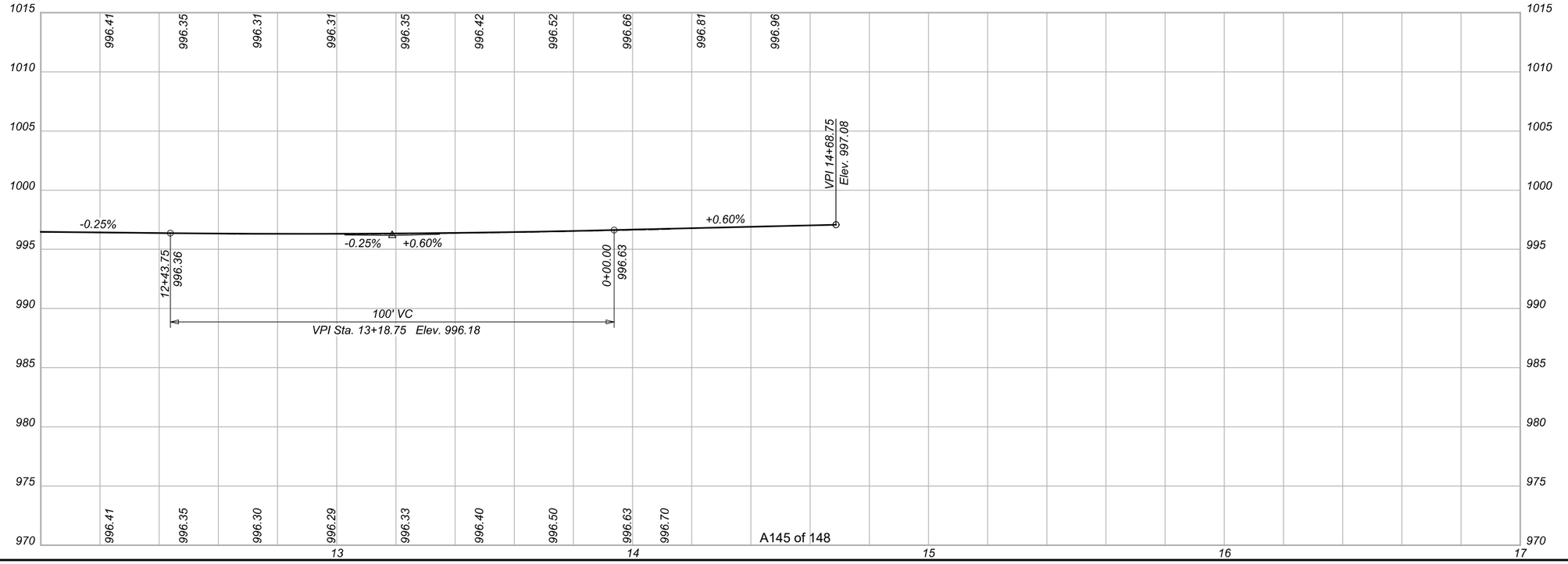
DESIGNER DMG

DESIGN AGENCY CARPENTER MARTY transportation

# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 2
## STA. 7+00.00 TO STA. 12+00.00

HORIZONTAL SCALE IN FEET
0 20
10 40






HORIZONTAL SCALE IN FEET
0 10 20 40

# PLAN AND PROFILE - MARKS ROAD - ALTERNATE 2
STA. 12+00.00 TO STA. 14+68.75

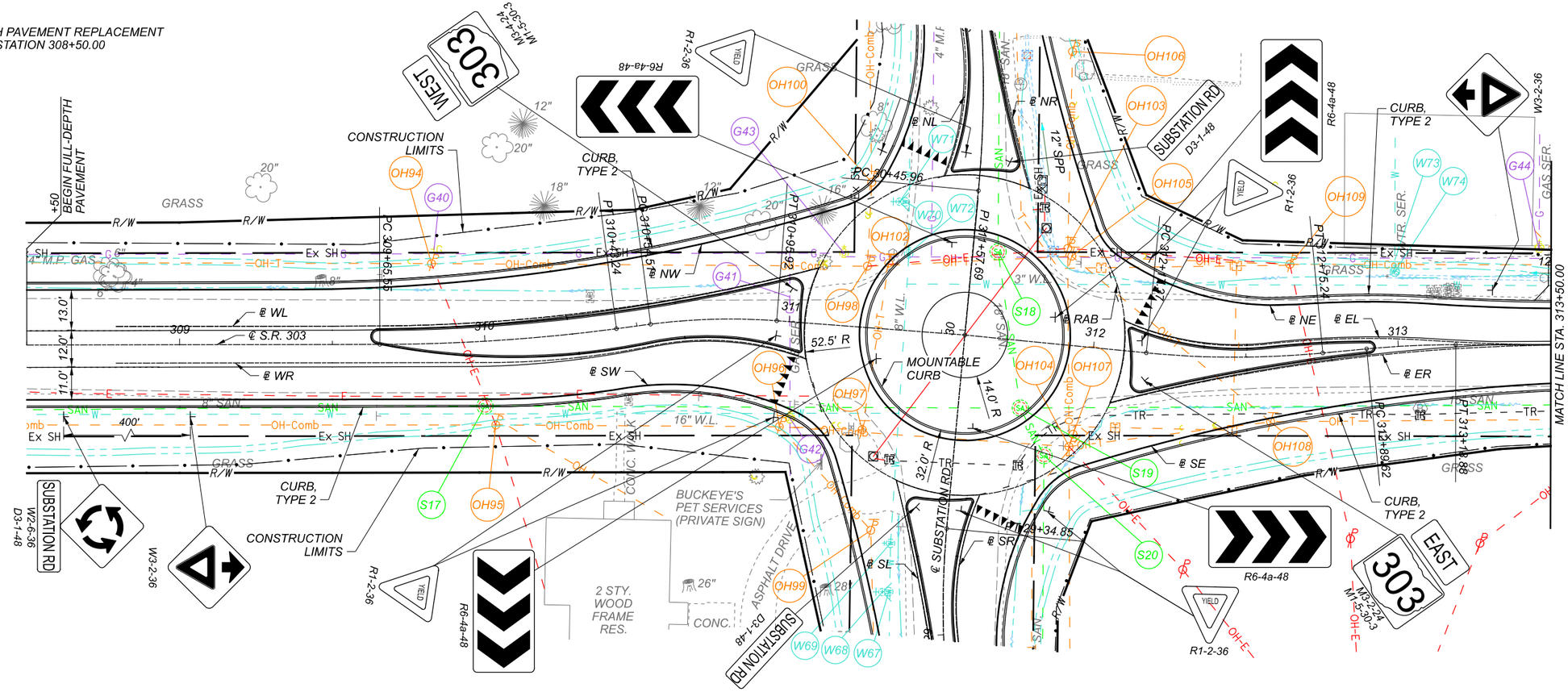
DESIGN AGENCY
CARPENTER MARTY Transportation

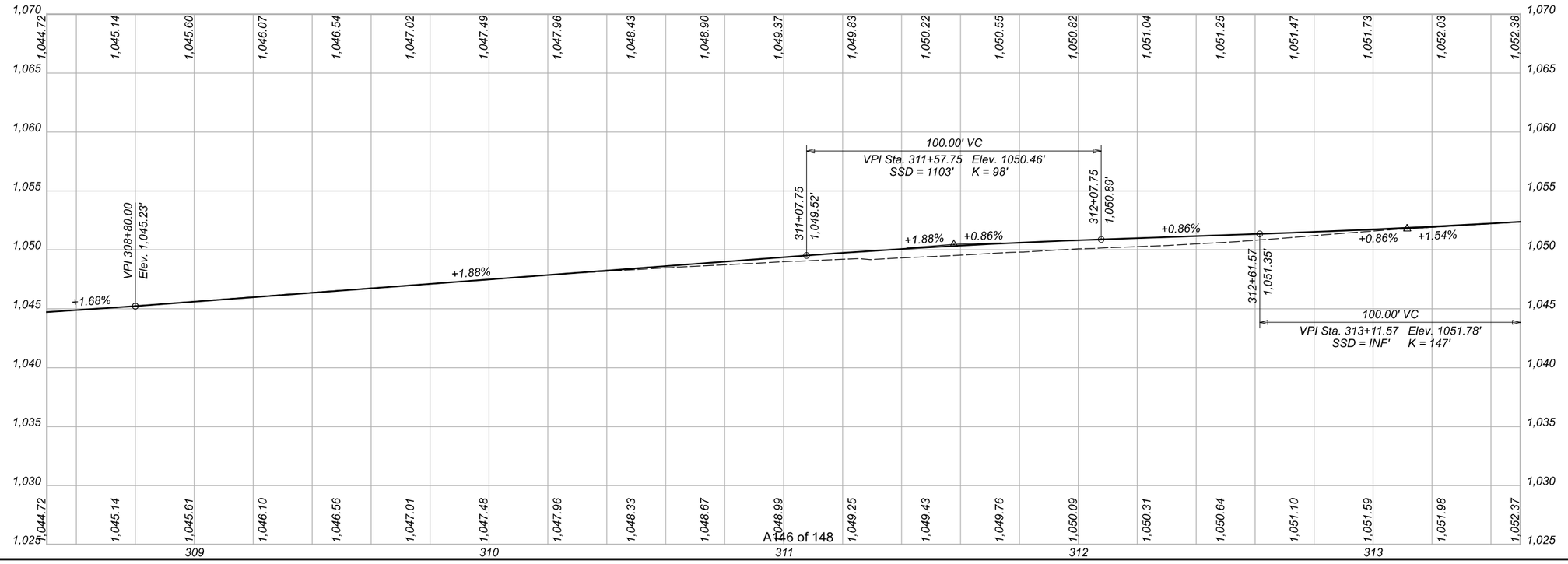
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 74 |
| TOTAL | 94 |

MED-303-4.85

MODEL: 111150_GP332 PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:38 PM USER: dgohs
P:\ODOT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP332.dgn

NOTES:
1. FULL-DEPTH PAVEMENT REPLACEMENT BEGINS AT STATION 308+50.00




HORIZONTAL SCALE IN FEET
0 10 20 40

# PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
## STA. 308+50.00 TO STA. 313+50.00

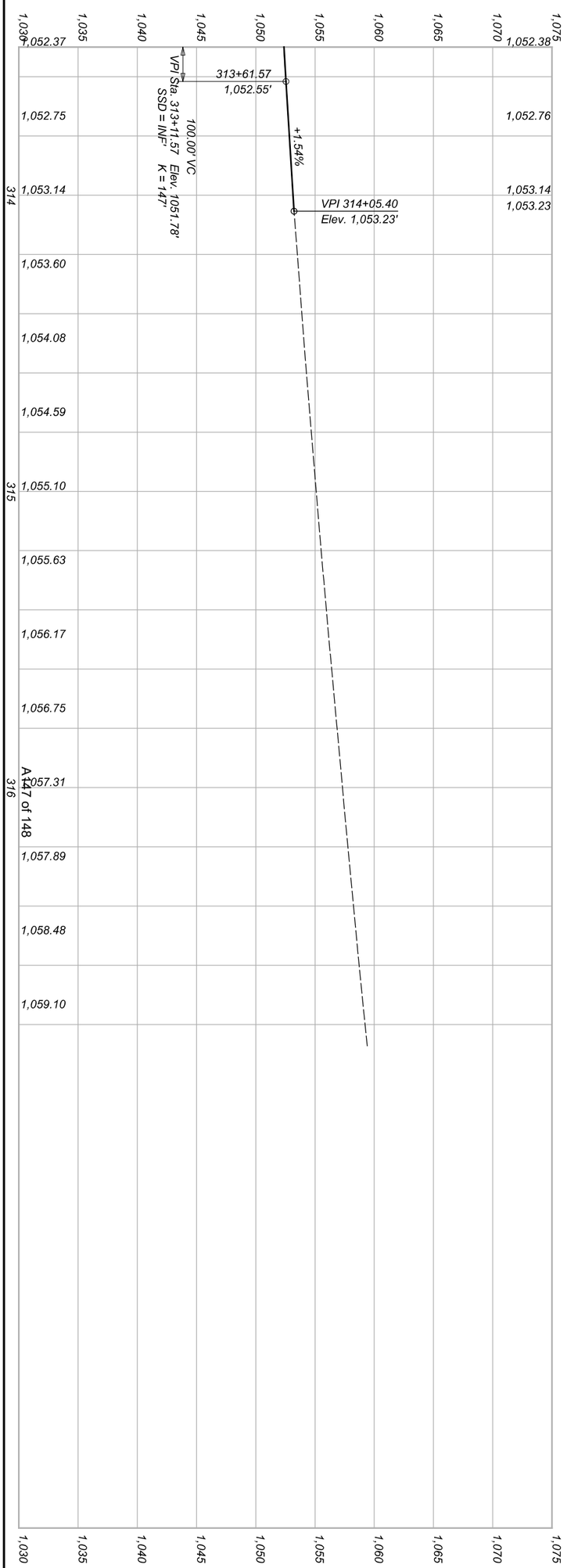
DESIGN AGENCY
CARPENTER MARTY Transportation

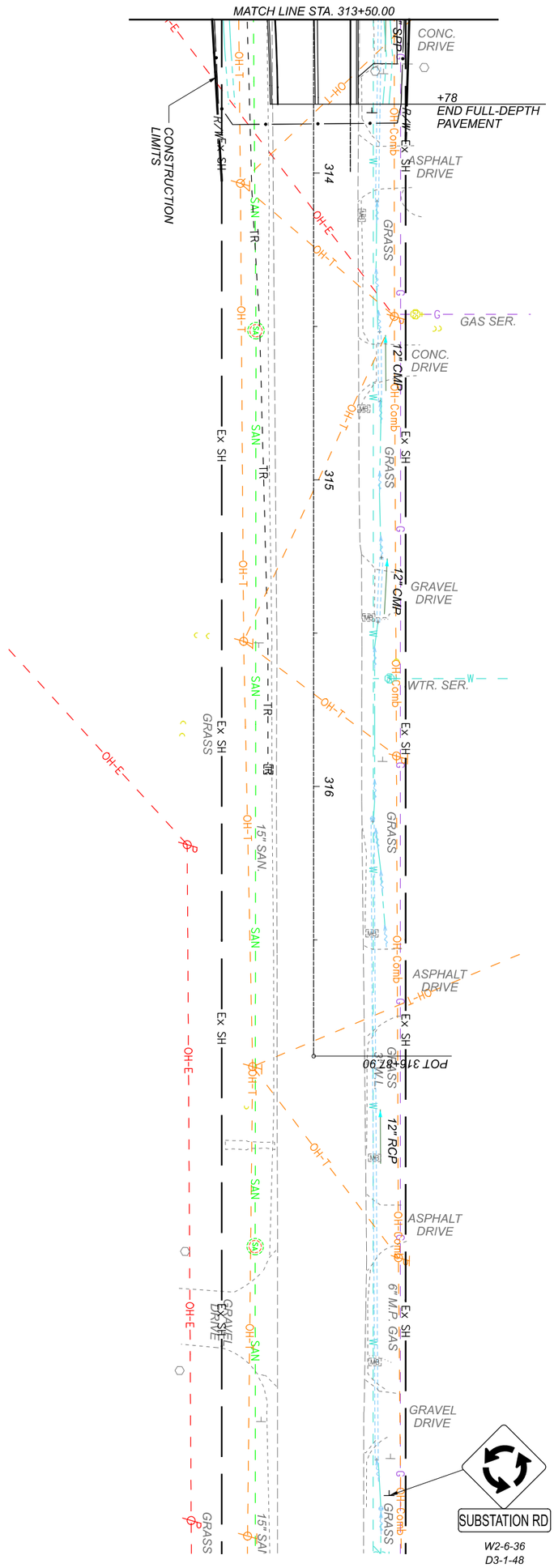
| | |
|---|---|
| DESIGNER | DMG |
| REVIEWER | MDW 09/15/21 |
| PROJECT ID | 111150 |
| SHEET | 81 |
| TOTAL | 94 |

MED-303-4.85

MODEL: 111150_GP2ll PAPERSIZE: 17x11(in.) DATE: 11/22/2021 TIME: 3:10:43 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP2ll.dgn

MODEL: 111150_GP212 PAPERSIZE: 17x11 (in.) DATE: 11/22/2021 TIME: 3:10:46 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP212.dgn



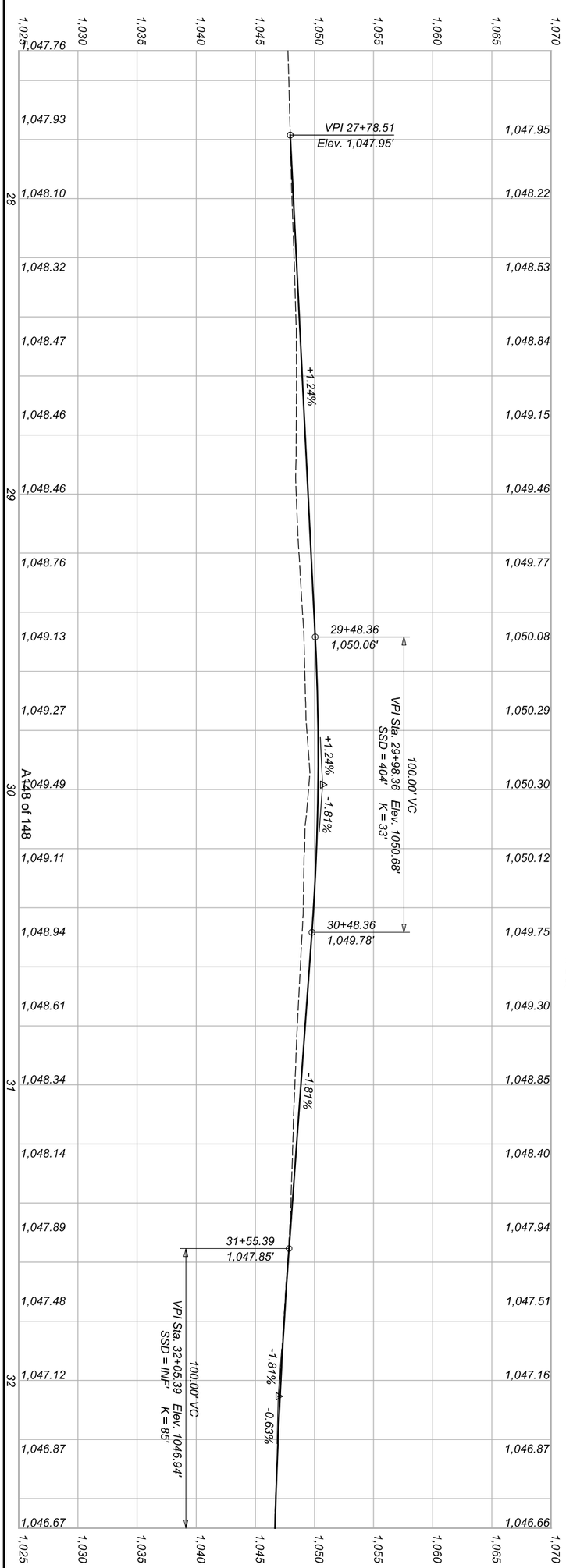





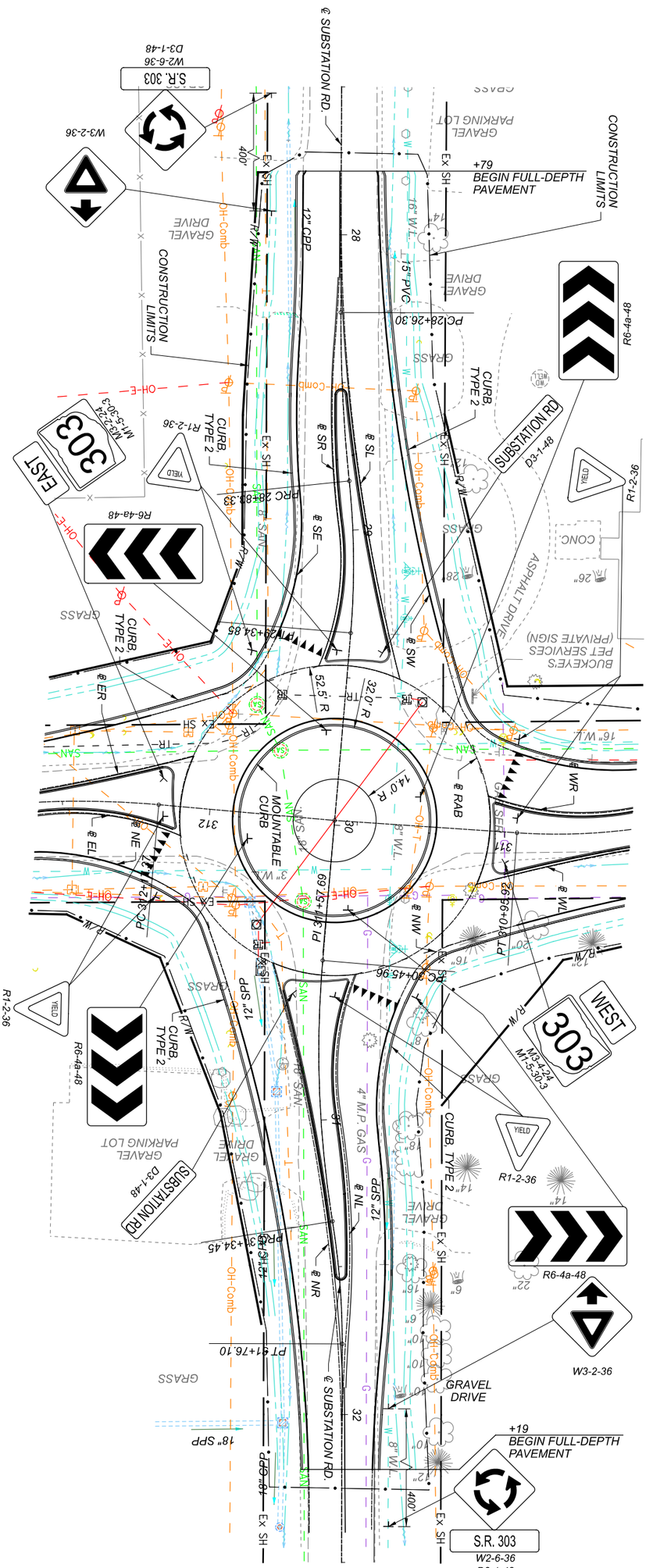

PLAN AND PROFILE - S.R. 303 - ALTERNATE 2
STA. 313+50.00 TO STA. 318+50.00

HORIZONTAL SCALE IN FEET
0 20
10 40

MODEL: 111150_GP231 PAPERSIZE: 17x11 (In.) DATE: 11/22/2021 TIME: 3:10:48 PM USER: dgohs
P:\ODT\03\0004_MED-303-4.85\111150\400-Engineering\Roadway\Sheets\111150_GP231.dgn








PLAN AND PROFILE - SUBSTATION RD. - ALTERNATE 2
STA. 27+50.00 TO STA. 32+50.00

HORIZONTAL SCALE IN FEET
0 20
10 40

# Appendix B
## Count Data, Growth Rates, Relevant TIS Portions, & Volume Calculations

Appendix B

CARPENTER MARTY transportation

Ohio Department of Transportation - Safety
1980 West Broad Street
Mail Stop 5160
Columbus, Ohio, United States 43223
+16147528099 kathryn.sharpnack@dot.ohio.gov
Office of Traffic Engineering

Count Name: MED-303-4.95
Site Code:
Start Date: 09/17/2024

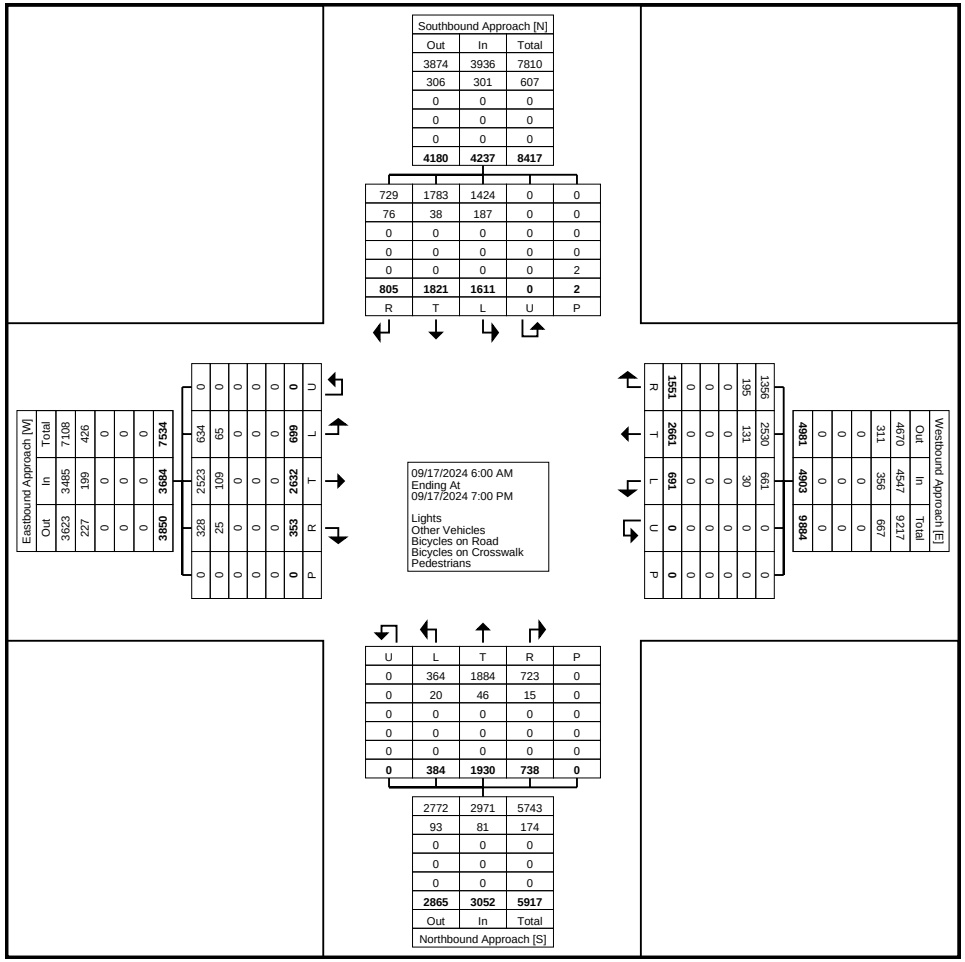

# Turning Movement Data

| Start Time | Southbound Approach Southbound | | | | | | Westbound Approach Westbound | | | | | | Northbound Approach Northbound | | | | | | Eastbound Approach Eastbound | | | | | | Int. Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | |
| 6:00 AM | 9 | 18 | 22 | 0 | 0 | 49 | 8 | 18 | 4 | 0 | 0 | 30 | 11 | 28 | 3 | 0 | 0 | 42 | 0 | 32 | 10 | 0 | 0 | 42 | 163 |
| 6:15 AM | 6 | 18 | 12 | 0 | 0 | 36 | 15 | 20 | 7 | 0 | 0 | 42 | 4 | 22 | 5 | 0 | 0 | 31 | 5 | 54 | 13 | 0 | 0 | 72 | 181 |
| 6:30 AM | 8 | 17 | 16 | 0 | 0 | 41 | 36 | 26 | 14 | 0 | 0 | 76 | 6 | 52 | 2 | 0 | 0 | 60 | 3 | 57 | 24 | 0 | 0 | 84 | 261 |
| 6:45 AM | 10 | 16 | 26 | 0 | 0 | 52 | 27 | 26 | 12 | 0 | 0 | 65 | 14 | 47 | 13 | 0 | 0 | 74 | 10 | 59 | 15 | 0 | 0 | 84 | 275 |
| Hourly Total | 33 | 69 | 76 | 0 | 0 | 178 | 86 | 90 | 37 | 0 | 0 | 213 | 35 | 149 | 23 | 0 | 0 | 207 | 18 | 202 | 62 | 0 | 0 | 282 | 880 |
| 7:00 AM | 10 | 30 | 28 | 0 | 0 | 68 | 24 | 50 | 13 | 0 | 0 | 87 | 6 | 30 | 9 | 0 | 0 | 45 | 9 | 47 | 17 | 0 | 0 | 73 | 273 |
| 7:15 AM | 8 | 54 | 24 | 0 | 0 | 86 | 28 | 50 | 23 | 0 | 0 | 101 | 10 | 50 | 9 | 0 | 0 | 69 | 12 | 45 | 20 | 0 | 0 | 77 | 333 |
| 7:30 AM | 15 | 42 | 21 | 0 | 0 | 78 | 23 | 48 | 23 | 0 | 0 | 94 | 14 | 74 | 13 | 0 | 0 | 101 | 3 | 72 | 19 | 0 | 0 | 94 | 367 |
| 7:45 AM | 7 | 37 | 22 | 0 | 0 | 66 | 27 | 46 | 17 | 0 | 0 | 90 | 8 | 71 | 9 | 0 | 0 | 88 | 2 | 68 | 20 | 0 | 0 | 90 | 334 |
| Hourly Total | 40 | 163 | 95 | 0 | 0 | 298 | 102 | 194 | 76 | 0 | 0 | 372 | 38 | 225 | 40 | 0 | 0 | 303 | 26 | 232 | 76 | 0 | 0 | 334 | 1307 |
| 8:00 AM | 14 | 32 | 22 | 0 | 0 | 68 | 21 | 39 | 12 | 0 | 0 | 72 | 9 | 52 | 7 | 0 | 0 | 68 | 6 | 50 | 12 | 0 | 0 | 68 | 276 |
| 8:15 AM | 15 | 31 | 18 | 0 | 0 | 64 | 27 | 39 | 13 | 0 | 0 | 79 | 15 | 45 | 4 | 0 | 0 | 64 | 5 | 48 | 16 | 0 | 0 | 69 | 276 |
| 8:30 AM | 16 | 30 | 11 | 0 | 0 | 57 | 26 | 42 | 7 | 0 | 0 | 75 | 13 | 46 | 6 | 0 | 0 | 65 | 6 | 51 | 14 | 0 | 0 | 71 | 268 |
| 8:45 AM | 12 | 20 | 24 | 0 | 0 | 56 | 24 | 45 | 6 | 0 | 0 | 75 | 19 | 25 | 9 | 0 | 0 | 53 | 3 | 54 | 17 | 0 | 0 | 74 | 258 |
| Hourly Total | 57 | 113 | 75 | 0 | 0 | 245 | 98 | 165 | 38 | 0 | 0 | 301 | 56 | 168 | 26 | 0 | 0 | 250 | 20 | 203 | 59 | 0 | 0 | 282 | 1078 |
| 9:00 AM | 18 | 16 | 21 | 0 | 0 | 55 | 22 | 41 | 11 | 0 | 0 | 74 | 11 | 36 | 9 | 0 | 0 | 56 | 6 | 52 | 13 | 0 | 0 | 71 | 256 |
| 9:15 AM | 15 | 18 | 23 | 0 | 0 | 56 | 20 | 37 | 7 | 0 | 0 | 64 | 7 | 26 | 10 | 0 | 0 | 43 | 3 | 39 | 8 | 0 | 0 | 50 | 213 |
| 9:30 AM | 6 | 23 | 29 | 0 | 0 | 58 | 32 | 44 | 13 | 0 | 0 | 89 | 5 | 22 | 6 | 0 | 0 | 33 | 10 | 37 | 11 | 0 | 0 | 58 | 238 |
| 9:45 AM | 3 | 16 | 22 | 0 | 2 | 41 | 27 | 33 | 14 | 0 | 0 | 74 | 11 | 21 | 4 | 0 | 0 | 36 | 5 | 40 | 6 | 0 | 0 | 51 | 202 |
| Hourly Total | 42 | 73 | 95 | 0 | 2 | 210 | 101 | 155 | 45 | 0 | 0 | 301 | 34 | 105 | 29 | 0 | 0 | 168 | 24 | 168 | 38 | 0 | 0 | 230 | 909 |
| 10:00 AM | 14 | 18 | 26 | 0 | 0 | 58 | 39 | 46 | 7 | 0 | 0 | 92 | 12 | 24 | 9 | 0 | 0 | 45 | 8 | 51 | 0 | 0 | 0 | 59 | 254 |
| 10:15 AM | 9 | 20 | 34 | 0 | 0 | 63 | 25 | 38 | 7 | 0 | 0 | 70 | 11 | 24 | 7 | 0 | 0 | 42 | 6 | 45 | 5 | 0 | 0 | 56 | 231 |
| 10:30 AM | 8 | 22 | 24 | 0 | 0 | 54 | 35 | 44 | 14 | 0 | 0 | 93 | 16 | 38 | 9 | 0 | 0 | 63 | 7 | 39 | 14 | 0 | 0 | 60 | 270 |
| 10:45 AM | 13 | 24 | 27 | 0 | 0 | 64 | 21 | 56 | 9 | 0 | 0 | 86 | 14 | 34 | 6 | 0 | 0 | 54 | 5 | 49 | 7 | 0 | 0 | 61 | 265 |
| Hourly Total | 44 | 84 | 111 | 0 | 0 | 239 | 120 | 184 | 37 | 0 | 0 | 341 | 53 | 120 | 31 | 0 | 0 | 204 | 26 | 184 | 26 | 0 | 0 | 236 | 1020 |
| 11:00 AM | 14 | 30 | 34 | 0 | 0 | 78 | 23 | 44 | 14 | 0 | 0 | 81 | 8 | 31 | 7 | 0 | 0 | 46 | 8 | 64 | 20 | 0 | 0 | 92 | 297 |
| 11:15 AM | 14 | 22 | 34 | 0 | 0 | 70 | 33 | 44 | 7 | 0 | 0 | 84 | 14 | 27 | 8 | 0 | 0 | 49 | 3 | 43 | 7 | 0 | 0 | 53 | 256 |
| 11:30 AM | 10 | 16 | 35 | 0 | 0 | 61 | 29 | 61 | 9 | 0 | 0 | 99 | 6 | 18 | 6 | 0 | 0 | 30 | 5 | 48 | 19 | 0 | 0 | 72 | 262 |
| 11:45 AM | 15 | 21 | 28 | 0 | 0 | 64 | 30 | 48 | 12 | 0 | 0 | 90 | 15 | 29 | 6 | 0 | 0 | 50 | 7 | 26 | 13 | 0 | 0 | 46 | 250 |
| Hourly Total | 53 | 89 | 131 | 0 | 0 | 273 | 115 | 197 | 42 | 0 | 0 | 354 | 43 | 105 | 27 | 0 | 0 | 175 | 23 | 181 | 59 | 0 | 0 | 263 | 1065 |
| 12:00 PM | 14 | 26 | 59 | 0 | 0 | 99 | 40 | 47 | 11 | 0 | 0 | 98 | 15 | 29 | 8 | 0 | 0 | 52 | 7 | 54 | 5 | 0 | 0 | 66 | 315 |
| 12:15 PM | 11 | 31 | 38 | 0 | 0 | 80 | 30 | 54 | 15 | 0 | 0 | 99 | 11 | 27 | 9 | 0 | 0 | 47 | 6 | 50 | 12 | 0 | 0 | 68 | 294 |
| 12:30 PM | 13 | 30 | 44 | 0 | 0 | 87 | 40 | 60 | 12 | 0 | 0 | 112 | 16 | 33 | 4 | 0 | 0 | 53 | 7 | 44 | 8 | 0 | 0 | 59 | 311 |
| 12:45 PM | 12 | 29 | 34 | 0 | 0 | 75 | 34 | 42 | 16 | 0 | 0 | 92 | 10 | 26 | 7 | 0 | 0 | 43 | 4 | 51 | 18 | 0 | 0 | 73 | 283 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hourly Total | 50 | 116 | 175 | 0 | 0 | 341 | 144 | 203 | 54 | 0 | 0 | 401 | 52 | 115 | 28 | 0 | 0 | 195 | 24 | 199 | 43 | 0 | 0 | 266 | 1203 |
| 1:00 PM | 15 | 21 | 28 | 0 | 0 | 64 | 31 | 46 | 13 | 0 | 0 | 90 | 19 | 28 | 11 | 0 | 0 | 58 | 6 | 36 | 6 | 0 | 0 | 48 | 260 |
| 1:15 PM | 12 | 24 | 32 | 0 | 0 | 68 | 32 | 52 | 18 | 0 | 0 | 102 | 15 | 35 | 10 | 0 | 0 | 60 | 5 | 40 | 22 | 0 | 0 | 67 | 297 |
| 1:30 PM | 14 | 29 | 26 | 0 | 0 | 69 | 33 | 61 | 18 | 0 | 0 | 112 | 9 | 23 | 8 | 0 | 0 | 40 | 9 | 65 | 10 | 0 | 0 | 84 | 305 |
| 1:45 PM | 18 | 29 | 32 | 0 | 0 | 79 | 30 | 50 | 12 | 0 | 0 | 92 | 12 | 19 | 3 | 0 | 0 | 34 | 12 | 52 | 12 | 0 | 0 | 76 | 281 |
| Hourly Total | 59 | 103 | 118 | 0 | 0 | 280 | 126 | 209 | 61 | 0 | 0 | 396 | 55 | 105 | 32 | 0 | 0 | 192 | 32 | 193 | 50 | 0 | 0 | 275 | 1143 |
| 2:00 PM | 20 | 33 | 37 | 0 | 0 | 90 | 25 | 64 | 14 | 0 | 0 | 103 | 13 | 26 | 3 | 0 | 0 | 42 | 3 | 52 | 7 | 0 | 0 | 62 | 297 |
| 2:15 PM | 19 | 37 | 29 | 0 | 0 | 85 | 43 | 61 | 14 | 0 | 0 | 118 | 23 | 53 | 4 | 0 | 0 | 80 | 6 | 62 | 15 | 0 | 0 | 83 | 366 |
| 2:30 PM | 23 | 44 | 44 | 0 | 0 | 111 | 30 | 47 | 9 | 0 | 0 | 86 | 32 | 64 | 6 | 0 | 0 | 102 | 6 | 46 | 18 | 0 | 0 | 70 | 369 |
| 2:45 PM | 23 | 34 | 22 | 0 | 0 | 79 | 33 | 58 | 18 | 0 | 0 | 109 | 22 | 33 | 4 | 0 | 0 | 59 | 10 | 43 | 22 | 0 | 0 | 75 | 322 |
| Hourly Total | 85 | 148 | 132 | 0 | 0 | 365 | 131 | 230 | 55 | 0 | 0 | 416 | 90 | 176 | 17 | 0 | 0 | 283 | 25 | 203 | 62 | 0 | 0 | 290 | 1354 |
| 3:00 PM | 28 | 54 | 50 | 0 | 0 | 132 | 32 | 65 | 18 | 0 | 0 | 115 | 19 | 33 | 3 | 0 | 0 | 55 | 9 | 50 | 20 | 0 | 0 | 79 | 381 |
| 3:15 PM | 22 | 54 | 33 | 0 | 0 | 109 | 28 | 56 | 13 | 0 | 0 | 97 | 17 | 44 | 6 | 0 | 0 | 67 | 8 | 53 | 20 | 0 | 0 | 81 | 354 |
| 3:30 PM | 21 | 58 | 49 | 0 | 0 | 128 | 39 | 67 | 12 | 0 | 0 | 118 | 15 | 42 | 9 | 0 | 0 | 66 | 10 | 68 | 14 | 0 | 0 | 92 | 404 |
| 3:45 PM | 17 | 47 | 34 | 0 | 0 | 98 | 27 | 61 | 16 | 0 | 0 | 104 | 15 | 37 | 12 | 0 | 0 | 64 | 8 | 61 | 17 | 0 | 0 | 86 | 352 |
| Hourly Total | 88 | 213 | 166 | 0 | 0 | 467 | 126 | 249 | 59 | 0 | 0 | 434 | 66 | 156 | 30 | 0 | 0 | 252 | 35 | 232 | 71 | 0 | 0 | 338 | 1491 |
| 4:00 PM | 17 | 61 | 39 | 0 | 0 | 117 | 38 | 72 | 12 | 0 | 0 | 122 | 18 | 39 | 14 | 0 | 0 | 71 | 18 | 69 | 15 | 0 | 0 | 102 | 412 |
| 4:15 PM | 28 | 63 | 37 | 0 | 0 | 128 | 33 | 76 | 19 | 0 | 0 | 128 | 16 | 40 | 11 | 0 | 0 | 67 | 13 | 64 | 7 | 0 | 0 | 84 | 407 |
| 4:30 PM | 35 | 86 | 61 | 0 | 0 | 182 | 33 | 80 | 16 | 0 | 0 | 129 | 17 | 52 | 8 | 0 | 0 | 77 | 12 | 53 | 10 | 0 | 0 | 75 | 463 |
| 4:45 PM | 21 | 73 | 54 | 0 | 0 | 148 | 42 | 74 | 15 | 0 | 0 | 131 | 28 | 49 | 12 | 0 | 0 | 89 | 7 | 66 | 11 | 0 | 0 | 84 | 452 |
| Hourly Total | 101 | 283 | 191 | 0 | 0 | 575 | 146 | 302 | 62 | 0 | 0 | 510 | 79 | 180 | 45 | 0 | 0 | 304 | 50 | 252 | 43 | 0 | 0 | 345 | 1734 |
| 5:00 PM | 28 | 82 | 51 | 0 | 0 | 161 | 28 | 74 | 19 | 0 | 0 | 121 | 22 | 56 | 7 | 0 | 0 | 85 | 8 | 48 | 21 | 0 | 0 | 77 | 444 |
| 5:15 PM | 27 | 70 | 40 | 0 | 0 | 137 | 35 | 70 | 13 | 0 | 0 | 118 | 22 | 56 | 13 | 0 | 0 | 91 | 6 | 41 | 16 | 0 | 0 | 63 | 409 |
| 5:30 PM | 31 | 53 | 36 | 0 | 0 | 120 | 39 | 66 | 15 | 0 | 0 | 120 | 26 | 40 | 10 | 0 | 0 | 76 | 9 | 51 | 15 | 0 | 0 | 75 | 391 |
| 5:45 PM | 15 | 43 | 30 | 0 | 0 | 88 | 33 | 53 | 15 | 0 | 0 | 101 | 14 | 49 | 9 | 0 | 0 | 72 | 7 | 52 | 13 | 0 | 0 | 72 | 333 |
| Hourly Total | 101 | 248 | 157 | 0 | 0 | 506 | 135 | 263 | 62 | 0 | 0 | 460 | 84 | 201 | 39 | 0 | 0 | 324 | 30 | 192 | 65 | 0 | 0 | 287 | 1577 |
| 6:00 PM | 13 | 38 | 24 | 0 | 0 | 75 | 34 | 51 | 15 | 0 | 0 | 100 | 20 | 37 | 2 | 0 | 0 | 59 | 4 | 46 | 14 | 0 | 0 | 64 | 298 |
| 6:15 PM | 19 | 30 | 19 | 0 | 0 | 68 | 34 | 73 | 12 | 0 | 0 | 119 | 12 | 38 | 5 | 0 | 0 | 55 | 4 | 56 | 10 | 0 | 0 | 70 | 312 |
| 6:30 PM | 14 | 27 | 22 | 0 | 0 | 63 | 32 | 56 | 22 | 0 | 0 | 110 | 13 | 21 | 7 | 0 | 0 | 41 | 8 | 41 | 13 | 0 | 0 | 62 | 276 |
| 6:45 PM | 6 | 24 | 24 | 0 | 0 | 54 | 21 | 40 | 14 | 0 | 0 | 75 | 8 | 29 | 3 | 0 | 0 | 40 | 4 | 48 | 8 | 0 | 0 | 60 | 229 |
| Hourly Total | 52 | 119 | 89 | 0 | 0 | 260 | 121 | 220 | 63 | 0 | 0 | 404 | 53 | 125 | 17 | 0 | 0 | 195 | 20 | 191 | 45 | 0 | 0 | 256 | 1115 |
| Grand Total | 805 | 1821 | 1611 | 0 | 2 | 4237 | 1551 | 2661 | 691 | 0 | 0 | 4903 | 738 | 1930 | 384 | 0 | 0 | 3052 | 353 | 2632 | 699 | 0 | 0 | 3684 | 15876 |
| Approach % | 19.0 | 43.0 | 38.0 | 0.0 | - | - | 31.6 | 54.3 | 14.1 | 0.0 | - | - | 24.2 | 63.2 | 12.6 | 0.0 | - | - | 9.6 | 71.4 | 19.0 | 0.0 | - | - | - |
| Total % | 5.1 | 11.5 | 10.1 | 0.0 | - | 26.7 | 9.8 | 16.8 | 4.4 | 0.0 | - | 30.9 | 4.6 | 12.2 | 2.4 | 0.0 | - | 19.2 | 2.2 | 16.6 | 4.4 | 0.0 | - | 23.2 | - |
| Lights | 729 | 1783 | 1424 | 0 | - | 3936 | 1356 | 2530 | 661 | 0 | - | 4547 | 723 | 1884 | 364 | 0 | - | 2971 | 328 | 2523 | 634 | 0 | - | 3485 | 14939 |
| % Lights | 90.6 | 97.9 | 88.4 | - | - | 92.9 | 87.4 | 95.1 | 95.7 | - | - | 92.7 | 98.0 | 97.6 | 94.8 | - | - | 97.3 | 92.9 | 95.9 | 90.7 | - | - | 94.6 | 94.1 |
| Other Vehicles | 76 | 38 | 187 | 0 | - | 301 | 195 | 131 | 30 | 0 | - | 356 | 15 | 46 | 20 | 0 | - | 81 | 25 | 109 | 65 | 0 | - | 199 | 937 |
| % Other Vehicles | 9.4 | 2.1 | 11.6 | - | - | 7.1 | 12.6 | 4.9 | 4.3 | - | - | 7.3 | 2.0 | 2.4 | 5.2 | - | - | 2.7 | 7.1 | 4.1 | 9.3 | - | - | 5.4 | 5.9 |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| % Bicycles on Road | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Bicycles on Crosswalk | - | - | - | - | 0.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Pedestrians | - | - | - | - | 2 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Pedestrians | - | - | - | - | 100.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Ohio Department of Transportation - Safety
1980 West Broad Street
Mail Stop 5160
Columbus, Ohio, United States 43223
+16147528099 kathryn.sharpnack@dot.ohio.gov
Office of Traffic Engineering

Count Name: MED-303-4.95
Site Code:
Start Date: 09/17/2024


Turning Movement Data Plot

Ohio Department of Transportation - Safety
1980 West Broad Street
Mail Stop 5160
Columbus, Ohio, United States 43223
+16147528099 kathryn.sharpnack@dot.ohio.gov
Office of Traffic Engineering

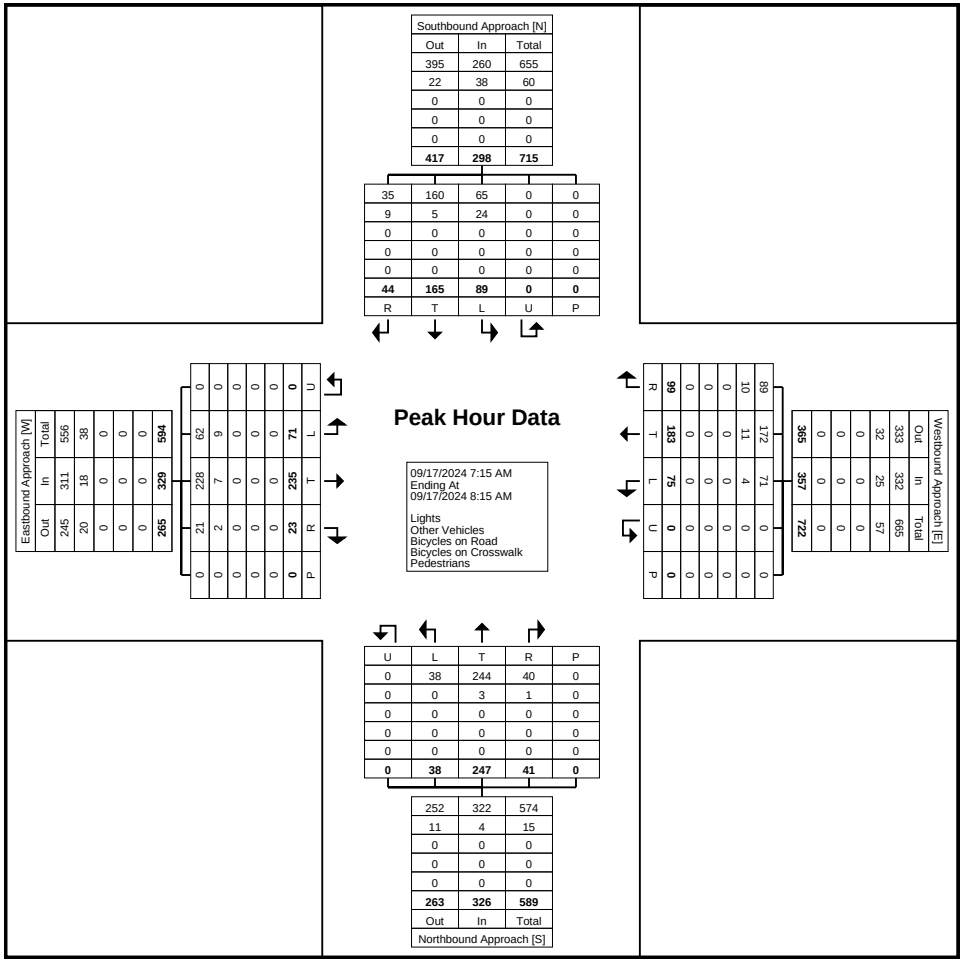
Count Name: MED-303-4.95
Site Code:
Start Date: 09/17/2024


# Turning Movement Peak Hour Data (7:15 AM)

| Start Time | Southbound Approach Southbound | | | | | | Westbound Approach Westbound | | | | | | Northbound Approach Northbound | | | | | | Eastbound Approach Eastbound | | | | | | Int. Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | |
| 7:15 AM | 8 | 54 | 24 | 0 | 0 | 86 | 28 | 50 | 23 | 0 | 0 | 101 | 10 | 50 | 9 | 0 | 0 | 69 | 12 | 45 | 20 | 0 | 0 | 77 | 333 |
| 7:30 AM | 15 | 42 | 21 | 0 | 0 | 78 | 23 | 48 | 23 | 0 | 0 | 94 | 14 | 74 | 13 | 0 | 0 | 101 | 3 | 72 | 19 | 0 | 0 | 94 | 367 |
| 7:45 AM | 7 | 37 | 22 | 0 | 0 | 66 | 27 | 46 | 17 | 0 | 0 | 90 | 8 | 71 | 9 | 0 | 0 | 88 | 2 | 68 | 20 | 0 | 0 | 90 | 334 |
| 8:00 AM | 14 | 32 | 22 | 0 | 0 | 68 | 21 | 39 | 12 | 0 | 0 | 72 | 9 | 52 | 7 | 0 | 0 | 68 | 6 | 50 | 12 | 0 | 0 | 68 | 276 |
| Total | 44 | 165 | 89 | 0 | 0 | 298 | 99 | 183 | 75 | 0 | 0 | 357 | 41 | 247 | 38 | 0 | 0 | 326 | 23 | 235 | 71 | 0 | 0 | 329 | 1310 |
| Approach % | 14.8 | 55.4 | 29.9 | 0.0 | - | - | 27.7 | 51.3 | 21.0 | 0.0 | - | - | 12.6 | 75.8 | 11.7 | 0.0 | - | - | 7.0 | 71.4 | 21.6 | 0.0 | - | - | - |
| Total % | 3.4 | 12.6 | 6.8 | 0.0 | - | 22.7 | 7.6 | 14.0 | 5.7 | 0.0 | - | 27.3 | 3.1 | 18.9 | 2.9 | 0.0 | - | 24.9 | 1.8 | 17.9 | 5.4 | 0.0 | - | 25.1 | - |
| PHF | 0.733 | 0.764 | 0.927 | 0.000 | - | 0.866 | 0.884 | 0.915 | 0.815 | 0.000 | - | 0.884 | 0.732 | 0.834 | 0.731 | 0.000 | - | 0.807 | 0.479 | 0.816 | 0.888 | 0.000 | - | 0.875 | 0.892 |
| Lights | 35 | 160 | 65 | 0 | - | 260 | 89 | 172 | 71 | 0 | - | 332 | 40 | 244 | 38 | 0 | - | 322 | 21 | 228 | 62 | 0 | - | 311 | 1225 |
| % Lights | 79.5 | 97.0 | 73.0 | - | - | 87.2 | 89.9 | 94.0 | 94.7 | - | - | 93.0 | 97.6 | 98.8 | 100.0 | - | - | 98.8 | 91.3 | 97.0 | 87.3 | - | - | 94.5 | 93.5 |
| Other Vehicles | 9 | 5 | 24 | 0 | - | 38 | 10 | 11 | 4 | 0 | - | 25 | 1 | 3 | 0 | 0 | - | 4 | 2 | 7 | 9 | 0 | - | 18 | 85 |
| % Other Vehicles | 20.5 | 3.0 | 27.0 | - | - | 12.8 | 10.1 | 6.0 | 5.3 | - | - | 7.0 | 2.4 | 1.2 | 0.0 | - | - | 1.2 | 8.7 | 3.0 | 12.7 | - | - | 5.5 | 6.5 |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| % Bicycles on Road | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Ohio Department of Transportation - Safety
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Mail Stop 5160
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Office of Traffic Engineering

Count Name: MED-303-4.95
Site Code:
Start Date: 09/17/2024


Turning Movement Peak Hour Data Plot (7:15 AM)

Ohio Department of Transportation - Safety
1980 West Broad Street
Mail Stop 5160
Columbus, Ohio, United States 43223
+16147528099 kathryn.sharpnack@dot.ohio.gov
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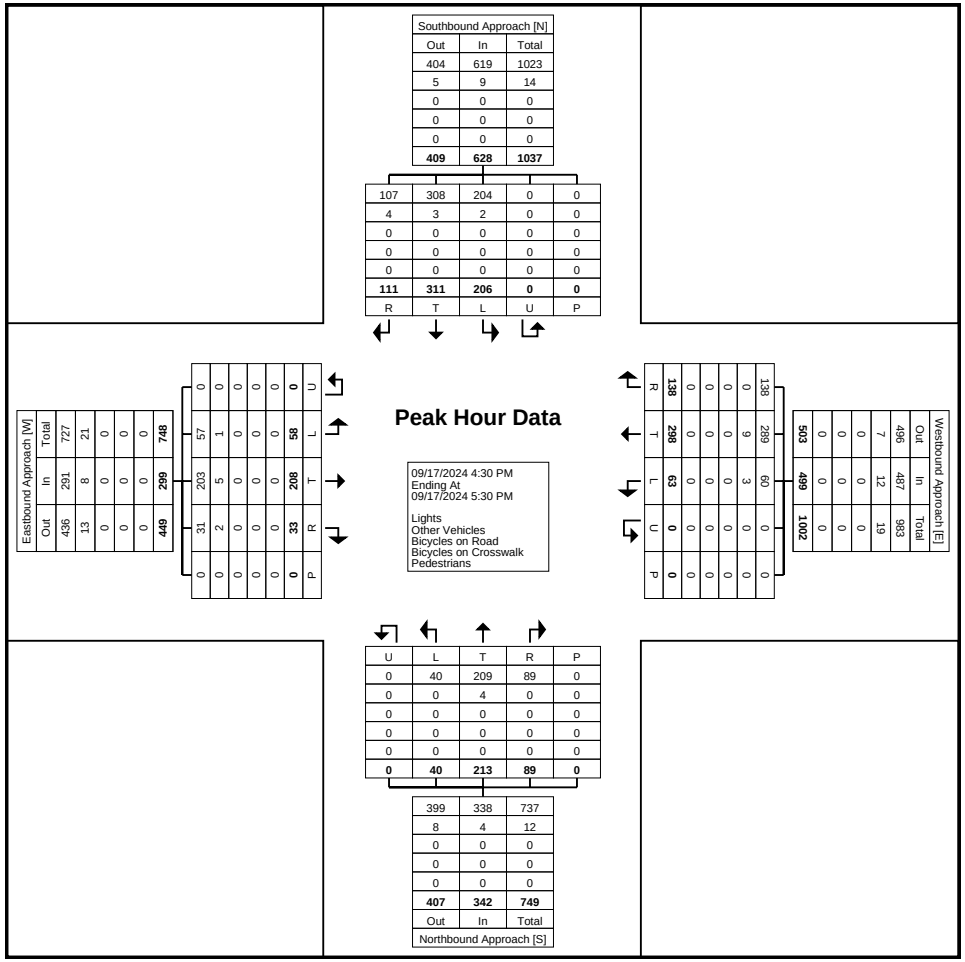
Count Name: MED-303-4.95
Site Code:
Start Date: 09/17/2024


# Turning Movement Peak Hour Data (4:30 PM)

| Start Time | Southbound Approach | | | | | | Westbound Approach | | | | | | Northbound Approach | | | | | | Eastbound Approach | | | | | | Int. Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Southbound | | | | | | Westbound | | | | | | Northbound | | | | | | Eastbound | | | | | | |
| | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | |
| 4:30 PM | 35 | 86 | 61 | 0 | 0 | 182 | 33 | 80 | 16 | 0 | 0 | 129 | 17 | 52 | 8 | 0 | 0 | 77 | 12 | 53 | 10 | 0 | 0 | 75 | 463 |
| 4:45 PM | 21 | 73 | 54 | 0 | 0 | 148 | 42 | 74 | 15 | 0 | 0 | 131 | 28 | 49 | 12 | 0 | 0 | 89 | 7 | 66 | 11 | 0 | 0 | 84 | 452 |
| 5:00 PM | 28 | 82 | 51 | 0 | 0 | 161 | 28 | 74 | 19 | 0 | 0 | 121 | 22 | 56 | 7 | 0 | 0 | 85 | 8 | 48 | 21 | 0 | 0 | 77 | 444 |
| 5:15 PM | 27 | 70 | 40 | 0 | 0 | 137 | 35 | 70 | 13 | 0 | 0 | 118 | 22 | 56 | 13 | 0 | 0 | 91 | 6 | 41 | 16 | 0 | 0 | 63 | 409 |
| Total | 111 | 311 | 206 | 0 | 0 | 628 | 138 | 298 | 63 | 0 | 0 | 499 | 89 | 213 | 40 | 0 | 0 | 342 | 33 | 208 | 58 | 0 | 0 | 299 | 1768 |
| Approach % | 17.7 | 49.5 | 32.8 | 0.0 | - | - | 27.7 | 59.7 | 12.6 | 0.0 | - | - | 26.0 | 62.3 | 11.7 | 0.0 | - | - | 11.0 | 69.6 | 19.4 | 0.0 | - | - | - |
| Total % | 6.3 | 17.6 | 11.7 | 0.0 | - | 35.5 | 7.8 | 16.9 | 3.6 | 0.0 | - | 28.2 | 5.0 | 12.0 | 2.3 | 0.0 | - | 19.3 | 1.9 | 11.8 | 3.3 | 0.0 | - | 16.9 | - |
| PHF | 0.793 | 0.904 | 0.844 | 0.000 | - | 0.863 | 0.821 | 0.931 | 0.829 | 0.000 | - | 0.952 | 0.795 | 0.951 | 0.769 | 0.000 | - | 0.940 | 0.688 | 0.788 | 0.690 | 0.000 | - | 0.890 | 0.955 |
| Lights | 107 | 308 | 204 | 0 | - | 619 | 138 | 289 | 60 | 0 | - | 487 | 89 | 209 | 40 | 0 | - | 338 | 31 | 203 | 57 | 0 | - | 291 | 1735 |
| % Lights | 96.4 | 99.0 | 99.0 | - | - | 98.6 | 100.0 | 97.0 | 95.2 | - | - | 97.6 | 100.0 | 98.1 | 100.0 | - | - | 98.8 | 93.9 | 97.6 | 98.3 | - | - | 97.3 | 98.1 |
| Other Vehicles | 4 | 3 | 2 | 0 | - | 9 | 0 | 9 | 3 | 0 | - | 12 | 0 | 4 | 0 | 0 | - | 4 | 2 | 5 | 1 | 0 | - | 8 | 33 |
| % Other Vehicles | 3.6 | 1.0 | 1.0 | - | - | 1.4 | 0.0 | 3.0 | 4.8 | - | - | 2.4 | 0.0 | 1.9 | 0.0 | - | - | 1.2 | 6.1 | 2.4 | 1.7 | - | - | 2.7 | 1.9 |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| % Bicycles on Road | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

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Office of Traffic Engineering

Count Name: MED-303-4.95
Site Code:
Start Date: 09/17/2024


Turning Movement Peak Hour Data Plot (4:30 PM)

Ohio Department of Transportation - Safety
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Office of Traffic Engineering

Count Name: MED-303-5.88
Site Code:
Start Date: 09/17/2024

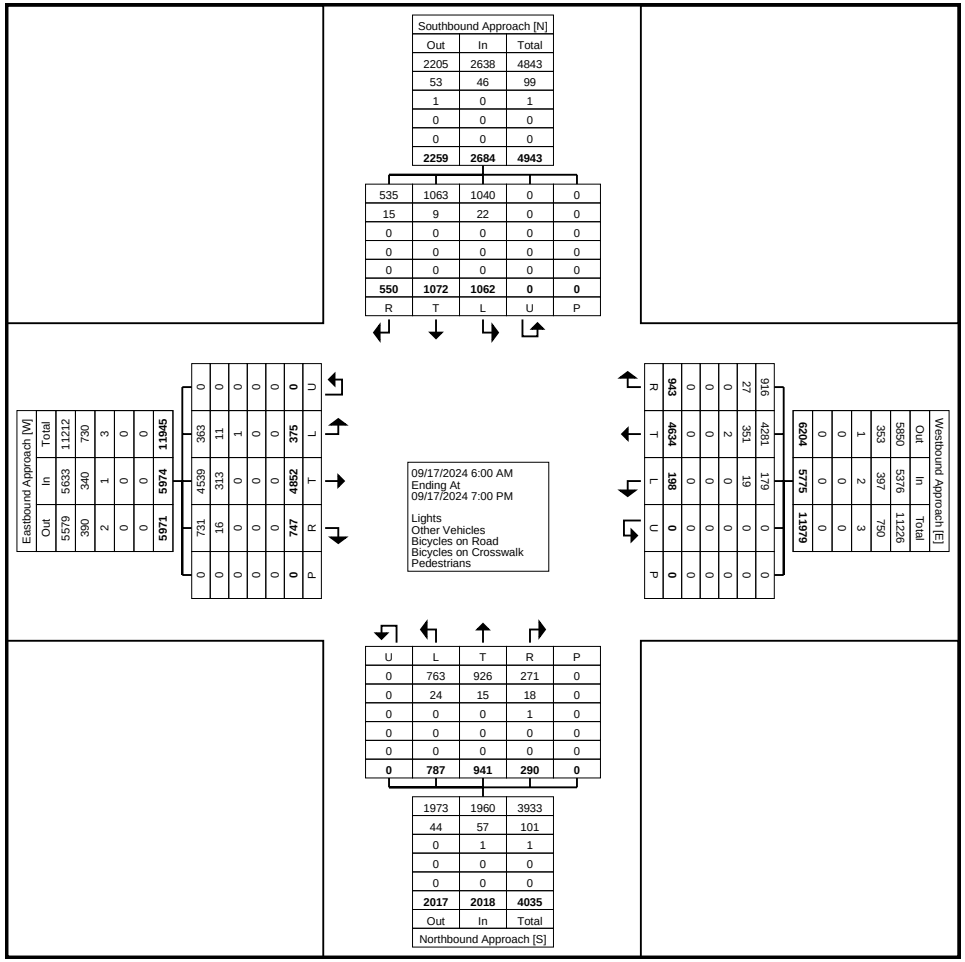

# Turning Movement Data

| Start Time | Southbound Approach Southbound | | | | | | Westbound Approach Westbound | | | | | | Northbound Approach Northbound | | | | | | Eastbound Approach Eastbound | | | | | | Int. Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | |
| 6:00 AM | 9 | 13 | 16 | 0 | 0 | 38 | 3 | 27 | 0 | 0 | 0 | 30 | 0 | 6 | 6 | 0 | 0 | 12 | 9 | 70 | 2 | 0 | 0 | 81 | 161 |
| 6:15 AM | 3 | 15 | 15 | 0 | 0 | 33 | 2 | 25 | 0 | 0 | 0 | 27 | 0 | 11 | 12 | 0 | 0 | 23 | 3 | 101 | 1 | 0 | 0 | 105 | 188 |
| 6:30 AM | 6 | 24 | 18 | 0 | 0 | 48 | 11 | 70 | 3 | 0 | 0 | 84 | 0 | 12 | 13 | 0 | 0 | 25 | 11 | 84 | 7 | 0 | 0 | 102 | 259 |
| 6:45 AM | 3 | 18 | 38 | 0 | 0 | 59 | 5 | 59 | 3 | 0 | 0 | 67 | 4 | 12 | 12 | 0 | 0 | 28 | 17 | 119 | 10 | 0 | 0 | 146 | 300 |
| Hourly Total | 21 | 70 | 87 | 0 | 0 | 178 | 21 | 181 | 6 | 0 | 0 | 208 | 4 | 41 | 43 | 0 | 0 | 88 | 40 | 374 | 20 | 0 | 0 | 434 | 908 |
| 7:00 AM | 16 | 20 | 47 | 0 | 0 | 83 | 7 | 86 | 2 | 0 | 0 | 95 | 1 | 10 | 8 | 0 | 0 | 19 | 18 | 137 | 8 | 0 | 0 | 163 | 360 |
| 7:15 AM | 6 | 28 | 17 | 0 | 0 | 51 | 19 | 101 | 4 | 0 | 0 | 124 | 5 | 9 | 12 | 0 | 0 | 26 | 24 | 107 | 5 | 0 | 0 | 136 | 337 |
| 7:30 AM | 16 | 39 | 30 | 0 | 0 | 85 | 10 | 76 | 8 | 0 | 0 | 94 | 5 | 11 | 16 | 0 | 0 | 32 | 9 | 121 | 7 | 0 | 0 | 137 | 348 |
| 7:45 AM | 8 | 28 | 23 | 0 | 0 | 59 | 7 | 88 | 5 | 0 | 0 | 100 | 10 | 21 | 15 | 0 | 0 | 46 | 17 | 118 | 5 | 0 | 0 | 140 | 345 |
| Hourly Total | 46 | 115 | 117 | 0 | 0 | 278 | 43 | 351 | 19 | 0 | 0 | 413 | 21 | 51 | 51 | 0 | 0 | 123 | 68 | 483 | 25 | 0 | 0 | 576 | 1390 |
| 8:00 AM | 8 | 21 | 25 | 0 | 0 | 54 | 13 | 71 | 9 | 0 | 0 | 93 | 1 | 12 | 13 | 0 | 0 | 26 | 18 | 119 | 9 | 0 | 0 | 146 | 319 |
| 8:15 AM | 20 | 18 | 25 | 0 | 0 | 63 | 11 | 70 | 1 | 0 | 0 | 82 | 7 | 16 | 14 | 0 | 0 | 37 | 14 | 85 | 6 | 0 | 0 | 105 | 287 |
| 8:30 AM | 6 | 18 | 27 | 0 | 0 | 51 | 6 | 77 | 4 | 0 | 0 | 87 | 5 | 14 | 12 | 0 | 0 | 31 | 24 | 82 | 11 | 0 | 0 | 117 | 286 |
| 8:45 AM | 9 | 16 | 30 | 0 | 0 | 55 | 12 | 69 | 4 | 0 | 0 | 85 | 7 | 7 | 15 | 0 | 0 | 29 | 14 | 96 | 2 | 0 | 0 | 112 | 281 |
| Hourly Total | 43 | 73 | 107 | 0 | 0 | 223 | 42 | 287 | 18 | 0 | 0 | 347 | 20 | 49 | 54 | 0 | 0 | 123 | 70 | 382 | 28 | 0 | 0 | 480 | 1173 |
| 9:00 AM | 10 | 17 | 16 | 0 | 0 | 43 | 17 | 59 | 2 | 0 | 0 | 78 | 5 | 20 | 31 | 0 | 0 | 56 | 6 | 98 | 6 | 0 | 0 | 110 | 287 |
| 9:15 AM | 6 | 14 | 11 | 0 | 0 | 31 | 17 | 71 | 6 | 0 | 0 | 94 | 6 | 15 | 6 | 0 | 0 | 27 | 15 | 66 | 2 | 0 | 0 | 83 | 235 |
| 9:30 AM | 7 | 22 | 26 | 0 | 0 | 55 | 16 | 77 | 3 | 0 | 0 | 96 | 3 | 13 | 4 | 0 | 0 | 20 | 12 | 60 | 8 | 0 | 0 | 80 | 251 |
| 9:45 AM | 6 | 14 | 11 | 0 | 0 | 31 | 14 | 60 | 2 | 0 | 0 | 76 | 4 | 15 | 12 | 0 | 0 | 31 | 8 | 74 | 7 | 0 | 0 | 89 | 227 |
| Hourly Total | 29 | 67 | 64 | 0 | 0 | 160 | 64 | 267 | 13 | 0 | 0 | 344 | 18 | 63 | 53 | 0 | 0 | 134 | 41 | 298 | 23 | 0 | 0 | 362 | 1000 |
| 10:00 AM | 4 | 12 | 20 | 0 | 0 | 36 | 14 | 84 | 1 | 0 | 0 | 99 | 4 | 6 | 11 | 0 | 0 | 21 | 7 | 82 | 5 | 0 | 0 | 94 | 250 |
| 10:15 AM | 6 | 8 | 13 | 0 | 0 | 27 | 14 | 83 | 2 | 0 | 0 | 99 | 4 | 10 | 10 | 0 | 0 | 24 | 11 | 82 | 10 | 0 | 0 | 103 | 253 |
| 10:30 AM | 9 | 18 | 14 | 0 | 0 | 41 | 8 | 77 | 0 | 0 | 0 | 85 | 4 | 9 | 10 | 0 | 0 | 23 | 12 | 67 | 1 | 0 | 0 | 80 | 229 |
| 10:45 AM | 7 | 16 | 15 | 0 | 0 | 38 | 20 | 88 | 8 | 0 | 0 | 116 | 4 | 12 | 9 | 0 | 0 | 25 | 7 | 96 | 14 | 0 | 0 | 117 | 296 |
| Hourly Total | 26 | 54 | 62 | 0 | 0 | 142 | 56 | 332 | 11 | 0 | 0 | 399 | 16 | 37 | 40 | 0 | 0 | 93 | 37 | 327 | 30 | 0 | 0 | 394 | 1028 |
| 11:00 AM | 6 | 12 | 22 | 0 | 0 | 40 | 14 | 79 | 4 | 0 | 0 | 97 | 5 | 14 | 11 | 0 | 0 | 30 | 7 | 90 | 10 | 0 | 0 | 107 | 274 |
| 11:15 AM | 8 | 18 | 19 | 0 | 0 | 45 | 15 | 75 | 5 | 0 | 0 | 95 | 3 | 7 | 13 | 0 | 0 | 23 | 9 | 81 | 7 | 0 | 0 | 97 | 260 |
| 11:30 AM | 9 | 21 | 26 | 0 | 0 | 56 | 16 | 93 | 3 | 0 | 0 | 112 | 4 | 19 | 14 | 0 | 0 | 37 | 8 | 99 | 8 | 0 | 0 | 115 | 320 |
| 11:45 AM | 14 | 12 | 12 | 0 | 0 | 38 | 20 | 78 | 3 | 0 | 0 | 101 | 8 | 8 | 16 | 0 | 0 | 32 | 9 | 85 | 5 | 0 | 0 | 99 | 270 |
| Hourly Total | 37 | 63 | 79 | 0 | 0 | 179 | 65 | 325 | 15 | 0 | 0 | 405 | 20 | 48 | 54 | 0 | 0 | 122 | 33 | 355 | 30 | 0 | 0 | 418 | 1124 |
| 12:00 PM | 11 | 7 | 15 | 0 | 0 | 33 | 20 | 86 | 4 | 0 | 0 | 110 | 10 | 16 | 11 | 0 | 0 | 37 | 13 | 96 | 5 | 0 | 0 | 114 | 294 |
| 12:15 PM | 11 | 11 | 10 | 0 | 0 | 32 | 9 | 92 | 5 | 0 | 0 | 106 | 5 | 13 | 11 | 0 | 0 | 29 | 9 | 95 | 7 | 0 | 0 | 111 | 278 |
| 12:30 PM | 9 | 19 | 8 | 0 | 0 | 36 | 27 | 100 | 4 | 0 | 0 | 131 | 2 | 16 | 14 | 0 | 0 | 32 | 16 | 83 | 3 | 0 | 0 | 102 | 301 |
| 12:45 PM | 11 | 9 | 22 | 0 | 0 | 42 | 12 | 87 | 1 | 0 | 0 | 100 | 3 | 21 | 14 | 0 | 0 | 38 | 8 | 85 | 8 | 0 | 0 | 101 | 281 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hourly Total | 42 | 46 | 55 | 0 | 0 | 143 | 68 | 365 | 14 | 0 | 0 | 447 | 20 | 66 | 50 | 0 | 0 | 136 | 46 | 359 | 23 | 0 | 0 | 428 | 1154 |
| 1:00 PM | 12 | 19 | 18 | 0 | 0 | 49 | 17 | 81 | 5 | 0 | 0 | 103 | 2 | 20 | 8 | 0 | 0 | 30 | 9 | 58 | 10 | 0 | 0 | 77 | 259 |
| 1:15 PM | 12 | 23 | 17 | 0 | 0 | 52 | 19 | 84 | 9 | 0 | 0 | 112 | 8 | 7 | 15 | 0 | 0 | 30 | 11 | 66 | 8 | 0 | 0 | 85 | 279 |
| 1:30 PM | 12 | 13 | 11 | 0 | 0 | 36 | 18 | 110 | 4 | 0 | 0 | 132 | 5 | 9 | 11 | 0 | 0 | 25 | 18 | 92 | 10 | 0 | 0 | 120 | 313 |
| 1:45 PM | 16 | 15 | 21 | 0 | 0 | 52 | 21 | 82 | 3 | 0 | 0 | 106 | 4 | 17 | 17 | 0 | 0 | 38 | 11 | 97 | 3 | 0 | 0 | 111 | 307 |
| Hourly Total | 52 | 70 | 67 | 0 | 0 | 189 | 75 | 357 | 21 | 0 | 0 | 453 | 19 | 53 | 51 | 0 | 0 | 123 | 49 | 313 | 31 | 0 | 0 | 393 | 1158 |
| 2:00 PM | 11 | 7 | 12 | 0 | 0 | 30 | 14 | 90 | 8 | 0 | 0 | 112 | 1 | 11 | 10 | 0 | 0 | 22 | 16 | 88 | 5 | 0 | 0 | 109 | 273 |
| 2:15 PM | 14 | 18 | 17 | 0 | 0 | 49 | 11 | 95 | 5 | 0 | 0 | 111 | 11 | 21 | 17 | 0 | 0 | 49 | 18 | 99 | 14 | 0 | 0 | 131 | 340 |
| 2:30 PM | 5 | 16 | 16 | 0 | 0 | 37 | 25 | 81 | 3 | 0 | 0 | 109 | 5 | 16 | 12 | 0 | 0 | 33 | 14 | 100 | 12 | 0 | 0 | 126 | 305 |
| 2:45 PM | 11 | 17 | 24 | 0 | 0 | 52 | 31 | 120 | 3 | 0 | 0 | 154 | 4 | 15 | 9 | 0 | 0 | 28 | 13 | 87 | 10 | 0 | 0 | 110 | 344 |
| Hourly Total | 41 | 58 | 69 | 0 | 0 | 168 | 81 | 386 | 19 | 0 | 0 | 486 | 21 | 63 | 48 | 0 | 0 | 132 | 61 | 374 | 41 | 0 | 0 | 476 | 1262 |
| 3:00 PM | 13 | 24 | 19 | 0 | 0 | 56 | 27 | 111 | 3 | 0 | 0 | 141 | 5 | 21 | 18 | 0 | 0 | 44 | 16 | 92 | 4 | 0 | 0 | 112 | 353 |
| 3:15 PM | 9 | 32 | 18 | 0 | 0 | 59 | 26 | 82 | 5 | 0 | 0 | 113 | 14 | 25 | 17 | 0 | 0 | 56 | 20 | 107 | 8 | 0 | 0 | 135 | 363 |
| 3:30 PM | 12 | 24 | 19 | 0 | 0 | 55 | 22 | 108 | 5 | 0 | 0 | 135 | 9 | 31 | 26 | 0 | 0 | 66 | 18 | 115 | 7 | 0 | 0 | 140 | 396 |
| 3:45 PM | 16 | 27 | 19 | 0 | 0 | 62 | 19 | 120 | 4 | 0 | 0 | 143 | 8 | 19 | 17 | 0 | 0 | 44 | 21 | 100 | 13 | 0 | 0 | 134 | 383 |
| Hourly Total | 50 | 107 | 75 | 0 | 0 | 232 | 94 | 421 | 17 | 0 | 0 | 532 | 36 | 96 | 78 | 0 | 0 | 210 | 75 | 414 | 32 | 0 | 0 | 521 | 1495 |
| 4:00 PM | 13 | 32 | 27 | 0 | 0 | 72 | 30 | 118 | 0 | 0 | 0 | 148 | 10 | 27 | 22 | 0 | 0 | 59 | 17 | 111 | 4 | 0 | 0 | 132 | 411 |
| 4:15 PM | 11 | 40 | 15 | 0 | 0 | 66 | 28 | 129 | 8 | 0 | 0 | 165 | 8 | 37 | 27 | 0 | 0 | 72 | 22 | 94 | 7 | 0 | 0 | 123 | 426 |
| 4:30 PM | 14 | 26 | 17 | 0 | 0 | 57 | 31 | 130 | 5 | 0 | 0 | 166 | 10 | 36 | 30 | 0 | 0 | 76 | 26 | 93 | 5 | 0 | 0 | 124 | 423 |
| 4:45 PM | 15 | 27 | 21 | 0 | 0 | 63 | 32 | 127 | 5 | 0 | 0 | 164 | 10 | 23 | 26 | 0 | 0 | 59 | 15 | 135 | 6 | 0 | 0 | 156 | 442 |
| Hourly Total | 53 | 125 | 80 | 0 | 0 | 258 | 121 | 504 | 18 | 0 | 0 | 643 | 38 | 123 | 105 | 0 | 0 | 266 | 80 | 433 | 22 | 0 | 0 | 535 | 1702 |
| 5:00 PM | 13 | 27 | 15 | 0 | 0 | 55 | 29 | 132 | 0 | 0 | 0 | 161 | 10 | 37 | 27 | 0 | 0 | 74 | 15 | 120 | 8 | 0 | 0 | 143 | 433 |
| 5:15 PM | 11 | 43 | 29 | 0 | 0 | 83 | 30 | 107 | 2 | 0 | 0 | 139 | 7 | 37 | 23 | 0 | 0 | 67 | 19 | 98 | 9 | 0 | 0 | 126 | 415 |
| 5:30 PM | 21 | 36 | 31 | 0 | 0 | 88 | 28 | 114 | 4 | 0 | 0 | 146 | 6 | 40 | 27 | 0 | 0 | 73 | 18 | 110 | 3 | 0 | 0 | 131 | 438 |
| 5:45 PM | 16 | 42 | 39 | 0 | 0 | 97 | 24 | 110 | 2 | 0 | 0 | 136 | 13 | 42 | 17 | 0 | 0 | 72 | 25 | 100 | 12 | 0 | 0 | 137 | 442 |
| Hourly Total | 61 | 148 | 114 | 0 | 0 | 323 | 111 | 463 | 8 | 0 | 0 | 582 | 36 | 156 | 94 | 0 | 0 | 286 | 77 | 428 | 32 | 0 | 0 | 537 | 1728 |
| 6:00 PM | 13 | 27 | 24 | 0 | 0 | 64 | 22 | 101 | 4 | 0 | 0 | 127 | 4 | 26 | 22 | 0 | 0 | 52 | 12 | 87 | 11 | 0 | 0 | 110 | 353 |
| 6:15 PM | 17 | 19 | 27 | 0 | 0 | 63 | 31 | 112 | 4 | 0 | 0 | 147 | 8 | 17 | 22 | 0 | 0 | 47 | 13 | 90 | 6 | 0 | 0 | 109 | 366 |
| 6:30 PM | 7 | 8 | 20 | 0 | 0 | 35 | 25 | 109 | 5 | 0 | 0 | 139 | 2 | 32 | 14 | 0 | 0 | 48 | 17 | 76 | 10 | 0 | 0 | 103 | 325 |
| 6:45 PM | 12 | 22 | 15 | 0 | 0 | 49 | 24 | 73 | 6 | 0 | 0 | 103 | 7 | 20 | 8 | 0 | 0 | 35 | 28 | 59 | 11 | 0 | 0 | 98 | 285 |
| Hourly Total | 49 | 76 | 86 | 0 | 0 | 211 | 102 | 395 | 19 | 0 | 0 | 516 | 21 | 95 | 66 | 0 | 0 | 182 | 70 | 312 | 38 | 0 | 0 | 420 | 1329 |
| Grand Total | 550 | 1072 | 1062 | 0 | 0 | 2684 | 943 | 4634 | 198 | 0 | 0 | 5775 | 290 | 941 | 787 | 0 | 0 | 2018 | 747 | 4852 | 375 | 0 | 0 | 5974 | 16451 |
| Approach % | 20.5 | 39.9 | 39.6 | 0.0 | - | - | 16.3 | 80.2 | 3.4 | 0.0 | - | - | 14.4 | 46.6 | 39.0 | 0.0 | - | - | 12.5 | 81.2 | 6.3 | 0.0 | - | - | - |
| Total % | 3.3 | 6.5 | 6.5 | 0.0 | - | 16.3 | 5.7 | 28.2 | 1.2 | 0.0 | - | 35.1 | 1.8 | 5.7 | 4.8 | 0.0 | - | 12.3 | 4.5 | 29.5 | 2.3 | 0.0 | - | 36.3 | - |
| Lights | 535 | 1063 | 1040 | 0 | - | 2638 | 916 | 4281 | 179 | 0 | - | 5376 | 271 | 926 | 763 | 0 | - | 1960 | 731 | 4539 | 363 | 0 | - | 5633 | 15607 |
| % Lights | 97.3 | 99.2 | 97.9 | - | - | 98.3 | 97.1 | 92.4 | 90.4 | - | - | 93.1 | 93.4 | 98.4 | 97.0 | - | - | 97.1 | 97.9 | 93.5 | 96.8 | - | - | 94.3 | 94.9 |
| Other Vehicles | 15 | 9 | 22 | 0 | - | 46 | 27 | 351 | 19 | 0 | - | 397 | 18 | 15 | 24 | 0 | - | 57 | 16 | 313 | 11 | 0 | - | 340 | 840 |
| % Other Vehicles | 2.7 | 0.8 | 2.1 | - | - | 1.7 | 2.9 | 7.6 | 9.6 | - | - | 6.9 | 6.2 | 1.6 | 3.0 | - | - | 2.8 | 2.1 | 6.5 | 2.9 | - | - | 5.7 | 5.1 |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 2 | 0 | 0 | - | 2 | 1 | 0 | 0 | 0 | - | 1 | 0 | 0 | 1 | 0 | - | 1 | 4 |
| % Bicycles on Road | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.3 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.3 | - | - | 0.0 | 0.0 |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

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Mail Stop 5160
Columbus, Ohio, United States 43223
+16147528099 kathryn.sharpnack@dot.ohio.gov
Office of Traffic Engineering

Count Name: MED-303-5.88
Site Code:
Start Date: 09/17/2024


Turning Movement Data Plot

Ohio Department of Transportation - Safety
1980 West Broad Street
Mail Stop 5160
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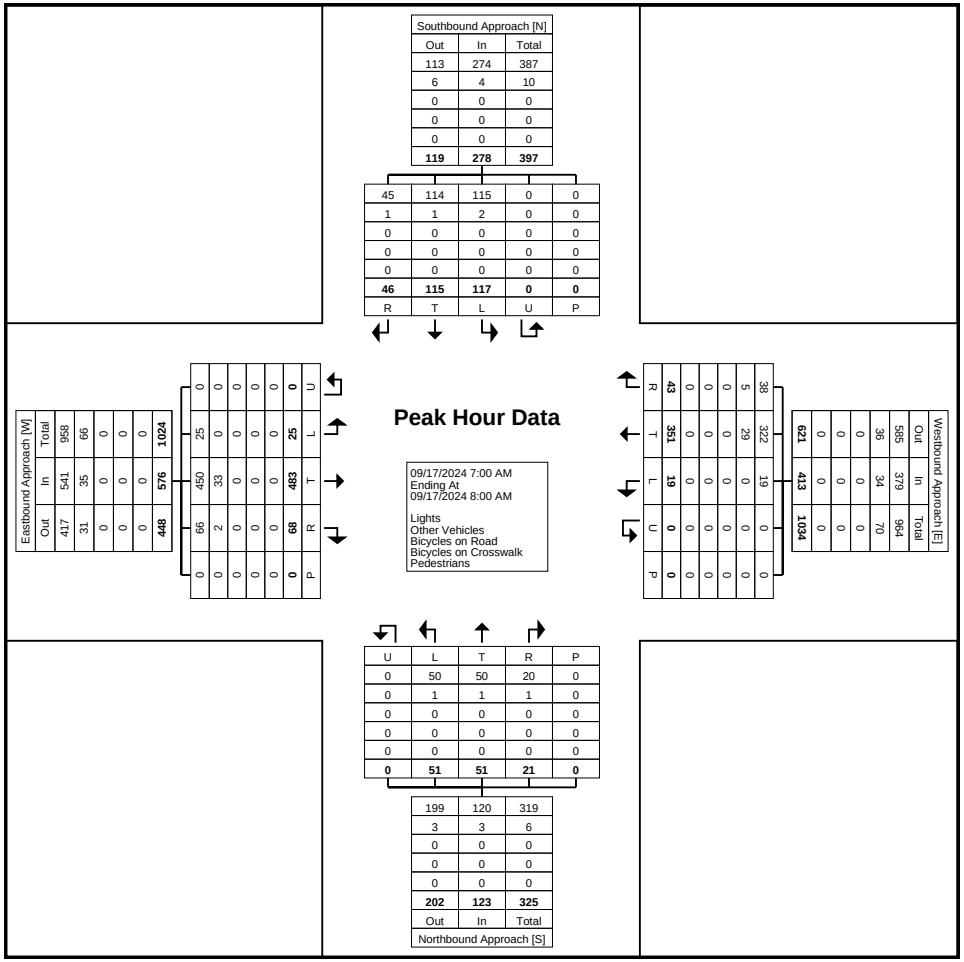
Count Name: MED-303-5.88
Site Code:
Start Date: 09/17/2024


# Turning Movement Peak Hour Data (7:00 AM)

| Start Time | Southbound Approach | | | | | | Westbound Approach | | | | | | Northbound Approach | | | | | | Eastbound Approach | | | | | | Int. Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Southbound | | | | | | Westbound | | | | | | Northbound | | | | | | Eastbound | | | | | | |
| | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | |
| 7:00 AM | 16 | 20 | 47 | 0 | 0 | 83 | 7 | 86 | 2 | 0 | 0 | 95 | 1 | 10 | 8 | 0 | 0 | 19 | 18 | 137 | 8 | 0 | 0 | 163 | 360 |
| 7:15 AM | 6 | 28 | 17 | 0 | 0 | 51 | 19 | 101 | 4 | 0 | 0 | 124 | 5 | 9 | 12 | 0 | 0 | 26 | 24 | 107 | 5 | 0 | 0 | 136 | 337 |
| 7:30 AM | 16 | 39 | 30 | 0 | 0 | 85 | 10 | 76 | 8 | 0 | 0 | 94 | 5 | 11 | 16 | 0 | 0 | 32 | 9 | 121 | 7 | 0 | 0 | 137 | 348 |
| 7:45 AM | 8 | 28 | 23 | 0 | 0 | 59 | 7 | 88 | 5 | 0 | 0 | 100 | 10 | 21 | 15 | 0 | 0 | 46 | 17 | 118 | 5 | 0 | 0 | 140 | 345 |
| Total | 46 | 115 | 117 | 0 | 0 | 278 | 43 | 351 | 19 | 0 | 0 | 413 | 21 | 51 | 51 | 0 | 0 | 123 | 68 | 483 | 25 | 0 | 0 | 576 | 1390 |
| Approach % | 16.5 | 41.4 | 42.1 | 0.0 | - | - | 10.4 | 85.0 | 4.6 | 0.0 | - | - | 17.1 | 41.5 | 41.5 | 0.0 | - | - | 11.8 | 83.9 | 4.3 | 0.0 | - | - | - |
| Total % | 3.3 | 8.3 | 8.4 | 0.0 | - | 20.0 | 3.1 | 25.3 | 1.4 | 0.0 | - | 29.7 | 1.5 | 3.7 | 3.7 | 0.0 | - | 8.8 | 4.9 | 34.7 | 1.8 | 0.0 | - | 41.4 | - |
| PHF | 0.719 | 0.737 | 0.622 | 0.000 | - | 0.818 | 0.566 | 0.869 | 0.594 | 0.000 | - | 0.833 | 0.525 | 0.607 | 0.797 | 0.000 | - | 0.668 | 0.708 | 0.881 | 0.781 | 0.000 | - | 0.883 | 0.965 |
| Lights | 45 | 114 | 115 | 0 | - | 274 | 38 | 322 | 19 | 0 | - | 379 | 20 | 50 | 50 | 0 | - | 120 | 66 | 450 | 25 | 0 | - | 541 | 1314 |
| % Lights | 97.8 | 99.1 | 98.3 | - | - | 98.6 | 88.4 | 91.7 | 100.0 | - | - | 91.8 | 95.2 | 98.0 | 98.0 | - | - | 97.6 | 97.1 | 93.2 | 100.0 | - | - | 93.9 | 94.5 |
| Other Vehicles | 1 | 1 | 2 | 0 | - | 4 | 5 | 29 | 0 | 0 | - | 34 | 1 | 1 | 1 | 0 | - | 3 | 2 | 33 | 0 | 0 | - | 35 | 76 |
| % Other Vehicles | 2.2 | 0.9 | 1.7 | - | - | 1.4 | 11.6 | 8.3 | 0.0 | - | - | 8.2 | 4.8 | 2.0 | 2.0 | - | - | 2.4 | 2.9 | 6.8 | 0.0 | - | - | 6.1 | 5.5 |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| % Bicycles on Road | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

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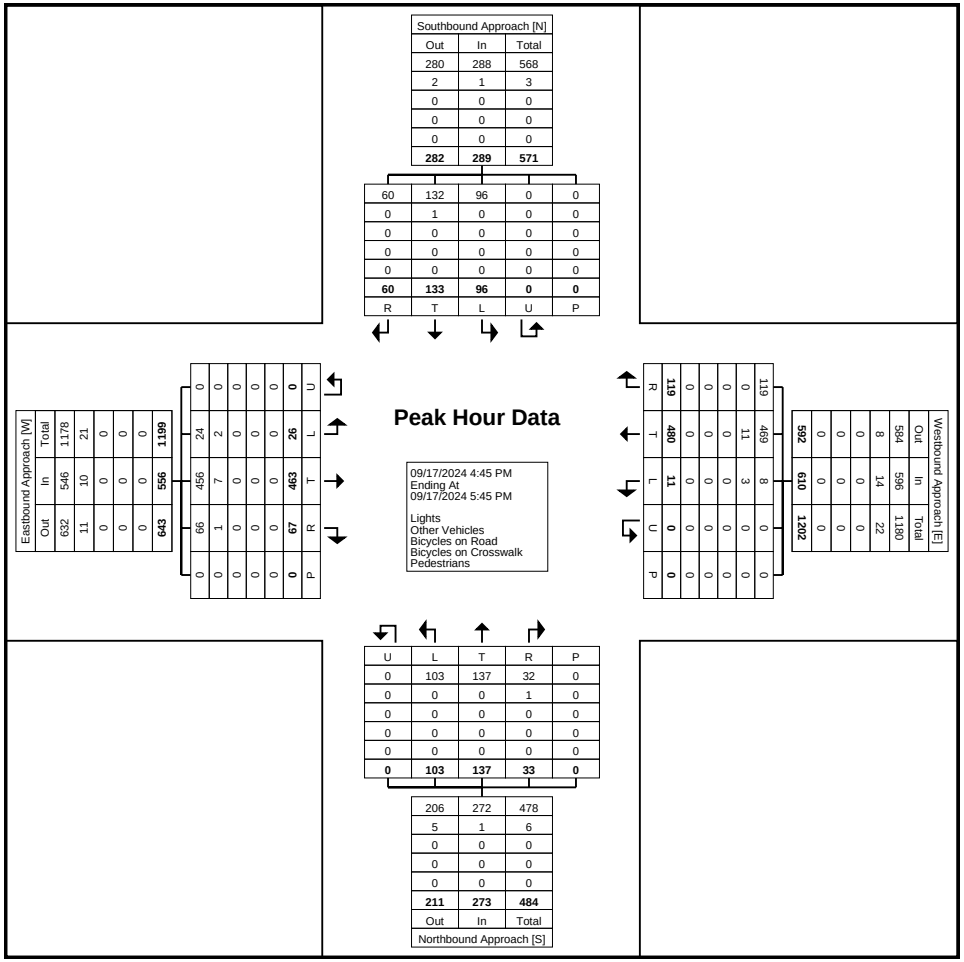
Count Name: MED-303-5.88
Site Code:
Start Date: 09/17/2024


# Turning Movement Peak Hour Data (4:45 PM)

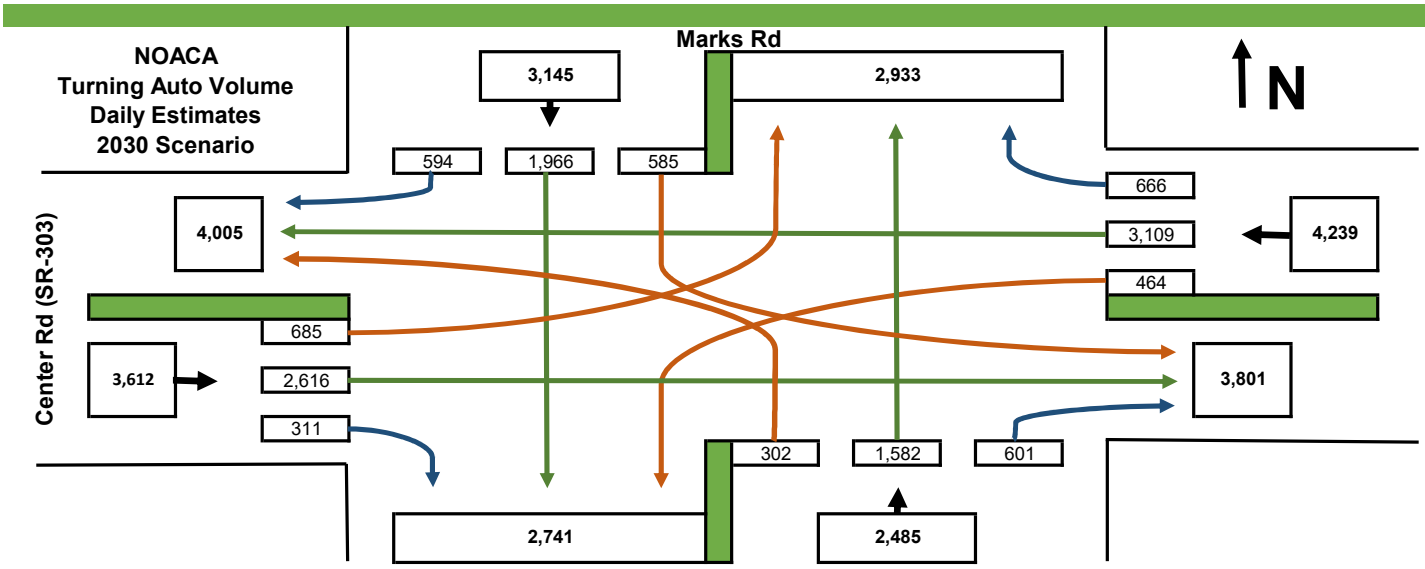
| Start Time | Southbound Approach Southbound | | | | | | Westbound Approach Westbound | | | | | | Northbound Approach Northbound | | | | | | Eastbound Approach Eastbound | | | | | | Int. Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | Right | Thru | Left | U-Turn | Peds | App. Total | |
| 4:45 PM | 15 | 27 | 21 | 0 | 0 | 63 | 32 | 127 | 5 | 0 | 0 | 164 | 10 | 23 | 26 | 0 | 0 | 59 | 15 | 135 | 6 | 0 | 0 | 156 | 442 |
| 5:00 PM | 13 | 27 | 15 | 0 | 0 | 55 | 29 | 132 | 0 | 0 | 0 | 161 | 10 | 37 | 27 | 0 | 0 | 74 | 15 | 120 | 8 | 0 | 0 | 143 | 433 |
| 5:15 PM | 11 | 43 | 29 | 0 | 0 | 83 | 30 | 107 | 2 | 0 | 0 | 139 | 7 | 37 | 23 | 0 | 0 | 67 | 19 | 98 | 9 | 0 | 0 | 126 | 415 |
| 5:30 PM | 21 | 36 | 31 | 0 | 0 | 88 | 28 | 114 | 4 | 0 | 0 | 146 | 6 | 40 | 27 | 0 | 0 | 73 | 18 | 110 | 3 | 0 | 0 | 131 | 438 |
| Total | 60 | 133 | 96 | 0 | 0 | 289 | 119 | 480 | 11 | 0 | 0 | 610 | 33 | 137 | 103 | 0 | 0 | 273 | 67 | 463 | 26 | 0 | 0 | 556 | 1728 |
| Approach % | 20.8 | 46.0 | 33.2 | 0.0 | - | - | 19.5 | 78.7 | 1.8 | 0.0 | - | - | 12.1 | 50.2 | 37.7 | 0.0 | - | - | 12.1 | 83.3 | 4.7 | 0.0 | - | - | - |
| Total % | 3.5 | 7.7 | 5.6 | 0.0 | - | 16.7 | 6.9 | 27.8 | 0.6 | 0.0 | - | 35.3 | 1.9 | 7.9 | 6.0 | 0.0 | - | 15.8 | 3.9 | 26.8 | 1.5 | 0.0 | - | 32.2 | - |
| PHF | 0.714 | 0.773 | 0.774 | 0.000 | - | 0.821 | 0.930 | 0.909 | 0.550 | 0.000 | - | 0.930 | 0.825 | 0.856 | 0.954 | 0.000 | - | 0.922 | 0.882 | 0.857 | 0.722 | 0.000 | - | 0.891 | 0.977 |
| Lights | 60 | 132 | 96 | 0 | - | 288 | 119 | 469 | 8 | 0 | - | 596 | 32 | 137 | 103 | 0 | - | 272 | 66 | 456 | 24 | 0 | - | 546 | 1702 |
| % Lights | 100.0 | 99.2 | 100.0 | - | - | 99.7 | 100.0 | 97.7 | 72.7 | - | - | 97.7 | 97.0 | 100.0 | 100.0 | - | - | 99.6 | 98.5 | 98.5 | 92.3 | - | - | 98.2 | 98.5 |
| Other Vehicles | 0 | 1 | 0 | 0 | - | 1 | 0 | 11 | 3 | 0 | - | 14 | 1 | 0 | 0 | 0 | - | 1 | 1 | 7 | 2 | 0 | - | 10 | 26 |
| % Other Vehicles | 0.0 | 0.8 | 0.0 | - | - | 0.3 | 0.0 | 2.3 | 27.3 | - | - | 2.3 | 3.0 | 0.0 | 0.0 | - | - | 0.4 | 1.5 | 1.5 | 7.7 | - | - | 1.8 | 1.5 |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| % Bicycles on Road | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | - | - | 0.0 | 0.0 |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Bicycles on Crosswalk | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Pedestrians | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - | - | - | - | 0 | - | - |
| % Pedestrians | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

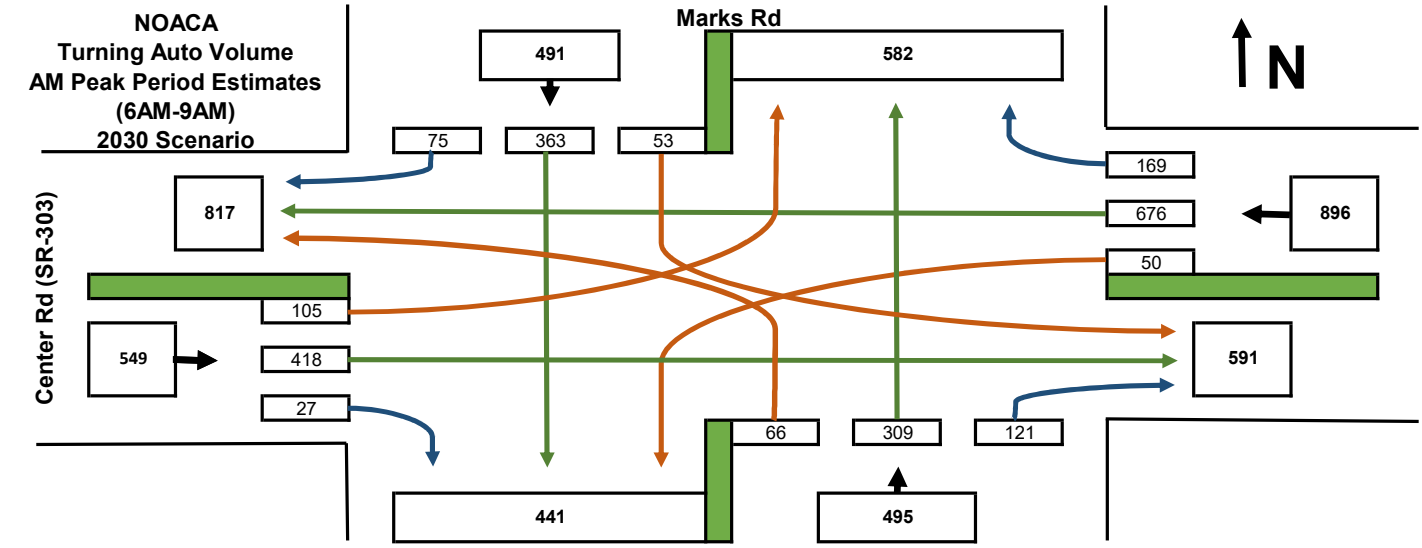
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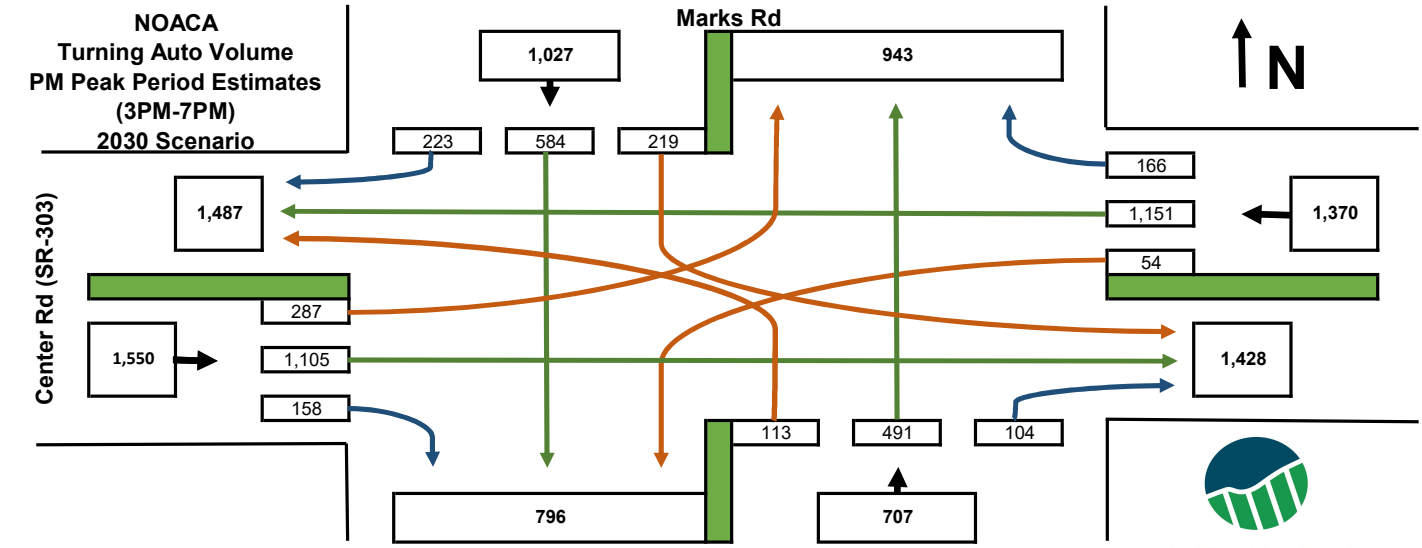
Count Name: MED-303-5.88
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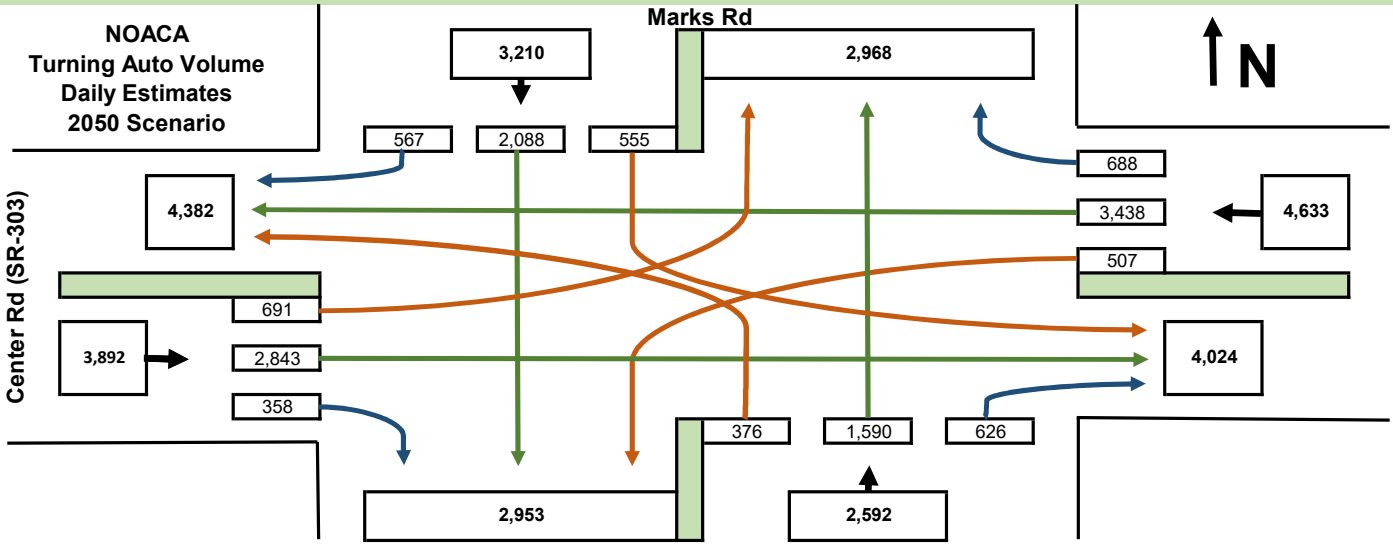

Turning Movement Peak Hour Data Plot (4:45 PM)

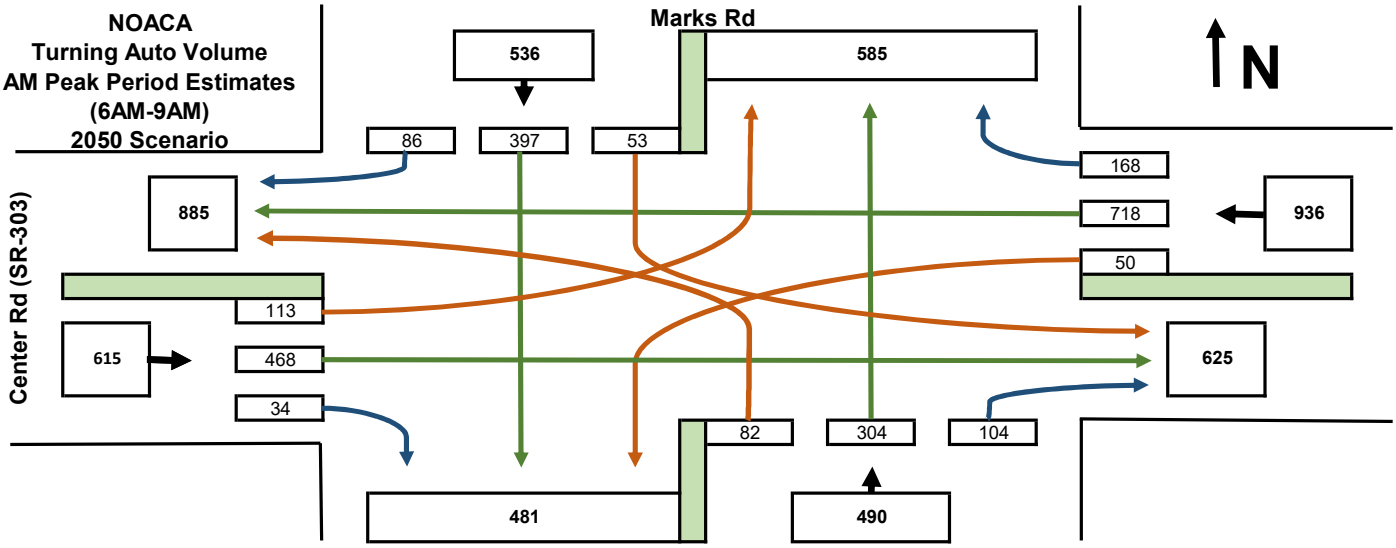


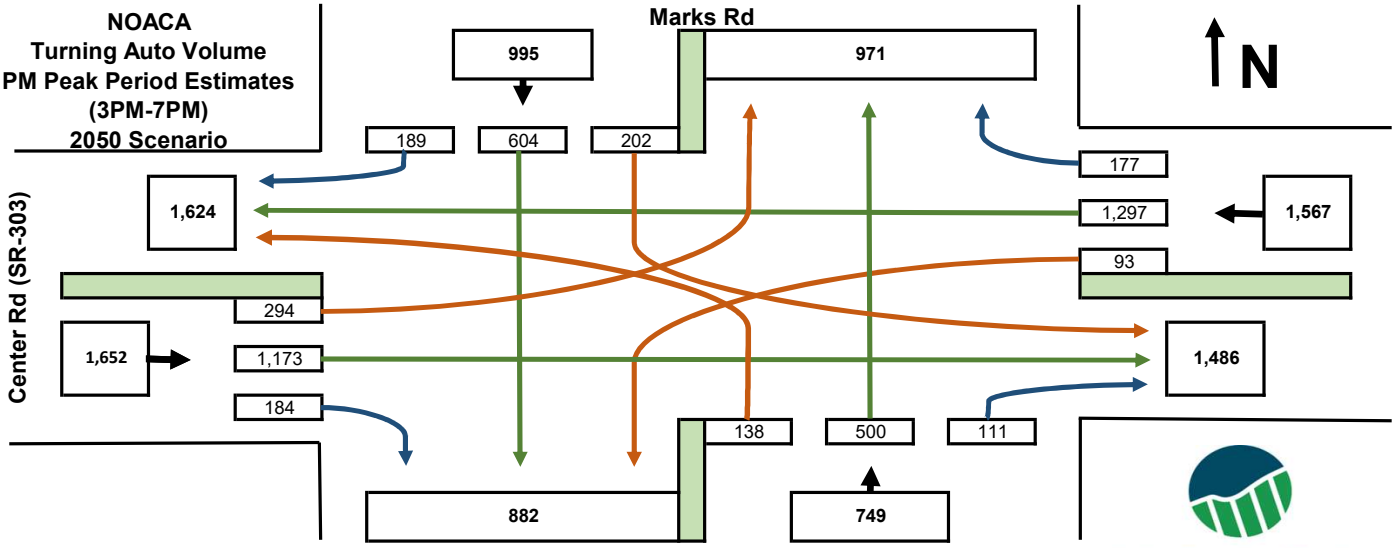



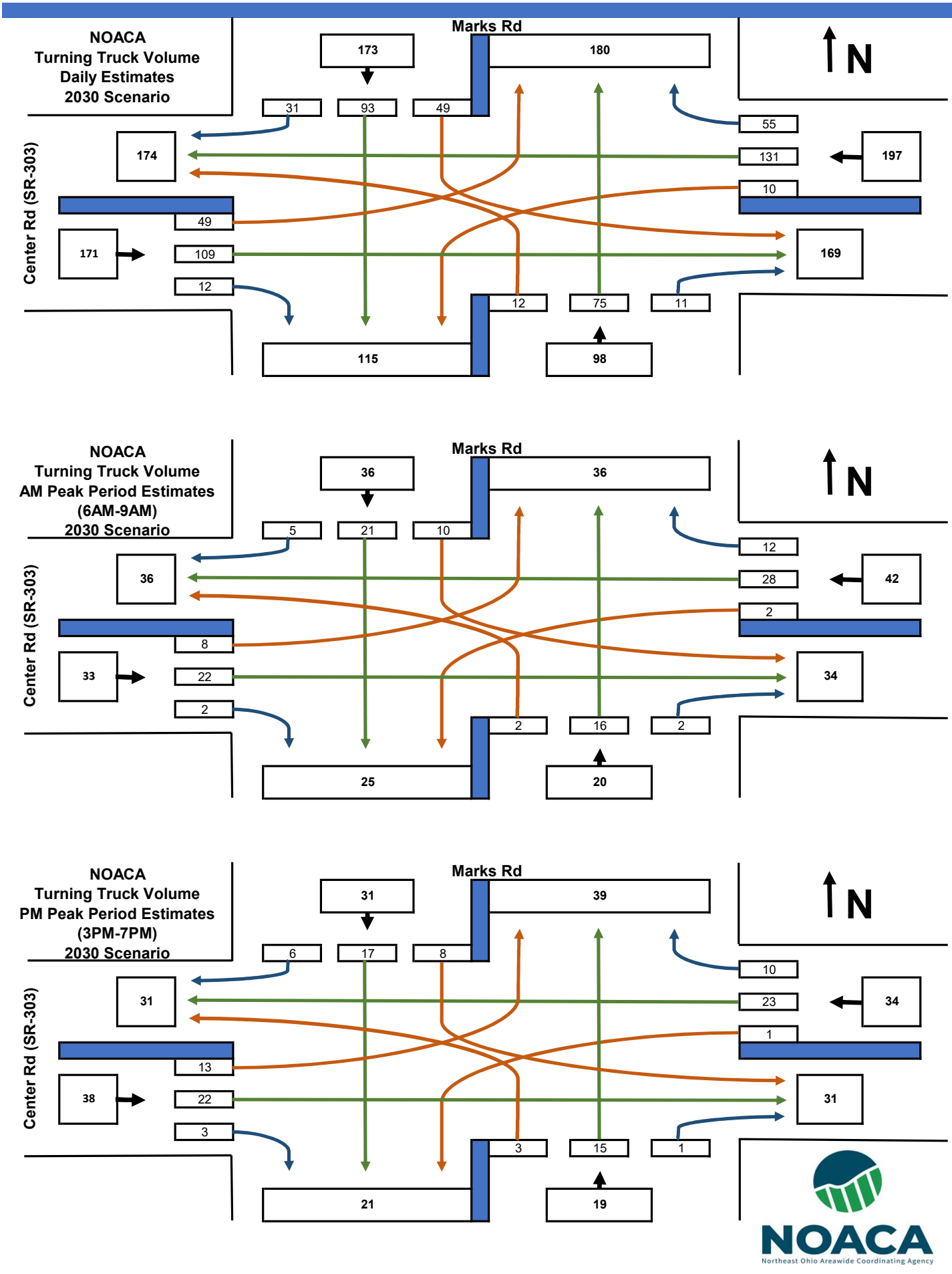

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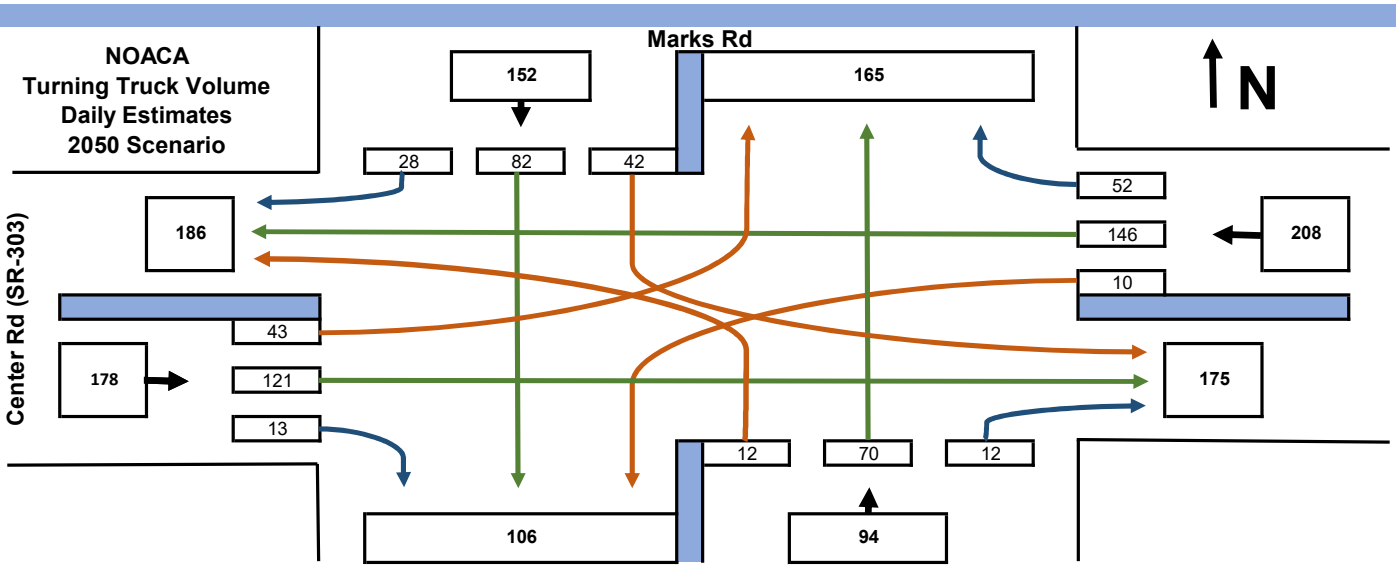


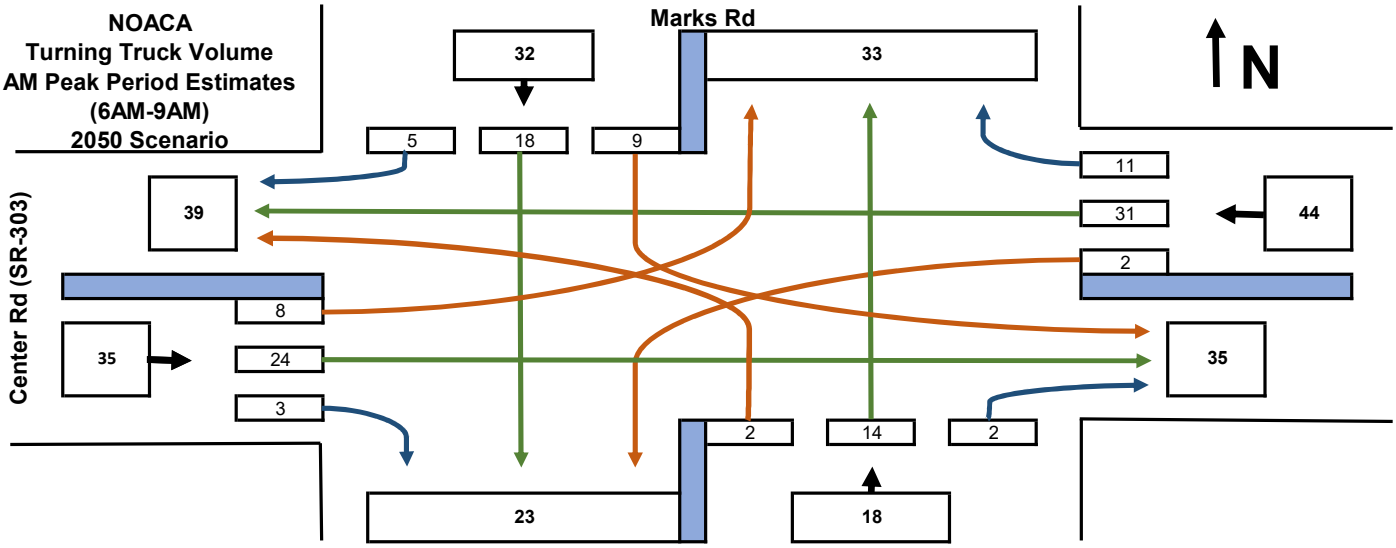



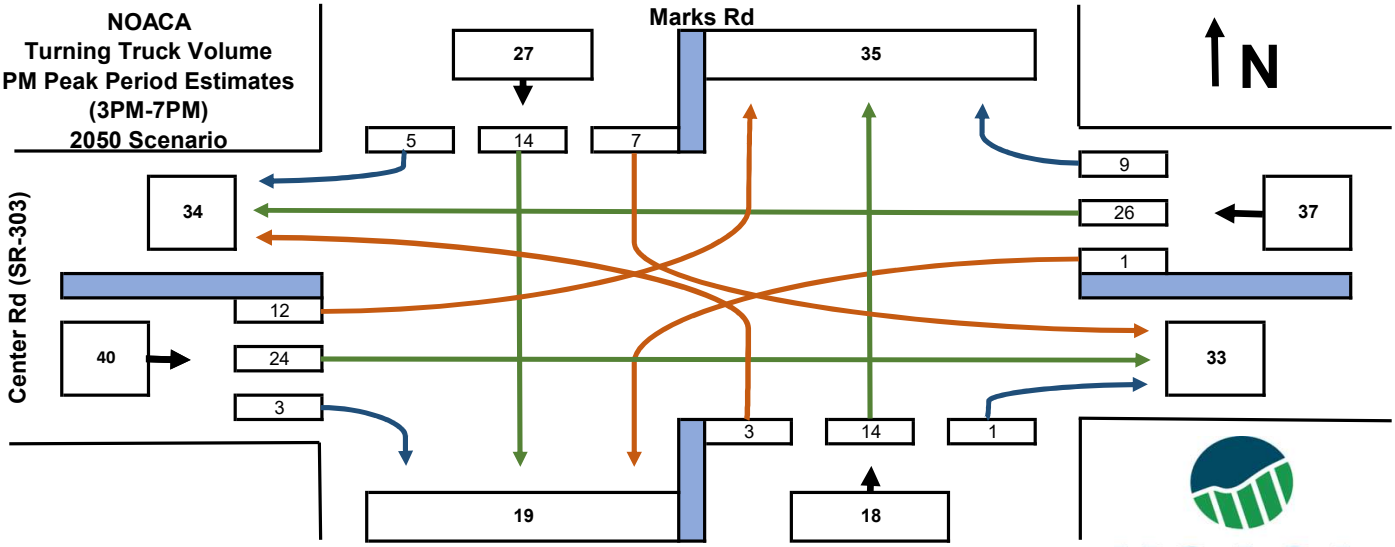




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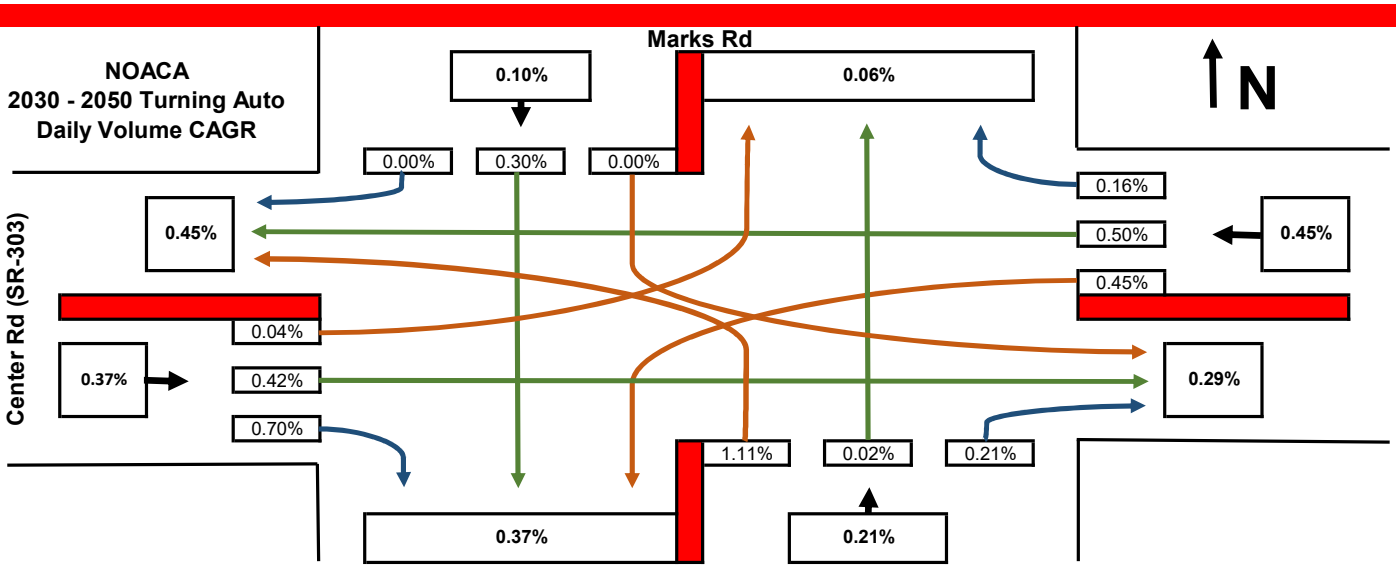

NOACA
Turning Truck Volume
Daily Estimates
2030 Scenario
Marks Rd
N
Center Rd (SR-303)
173
180
31
93
49
55
174
131
197
10
49
171
109
169
12
12
75
11
115
98
NOACA
Turning Truck Volume
AM Peak Period Estimates
(6AM-9AM)
2030 Scenario
Marks Rd
N
Center Rd (SR-303)
36
36
5
21
10
12
36
28
42
2
8
33
22
34
2
2
16
2
25
20
NOACA
Turning Truck Volume
PM Peak Period Estimates
(3PM-7PM)
2030 Scenario
Marks Rd
N
Center Rd (SR-303)
31
39
6
17
8
10
31
23
34
1
13
38
22
31
3
3
15
1
21
19
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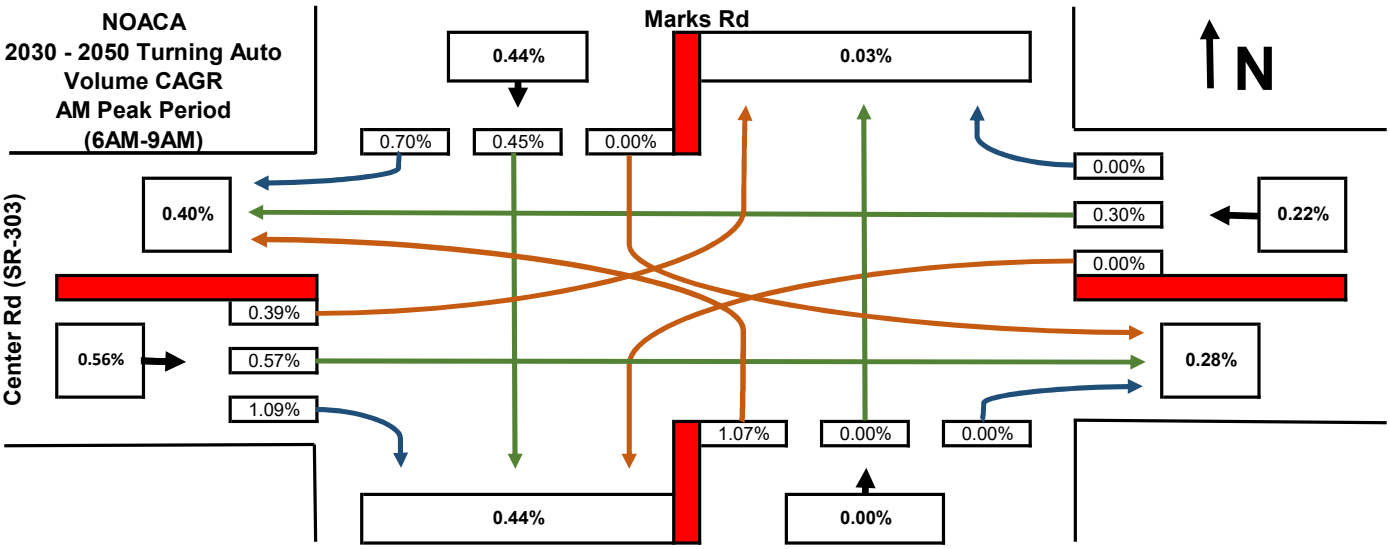


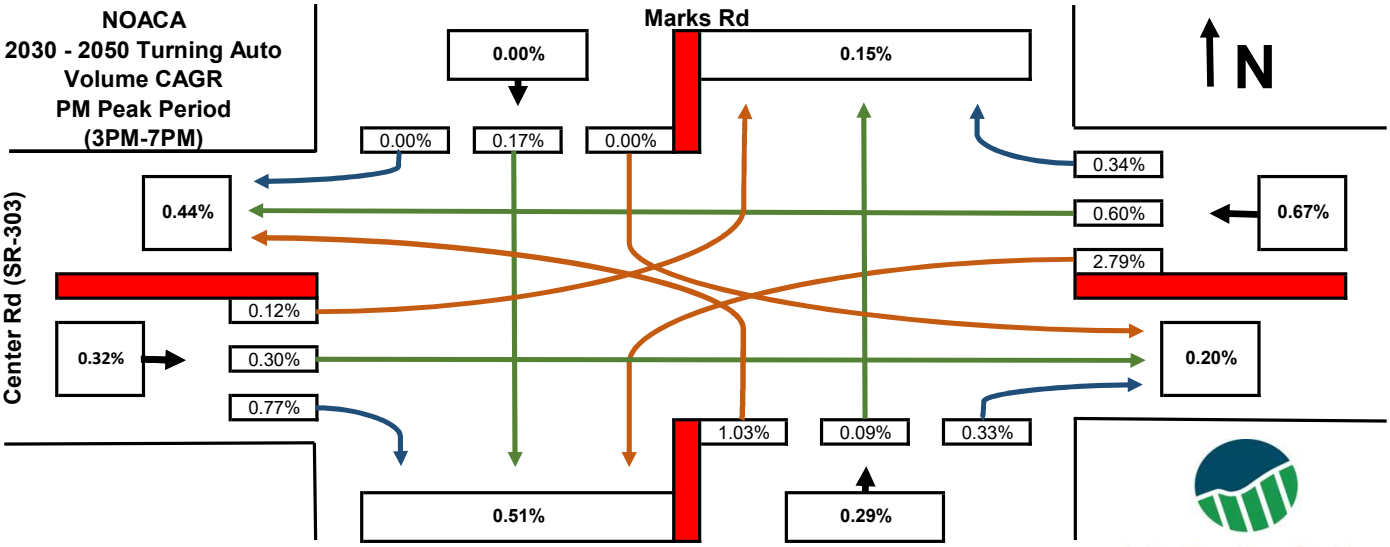



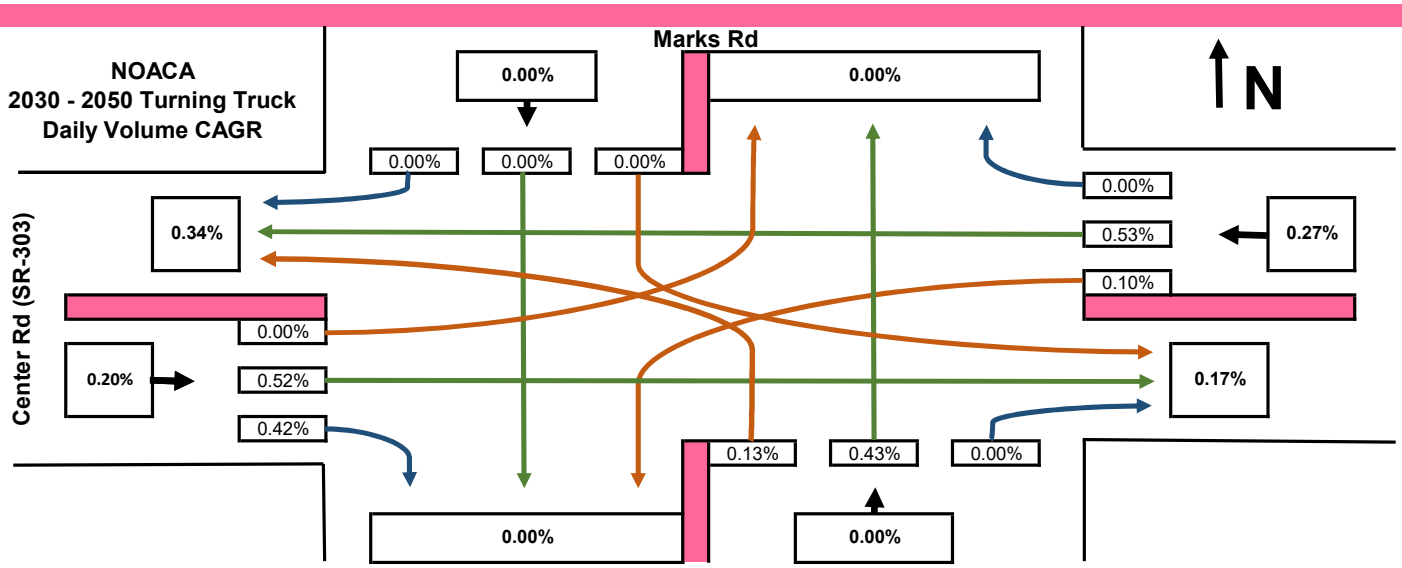

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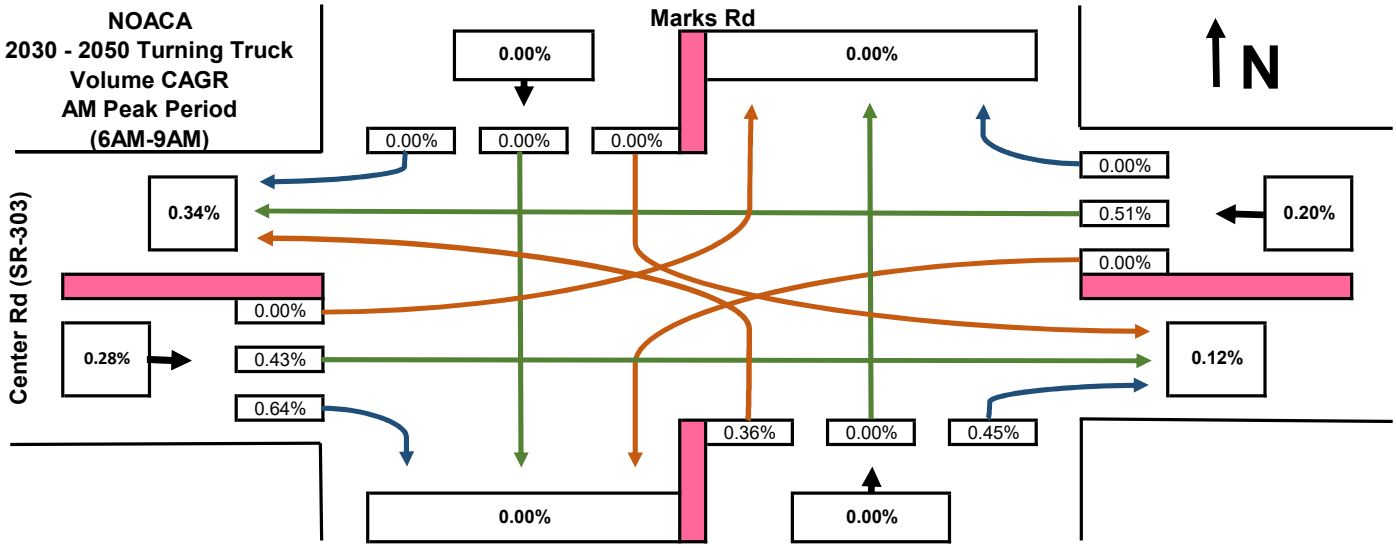


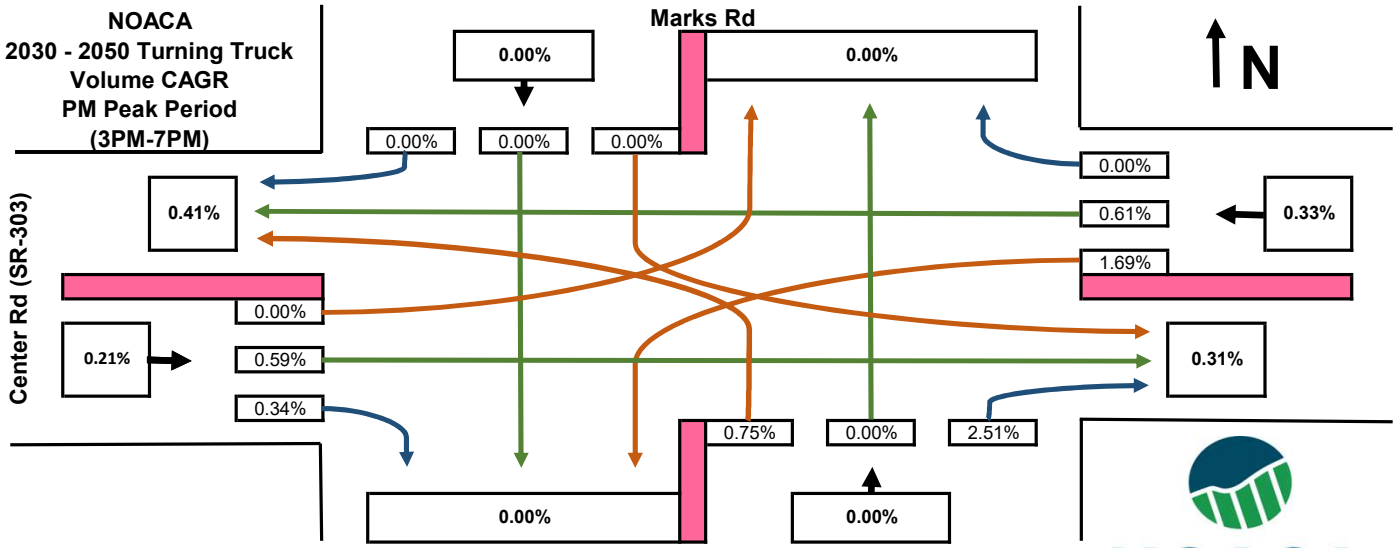



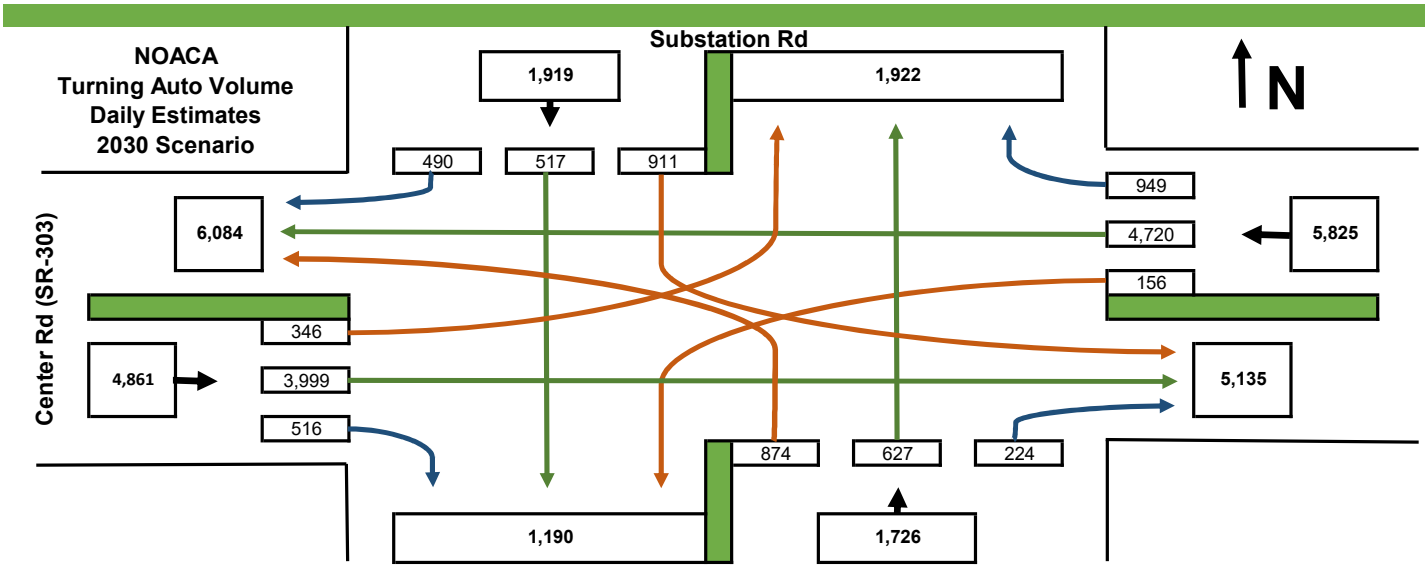

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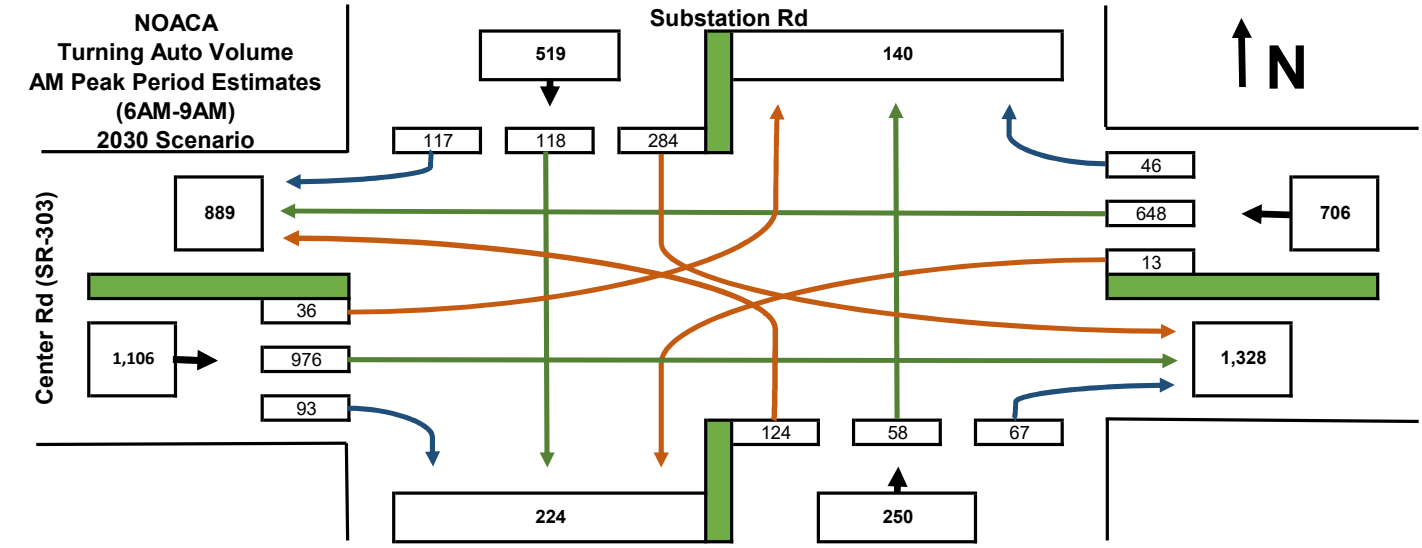


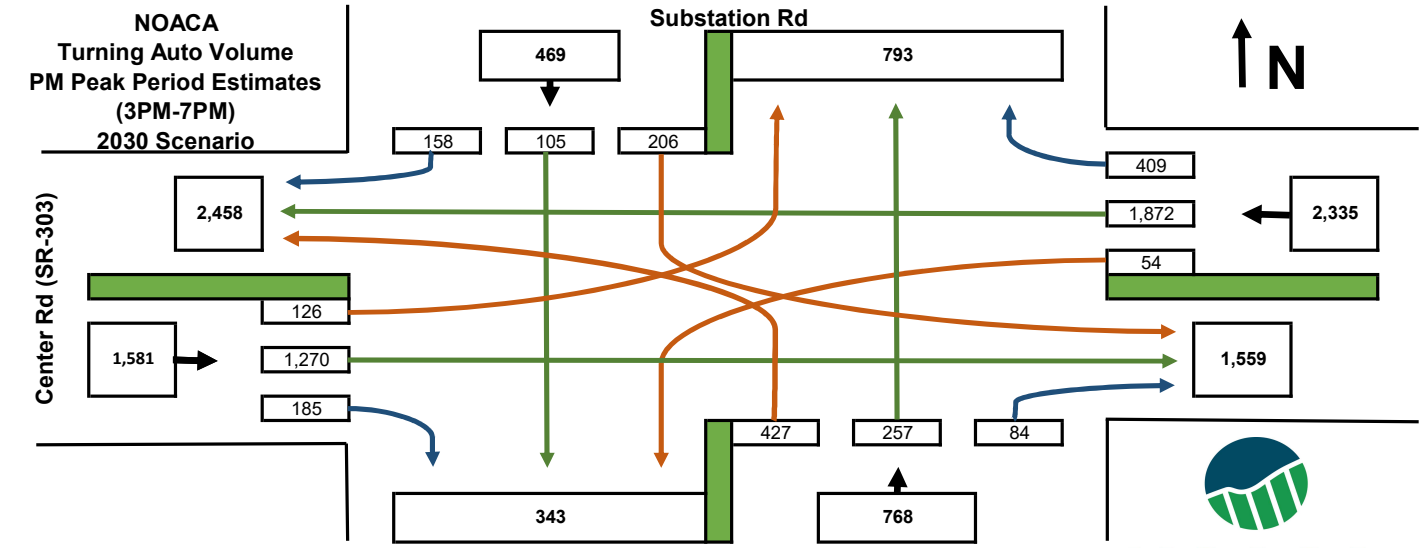



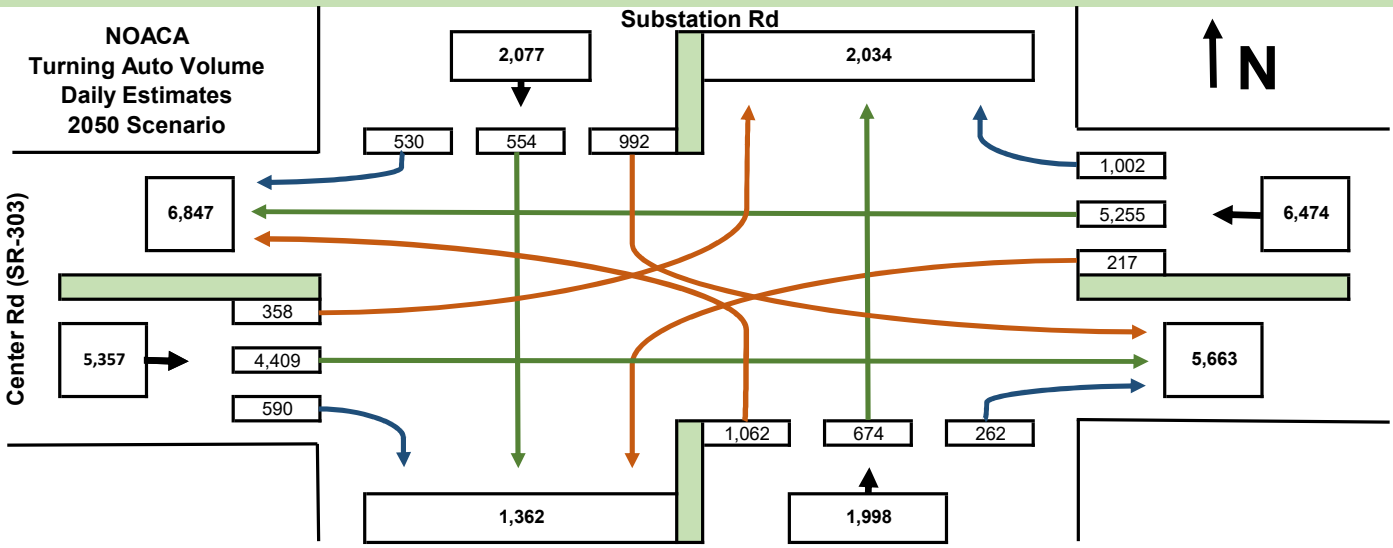

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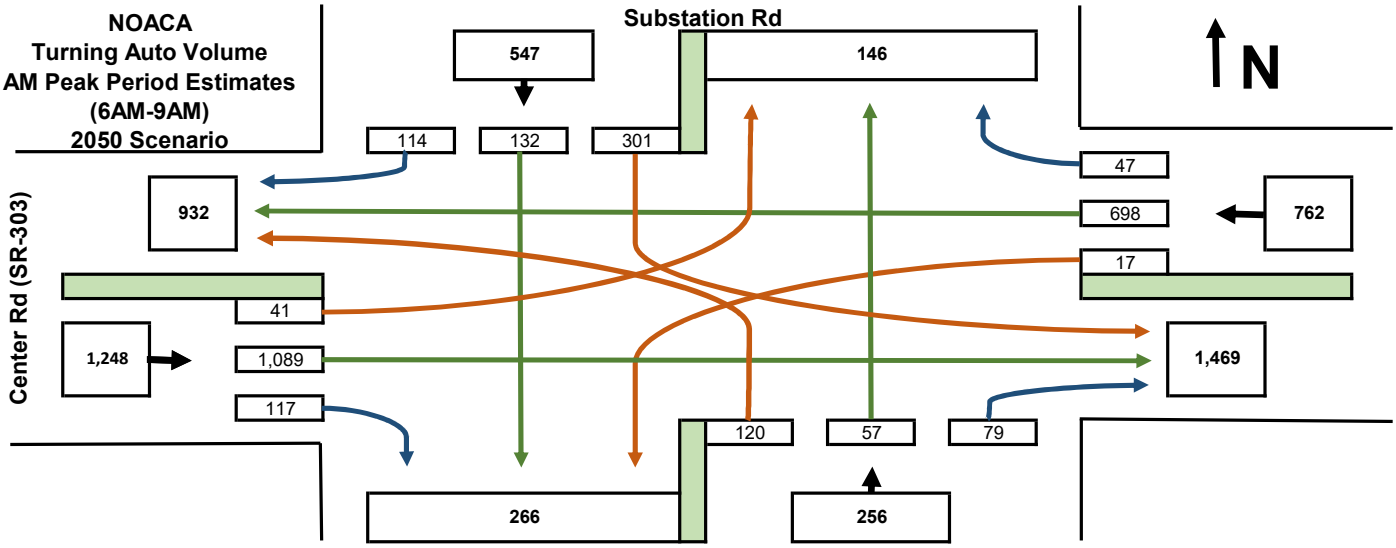


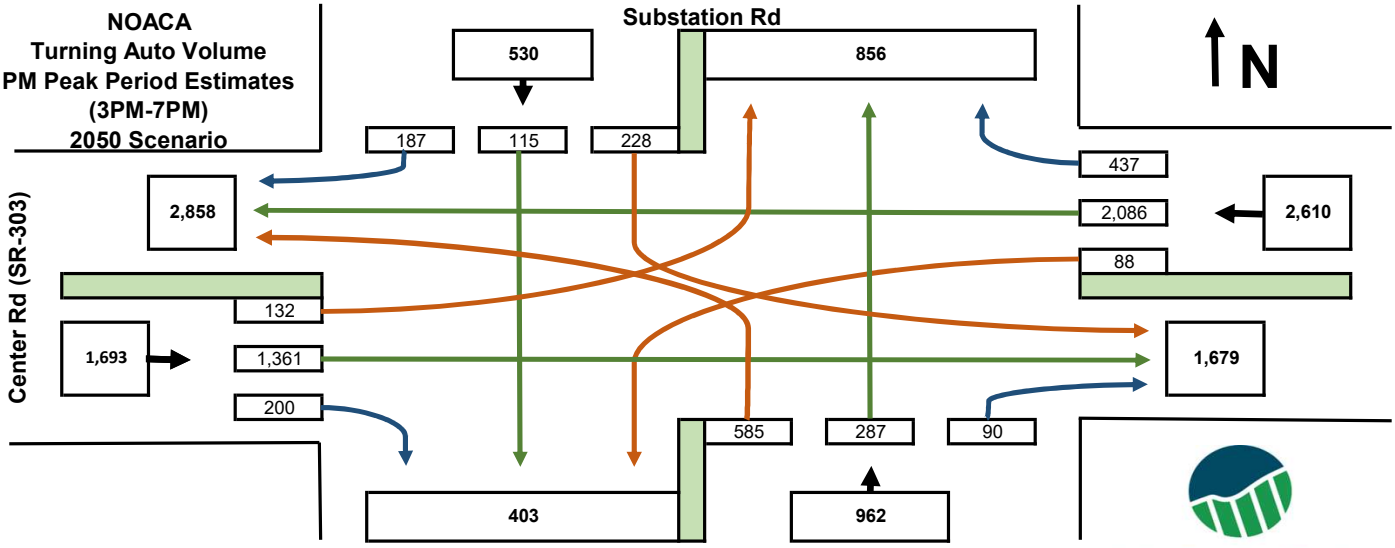



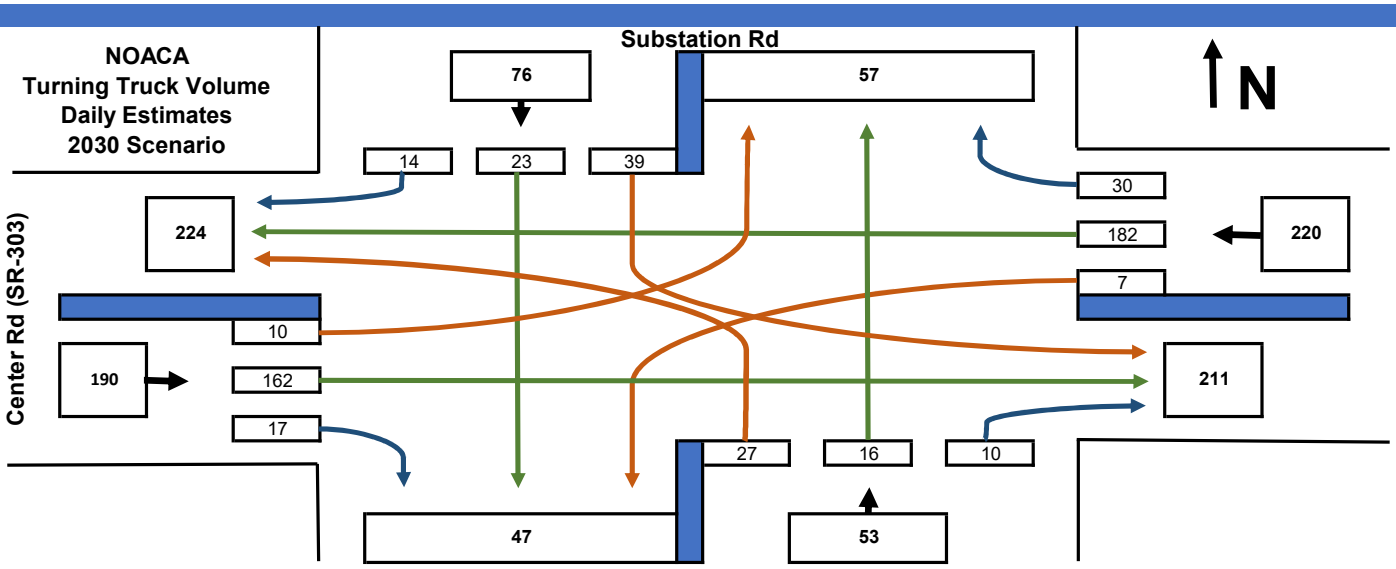

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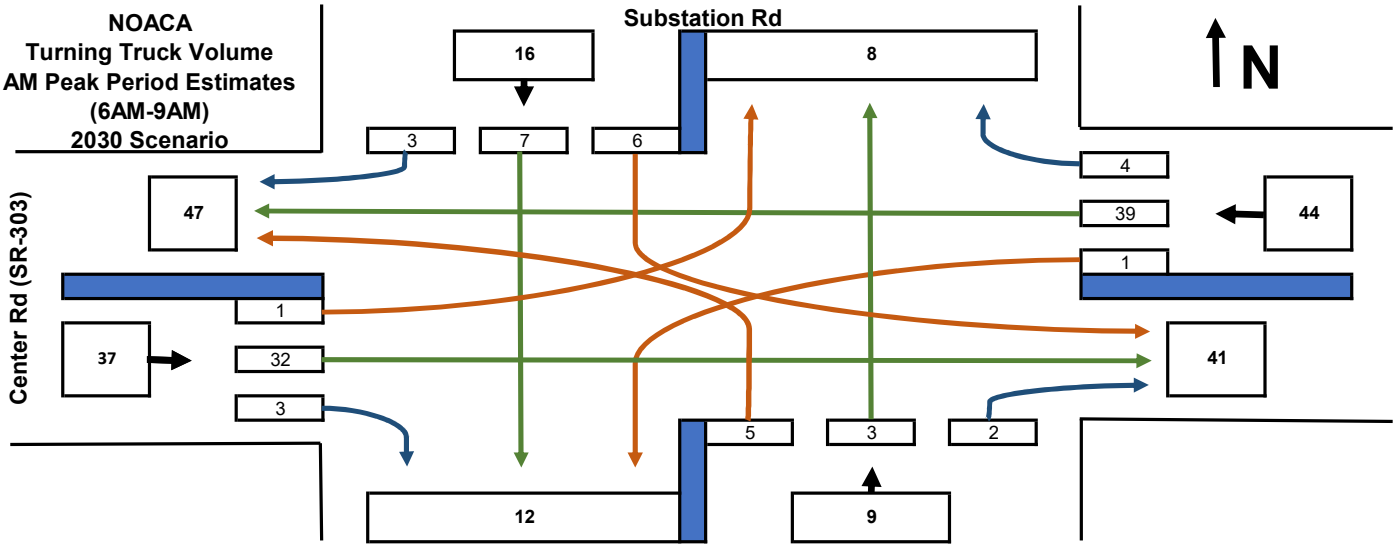


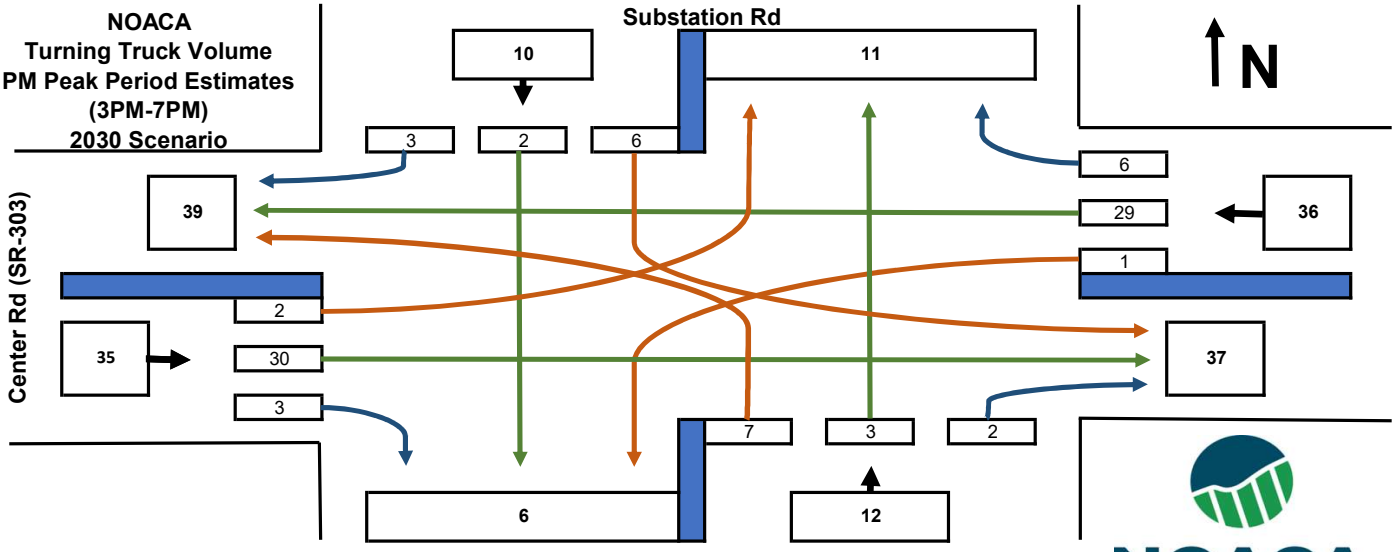



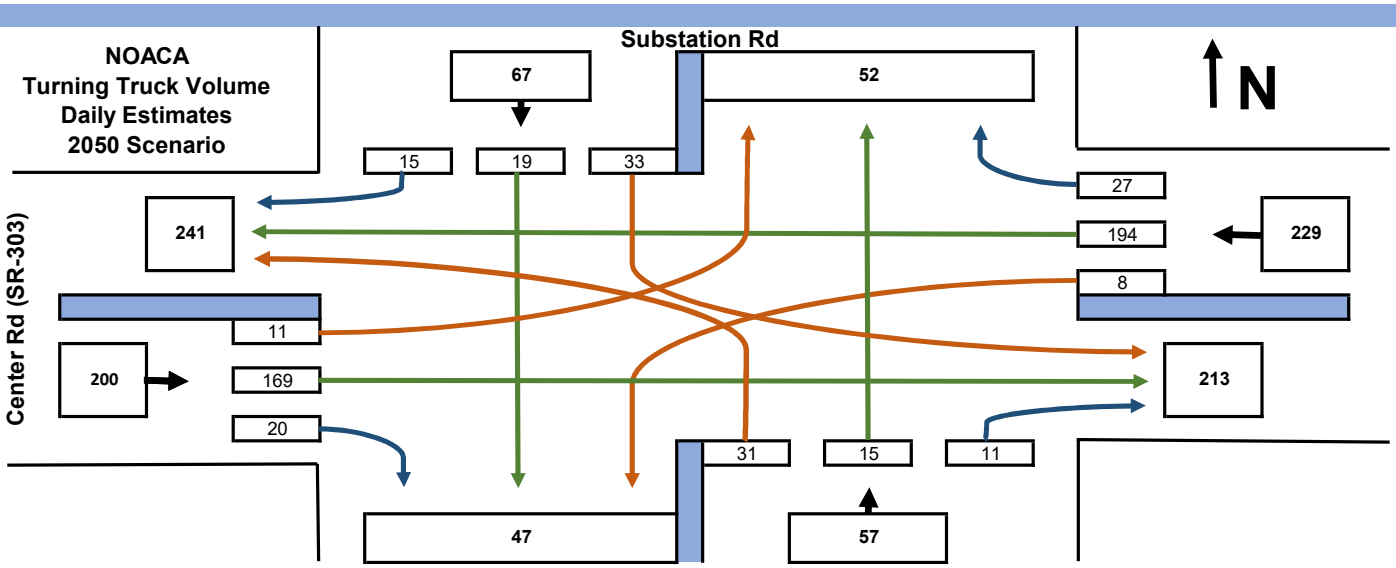

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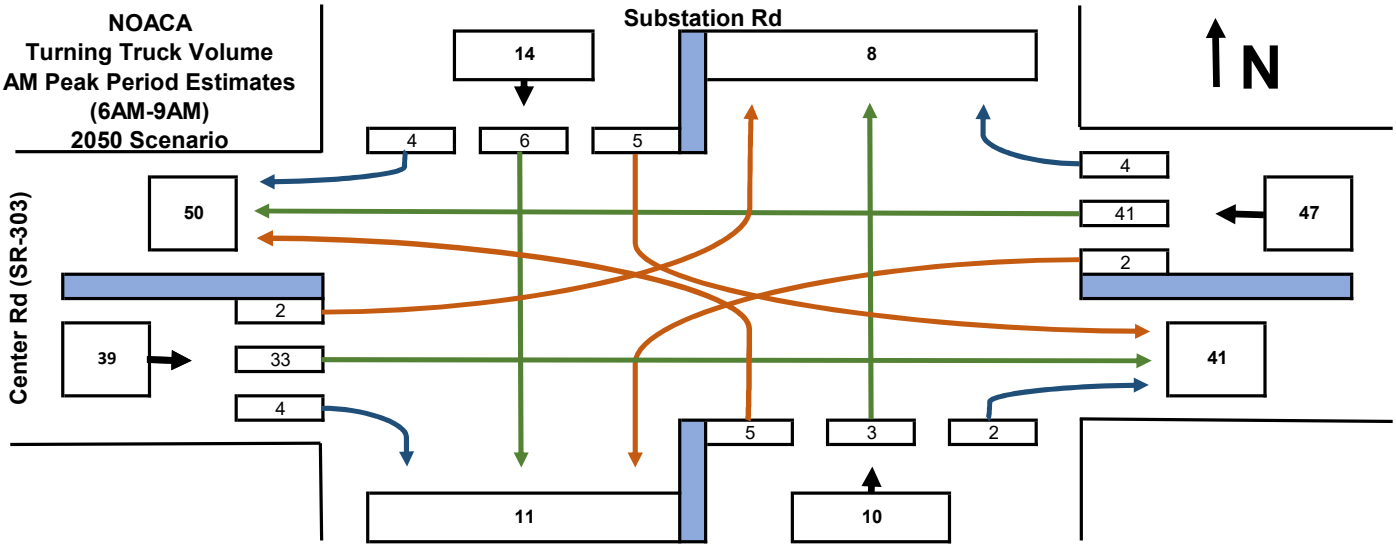


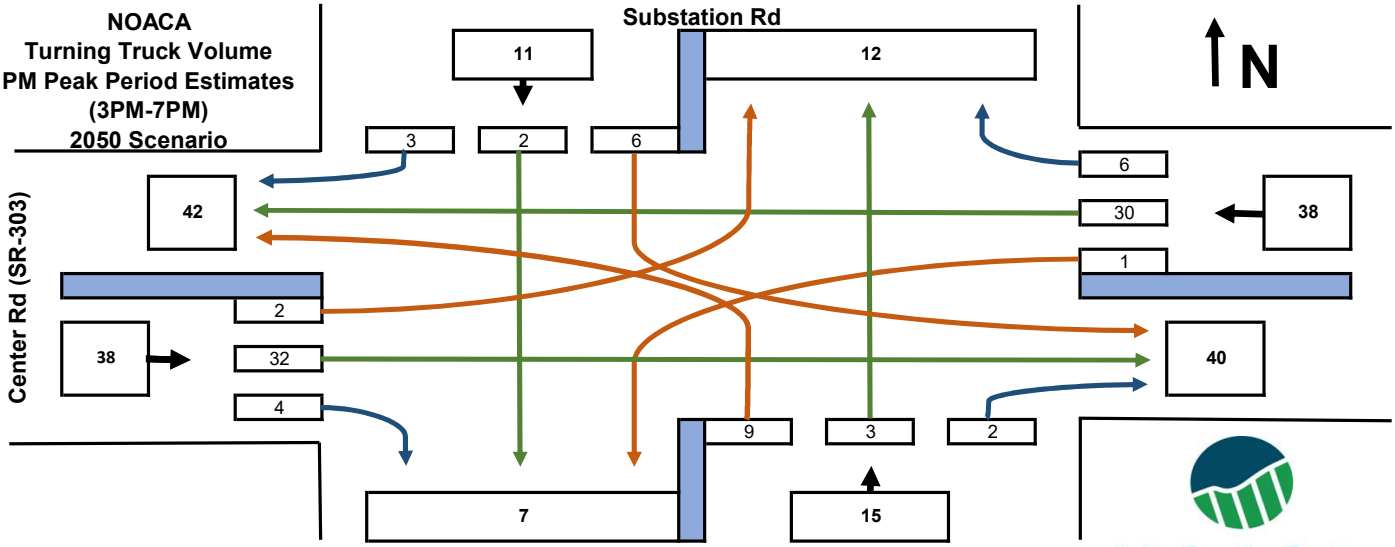



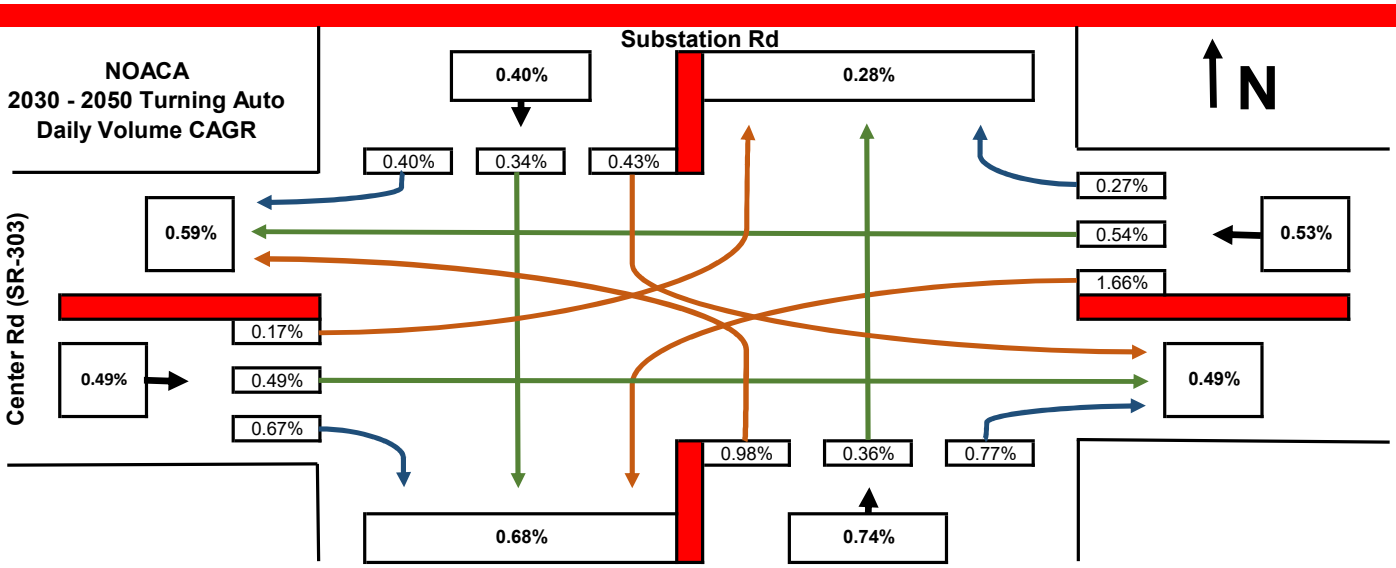

NOACA
Northeast Ohio Areawide Coordinating Agency

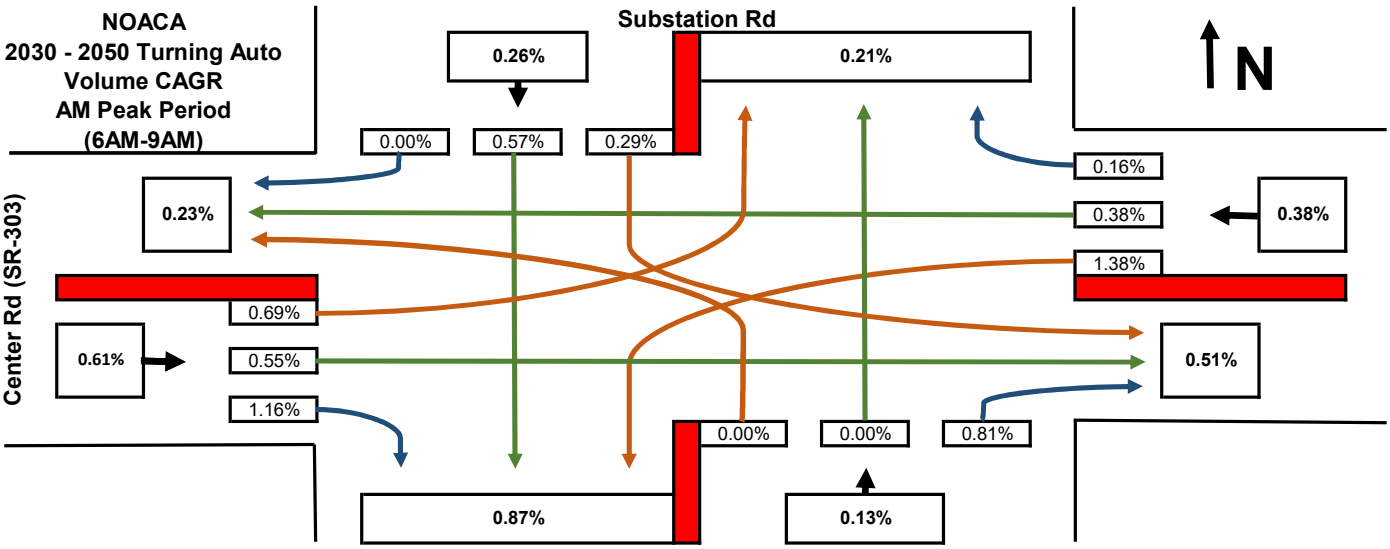


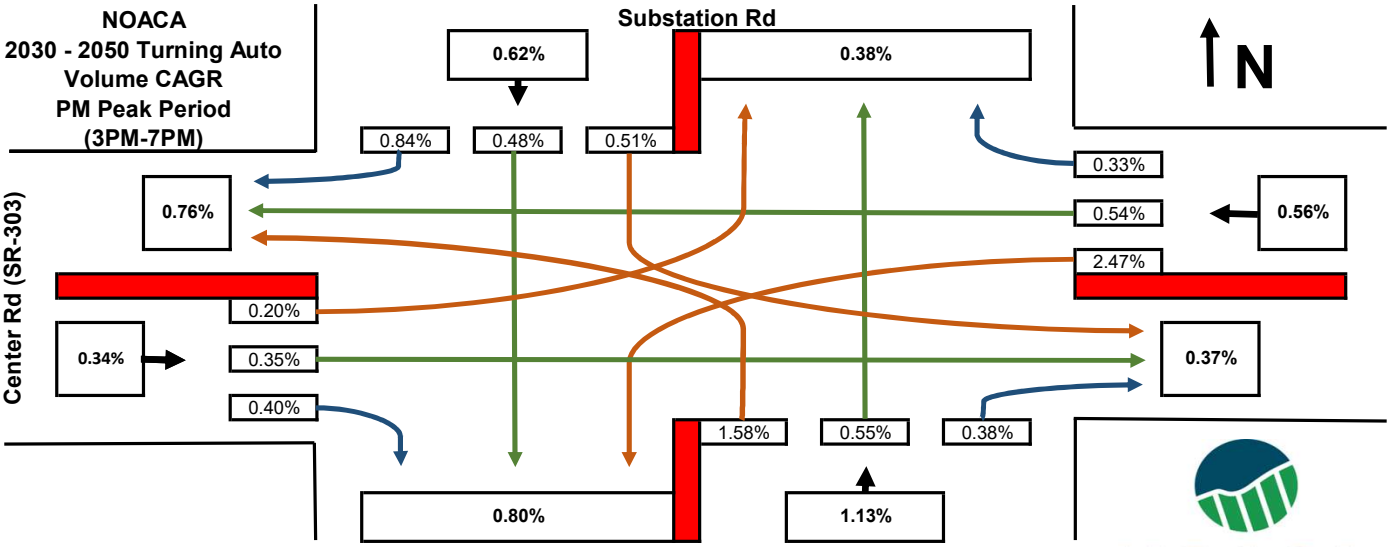



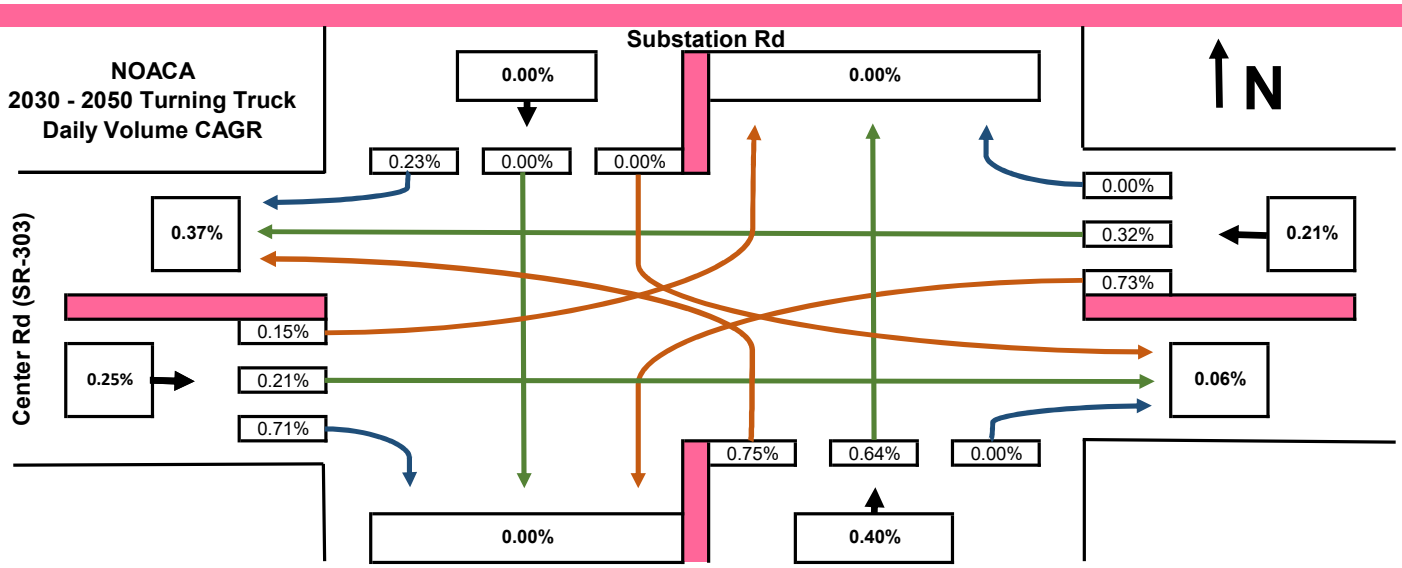

NOACA
Northeast Ohio Areawide Coordinating Agency

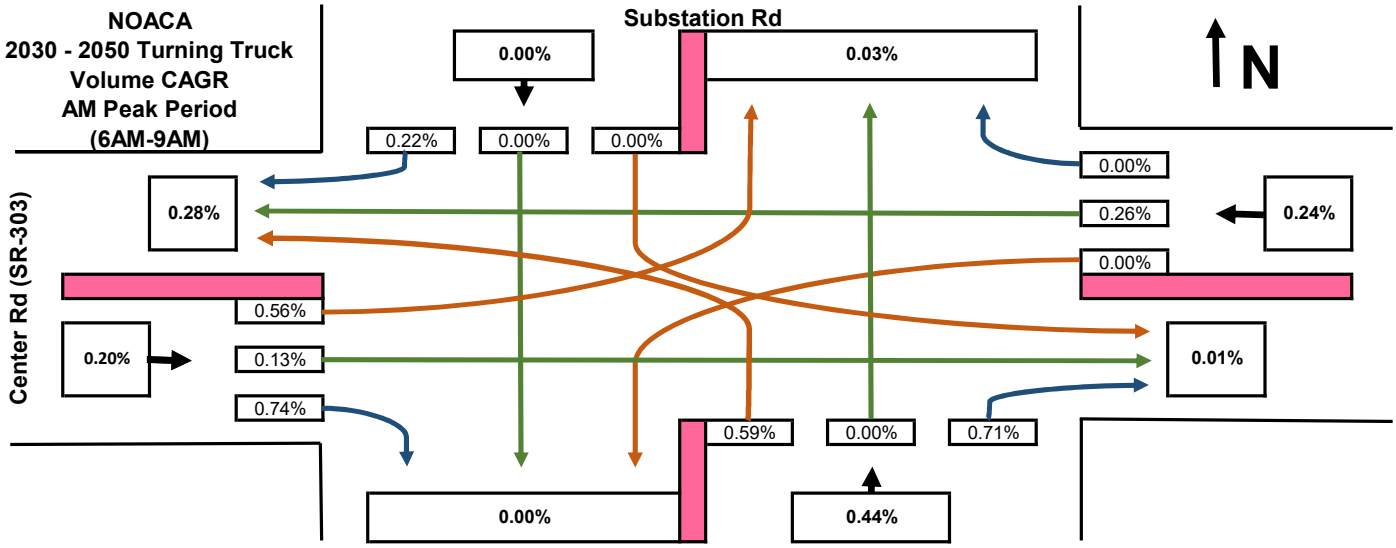


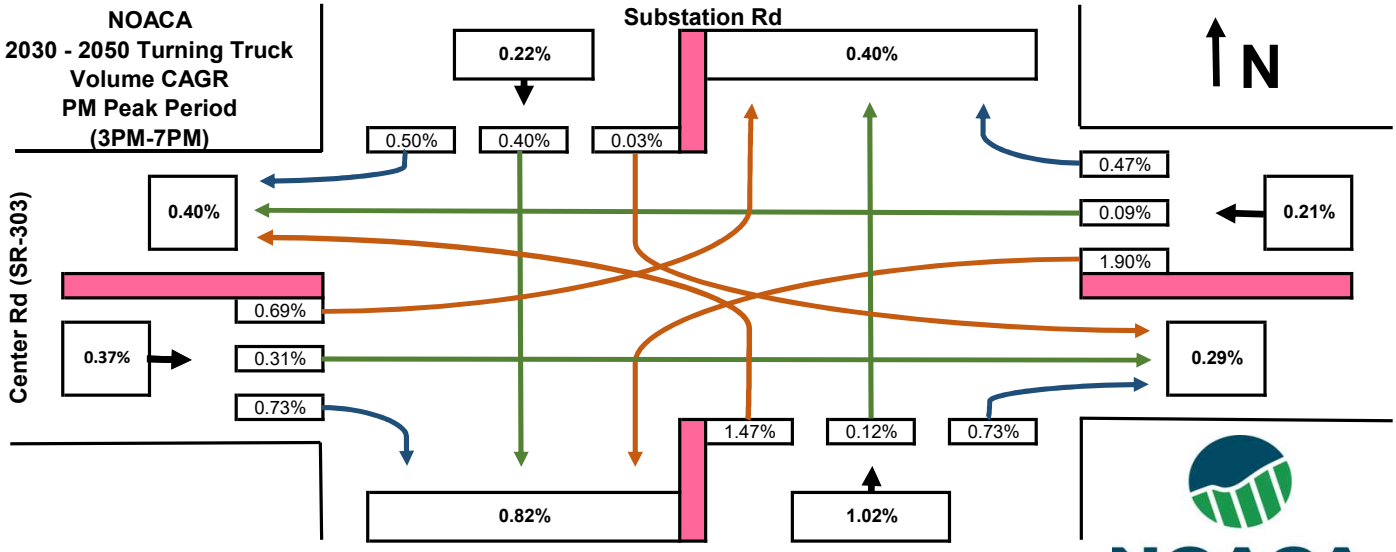




NOACA
Northeast Ohio Areawide Coordinating Agency




NOACA
Northeast Ohio Areawide Coordinating Agency

## BellStores Generated Traffic Volumes

| ITE Land Use Description | ITE Cat. | Size | Unit | Total Generated Trips | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Weekday | | | Weekday AM Peak Hour | | | | Weekday PM Peak Hour | | | |
| | | | | Tot | In | Out | [A]Tot | In | Out | [B]PB | [A]Tot | In | Out | [B]PB |
| Passenger Car | | | | | | | | | | | | | | |
| Gasoline/Service Station with Convenience Market | 945 | 16 | Fuel Pos. | 4,114 | 2,057 | 2,057 | 434 | 52 | 52 | 330 | 364 | 45 | 45 | 274 |
| *ITE Cat. 945 Entering (%)/Exiting (%)* | | | | *100%* | *50%* | *50%* | *100%* | *50%* | *50%* | [C]*76%* | *100%* | *50%* | *50%* | [C]*75%* |
| Beverage Drive-Through | N/A | 1.5 | KSF | -- | -- | -- | -- | -- | -- | -- | 12 | 6 | 6 | 0 |
| *Entering (%)/Exiting (%)* | | | | --- | --- | --- | --- | --- | --- | --- | *100%* | *50%* | *50%* | *0%* |
| Automated Car Wash | 948 | 1 | # of Lanes | -- | -- | -- | -- | -- | -- | -- | 78 | 39 | 39 | 0 |
| *ITE Cat. 948 Entering (%)/Exiting (%)* | | | | --- | --- | --- | --- | --- | --- | --- | *100%* | *50%* | *50%* | *0%* |
| Internal Capture Applied | | | | --- | --- | --- | --- | --- | --- | --- | 38 | 19 | 19 | 0 |
| *Internal Capture Rates* | | | | --- | --- | --- | --- | --- | --- | --- | --- | **50%* | **50%* | --- |
| Total (No Internal Capture Applied) | | | | 4,114 | 2,057 | 2,057 | 434 | 52 | 52 | 330 | 454 | 90 | 90 | 274 |
| Internal Capture Subtracted | | | | --- | --- | --- | --- | --- | --- | --- | 40 | 20 | 20 | 0 |
| BellStores Net Trip Generation | | | | 4,114 | 2,057 | 2,057 | 434 | 52 | 52 | 330 | 414 | 70 | 70 | 274 |

* Internal capture rate estimated at 50% since most car washes come directly from fueling customers.
NOTE: Beverage Drive-Through data was provided by the client to calculate the PM Peak Hour trips.

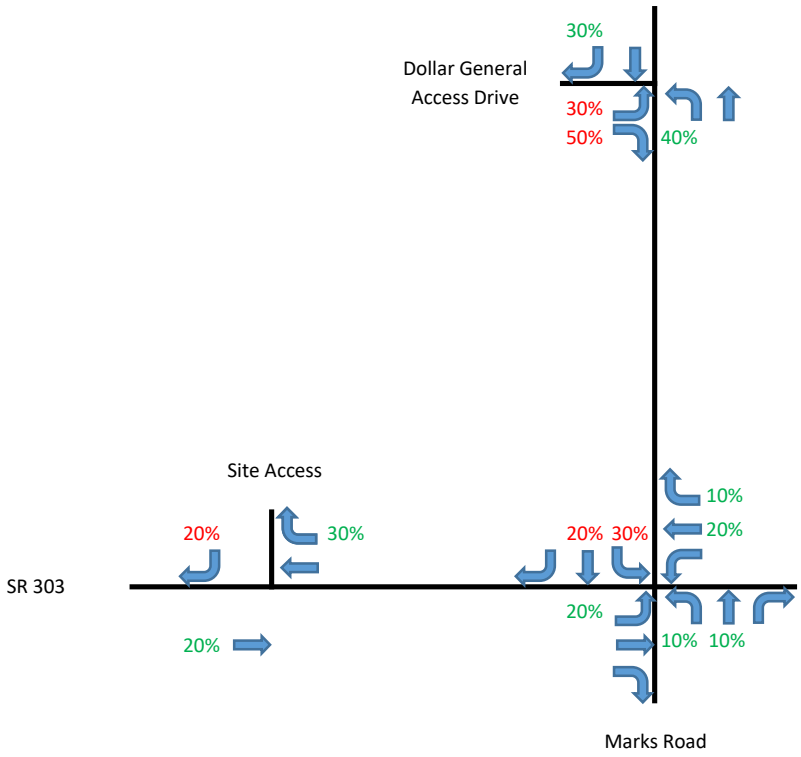
## Full Site Generated Traffic Volumes (with potential Future Development)

| ITE Land Use Description | ITE Cat. | Size | Unit | Total Generated Trips | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Weekday | | | Weekday AM Peak Hour | | | | Weekday PM Peak Hour | | | |
| | | | | Tot | In | Out | [A]Tot | In | Out | [B]PB | [A]Tot | In | Out | [B]PB |
| Passenger Car | | | | | | | | | | | | | | |
| Gasoline/Service Station with Convenience Market | 945 | 16 | Fuel Pos. | 4,114 | 2,057 | 2,057 | 434 | 52 | 52 | 330 | 364 | 45 | 45 | 274 |
| *ITE Cat. 945 Entering (%)/Exiting (%)* | | | | *100%* | *50%* | *50%* | *100%* | *50%* | *50%* | [C]*76%* | *100%* | *50%* | *50%* | [C]*75%* |
| Internal Capture Applied | | | | --- | --- | --- | 419 | 52 | 49 | 318 | 350 | 44 | 44 | 262 |
| *Internal Capture Rates* | | | | --- | --- | --- | --- | *1%* | *6%* | --- | --- | *4%* | *4%* | --- |
| Beverage Drive-Through | N/A | 1.5 | KSF | -- | -- | -- | -- | -- | -- | -- | 12 | 6 | 6 | 0 |
| *Entering (%)/Exiting (%)* | | | | --- | --- | --- | --- | --- | --- | --- | *100%* | *50%* | *50%* | *0%* |
| Internal Capture Applied | | | | --- | --- | --- | --- | --- | --- | --- | 12 | 6 | 6 | 0 |
| *Internal Capture Rates* | | | | --- | --- | --- | --- | --- | --- | --- | --- | *4%* | *4%* | --- |
| Automated Car Wash | 948 | 1 | # of Lanes | -- | -- | -- | -- | -- | -- | -- | 78 | 39 | 39 | 0 |
| *ITE Cat. 948 Entering (%)/Exiting (%)* | | | | --- | --- | --- | --- | --- | --- | --- | *100%* | *50%* | *50%* | *0%* |
| Internal Capture Applied | | | | --- | --- | --- | --- | --- | --- | --- | 38 | 19 | 19 | 0 |
| *Internal Capture Rates* | | | | --- | --- | --- | --- | --- | --- | --- | --- | **50%* | **50%* | --- |
| High-Turnover (Sit-Down) Restaurant | 932 | 5.0 | KSF | 536 | 268 | 268 | 48 | 15 | 13 | 20 | 46 | 16 | 10 | 20 |
| *ITE Cat. 932 Entering (%)/Exiting (%)* | | | | *100%* | *50%* | *50%* | *100%* | *55%* | *45%* | *43%* | *100%* | *61%* | *39%* | *43%* |
| Internal Capture Applied | | | | --- | --- | --- | 32 | 7 | 11 | 14 | 30 | 11 | 7 | 12 |
| *Internal Capture Rates* | | | | --- | --- | --- | --- | *52%* | *13%* | --- | --- | *31%* | *40%* | --- |
| Total (No Internal Capture Applied) | | | | 4,650 | 2,325 | 2,325 | 482 | 67 | 65 | 350 | 500 | 106 | 100 | 294 |
| Internal Capture Subtracted | | | | --- | --- | --- | 31 | 8 | 5 | 18 | 70 | 26 | 24 | 20 |
| Full Site Trip Generation Summary | | | | 4,650 | 2,325 | 2,325 | 451 | 59 | 60 | 332 | 430 | 80 | 76 | 274 |

* Internal capture rate estimated at 50% since most car washes come directly from fueling customers.
NOTE: Beverage Drive-Through data was provided by the client to calculate the PM Peak Hour trips.

| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | | Non-Pass-By Distribution | |

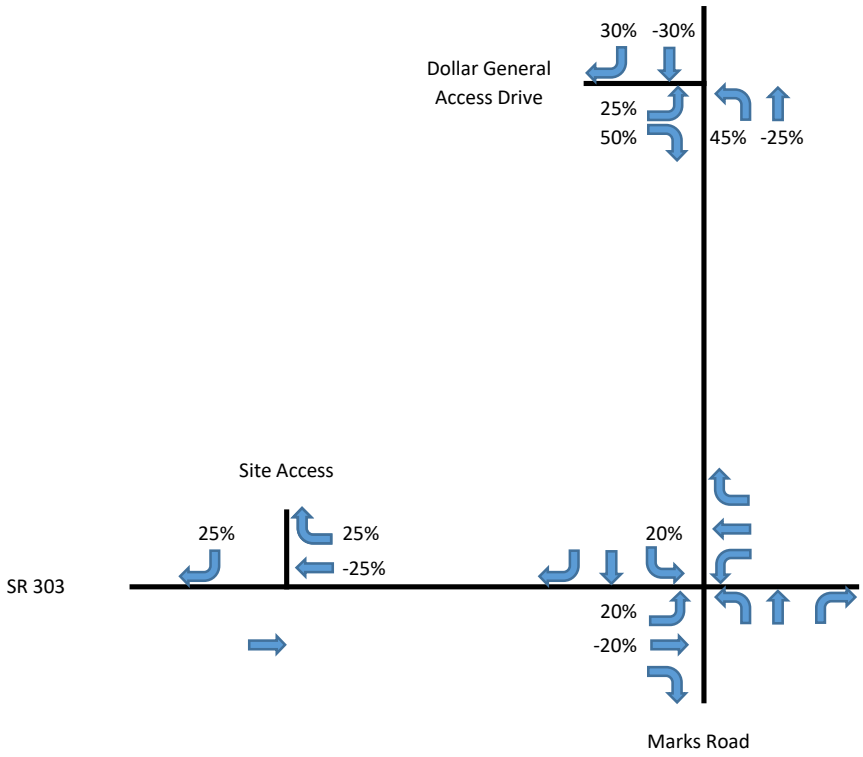
^
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | | Pass-By Distribution | |

^

N



## SITE LEGEND

PROPOSED

- PROPOSED CONCRETE SIDEWALK
- PROPOSED BRICK SIDEWALK
- BUILDING
- CONCRETE CURB
- PAVEMENT/WALK
- 7 PARKING SPACE COUNT
- SIGN
- BOLLARD

N

GRAPHIC SCALE (IN FEET)
30 0 30 60
1 in. = 30 ft.

## PROPERTY DATA:

| | |
|---|---|
| PARCEL OWNER: | CAMPBELL OIL COMPANY |
| PARCEL ID: | 025-01B-44-013 |
| ADDRESS: | XXXX CENTER RD.<br>BRUNSWICK OH, 44280 |
| PROPERTY AREA: | 3.35 ACRES |
| ZONING: | M *, LIGHT MANUFACTURING<br>* C1, COMMERCIAL DISTRICT USES PERMITTED PER ZONING MAP |
| PROPOSED USE: | CONVENIENCE STORE & GASOLINE SERVICE STATION WITH CAR WASH |

| | REQUIRED | PROPOSED |
|---|---|---|
| BUILDING SETBACKS | | |
| FRONTAGE ALONG STREET: | 100' | 179.5' |
| SIDE: | 50' | 188.4' / 256.4' |
| REAR: | N/A | 252.8' |
| BUILDING AREA: | | 5,472 SF |
| PARKING C-STORE: | | |
| TOTAL PARKING SPACES: | 20 | 98 |
| ADA PARKING SPACES: | 4 | 4 |
| EV PARKING SPACES: | N/A | 4 |
| *PARKING CALCULATION: | 2 SPACES PER FILLING PUMP<br>10 PUMPS x 2 = 20 SPACES | |

## ENGINEER:

CESO, INC.
2800 CORPORATE EXCHANGE DR, SUITE 400
COLUMBUS, OH 43231
PHONE: (614) 942-3017
CONTACT: JEFF LONCHOR
EMAIL: LONCHOR@CESOINC.COM

Sublot 2B
Liverpool Fields Subdivision Replat No. 1
Plat Doc. No. 2022PL00004

Pride One Liverpool LLC
Parcel No: 025-01B-44-013
Instrument No: 2014OR021948
8.5186 acres (survey)
(371,071sq. ft.)
(7.8560 acres outside right-of-way)

Sublot 2A
Liverpool Fields Subsivision Replat No. 1
Plat Doc. No: 2022PL000004
Agree Limited Partnership
Parcel No: 025-01B-44-012

Parcel No: 025-01B-44-009

848.38' Rec. & Usd.
N 00° 20' 04" W
117.00' Rec. & Usd.
92.37' (92.30' Rec.)
N 56° 04' 12" W
S 89° 39' 56" W
222.82' (223.00' Rec.)
S 00° 20' 04" E
N 42° 55' 22" E
597.36' Rec. & Usd.
15' SETBACK
50' REAR BUILDING SETBACK
25' SIDE BUILDING SETBACK
M LIMITED MANUFACTURING
R20'
FULL ACCESS DRIVE
36' access easement
ACCESS
R25'
151.1'
69.4'
319.12' Rec. & Usd.
Marks Road (C.H. 22) (width varies)
112.39'
16" water (approx. per plans)
450.8'
30'
100' SETBACK
50' SIDE BUILDING SETBACK
25' SIDE PAVEMENT SETBACK
10' drainage and utility easement
29' telephone easement
15'
R20'
R5'
TRASH
20'
25'
10'
R10'
R12'
6'
4'
5'
56.3'
DRIVE-THRU ±1,454 SF
C-STORE ±5,472 SF
95.6'
8'
12'
N 88° 50' 20" E
129.26' Rec. & Usd.
15' SETBACK
PR. 4,045 SF WASH BUILDING
128.8'
27'
61.9'
(2) FREEWIRE BOOST CHARGER 200 STATION
81.9'
78.4'
126.9'
PR. 50' x 103' CANOPY
R15'
R75'
100' SETBACK
50' FRONT GAS CANOPY SETBACK
25' FRONT PAVEMENT SETBACK
AUTOMATIC CW GATE
R7'
14'
18'
24'
DO NOT ENTER
36'
61.5'
R50'
RIGHT-IN / RIGHT-OUT
S 89° 39' 56" W
30.00' Rec. & Usd.
128.35' Rec. & Usd.
S 11° 06' 58" W
PR. SIGN
L1
129.81' Rec. & Usd.
S 73° 11' 49" W
200.00' Rec. & Usd.
S 00° 20' 04" E
Liverpool Township
Brunswick Hills Township
MARKS RD.
Lot 11, Tract 1
State of Ohio
Parcel No: 025-01B-44-001
centerline of ditch
Lot 2, Section 15
Lot 3, Section 15
S 88° 50' 20" W
CENTER RD.
643.11' Rec. & Usd.
S 01° 09' 40" E
30.00' Rec. & Usd.
194.40' Rec. & Usd.
S 88° 50' 20" W
Center Road (S.R. 303/S.H. 689) (width varies)
R-R RURAL

CESO
WWW.CESOINC.COM
2800 Corporate Exchange Drive, Suite 400
Columbus, OH 43231
Phone: 614.794.7080 Fax: 888.208.4826

CAMPBELL OIL

# BELLSTORES - BRUNSWICK, OH

XXX CENTER RD
BRUNSWICK, OH 44280

Revisions / Submissions

| ID | Description | Date |
|---|---|---|

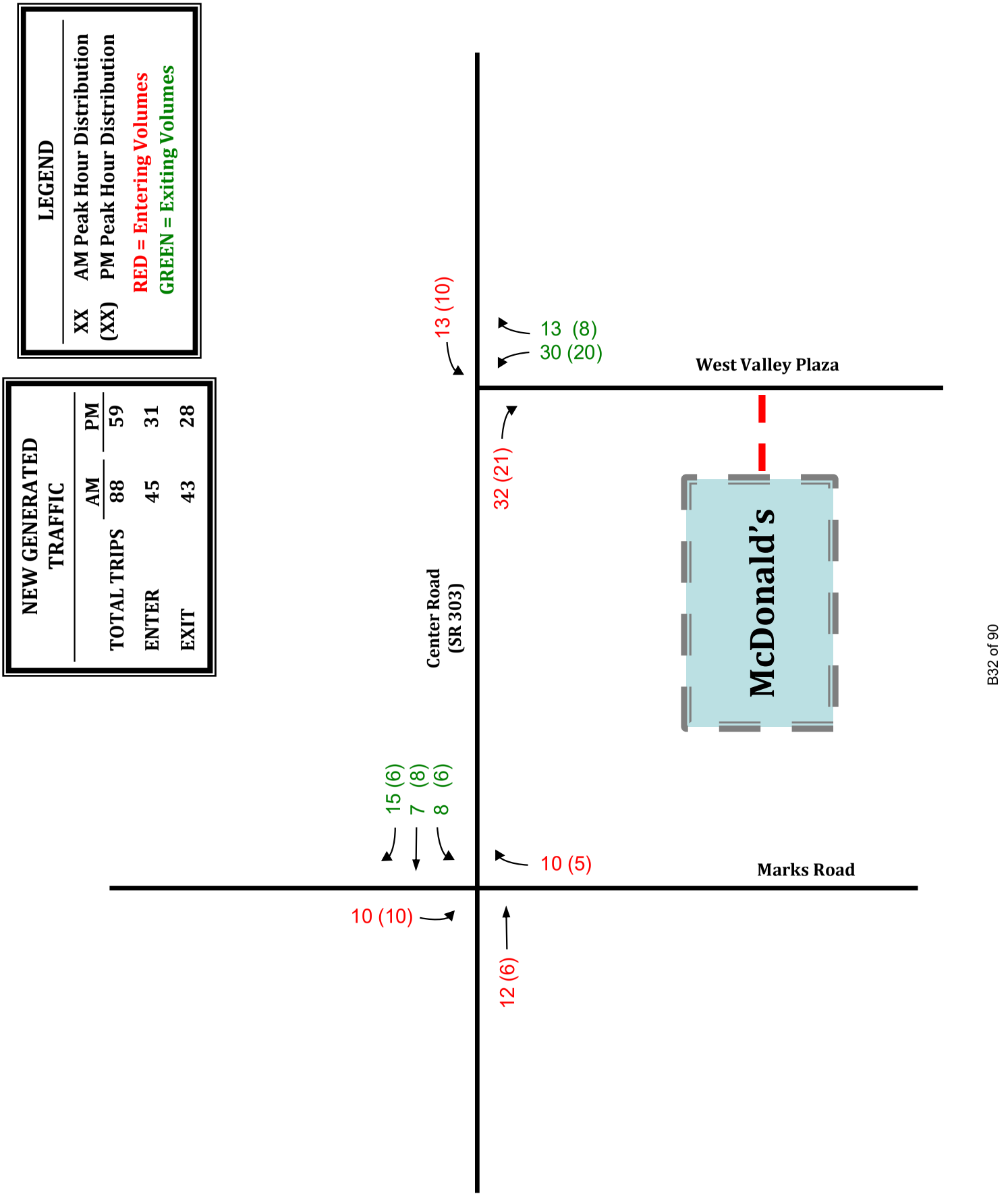
© 2023 CESO, INC.

| | |
|---|---|
| Project Number: | 764597 |
| Scale: | 1" = 30' |
| Drawn By: | AAF |
| Checked By: | JMR |
| Date: | 09/13/2024 |
| Issue: | CLIENT REVIEW |

Drawing Title:
**CONCEPT A.2**

**CCPT-A.2**

W:\PROJECTS\CAMPBELL OIL\764597_Bellstores_Brunswick OH\03-CIVIL\PLAN_CONCEPT\764597_CONCEPT A.2.dwg - 10/17/2024 - Patrick Oehlman






| | | | | |
|---|---|---|---|---|
| TMS Engineers, Inc.<br>2112 Case Parkway S., Unit 7,<br>Twinsburg, Ohio 44087<br>www.TMSEngineers.com | Proposed McDonald's<br>Brunswick Hills Twp., Ohio<br>Traffic Impact Study | New Generated<br>Traffic Assignment | NORTH<br>NOT TO SCALE | Figure A-4<br>Appendix A |

TMS Engineers, Inc.
2112 Case Parkway S., Unit 7,
Twinsburg, Ohio 44087
www.TMSEngineers.com

Proposed McDonald's
Brunswick Hills Twp., Ohio
Traffic Impact Study

Pass-by Traffic
Assignment

NORTH
NOT TO SCALE

Figure A-5

Appendix A

| PASS-BY TRAFFIC | AM | PM |
|---|---|---|
| TOTAL TRIPS | 88 | 71 |
| ENTER | 45 | 37 |
| EXIT | 43 | 34 |

**LEGEND**

XX AM Peak Hour Distribution
(XX) PM Peak Hour Distribution

RED = Entering Volumes
GREEN = Exiting Volumes

P.P.N. 001-02A-29-027
CENTER-MARK CAR WASH LTD.
5315 CENTER ROAD

P.P.N. 001-02A-29-007
GARY E & LYNDA M SUDYK
5293-1/2 CENTER ROAD

P.P.N. 001-02A-29-008
TLM5267, LLC.
5267-A & B CENTER ROAD

MONUMENT SIGN

LANDSCAPING

CENTER ROAD, SR 303, S.H. 689,
(VARIABLE WIDTH)(Public)

AGGREGATE DRIVE

ASPHALT DRIVE

LANDSCAPING

LANDSCAPING

R/W

R/W

R/W

POLE W/ COMM. DROPS

POLE W/ ELEC. DROP

267 268 269 270 271

ASPHALT PAVEMENT

ASPHALT PAVEMENT

EXTG. R/W

WB - Interstate Semi-Trailer

PROP. R/W

PROP. R/W

PROP. R/W

Truck Apron

Rolled Curb
(ODOT Type 3 or 9)

WEST VALLEY PLAZA SIGN

20' SAN ESMT.

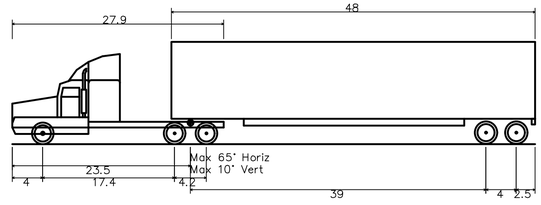
PROPOSED MCDONALD'S BUILDING

DRIVE THRU

DRIVE THRU

THANK YOU

DRIVE THRU




WB-62 - Interstate Semi-Trailer

| | |
|---|---|
| Overall Length | 69.000ft |
| Overall Width | 8.500ft |
| Overall Body Height | 13.500ft |
| Min Body Ground Clearance | 1.334ft |
| Max Track Width | 8.500ft |
| Lock-to-lock time | 6.00s |
| Max Steering Angle (Virtual) | 28.40° |

REVISIONS

# EASTBOUND WB-62 - ENTRY
# CENTER ROAD (S.R. 303) WIDENING
# MED SR-301
# BRUNSWICK HILLS TOWNSHIP
# MEDINA COUNTY, OHIO


DONALD G. BOHNING & ASSOCIATES, INC.
CIVIL ENGINEERING & SURVEYING
7979 HUB PARKWAY • VALLEY VIEW, OHIO 44125
PHONE: (216) 642-1130 FAX: (216) 642-1132


GRAPHIC SCALE
0' 10' 20'

HORZ. SCALE 1"=20'

VERT. SCALE 1"=5'

DRN. T.M. CHKD. E.K.

DATE FEB, 2024

ORDER NO. 5418E1

1 / 1

M:\Jobs\dwg\5500-5499\5418E1\dwg\5418E1 - Truck Movements WB-62.dwg 2/23/2024 - 2:11pm

## Scenario - 3

Scenario Name: McDonalds Site
User Group:
Dev. phase: 1
No. of Years to Project Traffic : 0
Analyst Note:
Warning:

## VEHICLE TRIPS BEFORE REDUCTION

| Land Use & Data Source | Location | IV | Size | Time Period | Method | Entry | Exit | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | | Rate/Equation | Split% | Split% | |
| 934 - Fast-Food Restaurant with Drive-Through | General Urban/Suburban | 1000 Sq. Ft. GFA | 3.85 | Weekday | Average | 900 | 900 | 1800 |
| Data Source: Trip Generation Manual, 11th Ed | | | | | 467.48 | 50% | 50% | |

## VEHICLE TO PERSON TRIP CONVERSION

**BASELINE SITE VEHICLE CHARACTERISTICS:**

| Land Use | Baseline Site Vehicle Mode Share | | Baseline Site Vehicle Occupancy | | Baseline Site Vehicle Directional Split | |
|---|---|---|---|---|---|---|
| | Entry (%) | Exit (%) | Entry | Exit | Entry (%) | Exit (%) |
| 934 - Fast-Food Restaurant with Drive-Through Window | 100 | 100 | 1 | 1 | 50 | 50 |

**ESTIMATED BASELINE SITE PERSON TRIPS:**

| Land Use | Person Trips by Vehicle | | Person Trips by Other Modes | | Total Baseline Site Person Trips | |
|---|---|---|---|---|---|---|
| | Entry | Exit | Entry | Exit | Entry | Exit |
| 934 - Fast-Food Restaurant with Drive-Through Window | 900 | 900 | 0 | 0 | 900 | 900 |
| | 1800 | | 0 | | 1800 | |

## INTERNAL VEHICLE TRIP REDUCTION

**LAND USE GROUP ASSIGNMENT:**

| Land Use | Land Use Group |
|---|---|
| 934 - Fast-Food Restaurant with Drive-Through Window | Resturant |

**BALANCED PERSON TRIPS:**

**INTERNAL PERSON TRIPS:**

**934 - Fast-Food Restaurant with Drive-Through Window**

| Internal Person Trips From | Entry | Exit | Total |
|---|---|---|---|
| **Total Internal Person Trips** | **0** | **0** | **0** |

**INTERNAL VEHICLE TRIPS AND CAPTURE:**

**934 - Fast-Food Restaurant with Drive-Through Window**

| | | | |
|---|---|---|---|
| Total Internal Person Trips | 0 | 0 | 0 |
| Vehicle Mode Share | 100% | 100% | - |
| Vehicle Occupancy | 1.00 | 1.00 | - |
| **Total Vehicle Internal Trips** | **0** | **0** | **0** |
| Total External Vehicle Trips | 900 | 900 | 1800 |
| **Internal Vehicle Trip Capture** | **0%** | **0%** | **0%** |

## PASS-BY VEHICLE TRIP REDUCTION

| Land Use | External Vehicle Trips | | Pass-by Vehicle Trip % | | Pass-by Vehicle Trips | |
|---|---|---|---|---|---|---|
| | Entry | Exit | Entry (%) | Exit (%) | Entry | Exit |
| 934 - Fast-Food Restaurant with Drive-Through Window | 900 | 900 | 0.00% | 0.00% | 0 | 0 |

## DIVERTED VEHICLE TRIP REDUCTION

| Land Use | External Vehicle Trips | | Diverted Vehicle Trip % | | Diverted Vehicle Trips | |
|---|---|---|---|---|---|---|
| | Entry | Exit | Entry (%) | Exit (%) | Entry | Exit |
| 934 - Fast-Food Restaurant with Drive-Through Window | 900 | 900 | 0.00% | 0.00% | 0 | 0 |

## EXTRA VEHICLE TRIP REDUCTION

| Land Use | (External - (Pass-by + Diverted)) Vehicle Trips | | Extra Vehicle Trip Reduction % | | Extra Reduced Vehicle Trips | |
|---|---|---|---|---|---|---|
| | Entry | Exit | Entry (%) | Exit (%) | Entry | Exit |
| 934 - Fast-Food Restaurant with Drive-Through Window | 900 | 900 | 0.00% | 0.00% | 0 | 0 |

## NEW VEHICLE TRIPS

| Land Use | New Vehicle Trips | | |
|---|---|---|---|
| | Entry | Exit | Total |
| 934 - Fast-Food Restaurant with Drive-Through Window | 900 | 900 | 1800 |

## RESULTS

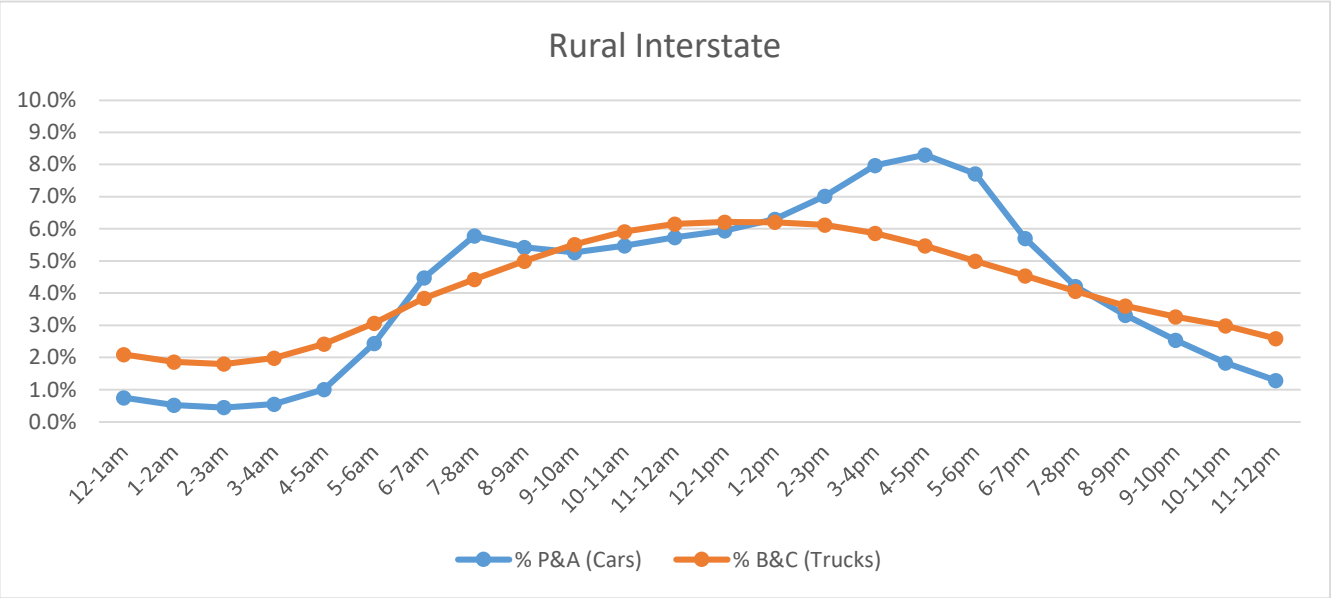
| Site Totals | Entry | Exit | Total |
|---|---|---|---|
| Vehicle Trips Before Reduction | 900 | 900 | 1800 |
| Internal Vehicle Trips | 0 | 0 | 0 |
| External Vehicle Trips | 900 | 900 | 1800 |
| Internal Vehicle Trip Capture | 0% | 0% | 0% |
| Pass-by Vehicle Trips | 0 | 0 | 0 |
| Diverted Vehicle Trips | 0 | 0 | 0 |
| Extra Reduced Vehicle Trips | 0 | 0 | 0 |
| New Vehicle Trips | 900 | 900 | 1800 |

## Hourly Percent By Vehicle Type

Rural Interstate

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 1,133,860 | **0.7%** | 919,155 | **2.1%** | 2,053,015 | **1.0%** |
| 1 | 1-2am | 788,289 | **0.5%** | 818,825 | **1.9%** | 1,607,114 | **0.8%** |
| 2 | 2-3am | 680,462 | **0.4%** | 792,080 | **1.8%** | 1,472,542 | **0.8%** |
| 3 | 3-4am | 832,433 | **0.5%** | 873,666 | **2.0%** | 1,706,099 | **0.9%** |
| 4 | 4-5am | 1,540,785 | **1.0%** | 1,065,484 | **2.4%** | 2,606,269 | **1.3%** |
| 5 | 5-6am | 3,719,710 | **2.4%** | 1,346,679 | **3.1%** | 5,066,389 | **2.6%** |
| 6 | 6-7am | 6,819,453 | **4.5%** | 1,691,338 | **3.8%** | 8,510,791 | **4.3%** |
| 7 | 7-8am | 8,812,687 | **5.8%** | 1,946,148 | **4.4%** | 10,758,835 | **5.5%** |
| 8 | 8-9am | 8,262,521 | **5.4%** | 2,198,797 | **5.0%** | 10,461,318 | **5.3%** |
| 9 | 9-10am | 8,026,972 | **5.3%** | 2,426,340 | **5.5%** | 10,453,312 | **5.3%** |
| 10 | 10-11am | 8,349,361 | **5.5%** | 2,598,841 | **5.9%** | 10,948,202 | **5.6%** |
| 11 | 11-12am | 8,730,392 | **5.7%** | 2,706,559 | **6.2%** | 11,436,951 | **5.8%** |
| 12 | 12-1pm | 9,052,090 | **5.9%** | 2,730,010 | **6.2%** | 11,782,100 | **6.0%** |
| 13 | 1-2pm | 9,596,486 | **6.3%** | 2,730,378 | **6.2%** | 12,326,864 | **6.3%** |
| 14 | 2-3pm | 10,690,764 | **7.0%** | 2,691,404 | **6.1%** | 13,382,168 | **6.8%** |
| 15 | 3-4pm | 12,142,086 | **8.0%** | 2,580,235 | **5.9%** | 14,722,321 | **7.5%** |
| 16 | 4-5pm | 12,653,628 | **8.3%** | 2,405,552 | **5.5%** | 15,059,180 | **7.7%** |
| 17 | 5-6pm | 11,746,382 | **7.7%** | 2,197,055 | **5.0%** | 13,943,437 | **7.1%** |
| 18 | 6-7pm | 8,695,054 | **5.7%** | 1,994,590 | **4.5%** | 10,689,644 | **5.4%** |
| 19 | 7-8pm | 6,416,765 | **4.2%** | 1,784,172 | **4.1%** | 8,200,937 | **4.2%** |
| 20 | 8-9pm | 5,054,211 | **3.3%** | 1,582,878 | **3.6%** | 6,637,089 | **3.4%** |
| 21 | 9-10pm | 3,865,474 | **2.5%** | 1,435,557 | **3.3%** | 5,301,031 | **2.7%** |
| 22 | 10-11pm | 2,788,790 | **1.8%** | 1,314,068 | **3.0%** | 4,102,858 | **2.1%** |
| 23 | 11-12pm | 1,960,911 | **1.3%** | 1,140,063 | **2.6%** | 3,100,974 | **1.6%** |
| | Total | 152,359,566 | **100%** | 43,969,874 | **100%** | 196,329,440 | **100%** |

Sample of 23 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

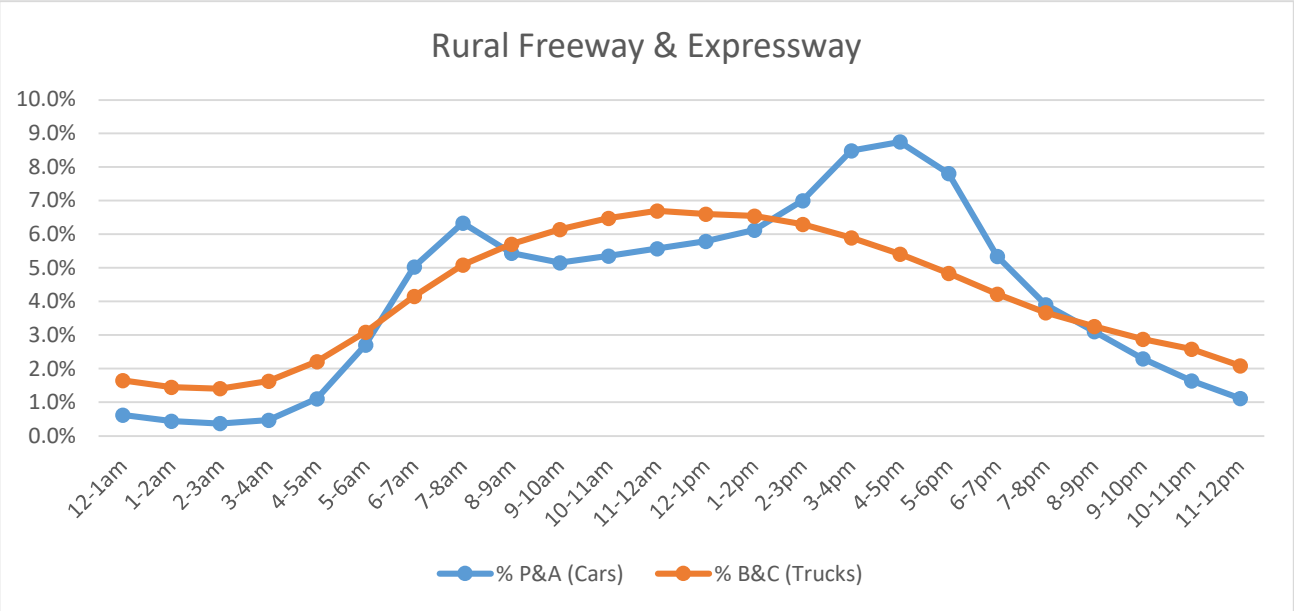


## Hourly Percent By Vehicle Type

Rural Freeway & Expressway

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 86,791 | **0.6%** | 74,389 | **1.7%** | 161,180 | **0.9%** |
| 1 | 1-2am | 61,283 | **0.4%** | 65,247 | **1.4%** | 126,530 | **0.7%** |
| 2 | 2-3am | 52,104 | **0.4%** | 63,383 | **1.4%** | 115,487 | **0.6%** |
| 3 | 3-4am | 65,716 | **0.5%** | 73,243 | **1.6%** | 138,959 | **0.7%** |
| 4 | 4-5am | 155,259 | **1.1%** | 99,707 | **2.2%** | 254,966 | **1.4%** |
| 5 | 5-6am | 381,212 | **2.7%** | 138,970 | **3.1%** | 520,182 | **2.8%** |
| 6 | 6-7am | 709,128 | **5.0%** | 187,376 | **4.2%** | 896,504 | **4.8%** |
| 7 | 7-8am | 892,542 | **6.3%** | 229,122 | **5.1%** | 1,121,664 | **6.0%** |
| 8 | 8-9am | 767,058 | **5.4%** | 257,317 | **5.7%** | 1,024,375 | **5.5%** |
| 9 | 9-10am | 726,490 | **5.2%** | 276,823 | **6.1%** | 1,003,313 | **5.4%** |
| 10 | 10-11am | 754,051 | **5.4%** | 292,007 | **6.5%** | 1,046,058 | **5.6%** |
| 11 | 11-12am | 785,270 | **5.6%** | 301,954 | **6.7%** | 1,087,224 | **5.8%** |
| 12 | 12-1pm | 815,616 | **5.8%** | 297,505 | **6.6%** | 1,113,121 | **6.0%** |
| 13 | 1-2pm | 863,484 | **6.1%** | 295,183 | **6.6%** | 1,158,667 | **6.2%** |
| 14 | 2-3pm | 987,064 | **7.0%** | 283,601 | **6.3%** | 1,270,665 | **6.8%** |
| 15 | 3-4pm | 1,196,465 | **8.5%** | 265,909 | **5.9%** | 1,462,374 | **7.9%** |
| 16 | 4-5pm | 1,233,500 | **8.8%** | 243,714 | **5.4%** | 1,477,214 | **7.9%** |
| 17 | 5-6pm | 1,101,339 | **7.8%** | 218,146 | **4.8%** | 1,319,485 | **7.1%** |
| 18 | 6-7pm | 753,774 | **5.3%** | 190,024 | **4.2%** | 943,798 | **5.1%** |
| 19 | 7-8pm | 550,916 | **3.9%** | 165,170 | **3.7%** | 716,086 | **3.9%** |
| 20 | 8-9pm | 437,468 | **3.1%** | 147,022 | **3.3%** | 584,490 | **3.1%** |
| 21 | 9-10pm | 324,128 | **2.3%** | 129,822 | **2.9%** | 453,950 | **2.4%** |
| 22 | 10-11pm | 231,098 | **1.6%** | 116,528 | **2.6%** | 347,626 | **1.9%** |
| 23 | 11-12pm | 157,509 | **1.1%** | 93,985 | **2.1%** | 251,494 | **1.4%** |
| | Total | 14,089,265 | **100%** | 4,506,147 | **100%** | 18,595,412 | **100%** |

Sample of 17 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

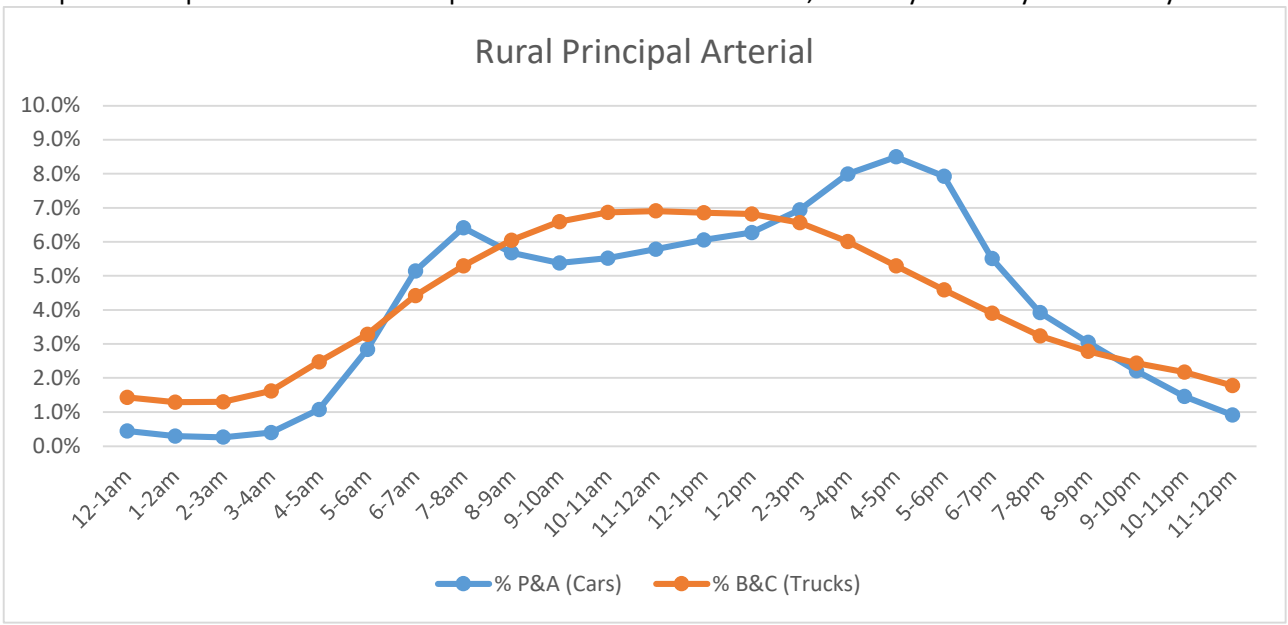


## Hourly Percent By Vehicle Type

Rural Principal Arterial

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 183,412 | **0.4%** | 56,807 | **1.4%** | 240,219 | **0.5%** |
| 1 | 1-2am | 120,353 | **0.3%** | 51,163 | **1.3%** | 171,516 | **0.4%** |
| 2 | 2-3am | 109,047 | **0.3%** | 51,574 | **1.3%** | 160,621 | **0.4%** |
| 3 | 3-4am | 165,440 | **0.4%** | 64,195 | **1.6%** | 229,635 | **0.5%** |
| 4 | 4-5am | 447,155 | **1.1%** | 97,772 | **2.5%** | 544,927 | **1.2%** |
| 5 | 5-6am | 1,179,369 | **2.8%** | 129,757 | **3.3%** | 1,309,126 | **2.9%** |
| 6 | 6-7am | 2,138,180 | **5.1%** | 174,857 | **4.4%** | 2,313,037 | **5.1%** |
| 7 | 7-8am | 2,666,771 | **6.4%** | 209,740 | **5.3%** | 2,876,511 | **6.3%** |
| 8 | 8-9am | 2,363,653 | **5.7%** | 239,420 | **6.1%** | 2,603,073 | **5.7%** |
| 9 | 9-10am | 2,238,471 | **5.4%** | 260,881 | **6.6%** | 2,499,352 | **5.5%** |
| 10 | 10-11am | 2,297,127 | **5.5%** | 271,777 | **6.9%** | 2,568,904 | **5.6%** |
| 11 | 11-12am | 2,405,291 | **5.8%** | 273,501 | **6.9%** | 2,678,792 | **5.9%** |
| 12 | 12-1pm | 2,516,392 | **6.1%** | 271,272 | **6.9%** | 2,787,664 | **6.1%** |
| 13 | 1-2pm | 2,609,363 | **6.3%** | 269,963 | **6.8%** | 2,879,326 | **6.3%** |
| 14 | 2-3pm | 2,884,261 | **6.9%** | 259,696 | **6.6%** | 3,143,957 | **6.9%** |
| 15 | 3-4pm | 3,324,629 | **8.0%** | 237,946 | **6.0%** | 3,562,575 | **7.8%** |
| 16 | 4-5pm | 3,533,668 | **8.5%** | 209,460 | **5.3%** | 3,743,128 | **8.2%** |
| 17 | 5-6pm | 3,294,641 | **7.9%** | 181,615 | **4.6%** | 3,476,256 | **7.6%** |
| 18 | 6-7pm | 2,292,421 | **5.5%** | 154,348 | **3.9%** | 2,446,769 | **5.4%** |
| 19 | 7-8pm | 1,628,932 | **3.9%** | 128,234 | **3.2%** | 1,757,166 | **3.9%** |
| 20 | 8-9pm | 1,266,167 | **3.0%** | 110,059 | **2.8%** | 1,376,226 | **3.0%** |
| 21 | 9-10pm | 921,290 | **2.2%** | 96,272 | **2.4%** | 1,017,562 | **2.2%** |
| 22 | 10-11pm | 604,810 | **1.5%** | 86,062 | **2.2%** | 690,872 | **1.5%** |
| 23 | 11-12pm | 379,140 | **0.9%** | 70,518 | **1.8%** | 449,658 | **1.0%** |
| | Total | 41,569,983 | **100%** | 3,956,889 | **100%** | 45,526,872 | **100%** |

Sample of 175 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

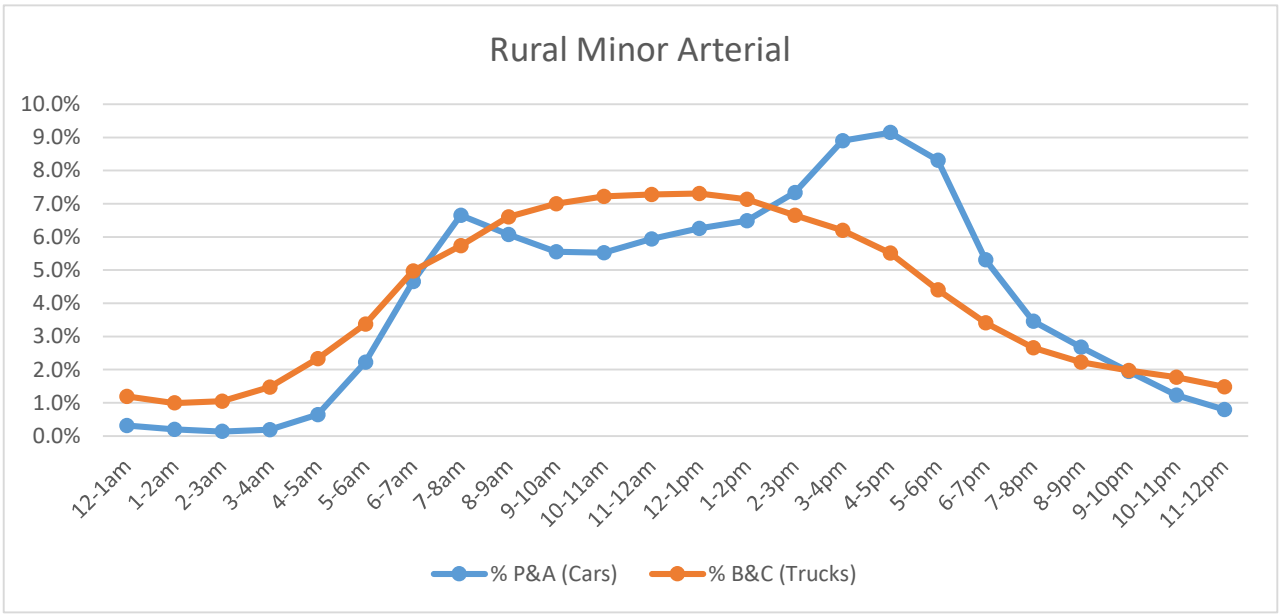


## Hourly Percent By Vehicle Type

Rural Minor Arterial

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 54,646 | **0.3%** | 18,813 | **1.2%** | 73,459 | **0.4%** |
| 1 | 1-2am | 35,604 | **0.2%** | 15,769 | **1.0%** | 51,373 | **0.3%** |
| 2 | 2-3am | 24,420 | **0.1%** | 16,581 | **1.1%** | 41,001 | **0.2%** |
| 3 | 3-4am | 32,626 | **0.2%** | 23,238 | **1.5%** | 55,864 | **0.3%** |
| 4 | 4-5am | 112,053 | **0.6%** | 36,818 | **2.3%** | 148,871 | **0.8%** |
| 5 | 5-6am | 384,853 | **2.2%** | 53,132 | **3.4%** | 437,985 | **2.3%** |
| 6 | 6-7am | 804,606 | **4.7%** | 78,466 | **5.0%** | 883,072 | **4.7%** |
| 7 | 7-8am | 1,148,811 | **6.6%** | 90,524 | **5.7%** | 1,239,335 | **6.6%** |
| 8 | 8-9am | 1,050,274 | **6.1%** | 104,093 | **6.6%** | 1,154,367 | **6.1%** |
| 9 | 9-10am | 959,567 | **5.6%** | 110,310 | **7.0%** | 1,069,877 | **5.7%** |
| 10 | 10-11am | 953,690 | **5.5%** | 113,902 | **7.2%** | 1,067,592 | **5.7%** |
| 11 | 11-12am | 1,026,508 | **5.9%** | 114,838 | **7.3%** | 1,141,346 | **6.1%** |
| 12 | 12-1pm | 1,080,311 | **6.3%** | 115,290 | **7.3%** | 1,195,601 | **6.3%** |
| 13 | 1-2pm | 1,121,679 | **6.5%** | 112,466 | **7.1%** | 1,234,145 | **6.5%** |
| 14 | 2-3pm | 1,267,095 | **7.3%** | 104,954 | **6.7%** | 1,372,049 | **7.3%** |
| 15 | 3-4pm | 1,537,706 | **8.9%** | 97,824 | **6.2%** | 1,635,530 | **8.7%** |
| 16 | 4-5pm | 1,580,722 | **9.1%** | 86,973 | **5.5%** | 1,667,695 | **8.8%** |
| 17 | 5-6pm | 1,435,620 | **8.3%** | 69,497 | **4.4%** | 1,505,117 | **8.0%** |
| 18 | 6-7pm | 917,631 | **5.3%** | 53,774 | **3.4%** | 971,405 | **5.2%** |
| 19 | 7-8pm | 597,755 | **3.5%** | 41,948 | **2.7%** | 639,703 | **3.4%** |
| 20 | 8-9pm | 463,159 | **2.7%** | 35,080 | **2.2%** | 498,239 | **2.6%** |
| 21 | 9-10pm | 336,728 | **1.9%** | 31,094 | **2.0%** | 367,822 | **2.0%** |
| 22 | 10-11pm | 213,757 | **1.2%** | 28,030 | **1.8%** | 241,787 | **1.3%** |
| 23 | 11-12pm | 138,147 | **0.8%** | 23,378 | **1.5%** | 161,525 | **0.9%** |
| | Total | 17,277,968 | **100%** | 1,576,792 | **100%** | 18,854,760 | **100%** |

Sample of 335 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

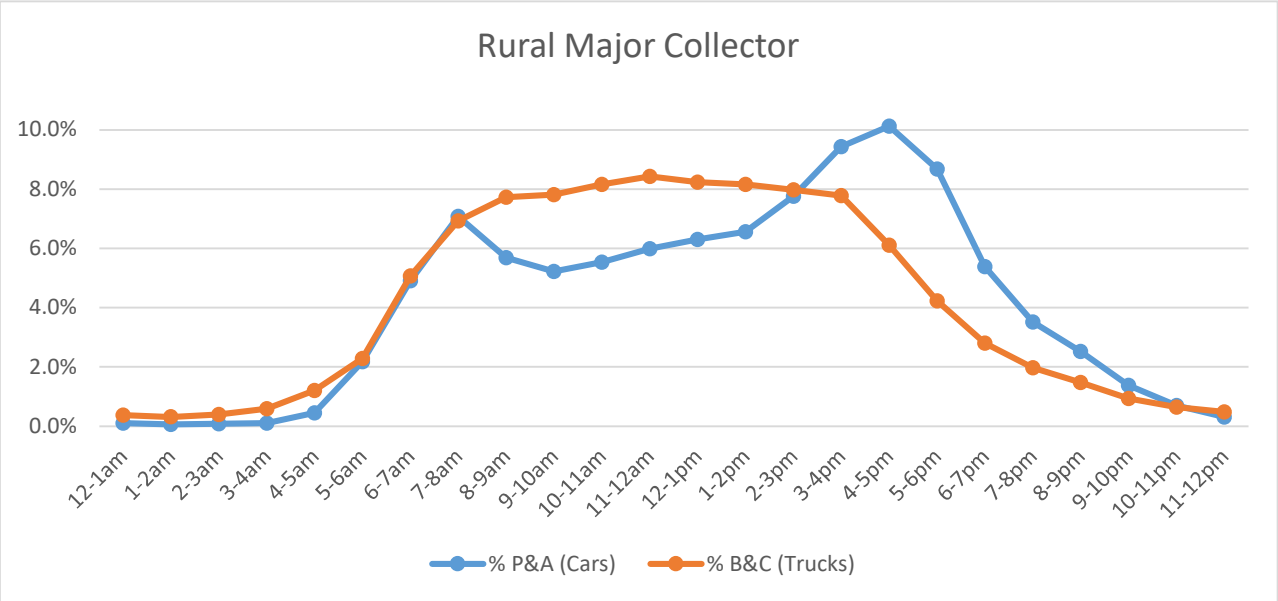


## Hourly Percent By Vehicle Type

Rural Major Collector

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 8,158 | **0.1%** | 2,484 | **0.4%** | 10,642 | **0.1%** |
| 1 | 1-2am | 4,533 | **0.1%** | 2,095 | **0.3%** | 6,628 | **0.1%** |
| 2 | 2-3am | 5,753 | **0.1%** | 2,629 | **0.4%** | 8,382 | **0.1%** |
| 3 | 3-4am | 8,082 | **0.1%** | 3,919 | **0.6%** | 12,001 | **0.1%** |
| 4 | 4-5am | 35,166 | **0.4%** | 8,126 | **1.2%** | 43,292 | **0.5%** |
| 5 | 5-6am | 171,030 | **2.2%** | 15,406 | **2.3%** | 186,436 | **2.2%** |
| 6 | 6-7am | 385,219 | **4.9%** | 34,187 | **5.1%** | 419,406 | **4.9%** |
| 7 | 7-8am | 556,391 | **7.1%** | 46,762 | **6.9%** | 603,153 | **7.1%** |
| 8 | 8-9am | 446,621 | **5.7%** | 52,141 | **7.7%** | 498,762 | **5.8%** |
| 9 | 9-10am | 410,181 | **5.2%** | 52,752 | **7.8%** | 462,933 | **5.4%** |
| 10 | 10-11am | 434,778 | **5.5%** | 55,091 | **8.2%** | 489,869 | **5.7%** |
| 11 | 11-12am | 470,836 | **6.0%** | 56,895 | **8.4%** | 527,731 | **6.2%** |
| 12 | 12-1pm | 495,288 | **6.3%** | 55,555 | **8.2%** | 550,843 | **6.5%** |
| 13 | 1-2pm | 515,747 | **6.6%** | 55,048 | **8.2%** | 570,795 | **6.7%** |
| 14 | 2-3pm | 609,999 | **7.8%** | 53,857 | **8.0%** | 663,856 | **7.8%** |
| 15 | 3-4pm | 741,448 | **9.4%** | 52,488 | **7.8%** | 793,936 | **9.3%** |
| 16 | 4-5pm | 795,978 | **10.1%** | 41,176 | **6.1%** | 837,154 | **9.8%** |
| 17 | 5-6pm | 682,318 | **8.7%** | 28,543 | **4.2%** | 710,861 | **8.3%** |
| 18 | 6-7pm | 422,795 | **5.4%** | 18,905 | **2.8%** | 441,700 | **5.2%** |
| 19 | 7-8pm | 275,832 | **3.5%** | 13,262 | **2.0%** | 289,094 | **3.4%** |
| 20 | 8-9pm | 197,929 | **2.5%** | 9,903 | **1.5%** | 207,832 | **2.4%** |
| 21 | 9-10pm | 108,311 | **1.4%** | 6,255 | **0.9%** | 114,566 | **1.3%** |
| 22 | 10-11pm | 54,101 | **0.7%** | 4,336 | **0.6%** | 58,437 | **0.7%** |
| 23 | 11-12pm | 24,334 | **0.3%** | 3,248 | **0.5%** | 27,582 | **0.3%** |
| | Total | 7,860,828 | **100%** | 675,063 | **100%** | 8,535,891 | **100%** |

Sample of 995 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

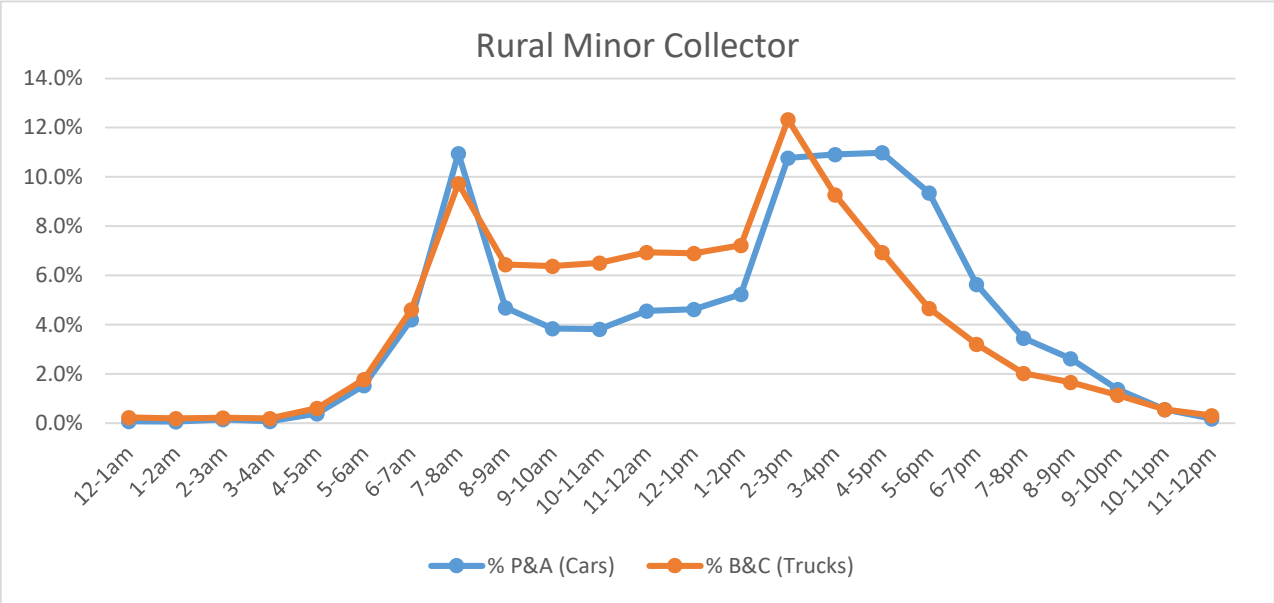


## Hourly Percent By Vehicle Type

Rural Minor Collector

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 256 | **0.1%** | 60 | **0.2%** | 316 | **0.1%** |
| 1 | 1-2am | 251 | **0.1%** | 52 | **0.2%** | 303 | **0.1%** |
| 2 | 2-3am | 551 | **0.1%** | 58 | **0.2%** | 609 | **0.2%** |
| 3 | 3-4am | 288 | **0.1%** | 52 | **0.2%** | 340 | **0.1%** |
| 4 | 4-5am | 1,416 | **0.4%** | 163 | **0.6%** | 1,579 | **0.4%** |
| 5 | 5-6am | 5,626 | **1.5%** | 473 | **1.8%** | 6,099 | **1.5%** |
| 6 | 6-7am | 15,536 | **4.2%** | 1,231 | **4.6%** | 16,767 | **4.2%** |
| 7 | 7-8am | 40,430 | **10.9%** | 2,595 | **9.7%** | 43,025 | **10.9%** |
| 8 | 8-9am | 17,315 | **4.7%** | 1,720 | **6.4%** | 19,035 | **4.8%** |
| 9 | 9-10am | 14,183 | **3.8%** | 1,701 | **6.4%** | 15,884 | **4.0%** |
| 10 | 10-11am | 14,074 | **3.8%** | 1,736 | **6.5%** | 15,810 | **4.0%** |
| 11 | 11-12am | 16,834 | **4.6%** | 1,849 | **6.9%** | 18,683 | **4.7%** |
| 12 | 12-1pm | 17,085 | **4.6%** | 1,840 | **6.9%** | 18,925 | **4.8%** |
| 13 | 1-2pm | 19,331 | **5.2%** | 1,928 | **7.2%** | 21,259 | **5.4%** |
| 14 | 2-3pm | 39,755 | **10.8%** | 3,291 | **12.3%** | 43,046 | **10.9%** |
| 15 | 3-4pm | 40,268 | **10.9%** | 2,475 | **9.3%** | 42,743 | **10.8%** |
| 16 | 4-5pm | 40,569 | **11.0%** | 1,849 | **6.9%** | 42,418 | **10.7%** |
| 17 | 5-6pm | 34,520 | **9.3%** | 1,243 | **4.7%** | 35,763 | **9.0%** |
| 18 | 6-7pm | 20,795 | **5.6%** | 854 | **3.2%** | 21,649 | **5.5%** |
| 19 | 7-8pm | 12,755 | **3.5%** | 539 | **2.0%** | 13,294 | **3.4%** |
| 20 | 8-9pm | 9,696 | **2.6%** | 444 | **1.7%** | 10,140 | **2.6%** |
| 21 | 9-10pm | 5,053 | **1.4%** | 304 | **1.1%** | 5,357 | **1.4%** |
| 22 | 10-11pm | 2,052 | **0.6%** | 147 | **0.6%** | 2,199 | **0.6%** |
| 23 | 11-12pm | 653 | **0.2%** | 83 | **0.3%** | 736 | **0.2%** |
| | Total | 369,292 | **100%** | 26,687 | **100%** | 395,979 | **100%** |

Sample of 176 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

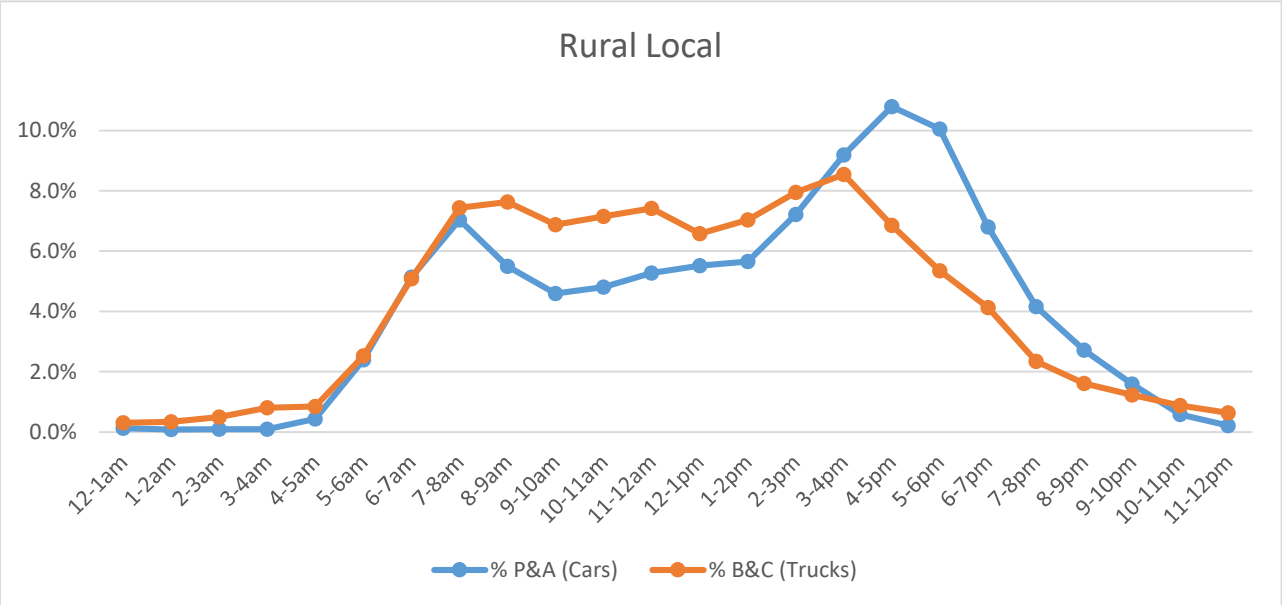


## Hourly Percent By Vehicle Type

Rural Local

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 89 | **0.1%** | 21 | **0.3%** | 110 | **0.1%** |
| 1 | 1-2am | 62 | **0.1%** | 23 | **0.3%** | 85 | **0.1%** |
| 2 | 2-3am | 67 | **0.1%** | 34 | **0.5%** | 101 | **0.1%** |
| 3 | 3-4am | 64 | **0.1%** | 55 | **0.8%** | 119 | **0.2%** |
| 4 | 4-5am | 313 | **0.4%** | 58 | **0.9%** | 371 | **0.5%** |
| 5 | 5-6am | 1,711 | **2.4%** | 172 | **2.5%** | 1,883 | **2.4%** |
| 6 | 6-7am | 3,671 | **5.1%** | 346 | **5.1%** | 4,017 | **5.1%** |
| 7 | 7-8am | 5,030 | **7.0%** | 507 | **7.4%** | 5,537 | **7.1%** |
| 8 | 8-9am | 3,927 | **5.5%** | 520 | **7.6%** | 4,447 | **5.7%** |
| 9 | 9-10am | 3,286 | **4.6%** | 468 | **6.9%** | 3,754 | **4.8%** |
| 10 | 10-11am | 3,439 | **4.8%** | 487 | **7.1%** | 3,926 | **5.0%** |
| 11 | 11-12am | 3,767 | **5.3%** | 505 | **7.4%** | 4,272 | **5.5%** |
| 12 | 12-1pm | 3,942 | **5.5%** | 448 | **6.6%** | 4,390 | **5.6%** |
| 13 | 1-2pm | 4,041 | **5.6%** | 479 | **7.0%** | 4,520 | **5.8%** |
| 14 | 2-3pm | 5,162 | **7.2%** | 541 | **7.9%** | 5,703 | **7.3%** |
| 15 | 3-4pm | 6,573 | **9.2%** | 582 | **8.5%** | 7,155 | **9.1%** |
| 16 | 4-5pm | 7,719 | **10.8%** | 467 | **6.9%** | 8,186 | **10.4%** |
| 17 | 5-6pm | 7,187 | **10.0%** | 364 | **5.3%** | 7,551 | **9.6%** |
| 18 | 6-7pm | 4,863 | **6.8%** | 281 | **4.1%** | 5,144 | **6.6%** |
| 19 | 7-8pm | 2,971 | **4.2%** | 160 | **2.3%** | 3,131 | **4.0%** |
| 20 | 8-9pm | 1,945 | **2.7%** | 110 | **1.6%** | 2,055 | **2.6%** |
| 21 | 9-10pm | 1,134 | **1.6%** | 84 | **1.2%** | 1,218 | **1.6%** |
| 22 | 10-11pm | 420 | **0.6%** | 60 | **0.9%** | 480 | **0.6%** |
| 23 | 11-12pm | 148 | **0.2%** | 43 | **0.6%** | 191 | **0.2%** |
| | Total | 71,531 | **100%** | 6,815 | **100%** | 78,346 | **100%** |

Sample of 60 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

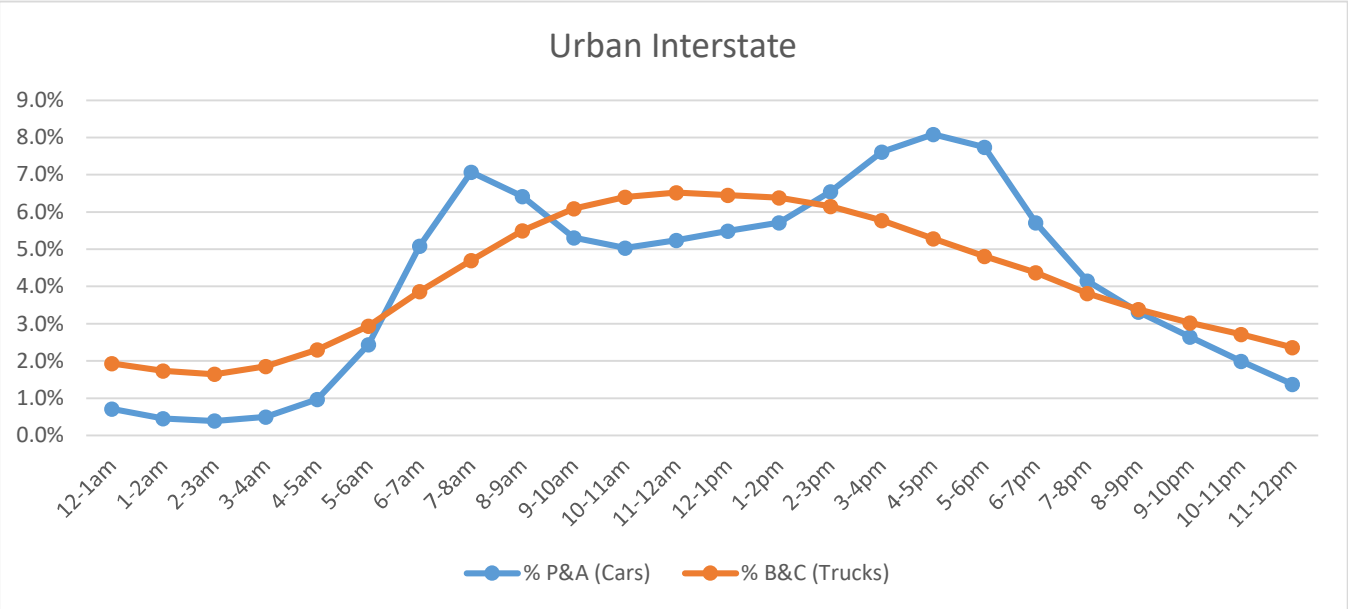


## Hourly Percent By Vehicle Type

Urban Interstate

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 9,344,947 | **0.7%** | 2,425,552 | **1.9%** | 11,770,499 | **0.8%** |
| 1 | 1-2am | 5,984,822 | **0.5%** | 2,181,927 | **1.7%** | 8,166,749 | **0.6%** |
| 2 | 2-3am | 5,163,334 | **0.4%** | 2,068,263 | **1.6%** | 7,231,597 | **0.5%** |
| 3 | 3-4am | 6,559,689 | **0.5%** | 2,334,044 | **1.9%** | 8,893,733 | **0.6%** |
| 4 | 4-5am | 12,782,862 | **1.0%** | 2,886,987 | **2.3%** | 15,669,849 | **1.1%** |
| 5 | 5-6am | 31,964,949 | **2.4%** | 3,687,679 | **2.9%** | 35,652,628 | **2.5%** |
| 6 | 6-7am | 66,707,056 | **5.1%** | 4,853,522 | **3.9%** | 71,560,578 | **5.0%** |
| 7 | 7-8am | 92,801,628 | **7.1%** | 5,900,783 | **4.7%** | 98,702,411 | **6.9%** |
| 8 | 8-9am | 84,204,159 | **6.4%** | 6,901,272 | **5.5%** | 91,105,431 | **6.3%** |
| 9 | 9-10am | 69,686,771 | **5.3%** | 7,645,394 | **6.1%** | 77,332,165 | **5.4%** |
| 10 | 10-11am | 66,115,545 | **5.0%** | 8,034,441 | **6.4%** | 74,149,986 | **5.2%** |
| 11 | 11-12am | 68,768,465 | **5.2%** | 8,189,775 | **6.5%** | 76,958,240 | **5.4%** |
| 12 | 12-1pm | 72,063,619 | **5.5%** | 8,107,664 | **6.5%** | 80,171,283 | **5.6%** |
| 13 | 1-2pm | 74,972,638 | **5.7%** | 8,016,522 | **6.4%** | 82,989,160 | **5.8%** |
| 14 | 2-3pm | 85,969,589 | **6.5%** | 7,722,997 | **6.1%** | 93,692,586 | **6.5%** |
| 15 | 3-4pm | 99,866,276 | **7.6%** | 7,247,575 | **5.8%** | 107,113,851 | **7.4%** |
| 16 | 4-5pm | 106,150,744 | **8.1%** | 6,636,383 | **5.3%** | 112,787,127 | **7.8%** |
| 17 | 5-6pm | 101,587,961 | **7.7%** | 6,046,203 | **4.8%** | 107,634,164 | **7.5%** |
| 18 | 6-7pm | 74,989,300 | **5.7%** | 5,493,656 | **4.4%** | 80,482,956 | **5.6%** |
| 19 | 7-8pm | 54,455,600 | **4.1%** | 4,790,266 | **3.8%** | 59,245,866 | **4.1%** |
| 20 | 8-9pm | 43,565,951 | **3.3%** | 4,255,531 | **3.4%** | 47,821,482 | **3.3%** |
| 21 | 9-10pm | 34,671,531 | **2.6%** | 3,795,909 | **3.0%** | 38,467,440 | **2.7%** |
| 22 | 10-11pm | 26,188,053 | **2.0%** | 3,409,318 | **2.7%** | 29,597,371 | **2.1%** |
| 23 | 11-12pm | 18,073,811 | **1.4%** | 2,972,117 | **2.4%** | 21,045,928 | **1.5%** |
| | Total | 1,312,639,300 | **100%** | 125,603,780 | **100%** | 1,438,243,080 | **100%** |

Sample of 106 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

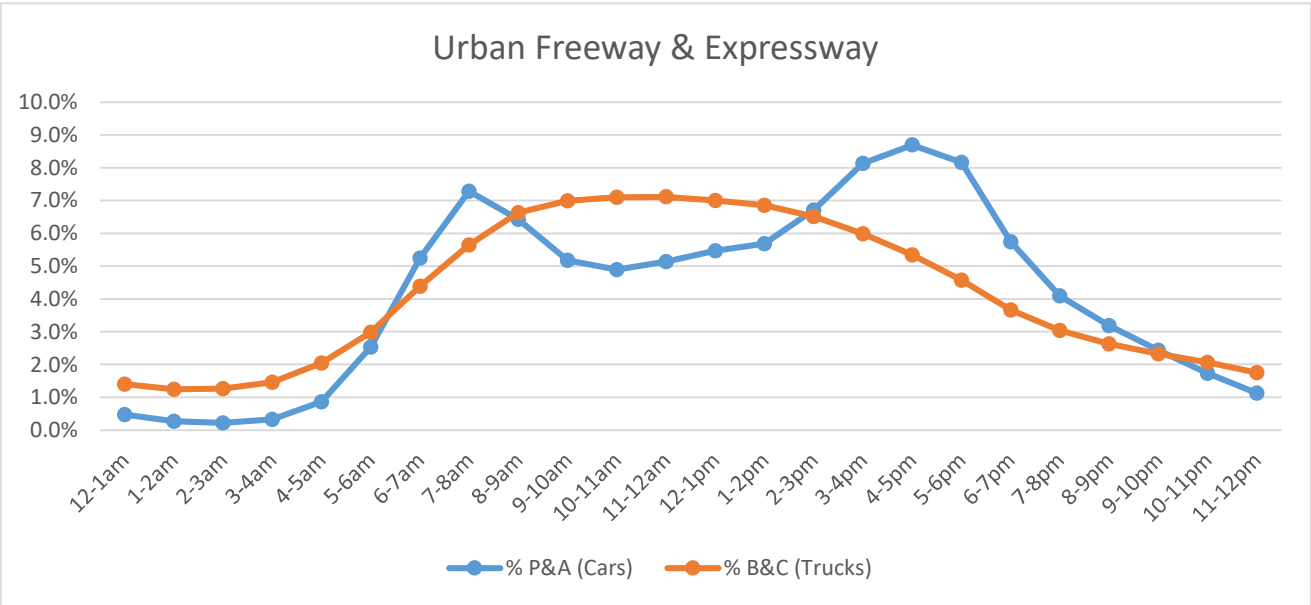


## Hourly Percent By Vehicle Type

Urban Freeway & Expressway

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 1,191,771 | **0.5%** | 150,220 | **1.4%** | 1,341,991 | **0.5%** |
| 1 | 1-2am | 690,309 | **0.3%** | 134,218 | **1.2%** | 824,527 | **0.3%** |
| 2 | 2-3am | 556,851 | **0.2%** | 135,508 | **1.3%** | 692,359 | **0.3%** |
| 3 | 3-4am | 817,124 | **0.3%** | 156,983 | **1.5%** | 974,107 | **0.4%** |
| 4 | 4-5am | 2,179,436 | **0.9%** | 220,103 | **2.0%** | 2,399,539 | **0.9%** |
| 5 | 5-6am | 6,435,979 | **2.5%** | 320,114 | **3.0%** | 6,756,093 | **2.6%** |
| 6 | 6-7am | 13,331,762 | **5.2%** | 471,302 | **4.4%** | 13,803,064 | **5.2%** |
| 7 | 7-8am | 18,490,692 | **7.3%** | 607,082 | **5.6%** | 19,097,774 | **7.2%** |
| 8 | 8-9am | 16,314,039 | **6.4%** | 713,500 | **6.6%** | 17,027,539 | **6.4%** |
| 9 | 9-10am | 13,141,473 | **5.2%** | 752,005 | **7.0%** | 13,893,478 | **5.2%** |
| 10 | 10-11am | 12,426,821 | **4.9%** | 763,974 | **7.1%** | 13,190,795 | **5.0%** |
| 11 | 11-12am | 13,055,080 | **5.1%** | 765,514 | **7.1%** | 13,820,594 | **5.2%** |
| 12 | 12-1pm | 13,882,649 | **5.5%** | 752,466 | **7.0%** | 14,635,115 | **5.5%** |
| 13 | 1-2pm | 14,426,040 | **5.7%** | 737,713 | **6.9%** | 15,163,753 | **5.7%** |
| 14 | 2-3pm | 17,044,638 | **6.7%** | 700,922 | **6.5%** | 17,745,560 | **6.7%** |
| 15 | 3-4pm | 20,658,318 | **8.1%** | 643,376 | **6.0%** | 21,301,694 | **8.0%** |
| 16 | 4-5pm | 22,094,556 | **8.7%** | 574,362 | **5.3%** | 22,668,918 | **8.6%** |
| 17 | 5-6pm | 20,732,271 | **8.2%** | 491,647 | **4.6%** | 21,223,918 | **8.0%** |
| 18 | 6-7pm | 14,582,696 | **5.7%** | 393,804 | **3.7%** | 14,976,500 | **5.7%** |
| 19 | 7-8pm | 10,394,829 | **4.1%** | 326,508 | **3.0%** | 10,721,337 | **4.1%** |
| 20 | 8-9pm | 8,081,738 | **3.2%** | 282,555 | **2.6%** | 8,364,293 | **3.2%** |
| 21 | 9-10pm | 6,182,442 | **2.4%** | 249,915 | **2.3%** | 6,432,357 | **2.4%** |
| 22 | 10-11pm | 4,395,339 | **1.7%** | 221,756 | **2.1%** | 4,617,095 | **1.7%** |
| 23 | 11-12pm | 2,854,653 | **1.1%** | 187,910 | **1.7%** | 3,042,563 | **1.1%** |
| | Total | 253,961,506 | **100%** | 10,753,457 | **100%** | 264,714,963 | **100%** |

Sample of 60 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

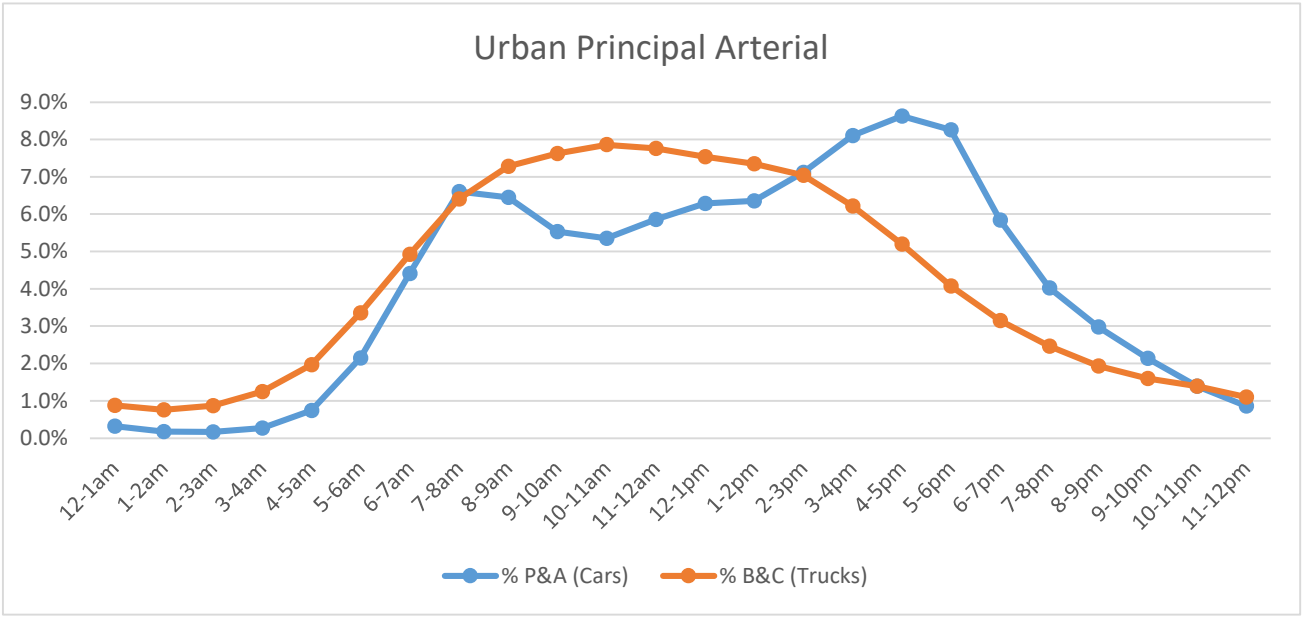


## Hourly Percent By Vehicle Type

Urban Principal Arterial

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 293,808 | **0.3%** | 24,787 | **0.9%** | 318,595 | **0.3%** |
| 1 | 1-2am | 155,458 | **0.2%** | 21,456 | **0.8%** | 176,914 | **0.2%** |
| 2 | 2-3am | 151,296 | **0.2%** | 24,479 | **0.9%** | 175,775 | **0.2%** |
| 3 | 3-4am | 246,719 | **0.3%** | 35,154 | **1.2%** | 281,873 | **0.3%** |
| 4 | 4-5am | 669,822 | **0.7%** | 55,591 | **2.0%** | 725,413 | **0.8%** |
| 5 | 5-6am | 1,953,669 | **2.1%** | 94,851 | **3.4%** | 2,048,520 | **2.2%** |
| 6 | 6-7am | 4,011,352 | **4.4%** | 139,144 | **4.9%** | 4,150,496 | **4.4%** |
| 7 | 7-8am | 6,008,034 | **6.6%** | 181,098 | **6.4%** | 6,189,132 | **6.6%** |
| 8 | 8-9am | 5,864,230 | **6.4%** | 205,680 | **7.3%** | 6,069,910 | **6.5%** |
| 9 | 9-10am | 5,032,503 | **5.5%** | 215,438 | **7.6%** | 5,247,941 | **5.6%** |
| 10 | 10-11am | 4,866,675 | **5.3%** | 222,142 | **7.9%** | 5,088,817 | **5.4%** |
| 11 | 11-12am | 5,332,752 | **5.9%** | 219,205 | **7.8%** | 5,551,957 | **5.9%** |
| 12 | 12-1pm | 5,719,152 | **6.3%** | 213,051 | **7.5%** | 5,932,203 | **6.3%** |
| 13 | 1-2pm | 5,779,196 | **6.4%** | 207,737 | **7.4%** | 5,986,933 | **6.4%** |
| 14 | 2-3pm | 6,476,478 | **7.1%** | 198,917 | **7.0%** | 6,675,395 | **7.1%** |
| 15 | 3-4pm | 7,374,068 | **8.1%** | 175,644 | **6.2%** | 7,549,712 | **8.0%** |
| 16 | 4-5pm | 7,852,759 | **8.6%** | 146,903 | **5.2%** | 7,999,662 | **8.5%** |
| 17 | 5-6pm | 7,511,313 | **8.3%** | 115,172 | **4.1%** | 7,626,485 | **8.1%** |
| 18 | 6-7pm | 5,317,742 | **5.8%** | 88,863 | **3.1%** | 5,406,605 | **5.8%** |
| 19 | 7-8pm | 3,658,163 | **4.0%** | 69,529 | **2.5%** | 3,727,692 | **4.0%** |
| 20 | 8-9pm | 2,708,086 | **3.0%** | 54,631 | **1.9%** | 2,762,717 | **2.9%** |
| 21 | 9-10pm | 1,946,965 | **2.1%** | 45,183 | **1.6%** | 1,992,148 | **2.1%** |
| 22 | 10-11pm | 1,267,703 | **1.4%** | 39,223 | **1.4%** | 1,306,926 | **1.4%** |
| 23 | 11-12pm | 784,847 | **0.9%** | 31,005 | **1.1%** | 815,852 | **0.9%** |
| | Total | 90,982,790 | **100%** | 2,824,883 | **100%** | 93,807,673 | **100%** |

Sample of 430 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

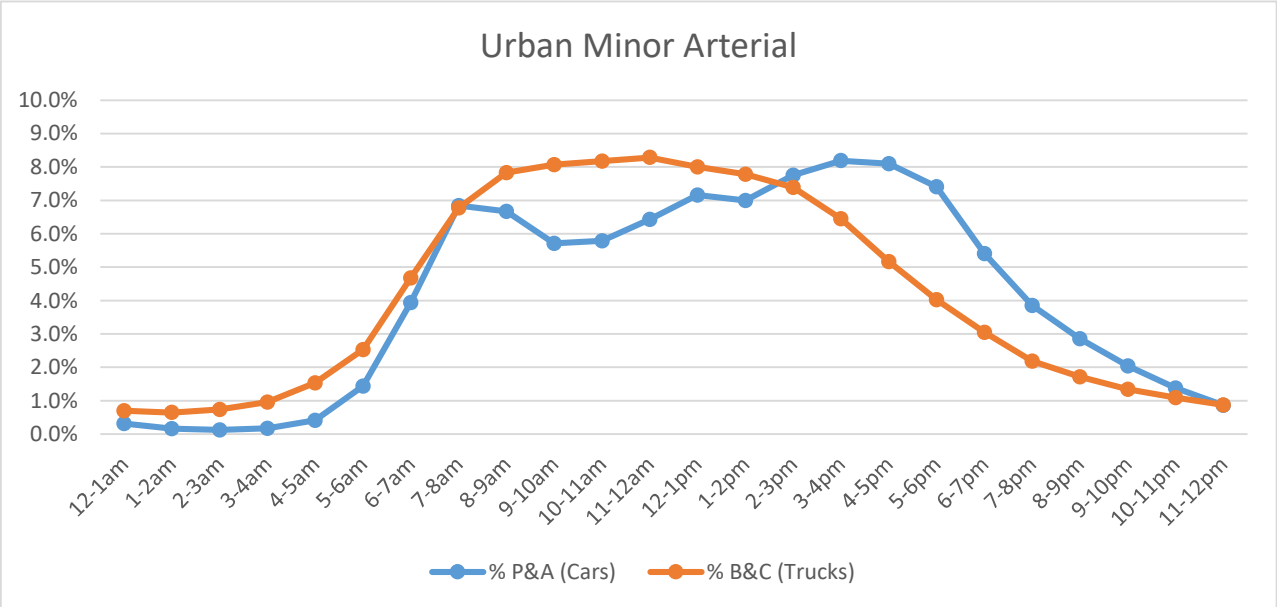


## Hourly Percent By Vehicle Type

Urban Minor Arterial

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 116,713 | **0.3%** | 6,275 | **0.7%** | 122,988 | **0.3%** |
| 1 | 1-2am | 58,329 | **0.2%** | 5,807 | **0.6%** | 64,136 | **0.2%** |
| 2 | 2-3am | 45,762 | **0.1%** | 6,626 | **0.7%** | 52,388 | **0.1%** |
| 3 | 3-4am | 62,928 | **0.2%** | 8,545 | **1.0%** | 71,473 | **0.2%** |
| 4 | 4-5am | 148,197 | **0.4%** | 13,728 | **1.5%** | 161,925 | **0.4%** |
| 5 | 5-6am | 524,843 | **1.4%** | 22,641 | **2.5%** | 547,484 | **1.5%** |
| 6 | 6-7am | 1,436,560 | **3.9%** | 41,809 | **4.7%** | 1,478,369 | **4.0%** |
| 7 | 7-8am | 2,492,559 | **6.8%** | 60,534 | **6.8%** | 2,553,093 | **6.8%** |
| 8 | 8-9am | 2,431,762 | **6.7%** | 69,950 | **7.8%** | 2,501,712 | **6.7%** |
| 9 | 9-10am | 2,080,938 | **5.7%** | 72,116 | **8.1%** | 2,153,054 | **5.8%** |
| 10 | 10-11am | 2,111,266 | **5.8%** | 73,079 | **8.2%** | 2,184,345 | **5.8%** |
| 11 | 11-12am | 2,343,890 | **6.4%** | 74,089 | **8.3%** | 2,417,979 | **6.5%** |
| 12 | 12-1pm | 2,608,798 | **7.2%** | 71,508 | **8.0%** | 2,680,306 | **7.2%** |
| 13 | 1-2pm | 2,549,636 | **7.0%** | 69,559 | **7.8%** | 2,619,195 | **7.0%** |
| 14 | 2-3pm | 2,827,499 | **7.8%** | 66,068 | **7.4%** | 2,893,567 | **7.7%** |
| 15 | 3-4pm | 2,985,476 | **8.2%** | 57,668 | **6.5%** | 3,043,144 | **8.1%** |
| 16 | 4-5pm | 2,953,613 | **8.1%** | 46,180 | **5.2%** | 2,999,793 | **8.0%** |
| 17 | 5-6pm | 2,699,249 | **7.4%** | 35,951 | **4.0%** | 2,735,200 | **7.3%** |
| 18 | 6-7pm | 1,969,186 | **5.4%** | 27,269 | **3.1%** | 1,996,455 | **5.3%** |
| 19 | 7-8pm | 1,402,632 | **3.8%** | 19,535 | **2.2%** | 1,422,167 | **3.8%** |
| 20 | 8-9pm | 1,041,942 | **2.9%** | 15,345 | **1.7%** | 1,057,287 | **2.8%** |
| 21 | 9-10pm | 742,429 | **2.0%** | 11,972 | **1.3%** | 754,401 | **2.0%** |
| 22 | 10-11pm | 503,492 | **1.4%** | 9,784 | **1.1%** | 513,276 | **1.4%** |
| 23 | 11-12pm | 314,551 | **0.9%** | 7,756 | **0.9%** | 322,307 | **0.9%** |
| | Total | 36,452,250 | **100%** | 893,794 | **100%** | 37,346,044 | **100%** |

Sample of 600 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

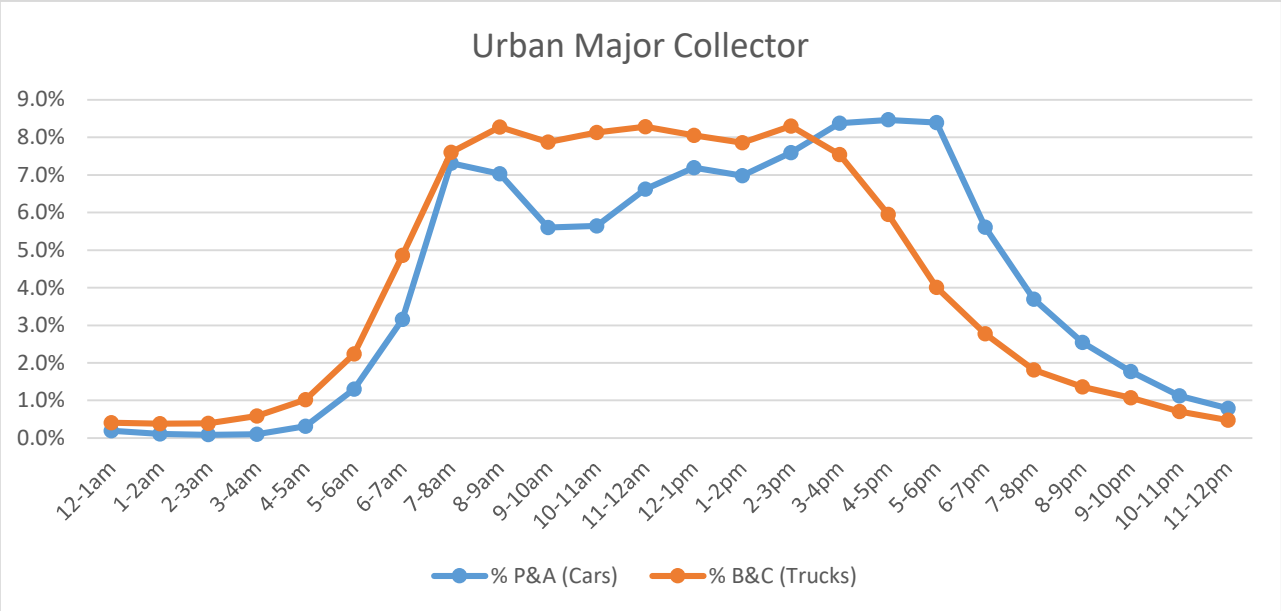


## Hourly Percent By Vehicle Type

Urban Major Collector

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 20,400 | **0.2%** | 1,005 | **0.4%** | 21,405 | **0.2%** |
| 1 | 1-2am | 10,894 | **0.1%** | 943 | **0.4%** | 11,837 | **0.1%** |
| 2 | 2-3am | 9,217 | **0.1%** | 970 | **0.4%** | 10,187 | **0.1%** |
| 3 | 3-4am | 10,298 | **0.1%** | 1,454 | **0.6%** | 11,752 | **0.1%** |
| 4 | 4-5am | 32,433 | **0.3%** | 2,515 | **1.0%** | 34,948 | **0.3%** |
| 5 | 5-6am | 133,147 | **1.3%** | 5,519 | **2.2%** | 138,666 | **1.3%** |
| 6 | 6-7am | 323,988 | **3.2%** | 11,974 | **4.9%** | 335,962 | **3.2%** |
| 7 | 7-8am | 750,035 | **7.3%** | 18,706 | **7.6%** | 768,741 | **7.3%** |
| 8 | 8-9am | 721,015 | **7.0%** | 20,376 | **8.3%** | 741,391 | **7.1%** |
| 9 | 9-10am | 574,299 | **5.6%** | 19,391 | **7.9%** | 593,690 | **5.7%** |
| 10 | 10-11am | 578,491 | **5.6%** | 20,006 | **8.1%** | 598,497 | **5.7%** |
| 11 | 11-12am | 679,042 | **6.6%** | 20,398 | **8.3%** | 699,440 | **6.7%** |
| 12 | 12-1pm | 737,651 | **7.2%** | 19,812 | **8.0%** | 757,463 | **7.2%** |
| 13 | 1-2pm | 715,624 | **7.0%** | 19,348 | **7.9%** | 734,972 | **7.0%** |
| 14 | 2-3pm | 779,056 | **7.6%** | 20,437 | **8.3%** | 799,493 | **7.6%** |
| 15 | 3-4pm | 858,959 | **8.4%** | 18,558 | **7.5%** | 877,517 | **8.4%** |
| 16 | 4-5pm | 868,550 | **8.5%** | 14,648 | **6.0%** | 883,198 | **8.4%** |
| 17 | 5-6pm | 860,939 | **8.4%** | 9,858 | **4.0%** | 870,797 | **8.3%** |
| 18 | 6-7pm | 575,049 | **5.6%** | 6,834 | **2.8%** | 581,883 | **5.5%** |
| 19 | 7-8pm | 378,603 | **3.7%** | 4,472 | **1.8%** | 383,075 | **3.6%** |
| 20 | 8-9pm | 260,708 | **2.5%** | 3,351 | **1.4%** | 264,059 | **2.5%** |
| 21 | 9-10pm | 181,880 | **1.8%** | 2,643 | **1.1%** | 184,523 | **1.8%** |
| 22 | 10-11pm | 115,192 | **1.1%** | 1,743 | **0.7%** | 116,935 | **1.1%** |
| 23 | 11-12pm | 81,294 | **0.8%** | 1,168 | **0.5%** | 82,462 | **0.8%** |
| | Total | 10,256,764 | **100%** | 246,129 | **100%** | 10,502,893 | **100%** |

Sample of 563 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

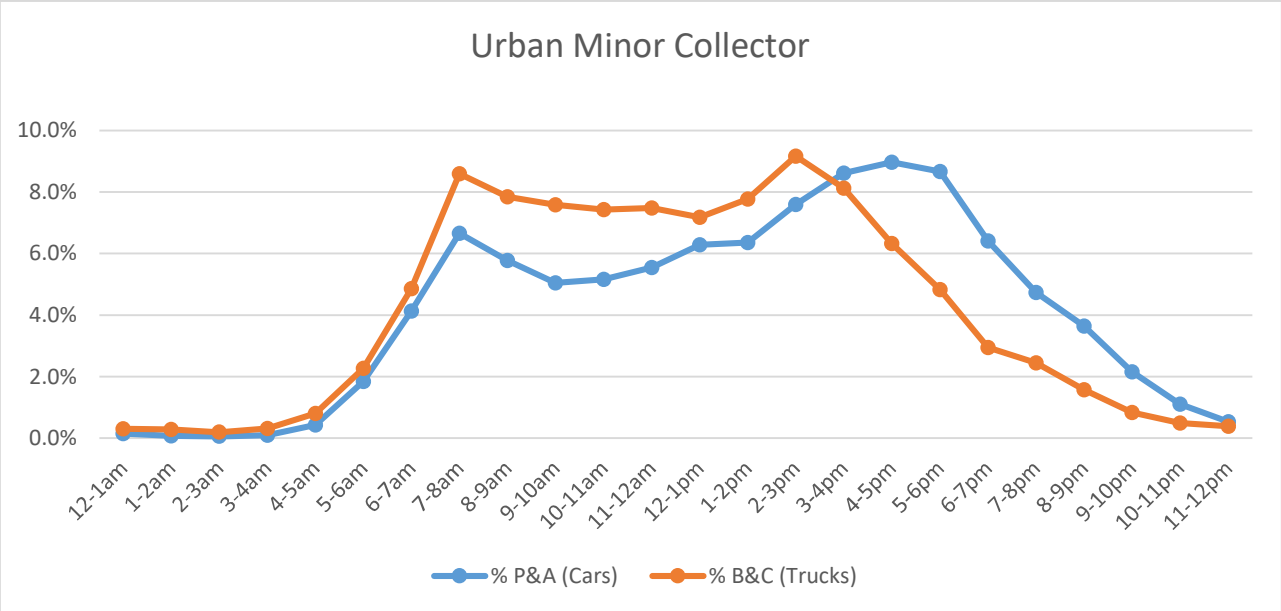


## Hourly Percent By Vehicle Type

Urban Minor Collector

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 245 | **0.1%** | 17 | **0.3%** | 262 | **0.2%** |
| 1 | 1-2am | 113 | **0.1%** | 16 | **0.3%** | 129 | **0.1%** |
| 2 | 2-3am | 94 | **0.1%** | 11 | **0.2%** | 105 | **0.1%** |
| 3 | 3-4am | 150 | **0.1%** | 18 | **0.3%** | 168 | **0.1%** |
| 4 | 4-5am | 708 | **0.4%** | 46 | **0.8%** | 754 | **0.4%** |
| 5 | 5-6am | 3,067 | **1.8%** | 130 | **2.3%** | 3,197 | **1.9%** |
| 6 | 6-7am | 6,870 | **4.1%** | 279 | **4.9%** | 7,149 | **4.2%** |
| 7 | 7-8am | 11,073 | **6.7%** | 493 | **8.6%** | 11,566 | **6.7%** |
| 8 | 8-9am | 9,609 | **5.8%** | 450 | **7.8%** | 10,059 | **5.8%** |
| 9 | 9-10am | 8,386 | **5.0%** | 435 | **7.6%** | 8,821 | **5.1%** |
| 10 | 10-11am | 8,584 | **5.2%** | 426 | **7.4%** | 9,010 | **5.2%** |
| 11 | 11-12am | 9,224 | **5.5%** | 429 | **7.5%** | 9,653 | **5.6%** |
| 12 | 12-1pm | 10,461 | **6.3%** | 412 | **7.2%** | 10,873 | **6.3%** |
| 13 | 1-2pm | 10,578 | **6.4%** | 446 | **7.8%** | 11,024 | **6.4%** |
| 14 | 2-3pm | 12,640 | **7.6%** | 526 | **9.2%** | 13,166 | **7.7%** |
| 15 | 3-4pm | 14,324 | **8.6%** | 466 | **8.1%** | 14,790 | **8.6%** |
| 16 | 4-5pm | 14,926 | **9.0%** | 363 | **6.3%** | 15,289 | **8.9%** |
| 17 | 5-6pm | 14,420 | **8.7%** | 277 | **4.8%** | 14,697 | **8.5%** |
| 18 | 6-7pm | 10,661 | **6.4%** | 169 | **2.9%** | 10,830 | **6.3%** |
| 19 | 7-8pm | 7,870 | **4.7%** | 140 | **2.4%** | 8,010 | **4.7%** |
| 20 | 8-9pm | 6,050 | **3.6%** | 90 | **1.6%** | 6,140 | **3.6%** |
| 21 | 9-10pm | 3,583 | **2.2%** | 48 | **0.8%** | 3,631 | **2.1%** |
| 22 | 10-11pm | 1,839 | **1.1%** | 28 | **0.5%** | 1,867 | **1.1%** |
| 23 | 11-12pm | 883 | **0.5%** | 22 | **0.4%** | 905 | **0.5%** |
| | Total | 166,358 | **100%** | 5,737 | **100%** | 172,095 | **100%** |

Sample of 44 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.

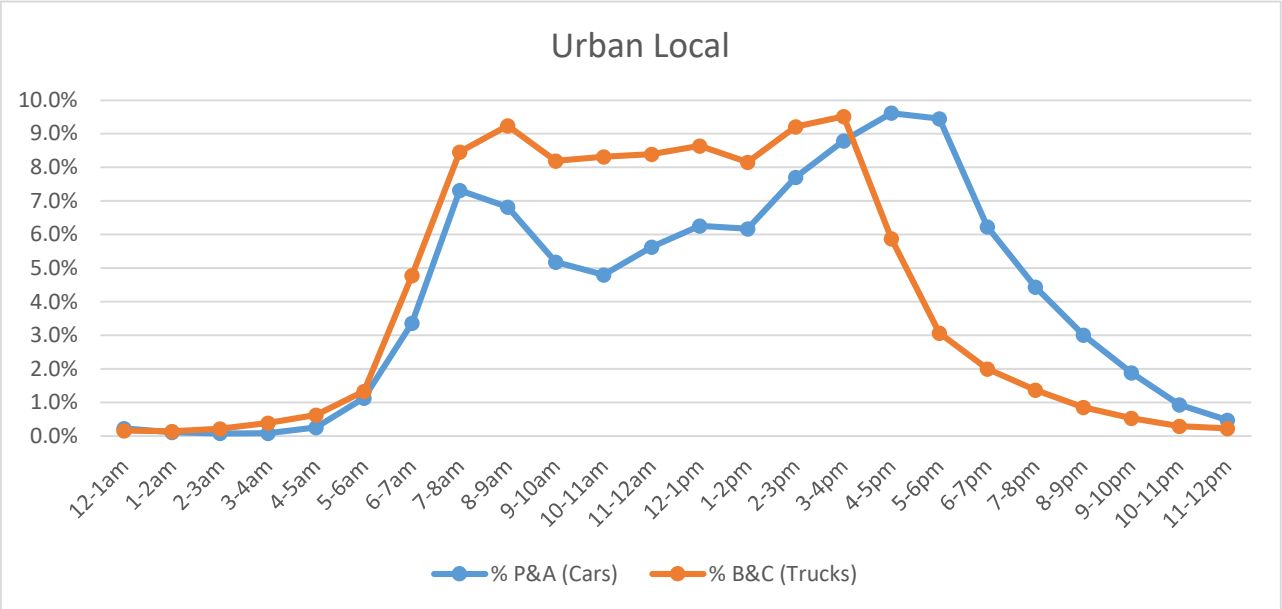


## Hourly Percent By Vehicle Type

Urban Local

| Hour | Hour of Day | P&A (Cars) | % P&A (Cars) | B&C (Trucks) | % B&C (Trucks) | Total | % Total |
|---|---|---|---|---|---|---|---|
| 0 | 12-1am | 1,376 | **0.2%** | 31 | **0.2%** | 1,407 | **0.2%** |
| 1 | 1-2am | 665 | **0.1%** | 27 | **0.1%** | 692 | **0.1%** |
| 2 | 2-3am | 499 | **0.1%** | 42 | **0.2%** | 541 | **0.1%** |
| 3 | 3-4am | 530 | **0.1%** | 73 | **0.4%** | 603 | **0.1%** |
| 4 | 4-5am | 1,545 | **0.3%** | 118 | **0.6%** | 1,663 | **0.3%** |
| 5 | 5-6am | 6,934 | **1.1%** | 251 | **1.3%** | 7,185 | **1.1%** |
| 6 | 6-7am | 20,572 | **3.4%** | 902 | **4.8%** | 21,474 | **3.4%** |
| 7 | 7-8am | 44,751 | **7.3%** | 1,597 | **8.5%** | 46,348 | **7.4%** |
| 8 | 8-9am | 41,724 | **6.8%** | 1,743 | **9.2%** | 43,467 | **6.9%** |
| 9 | 9-10am | 31,703 | **5.2%** | 1,546 | **8.2%** | 33,249 | **5.3%** |
| 10 | 10-11am | 29,340 | **4.8%** | 1,569 | **8.3%** | 30,909 | **4.9%** |
| 11 | 11-12am | 34,407 | **5.6%** | 1,583 | **8.4%** | 35,990 | **5.7%** |
| 12 | 12-1pm | 38,279 | **6.3%** | 1,631 | **8.6%** | 39,910 | **6.3%** |
| 13 | 1-2pm | 37,726 | **6.2%** | 1,538 | **8.2%** | 39,264 | **6.2%** |
| 14 | 2-3pm | 47,139 | **7.7%** | 1,739 | **9.2%** | 48,878 | **7.8%** |
| 15 | 3-4pm | 53,749 | **8.8%** | 1,796 | **9.5%** | 55,545 | **8.8%** |
| 16 | 4-5pm | 58,805 | **9.6%** | 1,110 | **5.9%** | 59,915 | **9.5%** |
| 17 | 5-6pm | 57,763 | **9.4%** | 578 | **3.1%** | 58,341 | **9.3%** |
| 18 | 6-7pm | 38,080 | **6.2%** | 378 | **2.0%** | 38,458 | **6.1%** |
| 19 | 7-8pm | 27,147 | **4.4%** | 258 | **1.4%** | 27,405 | **4.3%** |
| 20 | 8-9pm | 18,407 | **3.0%** | 161 | **0.9%** | 18,568 | **2.9%** |
| 21 | 9-10pm | 11,538 | **1.9%** | 101 | **0.5%** | 11,639 | **1.8%** |
| 22 | 10-11pm | 5,717 | **0.9%** | 56 | **0.3%** | 5,773 | **0.9%** |
| 23 | 11-12pm | 2,917 | **0.5%** | 43 | **0.2%** | 2,960 | **0.5%** |
| | Total | 611,313 | **100%** | 18,871 | **100%** | 630,184 | **100%** |

Sample of 133 permanent ATR's and portable counts taken in 2023, Monday to Friday counts only.



# 2023 Rural Seasonal Adjustment Factors
# (All Vehicles)

| Group | RURAL INTERSTATE (R01) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.449 | 1.194 | 1.166 | 1.171 | 1.139 | 1.049 | 1.277 |
| Feb | 1.335 | 1.148 | 1.130 | 1.128 | 1.081 | 0.981 | 1.227 |
| Mar | 1.157 | 1.108 | 1.088 | 1.053 | 0.987 | 0.922 | 1.142 |
| Apr | 1.087 | 1.035 | 1.049 | 1.020 | 0.935 | 0.873 | 1.070 |
| May | 1.040 | 1.025 | 1.013 | 0.973 | 0.902 | 0.810 | 1.003 |
| Jun | 0.986 | 0.959 | 0.978 | 0.934 | 0.876 | 0.782 | 0.943 |
| Jul | 0.934 | 0.944 | 0.960 | 0.927 | 0.874 | 0.787 | 0.936 |
| Aug | 0.967 | 0.984 | 0.975 | 0.944 | 0.886 | 0.788 | 0.942 |
| Sep | 1.048 | 1.002 | 1.018 | 0.991 | 0.925 | 0.807 | 0.999 |
| Oct | 1.027 | 1.014 | 1.021 | 0.966 | 0.910 | 0.808 | 1.022 |
| Nov | 1.109 | 1.030 | 1.014 | 1.035 | 0.972 | 0.864 | 1.071 |
| Dec | 1.290 | 1.127 | 1.084 | 1.024 | 0.968 | 0.912 | 1.129 |

| Group | RURAL FREEWAY EXPRESSWAY (R02) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.564 | 1.143 | 1.083 | 1.066 | 1.050 | 1.005 | 1.302 |
| Feb | 1.456 | 1.106 | 1.053 | 1.057 | 1.023 | 0.972 | 1.250 |
| Mar | 1.274 | 1.070 | 1.028 | 0.987 | 0.942 | 0.916 | 1.154 |
| Apr | 1.229 | 1.013 | 0.994 | 0.970 | 0.910 | 0.878 | 1.121 |
| May | 1.172 | 1.006 | 0.978 | 0.937 | 0.880 | 0.813 | 1.049 |
| Jun | 1.094 | 0.964 | 0.952 | 0.912 | 0.863 | 0.793 | 0.985 |
| Jul | 1.057 | 0.947 | 0.935 | 0.907 | 0.872 | 0.794 | 0.980 |
| Aug | 1.085 | 0.985 | 0.941 | 0.917 | 0.868 | 0.810 | 1.002 |
| Sep | 1.159 | 0.991 | 0.976 | 0.942 | 0.902 | 0.812 | 1.026 |
| Oct | 1.152 | 1.005 | 0.973 | 0.933 | 0.893 | 0.819 | 1.067 |
| Nov | 1.260 | 0.999 | 0.962 | 0.977 | 0.931 | 0.865 | 1.121 |
| Dec | 1.380 | 1.065 | 1.003 | 0.962 | 0.924 | 0.892 | 1.134 |

| Group | RURAL OTHER PRINCIPAL ARTERIAL (R03) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.558 | 1.108 | 1.075 | 1.102 | 1.066 | 1.002 | 1.295 |
| Feb | 1.441 | 1.074 | 1.024 | 1.029 | 1.018 | 0.942 | 1.213 |
| Mar | 1.312 | 1.043 | 1.010 | 0.980 | 0.949 | 0.931 | 1.182 |
| Apr | 1.249 | 0.986 | 0.965 | 0.950 | 0.898 | 0.870 | 1.093 |
| May | 1.160 | 0.972 | 0.954 | 0.922 | 0.874 | 0.816 | 1.036 |
| Jun | 1.157 | 0.961 | 0.948 | 0.912 | 0.878 | 0.822 | 1.018 |
| Jul | 1.124 | 0.941 | 0.931 | 0.912 | 0.886 | 0.824 | 1.042 |
| Aug | 1.137 | 0.966 | 0.933 | 0.911 | 0.880 | 0.814 | 1.012 |
| Sep | 1.172 | 0.953 | 0.944 | 0.925 | 0.895 | 0.807 | 1.028 |
| Oct | 1.183 | 0.968 | 0.957 | 0.919 | 0.894 | 0.822 | 1.078 |
| Nov | 1.285 | 0.994 | 0.967 | 0.966 | 0.931 | 0.861 | 1.140 |
| Dec | 1.417 | 1.039 | 1.002 | 0.969 | 0.936 | 0.905 | 1.139 |

| Group | RURAL MINOR ARTERIAL (R04) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.597 | 1.121 | 1.058 | 1.106 | 1.047 | 0.998 | 1.291 |
| Feb | 1.501 | 1.079 | 1.014 | 1.032 | 1.018 | 0.964 | 1.189 |
| Mar | 1.420 | 1.047 | 1.005 | 0.984 | 0.965 | 0.975 | 1.193 |
| Apr | 1.349 | 0.993 | 0.943 | 0.936 | 0.886 | 0.886 | 1.082 |
| May | 1.207 | 0.974 | 0.949 | 0.917 | 0.877 | 0.814 | 0.985 |
| Jun | 1.209 | 0.981 | 0.956 | 0.913 | 0.889 | 0.837 | 0.964 |
| Jul | 1.180 | 0.941 | 0.910 | 0.903 | 0.898 | 0.828 | 1.017 |
| Aug | 1.205 | 0.972 | 0.917 | 0.904 | 0.886 | 0.839 | 0.992 |
| Sep | 1.206 | 0.939 | 0.915 | 0.908 | 0.883 | 0.803 | 0.954 |
| Oct | 1.244 | 0.966 | 0.919 | 0.894 | 0.876 | 0.822 | 1.003 |
| Nov | 1.380 | 0.993 | 0.975 | 0.942 | 0.920 | 0.874 | 1.120 |
| Dec | 1.497 | 1.038 | 0.998 | 0.968 | 0.939 | 0.909 | 1.115 |

# 2023 Rural Seasonal Adjustment Factors
# (All Vehicles)

| Group | | RURAL MAJOR COLLECTOR,MINOR COLLECTOR,LOCAL (R05, 06, 07) | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | | 2023 | To Year: | | 2023 | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.613 | 1.119 | 1.035 | 1.074 | 1.016 | 0.978 | 1.258 |
| Feb | 1.477 | 1.057 | 0.975 | 0.991 | 0.980 | 0.965 | 1.213 |
| Mar | 1.406 | 1.000 | 0.972 | 0.944 | 0.934 | 0.967 | 1.226 |
| Apr | 1.363 | 0.959 | 0.906 | 0.895 | 0.861 | 0.884 | 1.101 |
| May | 1.198 | 0.927 | 0.894 | 0.865 | 0.836 | 0.808 | 1.007 |
| Jun | 1.275 | 0.994 | 0.946 | 0.924 | 0.904 | 0.885 | 1.009 |
| Jul | 1.233 | 0.956 | 0.926 | 0.911 | 0.928 | 0.887 | 1.093 |
| Aug | 1.201 | 0.956 | 0.898 | 0.888 | 0.883 | 0.842 | 1.016 |
| Sep | 1.281 | 0.920 | 0.889 | 0.883 | 0.867 | 0.803 | 1.000 |
| Oct | 1.295 | 0.952 | 0.903 | 0.881 | 0.872 | 0.834 | 1.080 |
| Nov | 1.399 | 0.974 | 0.958 | 0.923 | 0.904 | 0.884 | 1.119 |
| Dec | 1.485 | 1.010 | 0.962 | 0.941 | 0.927 | 0.919 | 1.126 |

# 2023 Urban Seasonal Adjustment Factors
# (All Vehicles)

| Group | URBAN INTERSTATE (U01) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.557 | 1.092 | 1.032 | 1.031 | 1.021 | 0.984 | 1.253 |
| Feb | 1.447 | 1.056 | 0.995 | 1.002 | 0.984 | 0.943 | 1.197 |
| Mar | 1.339 | 1.031 | 0.985 | 0.958 | 0.933 | 0.937 | 1.162 |
| Apr | 1.294 | 0.988 | 0.949 | 0.937 | 0.893 | 0.890 | 1.123 |
| May | 1.214 | 0.971 | 0.932 | 0.901 | 0.874 | 0.843 | 1.064 |
| Jun | 1.214 | 0.957 | 0.922 | 0.891 | 0.865 | 0.838 | 1.052 |
| Jul | 1.183 | 0.938 | 0.907 | 0.898 | 0.877 | 0.840 | 1.075 |
| Aug | 1.188 | 0.962 | 0.909 | 0.895 | 0.876 | 0.836 | 1.050 |
| Sep | 1.239 | 0.957 | 0.934 | 0.911 | 0.887 | 0.839 | 1.068 |
| Oct | 1.249 | 0.971 | 0.933 | 0.903 | 0.885 | 0.844 | 1.096 |
| Nov | 1.314 | 0.975 | 0.950 | 0.937 | 0.908 | 0.878 | 1.128 |
| Dec | 1.397 | 1.020 | 0.966 | 0.925 | 0.902 | 0.893 | 1.133 |

| Group | URBAN FREEWAY EXPRESSWAY (U02) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.645 | 1.062 | 0.994 | 1.009 | 0.978 | 0.962 | 1.286 |
| Feb | 1.521 | 1.024 | 0.953 | 0.958 | 0.947 | 0.934 | 1.227 |
| Mar | 1.451 | 0.996 | 0.952 | 0.927 | 0.917 | 0.938 | 1.218 |
| Apr | 1.412 | 0.965 | 0.914 | 0.903 | 0.874 | 0.887 | 1.160 |
| May | 1.299 | 0.942 | 0.903 | 0.877 | 0.857 | 0.842 | 1.102 |
| Jun | 1.295 | 0.953 | 0.901 | 0.876 | 0.860 | 0.849 | 1.079 |
| Jul | 1.289 | 0.928 | 0.886 | 0.886 | 0.876 | 0.850 | 1.123 |
| Aug | 1.271 | 0.941 | 0.887 | 0.878 | 0.864 | 0.841 | 1.094 |
| Sep | 1.324 | 0.934 | 0.903 | 0.885 | 0.871 | 0.837 | 1.095 |
| Oct | 1.367 | 0.953 | 0.902 | 0.879 | 0.867 | 0.848 | 1.154 |
| Nov | 1.425 | 0.960 | 0.932 | 0.914 | 0.888 | 0.883 | 1.176 |
| Dec | 1.490 | 0.990 | 0.937 | 0.913 | 0.898 | 0.893 | 1.162 |

| Group | URBAN OTHER PRINCIPAL ARTERIAL (U03) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.517 | 1.092 | 1.030 | 1.048 | 1.011 | 0.957 | 1.174 |
| Feb | 1.370 | 1.040 | 0.978 | 0.987 | 0.972 | 0.913 | 1.111 |
| Mar | 1.322 | 1.023 | 0.983 | 0.954 | 0.935 | 0.922 | 1.112 |
| Apr | 1.310 | 0.982 | 0.948 | 0.930 | 0.893 | 0.871 | 1.076 |
| May | 1.244 | 0.963 | 0.939 | 0.909 | 0.879 | 0.838 | 1.046 |
| Jun | 1.273 | 0.993 | 0.954 | 0.925 | 0.897 | 0.863 | 1.060 |
| Jul | 1.273 | 0.961 | 0.936 | 0.929 | 0.912 | 0.870 | 1.100 |
| Aug | 1.239 | 0.978 | 0.927 | 0.923 | 0.899 | 0.854 | 1.070 |
| Sep | 1.280 | 0.957 | 0.943 | 0.923 | 0.896 | 0.834 | 1.039 |
| Oct | 1.299 | 0.972 | 0.937 | 0.913 | 0.894 | 0.847 | 1.092 |
| Nov | 1.309 | 0.965 | 0.948 | 0.936 | 0.909 | 0.856 | 1.074 |
| Dec | 1.374 | 0.984 | 0.945 | 0.916 | 0.898 | 0.862 | 1.070 |

| Group | URBAN MINOR ARTERIAL, COLLECTORS, LOCAL (U04,05,06,07) | | | | | | |
|---|---|---|---|---|---|---|---|
| From Year: | 2023 | | To Year: | 2023 | | | |
| | Sun | Mon | Tue | Wed | Thu | Fri | Sat |
| Jan | 1.595 | 1.039 | 0.998 | 0.982 | 0.963 | 0.927 | 1.287 |
| Feb | 1.460 | 0.991 | 0.924 | 0.922 | 0.918 | 0.904 | 1.237 |
| Mar | 1.369 | 0.933 | 0.916 | 0.896 | 0.896 | 0.923 | 1.208 |
| Apr | 1.378 | 0.926 | 0.884 | 0.880 | 0.855 | 0.867 | 1.136 |
| May | 1.259 | 0.905 | 0.881 | 0.856 | 0.835 | 0.820 | 1.071 |
| Jun | 1.335 | 0.959 | 0.925 | 0.891 | 0.879 | 0.869 | 1.088 |
| Jul | 1.324 | 0.945 | 0.919 | 0.913 | 0.910 | 0.876 | 1.179 |
| Aug | 1.291 | 0.938 | 0.886 | 0.888 | 0.881 | 0.849 | 1.127 |
| Sep | 1.401 | 0.930 | 0.912 | 0.900 | 0.884 | 0.842 | 1.124 |
| Oct | 1.419 | 0.959 | 0.907 | 0.899 | 0.887 | 0.865 | 1.183 |
| Nov | 1.446 | 0.965 | 0.941 | 0.921 | 0.906 | 0.884 | 1.200 |
| Dec | 1.522 | 0.981 | 0.965 | 0.926 | 0.911 | 0.894 | 1.206 |

*For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.*
*Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjuistmtFactors_YYYY spreadsheet to lookup seasonal factor.*
*Use Avg TD by FC.xslx to compute P&A B&C FACTORs.*

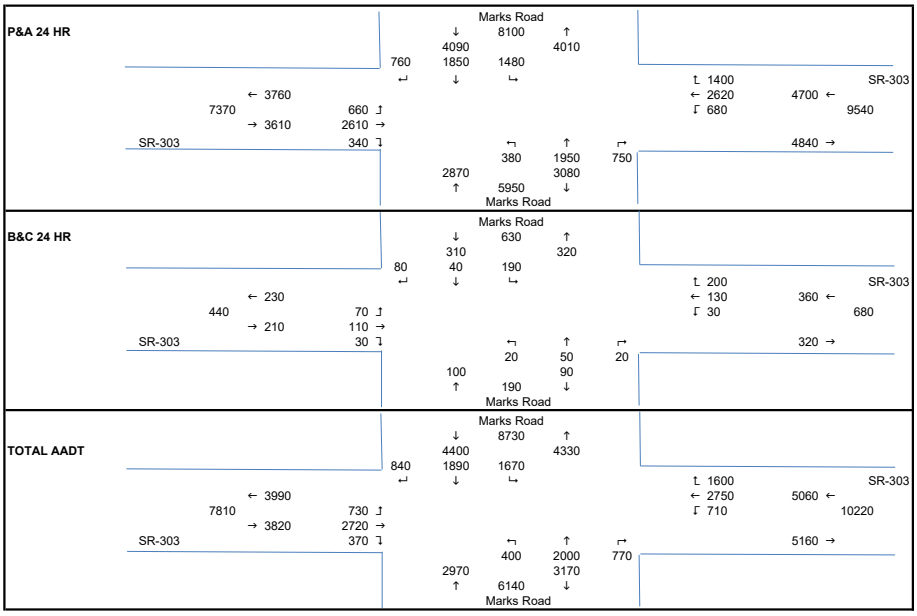
Date of Count: 9/17/2024 3 Tuesday September

**PART 1:** INPUT PARTIAL DAY P&A VEHICLES — ROUTE SR-303
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOUTH LEG** | Marks Road | FC = | Urban Major Collect northbound | | | APROACH TOTAL | DEPART TOTAL | | **SOUTH LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 364 | 1884 | 723 | 2971 | 2772 | **LT** | **THRU** | **RT** | | |
| P&A FACTOR | 1.136 | 1.136 | 1.136 | 413.504 | 2140.22 | 821.328 | 3375.06 | 3148.99 | 410 | 2140 | 820 | 3370 | 3150 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 377.116 | 1951.88 | 749.051 | 3078.05 | 2871.88 | ***380*** | ***1950*** | ***750*** | ***3080*** | ***2870*** |
| **WEST LEG** | SR-303 | FC = | Urban Major Collect eastbound | | | | APROACH TOTAL | DEPART TOTAL | | **WEST LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | FACTOR | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 634 | 2523 | 328 | 3485 | 3623 | **LT** | **THRU** | **RT** | | |
| P&A FACTOR | 1.136 | 1.136 | 1.136 | 720.224 | 2866.13 | 372.608 | 3958.96 | 4115.73 | 720 | 2870 | 370 | 3960 | 4110 |
| SEASONAL F | 0.912 | 0.912 | 0.912 | 656.844 | 2613.91 | 339.818 | 3610.57 | 3753.54 | ***660*** | ***2610*** | ***340*** | ***3610*** | ***3760*** |
| **NORTH LEG** | Marks Road | FC = | Urban Major Collect southbound | | | | APROACH TOTAL | DEPART TOTAL | | **NORTH LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | FACTOR | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 1424 | 1783 | 729 | 3936 | 3874 | **LT** | **THRU** | **RT** | | |
| P&A FACTOR | 1.136 | 1.136 | 1.136 | 1617.66 | 2025.49 | 828.144 | 4471.3 | 4400.86 | 1620 | 2030 | 830 | 4480 | 4400 |
| SEASONAL F | 0.912 | 0.912 | 0.912 | 1475.31 | 1847.25 | 755.267 | 4077.82 | 4013.59 | ***1480*** | ***1850*** | ***760*** | ***4090*** | ***4010*** |
| **EAST LEG** | SR-303 | FC = | Urban Major Collect westbound | | | | APROACH TOTAL | DEPART TOTAL | | **EAST LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | FACTOR | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 661 | 2530 | 1356 | 4547 | 4670 | **LT** | **THRU** | **RT** | | |
| P&A FACTOR | 1.136 | 1.136 | 1.136 | 750.896 | 2874.08 | 1540.42 | 5165.39 | 5305.12 | 750 | 2870 | 1540 | 5160 | 5310 |
| SEASONAL F | 0.912 | 0.912 | 0.912 | 684.817 | 2621.16 | 1404.86 | 4710.84 | 4838.27 | ***680*** | ***2620*** | ***1400*** | ***4700*** | ***4840*** |

**PART 2:** INPUT PARTIAL DAY B&C VEHICLES — ROUTE SR-303
PARTIAL COUNT * FACTOR = 24 HR B&C

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOUTH LEG** | Marks Road | FC = | Urban Major Collect northbound | | | APROACH TOTAL | DEPART TOTAL | | **SOUTH LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | FACTOR | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 20 | 46 | 15 | 81 | 93 | **LT** | **THRU** | **RT** | | |
| B&C FACTOR | 1.118 | 1.118 | 1.118 | 22.36 | 51.428 | 16.77 | 90.558 | 103.974 | 20 | 50 | 20 | 90 | 100 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 20.3923 | 46.9023 | 15.2942 | 82.5889 | 94.8243 | ***20*** | ***50*** | ***20*** | ***90*** | ***100*** |
| **WEST LEG** | SR-303 | FC = | Urban Major Collect eastbound | | | | APROACH TOTAL | DEPART TOTAL | | **WEST LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | FACTOR | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 65 | 109 | 25 | 199 | 227 | **LT** | **THRU** | **RT** | | |
| B&C FACTOR | 1.118 | 1.118 | 1.118 | 72.67 | 121.862 | 27.95 | 222.482 | 253.786 | 70 | 120 | 30 | 220 | 250 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 66.275 | 111.138 | 25.4904 | 202.904 | 211.061 | ***70*** | ***110*** | ***30*** | ***210*** | ***230*** |
| **NORTH LEG** | Marks Road | FC = | Urban Major Collect southbound | | | | APROACH TOTAL | DEPART TOTAL | | **NORTH LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | FACTOR | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 187 | 38 | 76 | 301 | 306 | **LT** | **THRU** | **RT** | | |
| B&C FACTOR | 1.118 | 1.118 | 1.118 | 209.066 | 42.484 | 84.968 | 336.518 | 342.108 | 210 | 40 | 80 | 330 | 340 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 190.668 | 38.7454 | 77.4908 | 306.904 | 312.002 | ***190*** | ***40*** | ***80*** | ***310*** | ***320*** |
| **EAST LEG** | SR-303 | FC = | Urban Major Collect westbound | | | | APROACH TOTAL | DEPART TOTAL | | **EAST LEG** | | APROACH **TOTAL** | DEPART **TOTAL** |
| | FACTOR | | | **LT** | **THRU** | **RT** | | | | | | | |
| | LT | THRU | RT | 30 | 131 | 195 | 356 | 311 | **LT** | **THRU** | **RT** | | |
| B&C FACTOR | 1.118 | 1.118 | 1.118 | 33.54 | 146.458 | 218.01 | 398.008 | 347.698 | 30 | 150 | 220 | 400 | 350 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 30.5885 | 133.57 | 198.825 | 362.983 | 317.101 | ***30*** | ***130*** | ***200*** | ***360*** | ***320*** |



*For converting partial day turning movements counts to seasonally adjusted 24 hour (AADT) counts.*
*Yellow boxes require user input. Scroll down for 24 hour diagrams. Use the Seasonal AdjuistmtFactors_YYYY spreadsheet to lookup seasonal factor.*
*Use Avg TD by FC.xslx to compute P&A B&C FACTORs.*

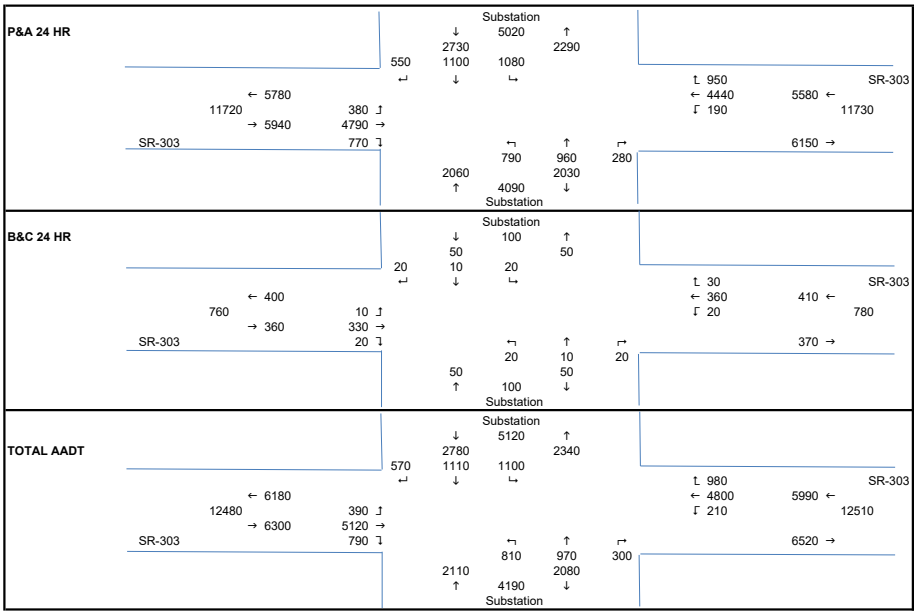
Date of Count: 9/17/2024 3 Tuesday September

**PART 1:** INPUT PARTIAL DAY P&A VEHICLES — ROUTE SR-303
PARTIAL COUNT * FACTOR * SEASONAL FACTOR = 24 HR P&A

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOUTH LEG** | Substation | FC = | Urban Local Road | northbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | | | | LT | THRU | RT | | | | SOUTH LEG | | | | |
| | LT | THRU | RT | 763 | 926 | 271 | 1960 | 1973 | LT | THRU | RT | | | |
| P&A FACTOR | 1.140 | 1.140 | 1.140 | 869.82 | 1055.64 | 308.94 | 2234.4 | 2256.68 | 870 | 1060 | 310 | | 2240 | 2260 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 793.276 | 962.744 | 281.753 | 2037.77 | 2058.09 | ***790*** | ***960*** | ***280*** | | ***2030*** | ***2060*** |
| **WEST LEG** | SR-303 | FC = | Urban Minor Arteria | eastbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | FACTOR | | | LT | THRU | RT | | | | WEST LEG | | | | |
| | LT | THRU | RT | 363 | 4539 | 731 | 5633 | 5579 | LT | THRU | RT | | | |
| P&A FACTOR | 1.157 | 1.157 | 1.157 | 419.991 | 5251.62 | 845.767 | 6517.38 | 6340.8 | 420 | 5250 | 850 | | 6520 | 6340 |
| SEASONAL F | 0.912 | 0.912 | 0.912 | 383.032 | 4789.48 | 771.34 | 5943.85 | 5782.81 | ***380*** | ***4790*** | ***770*** | | ***5940*** | ***5780*** |
| **NORTH LEG** | Substation | FC = | Urban Major Collect | southbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | FACTOR | | | LT | THRU | RT | | | | NORTH LEG | | | | |
| | LT | THRU | RT | 1040 | 1063 | 535 | 2638 | 2205 | LT | THRU | RT | | | |
| P&A FACTOR | 1.136 | 1.136 | 1.136 | 1181.44 | 1207.57 | 607.76 | 2996.77 | 2516.21 | 1180 | 1210 | 610 | | 3000 | 2520 |
| SEASONAL F | 0.912 | 0.912 | 0.912 | 1077.47 | 1101.3 | 554.277 | 2733.05 | 2294.78 | ***1080*** | ***1100*** | ***550*** | | ***2730*** | ***2290*** |
| **EAST LEG** | SR-303 | FC = | Urban Major Collect | westbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | FACTOR | | | LT | THRU | RT | | | | EAST LEG | | | | |
| | LT | THRU | RT | 179 | 4281 | 916 | 5376 | 5850 | LT | THRU | RT | | | |
| P&A FACTOR | 1.136 | 1.136 | 1.136 | 203.344 | 4863.22 | 1040.58 | 6107.14 | 6742 | 200 | 4860 | 1040 | | 6100 | 6740 |
| SEASONAL F | 0.912 | 0.912 | 0.912 | 185.45 | 4435.25 | 949.005 | 5569.71 | 6148.71 | ***190*** | ***4440*** | ***950*** | | ***5580*** | ***6150*** |

**PART 2:** INPUT PARTIAL DAY B&C VEHICLES — ROUTE SR-303
PARTIAL COUNT * FACTOR = 24 HR B&C

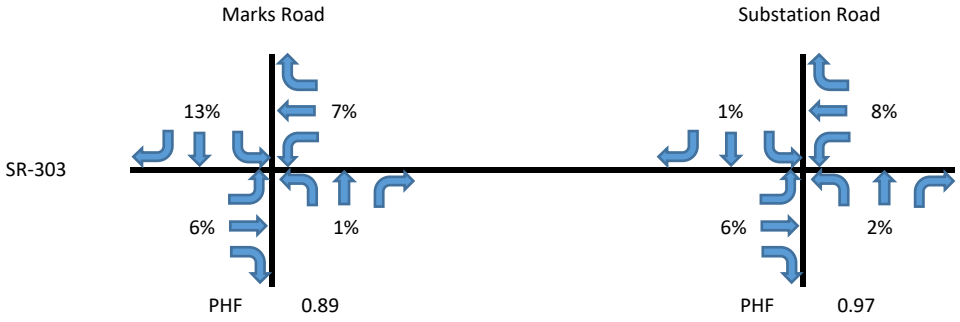
| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOUTH LEG** | Substation | FC = | Urban Local Road | northbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | FACTOR | | | LT | THRU | RT | | | | SOUTH LEG | | | | |
| | LT | THRU | RT | 24 | 15 | 18 | 57 | 44 | LT | THRU | RT | | | |
| B&C FACTOR | 1.065 | 1.065 | 1.065 | 25.56 | 15.975 | 19.17 | 60.705 | 49.944 | 30 | 20 | 20 | | 70 | 50 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 23.3107 | 14.5692 | 17.483 | 55.363 | 45.5489 | ***20*** | ***10*** | ***20*** | | ***50*** | ***50*** |
| **WEST LEG** | SR-303 | FC = | Urban Minor Arteria | eastbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | FACTOR | | | LT | THRU | RT | | | | WEST LEG | | | | |
| | LT | THRU | RT | 11 | 313 | 16 | 340 | 390 | LT | THRU | RT | | | |
| B&C FACTOR | 1.165 | 1.165 | 1.165 | 12.815 | 364.645 | 18.64 | 396.1 | 434.748 | 10 | 360 | 20 | | 390 | 440 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 11.6873 | 332.556 | 16.9997 | 361.243 | 373.179 | ***10*** | ***330*** | ***20*** | | ***360*** | ***400*** |
| **NORTH LEG** | Substation | FC = | Urban Major Collect | southbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | FACTOR | | | LT | THRU | RT | | | | NORTH LEG | | | | |
| | LT | THRU | RT | 22 | 9 | 15 | 46 | 53 | LT | THRU | RT | | | |
| B&C FACTOR | 1.118 | 1.118 | 1.118 | 24.596 | 10.062 | 16.77 | 51.428 | 58.976 | 20 | 10 | 20 | | 50 | 60 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 22.4316 | 9.17654 | 15.2942 | 46.9023 | 53.7861 | ***20*** | ***10*** | ***20*** | | ***50*** | ***50*** |
| **EAST LEG** | SR-303 | FC = | Urban Major Collect | westbound | | | APROACH TOTAL | DEPART TOTAL | | | | | APROACH TOTAL | DEPART TOTAL |
| | FACTOR | | | LT | THRU | RT | | | | EAST LEG | | | | |
| | LT | THRU | RT | 19 | 351 | 27 | 397 | 353 | LT | THRU | RT | | | |
| B&C FACTOR | 1.118 | 1.118 | 1.118 | 21.242 | 392.418 | 30.186 | 443.846 | 408.411 | 20 | 390 | 30 | | 440 | 400 |
| SEASONAL FACTOR | 0.912 | 0.912 | 0.912 | 19.3727 | 357.885 | 27.5296 | 404.788 | 372.471 | ***20*** | ***360*** | ***30*** | | ***410*** | ***370*** |



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | AM | Peak Hour Factors and Truck Percentages | |

^

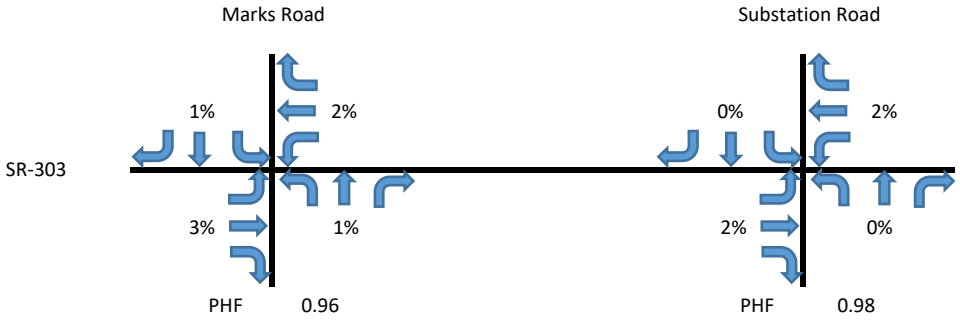
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | PM | Peak Hour Factors and Truck Percentages | |

^

N

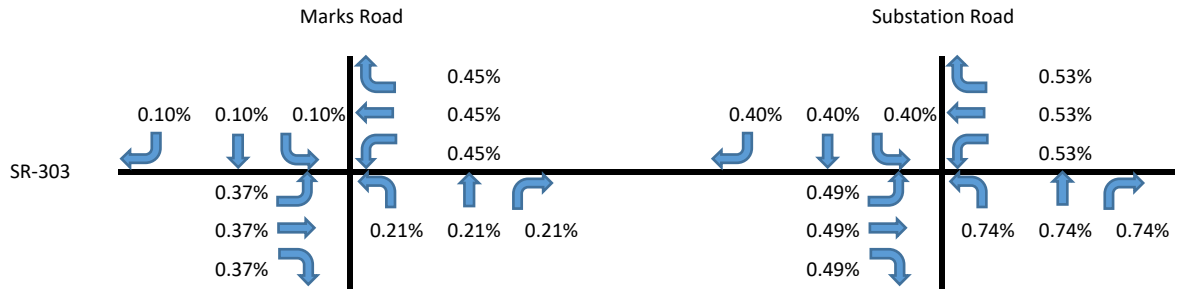


| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | | Growth Rates | |

^

N

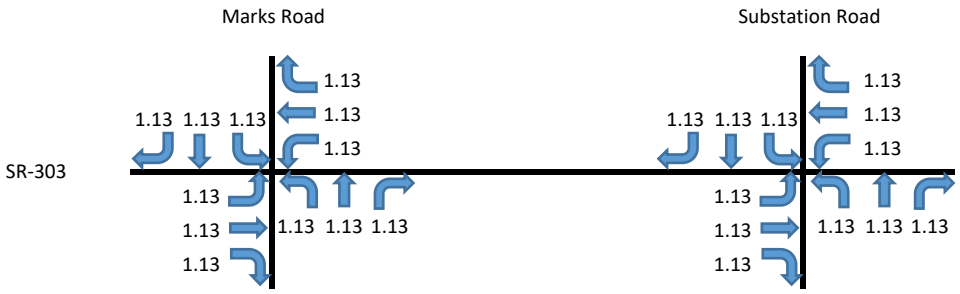
Growth rates were obtained from NOACA. The 2030-2050 Turning Auto Daily Volume CAGR growth rates were utilized. Note that the growth rates were applied per approach, rather than per movement.



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | | Peak Hour to Design Hour Factors | |

^
N

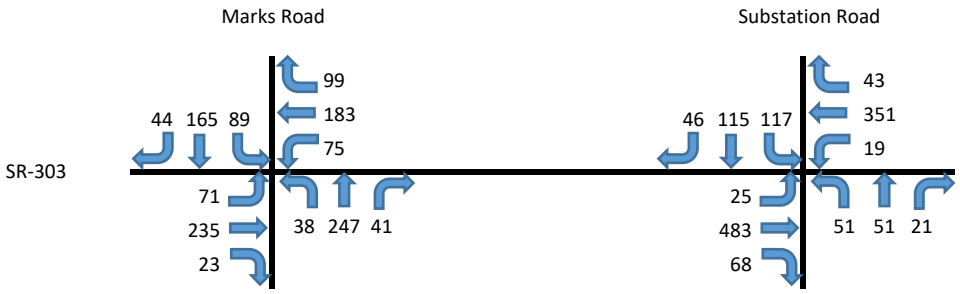
2022 ODOT Peak Hour to Design Hour factors were utilized. As there aren't factors available for Urban Local roads, the same factor was used for the south leg of Substation Road as the rest of the roads.



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2024 | AM | Count | A1 |

^

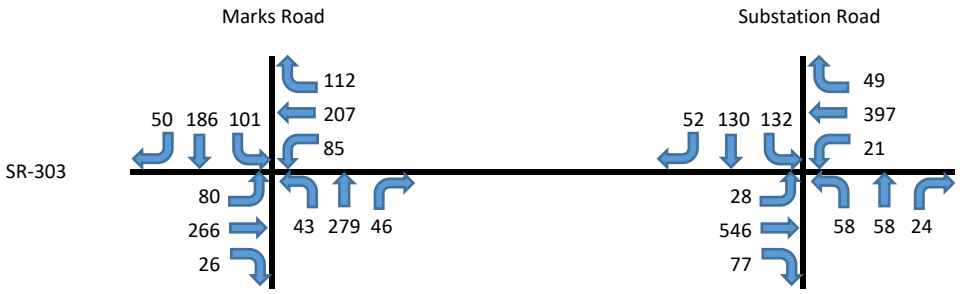
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2024 | AM | Peak Hour to Design Hour Volume Calculation | B1 = A1 Adjusted |

^

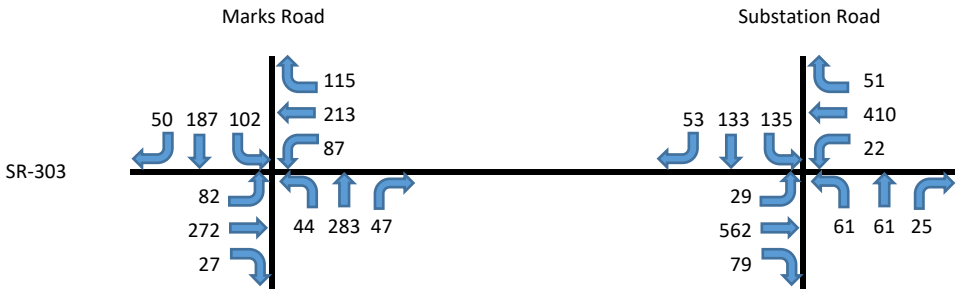
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | AM | Design Hour Volumes Grown | C1 = B1 Grown |

^

N



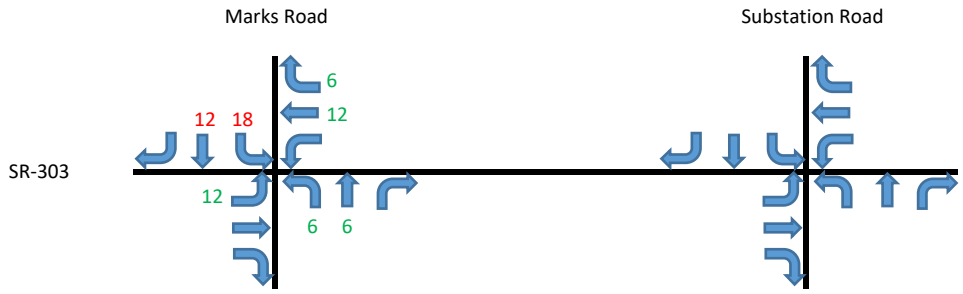
| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | AM | Bellstores and Potential Future Developments Non-Pass-By Traffic | D1 |

^

**N**

Trip generation for the BellStores and potential future development was included. The traffic distribution matches that shown in the Liverpool Fuel and Car Wash TIS.

| | |
|---|---|
| Enter | 59 |
| Exit | 60 |



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | AM | Bellstores and Potential Future Developments Pass-By Traffic | E1 |

^

N

Trip generation for the BellStores and potential future development was included. The traffic distribution matches that shown in the Liverpool Fuel and Car Wash TIS.

Average 166

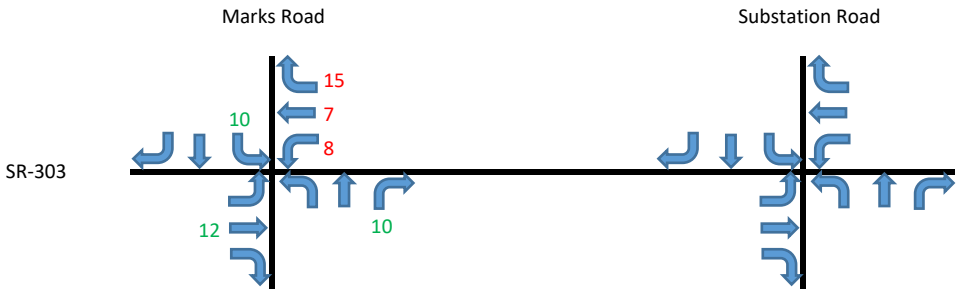


| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | AM | McDonalds Non-Pass-By Traffic | F1 |

^

N

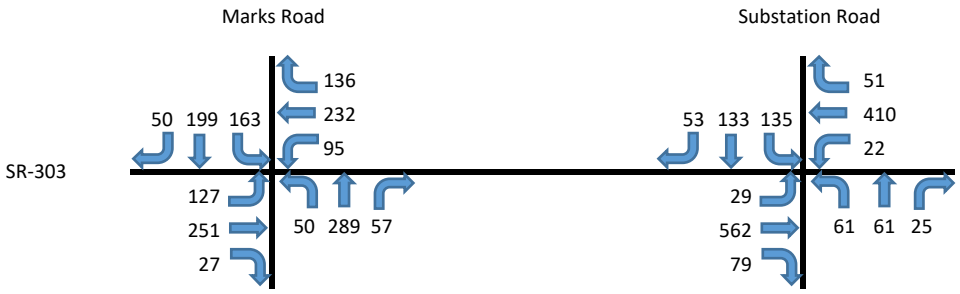
Trip generation for the McDonalds were taken from Figure A-4 in the Proposed McDonald's Brunkswick Hills Twp. Ohio Traffic Impact Study



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | AM | Unrounded Volumes | G1 = C1 + D1 + E1 + F1 |

^

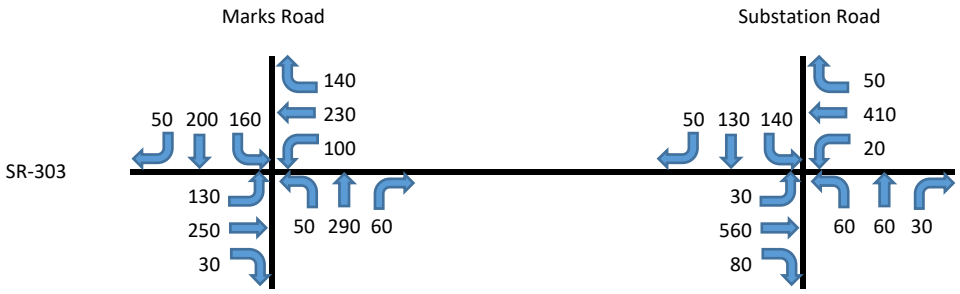
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | AM | Rounded Volumes | H1 = G1 Rounded |

^

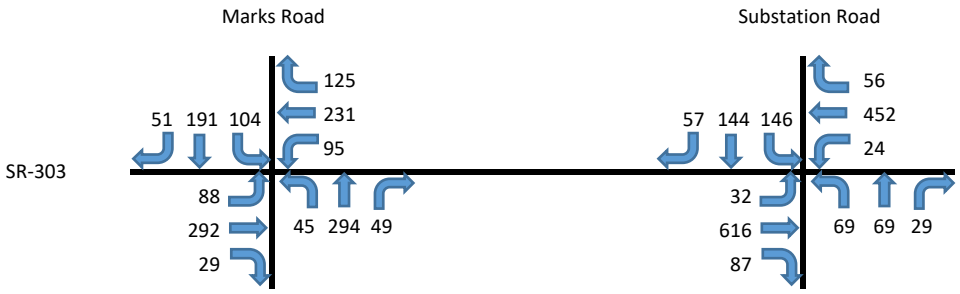
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | AM | Design Hour Volumes Grown | I1 = B1 Grown |

^

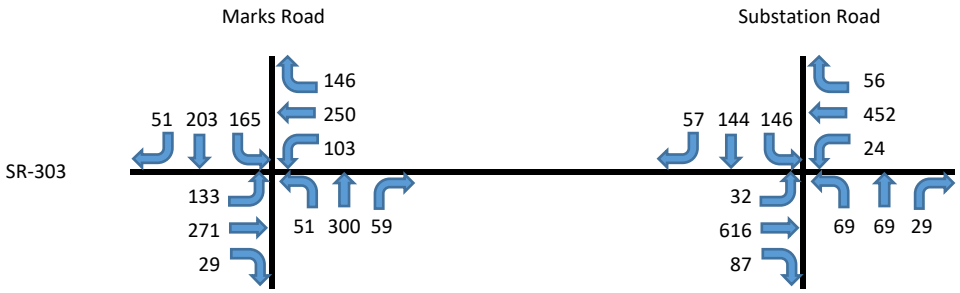
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | AM | Unrounded Volumes | J1 = D1 + E1 + F1 + I1 |

^

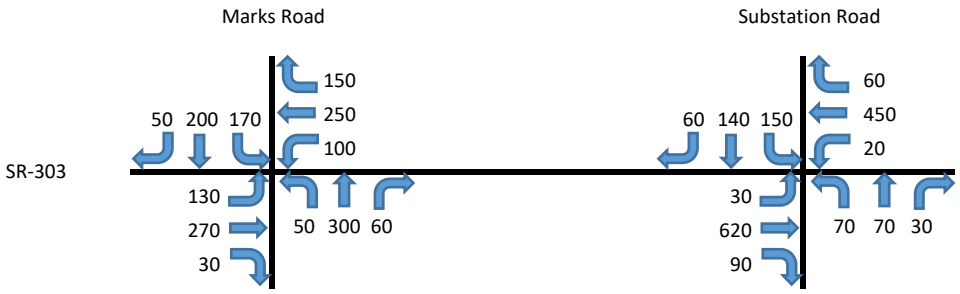
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | AM | Rounded Volumes | K1 = J1 Rounded |

^

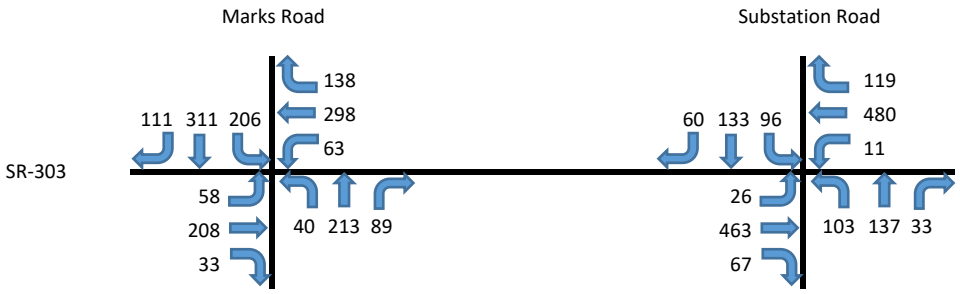
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2024 | PM | Count | A2 |

^

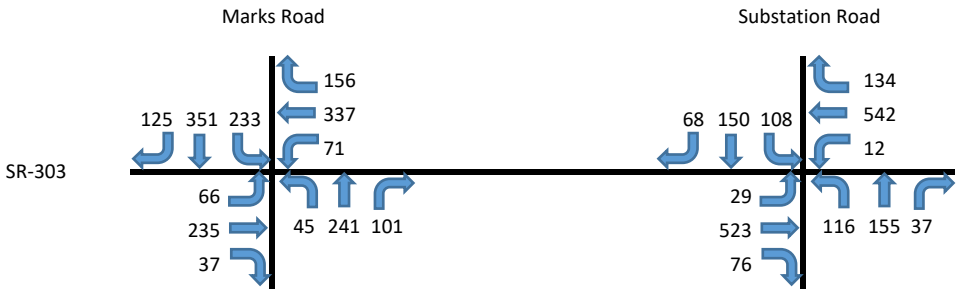
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2024 | PM | Peak Hour to Design Hour Volume Calculation | B2 = A2 Adjusted |

^

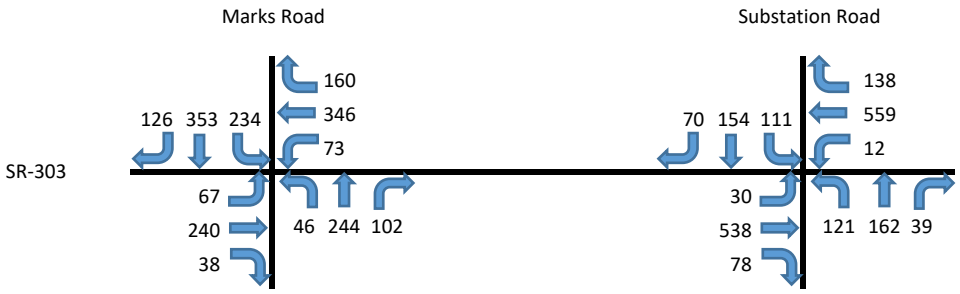
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | PM | Design Hour Volumes Grown | C2 = B2 Grown |

^

N



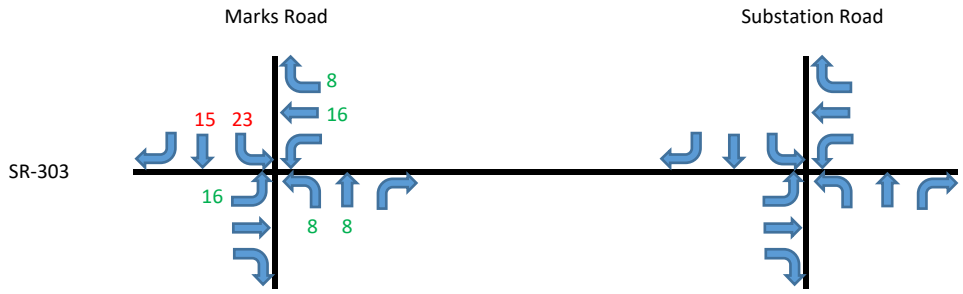
| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | PM | Bellstores and Potential Future Developments Non-Pass-By Traffic | D2 |

^

**N**

Trip generation for the BellStores and potential future development was included. The traffic distribution matches that shown in the Liverpool Fuel and Car Wash TIS.

| | |
|---|---|
| Enter | 80 |
| Exit | 76 |



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | PM | Bellstores and Potential Future Developments Pass-By Traffic | E2 |

^

**N**

Trip generation for the BellStores and potential future development was included. The traffic distribution matches that shown in the Liverpool Fuel and Car Wash TIS.

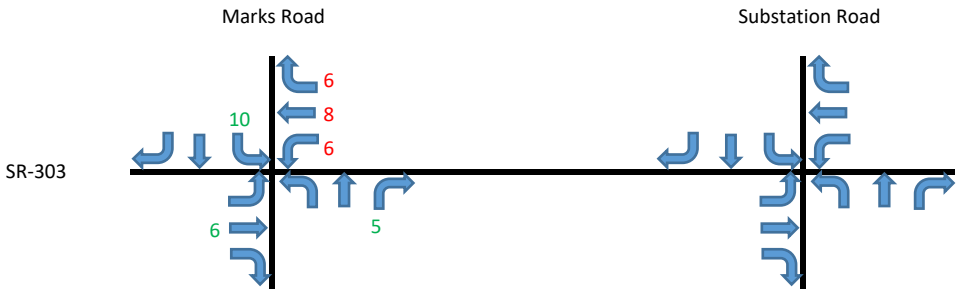
Average 137



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | PM | McDonalds Non-Pass-By Traffic | F2 |

^
N

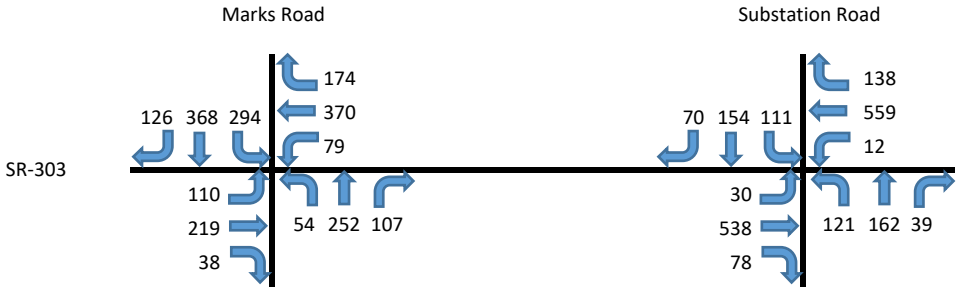
Trip generation for the McDonalds were taken from Figure A-4 in the Proposed McDonald's Brunkswick Hills Twp. Ohio Traffic Impact Study



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | PM | Unrounded Volumes | G2 = C2 + D2 + E2 + F2 |

^

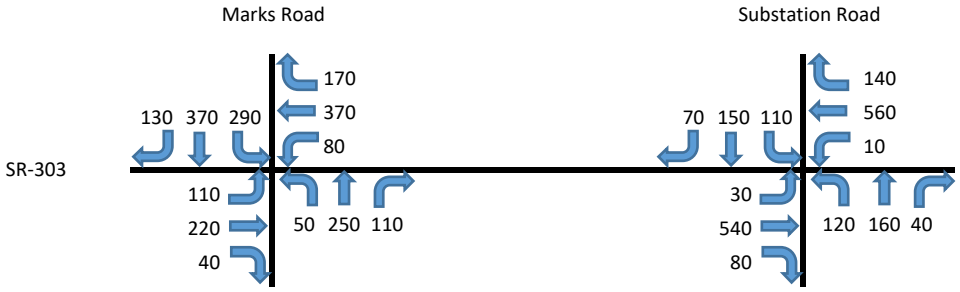
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | PM | Rounded Volumes | H2 = G2 Rounded |

^

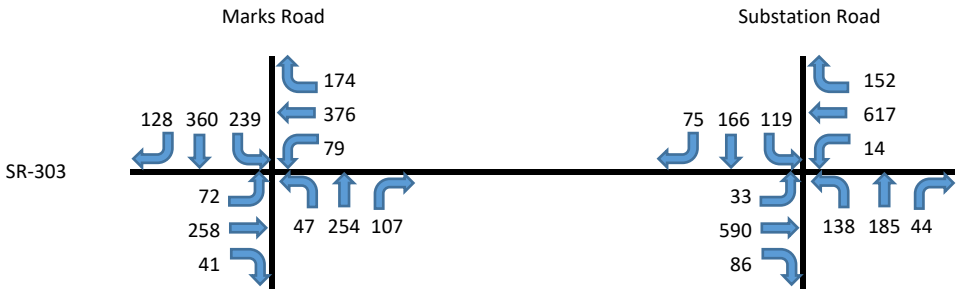
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | PM | Design Hour Volumes Grown | I2 = B2 Grown |

^

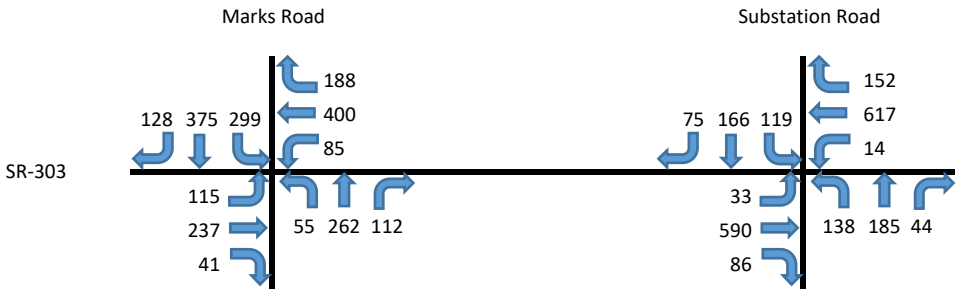
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | PM | Unrounded Volumes | J2 = D2 + E2 + F2 + I2 |

^

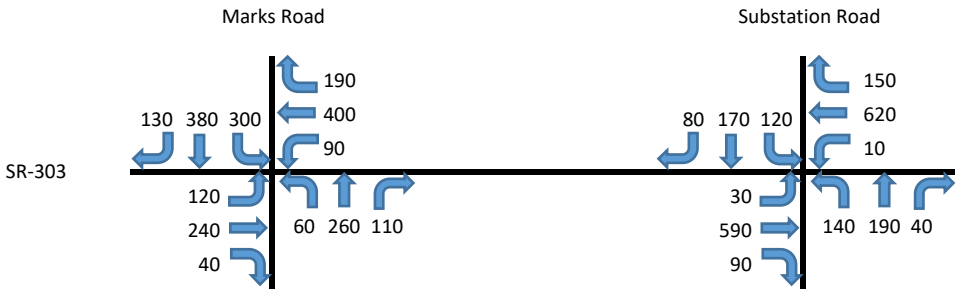
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | PM | Rounded Volumes | K2 = J2 Rounded |

^

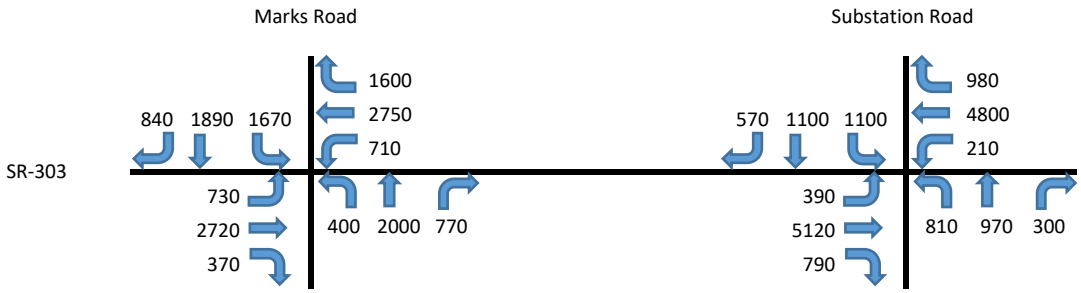
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2024 | ADT | Count | A3 |

^

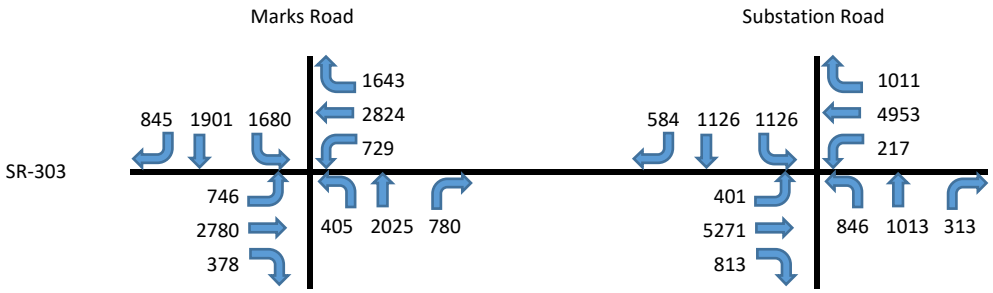
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | ADT | Count Grown | B3 = A3 Grown |

^

N



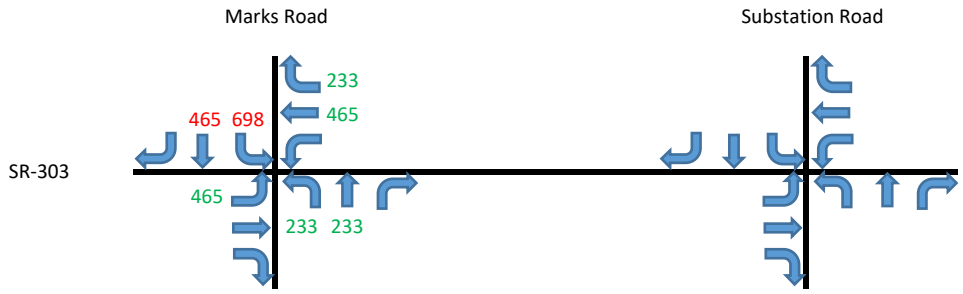
| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | ADT | Bellstores and Potential Future Developments Non-Pass-By Traffic | C3 |

^

**N**

Trip generation for the BellStores and potential future development was included. The traffic distribution matches that shown in the Liverpool Fuel and Car Wash TIS.

| | |
|---|---|
| Enter | 2325 |
| Exit | 2325 |



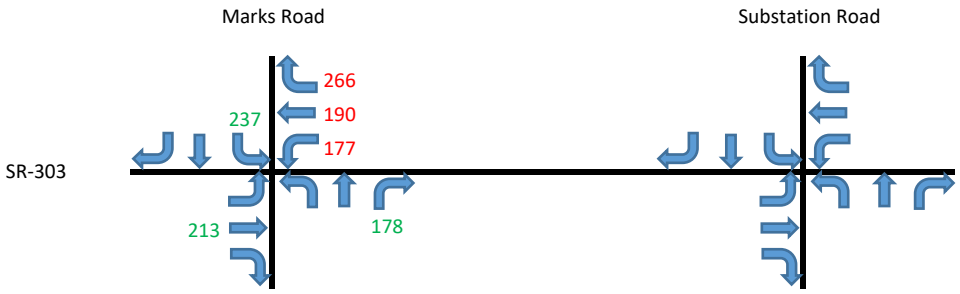
| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | | ADT | McDonalds Non-Pass-By Traffic | D3 |

^

**N**

The overall distribution for the McDonalds trips were taken from Figure A-4 in the Proposed McDonald's Brunkswick Hills Twp. Ohio Traffic Impact Study. The average of the AM and PM values were used to calculate the ADT distributions. The daily trip generation for the McDonalds site was generated using ITE 11th Edition methodology.

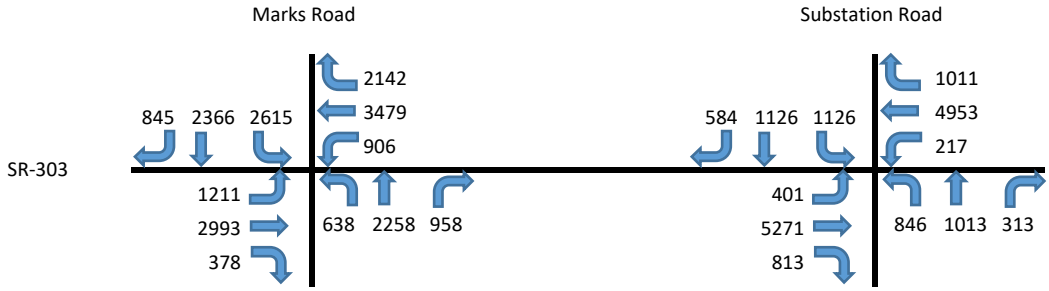
| | |
|---|---|
| Enter | 900 |
| Exit | 900 |



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | ADT | Unrounded Volumes | E3 = B3 + C3 + D3 |

^

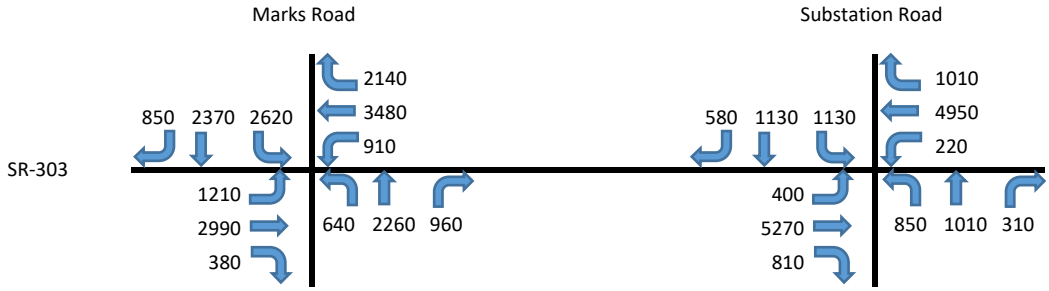
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2030 | ADT | Rounded Volumes | F3 = E3 Rounded |

^

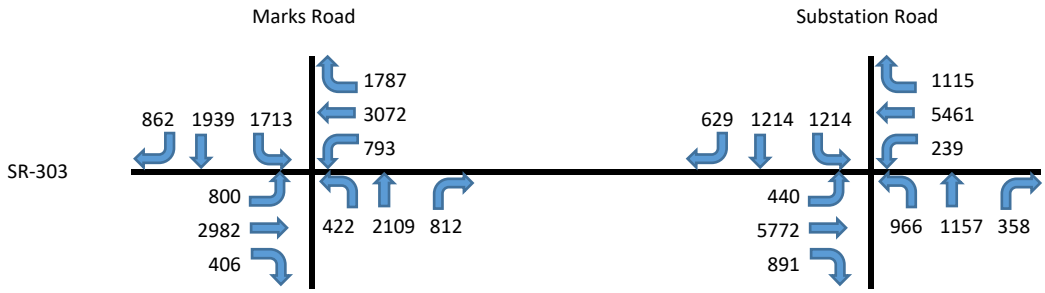
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | ADT | Count Grown | G3 = A3 Grown |

^

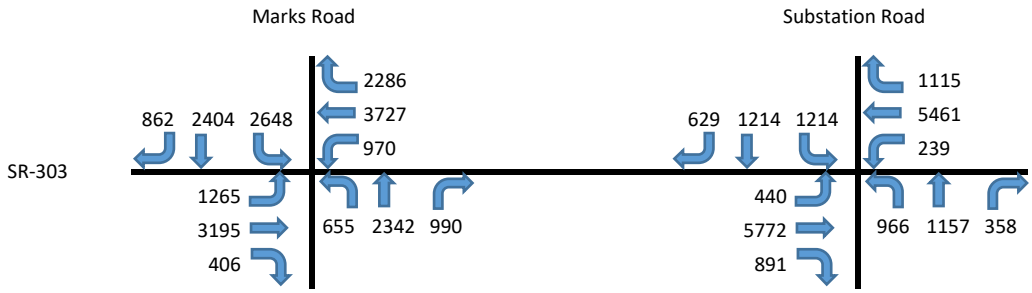
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | ADT | Unrounded Volumes | H3 = C3 + D3 + G3 |

^

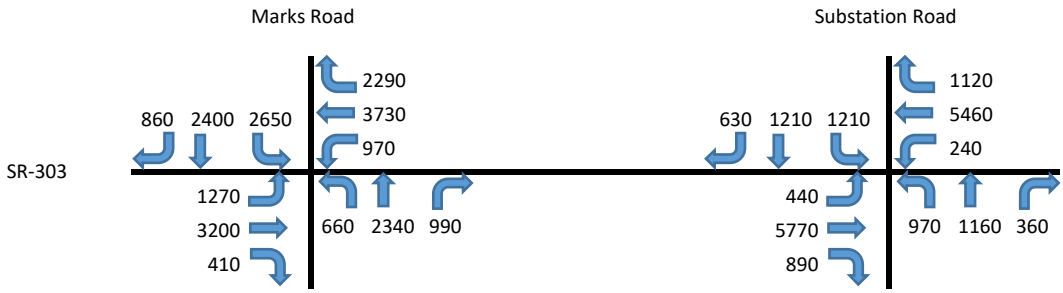
N



| CARPENTER MARTY transportation | Year | Period | Scenario | Plate |
|---|---|---|---|---|
| | 2050 | ADT | Rounded Volumes | I3 = H3 Rounded |

^

N

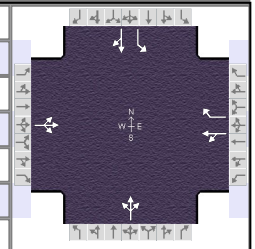


# Appendix C
## Existing Conditions Capacity Analysis

CARPENTER MARTY transportation

# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.89 |
| Urban Street | SR-303 | Analysis Year | 2024 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2024 AM Existing - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 80 | 266 | 26 | 85 | 207 | 112 | 43 | 279 | 46 | 101 | 186 | 50 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 66.6 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1 | 2 | 3 | 4 | |
| Green | 30.0 | 24.1 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5 | 6 | 7 | 8 | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 7.0 | | 8.0 | | 6.0 |
| Phase Duration, s | | 36.5 | | 36.5 | | 30.1 | | 30.1 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.1 | | 3.1 | | 3.2 | | 3.2 |
| Queue Clearance Time ( $g_s$ ), s | | 13.9 | | 11.2 | | 14.6 | | 22.3 |
| Green Extension Time ( $g_e$ ), s | | 1.7 | | 1.7 | | 1.7 | | 1.7 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.00 | | 0.00 | | 0.00 | | 0.00 |

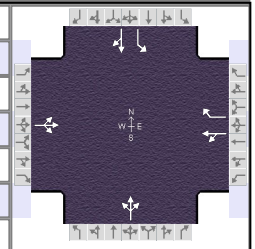
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 418 | | | 328 | 126 | | 413 | | 113 | 265 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1629 | | | 1518 | 1522 | | 1760 | | 928 | 1645 | |
| Queue Service Time ( $g_s$ ), s | | 2.7 | | | 0.0 | 3.3 | | 3.8 | | 7.7 | 8.2 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 11.9 | | | 9.2 | 3.3 | | 12.6 | | 20.3 | 8.2 | |
| Green Ratio ( *g/C* ) | | 0.45 | | | 0.45 | 0.45 | | 0.36 | | 0.36 | 0.36 | |
| Capacity ( *c* ), veh/h | | 799 | | | 753 | 685 | | 698 | | 269 | 596 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.523 | | | 0.436 | 0.184 | | 0.592 | | 0.422 | 0.445 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 166.3 | | | 128.2 | 43.6 | | 199.9 | | 77 | 131.4 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 6.3 | | | 4.9 | 1.7 | | 7.9 | | 2.8 | 4.8 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.17 | | | 0.08 | 0.35 | | 0.22 | | 0.34 | 0.15 | |
| Uniform Delay ( $d_1$ ), s/veh | | 13.2 | | | 12.4 | 11.0 | | 17.5 | | 26.0 | 16.2 | |
| Incremental Delay ( $d_2$ ), s/veh | | 0.2 | | | 0.1 | 0.0 | | 0.3 | | 0.4 | 0.2 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | | 13.4 | | | 12.6 | 11.0 | | 17.8 | | 26.4 | 16.3 | |
| Level of Service (LOS) | | B | | | B | B | | B | | C | B | |
| Approach Delay, s/veh / LOS | 13.4 | B | | 12.2 | B | | 17.8 | B | | 19.3 | B | |
| Intersection Delay, s/veh / LOS | 15.5 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.66 | B | 1.89 | B | 1.90 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.18 | A | 1.24 | A | 1.17 | A | 1.11 | A |

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# HCS Signalized Intersection Results Summary

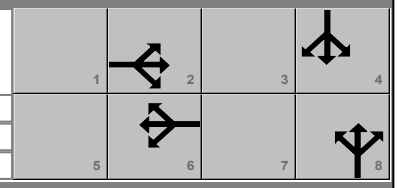
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.96 |
| Urban Street | SR-303 | Analysis Year | 2024 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2024 PM Existing - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 66 | 235 | 37 | 71 | 337 | 156 | 45 | 241 | 101 | 233 | 351 | 125 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 80.4 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 30.0 | 37.9 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 7.0 | | 8.0 | | 6.0 |
| Phase Duration, s | | 36.5 | | 36.5 | | 43.9 | | 43.9 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.1 | | 3.1 | | 3.3 | | 3.3 |
| Queue Clearance Time ( $g_s$ ), s | | 14.8 | | 17.9 | | 19.2 | | 36.3 |
| Green Extension Time ( $g_e$ ), s | | 1.9 | | 1.9 | | 2.7 | | 2.4 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.00 | | 0.00 | | 0.00 | | 0.06 |

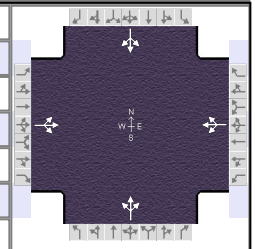
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 352 | | | 425 | 163 | | 403 | | 243 | 496 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1630 | | | 1710 | 1585 | | 1554 | | 1033 | 1800 | |
| Queue Service Time ( $g_s$ ), s | | 0.0 | | | 3.0 | 5.7 | | 1.0 | | 18.1 | 16.2 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 12.8 | | | 15.9 | 5.7 | | 17.2 | | 34.3 | 16.2 | |
| Green Ratio ( *g/C* ) | | 0.37 | | | 0.37 | 0.37 | | 0.47 | | 0.47 | 0.47 | |
| Capacity ( *c* ), veh/h | | 669 | | | 698 | 597 | | 775 | | 361 | 839 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.527 | | | 0.609 | 0.272 | | 0.520 | | 0.673 | 0.591 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 201.6 | | | 246.4 | 85.3 | | 195.2 | | 187.5 | 242.9 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 7.9 | | | 9.7 | 3.4 | | 7.7 | | 7.4 | 9.6 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.20 | | | 0.15 | 0.68 | | 0.22 | | 0.83 | 0.27 | |
| Uniform Delay ( $d_1$ ), s/veh | | 19.3 | | | 20.2 | 17.2 | | 14.7 | | 28.4 | 15.7 | |
| Incremental Delay ( $d_2$ ), s/veh | | 0.2 | | | 0.3 | 0.1 | | 0.2 | | 0.8 | 0.2 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | | 19.5 | | | 20.5 | 17.3 | | 14.9 | | 29.2 | 15.9 | |
| Level of Service (LOS) | | B | | | C | B | | B | | C | B | |
| Approach Delay, s/veh / LOS | 19.5 | B | | 19.6 | B | | 14.9 | B | | 20.3 | C | |
| Intersection Delay, s/veh / LOS | 18.9 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.68 | B | 1.91 | B | 1.89 | B | 1.67 | B |
| Bicycle LOS Score / LOS | 1.07 | A | 1.46 | A | 1.15 | A | 1.71 | B |

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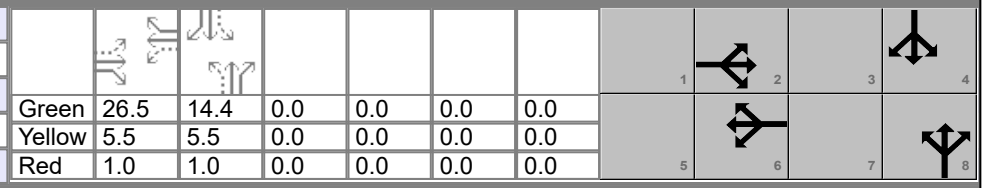
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.97 |
| Urban Street | SR-303 | Analysis Year | 2030 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2024 AM Existing - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 28 | 546 | 77 | 21 | 397 | 49 | 58 | 58 | 24 | 132 | 130 | 52 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 53.9 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Green | 26.5 | 14.4 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| Yellow | 5.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 8.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 33.0 | | 33.0 | | 20.9 | | 20.9 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.1 | | 5.1 |
| Queue Clearance Time ( $g_s$ ), s | | 18.9 | | 12.4 | | 5.6 | | 11.9 |
| Green Extension Time ( $g_e$ ), s | | 7.6 | | 8.4 | | 2.7 | | 2.5 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.22 | | 0.12 | | 0.00 | | 0.02 |

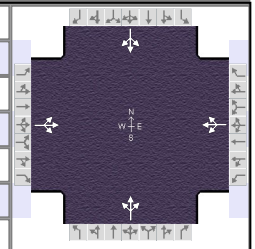
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 671 | | | 481 | | | 144 | | | 324 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1739 | | | 1708 | | | 1560 | | | 1598 | |
| Queue Service Time ( $g_s$ ), s | | 2.9 | | | 0.0 | | | 0.0 | | | 6.4 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 16.9 | | | 10.4 | | | 3.6 | | | 9.9 | |
| Green Ratio ( *g/C* ) | | 0.49 | | | 0.49 | | | 0.27 | | | 0.27 | |
| Capacity ( *c* ), veh/h | | 925 | | | 910 | | | 511 | | | 522 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.726 | | | 0.529 | | | 0.282 | | | 0.620 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 219.3 | | | 137 | | | 55.9 | | | 146.7 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 8.4 | | | 5.1 | | | 2.2 | | | 5.8 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.19 | | | 0.17 | | | 0.06 | | | 0.15 | |
| Uniform Delay ( $d_1$ ), s/veh | | 11.2 | | | 9.6 | | | 15.7 | | | 18.0 | |
| Incremental Delay ( $d_2$ ), s/veh | | 1.6 | | | 0.7 | | | 0.4 | | | 1.7 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | | 12.8 | | | 10.3 | | | 16.2 | | | 19.7 | |
| Level of Service (LOS) | | B | | | B | | | B | | | B | |
| Approach Delay, s/veh / LOS | 12.8 | | B | 10.3 | | B | 16.2 | | B | 19.7 | | B |
| Intersection Delay, s/veh / LOS | 13.7 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.65 | B | 1.65 | B | 1.68 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.59 | B | 1.28 | A | 0.73 | A | 1.02 | A |

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# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.98 |
| Urban Street | SR-303 | Analysis Year | 2024 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2024 PM Existing - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 29 | 523 | 76 | 12 | 542 | 134 | 116 | 155 | 37 | 108 | 150 | 68 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 59.6 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1 | 2 | 3 | 4 | |
| Green | 29.7 | 16.8 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Yellow | 5.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5 | 6 | 7 | 8 | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 8.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 36.2 | | 36.2 | | 23.3 | | 23.3 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.2 | | 5.2 |
| Queue Clearance Time ( $g_s$ ), s | | 18.1 | | 21.0 | | 13.1 | | 13.3 |
| Green Extension Time ( $g_e$ ), s | | 9.4 | | 8.8 | | 3.6 | | 3.6 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.31 | | 0.38 | | 0.09 | | 0.10 |

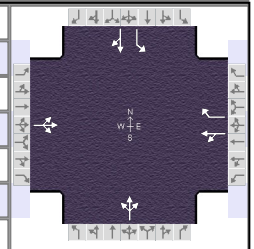
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 641 | | | 702 | | | 314 | | | 333 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1779 | | | 1794 | | | 1522 | | | 1580 | |
| Queue Service Time ( $g_s$ ), s | | 0.0 | | | 0.0 | | | 0.0 | | | 0.2 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 16.1 | | | 19.0 | | | 11.1 | | | 11.3 | |
| Green Ratio ( *g/C* ) | | 0.50 | | | 0.50 | | | 0.28 | | | 0.28 | |
| Capacity ( *c* ), veh/h | | 951 | | | 957 | | | 513 | | | 527 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.674 | | | 0.733 | | | 0.613 | | | 0.632 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 220.6 | | | 253 | | | 158.1 | | | 168 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 8.7 | | | 10.0 | | | 6.3 | | | 6.7 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.19 | | | 0.32 | | | 0.16 | | | 0.17 | |
| Uniform Delay ( $d_1$ ), s/veh | | 11.5 | | | 12.2 | | | 19.1 | | | 19.2 | |
| Incremental Delay ( $d_2$ ), s/veh | | 1.3 | | | 2.0 | | | 1.7 | | | 1.8 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | | 12.8 | | | 14.2 | | | 20.8 | | | 21.0 | |
| Level of Service (LOS) | | B | | | B | | | C | | | C | |
| Approach Delay, s/veh / LOS | 12.8 | B | | 14.2 | B | | 20.8 | C | | 21.0 | C | |
| Intersection Delay, s/veh / LOS | 15.9 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.65 | B | 1.65 | B | 1.68 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.54 | B | 1.65 | B | 1.01 | A | 1.04 | A |

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# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.89 |
| Urban Street | SR-303 | Analysis Year | 2030 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2030 AM Existing - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 130 | 250 | 30 | 100 | 230 | 140 | 50 | 290 | 60 | 160 | 200 | 50 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 74.9 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1 | 2 | 3 | 4 | |
| Green | 30.0 | 32.4 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5 | 6 | 7 | 8 | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 7.0 | | 8.0 | | 6.0 |
| Phase Duration, s | | 36.5 | | 36.5 | | 38.4 | | 38.4 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.2 | | 3.2 | | 3.3 | | 3.3 |
| Queue Clearance Time ( $g_s$ ), s | | 24.8 | | 19.5 | | 16.2 | | 30.4 |
| Green Extension Time ( $g_e$ ), s | | 2.1 | | 2.1 | | 2.1 | | 2.0 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.00 | | 0.00 | | 0.00 | | 0.00 |

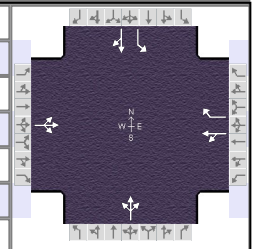
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 461 | | | 371 | 157 | | 449 | | 180 | 281 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1395 | | | 1330 | 1522 | | 1738 | | 904 | 1648 | |
| Queue Service Time ( $g_s$ ), s | | 5.3 | | | 0.0 | 5.2 | | 3.6 | | 14.1 | 8.7 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 22.8 | | | 17.5 | 5.2 | | 14.2 | | 28.4 | 8.7 | |
| Green Ratio ( *g/C* ) | | 0.40 | | | 0.40 | 0.40 | | 0.43 | | 0.43 | 0.43 | |
| Capacity ( *c* ), veh/h | | 622 | | | 596 | 610 | | 805 | | 315 | 712 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.740 | | | 0.622 | 0.258 | | 0.558 | | 0.571 | 0.394 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 269.2 | | | 213.1 | 74.6 | | 216.9 | | 138.6 | 140.1 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 10.3 | | | 8.1 | 2.8 | | 8.6 | | 5.0 | 5.1 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.27 | | | 0.13 | 0.60 | | 0.24 | | 0.62 | 0.16 | |
| Uniform Delay ( $d_1$ ), s/veh | | 20.1 | | | 18.1 | 15.0 | | 16.0 | | 26.9 | 14.5 | |
| Incremental Delay ( $d_2$ ), s/veh | | 0.7 | | | 0.4 | 0.1 | | 0.2 | | 0.6 | 0.1 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | | 20.7 | | | 18.5 | 15.1 | | 16.2 | | 27.5 | 14.7 | |
| Level of Service (LOS) | | C | | | B | B | | B | | C | B | |
| Approach Delay, s/veh / LOS | 20.7 | C | | 17.5 | B | | 16.2 | B | | 19.7 | B | |
| Intersection Delay, s/veh / LOS | 18.5 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.68 | B | 1.90 | B | 1.90 | B | 1.67 | B |
| Bicycle LOS Score / LOS | 1.25 | A | 1.36 | A | 1.23 | A | 1.25 | A |

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# HCS Signalized Intersection Results Summary

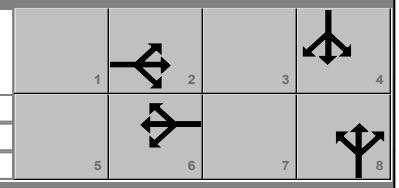
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.96 |
| Urban Street | SR-303 | Analysis Year | 2030 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2030 PM Existing - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 110 | 220 | 40 | 80 | 370 | 170 | 50 | 250 | 110 | 290 | 370 | 130 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 99.8 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 37.3 | 50.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 7.0 | | 8.0 | | 6.0 |
| Phase Duration, s | | 43.8 | | 43.8 | | 56.0 | | 56.0 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.2 | | 3.2 | | 3.3 | | 3.3 |
| Queue Clearance Time ( $g_s$ ), s | | 35.3 | | 31.9 | | 26.6 | | 52.0 |
| Green Extension Time ( $g_e$ ), s | | 2.0 | | 2.1 | | 3.0 | | 0.0 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.02 | | 0.01 | | 0.01 | | 1.00 |

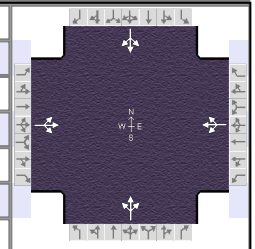
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 385 | | | 469 | 177 | | 427 | | 302 | 521 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1148 | | | 1463 | 1585 | | 1443 | | 1016 | 1801 | |
| Queue Service Time ( $g_s$ ), s | | 3.3 | | | 0.0 | 7.9 | | 4.4 | | 25.7 | 20.3 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 33.3 | | | 29.9 | 7.9 | | 24.6 | | 50.0 | 20.3 | |
| Green Ratio ( *g/C* ) | | 0.37 | | | 0.37 | 0.37 | | 0.50 | | 0.50 | 0.50 | |
| Capacity ( *c* ), veh/h | | 476 | | | 590 | 593 | | 763 | | 333 | 902 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.809 | | | 0.794 | 0.299 | | 0.560 | | 0.907 | 0.578 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 342.3 | | | 383.3 | 126.5 | | 248.5 | | 375.5 | 308.3 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 13.4 | | | 15.1 | 5.0 | | 9.9 | | 14.9 | 12.2 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.34 | | | 0.23 | 1.01 | | 0.28 | | 1.67 | 0.35 | |
| Uniform Delay ( $d_1$ ), s/veh | | 29.2 | | | 28.2 | 22.0 | | 17.1 | | 38.9 | 17.5 | |
| Incremental Delay ( $d_2$ ), s/veh | | 3.6 | | | 2.7 | 0.1 | | 0.6 | | 26.8 | 0.6 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | | 32.8 | | | 30.9 | 22.1 | | 17.7 | | 65.6 | 18.1 | |
| Level of Service (LOS) | | C | | | C | C | | B | | E | B | |
| Approach Delay, s/veh / LOS | 32.8 | C | | 28.5 | C | | 17.7 | B | | 35.6 | D | |
| Intersection Delay, s/veh / LOS | 29.7 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.69 | B | 1.92 | B | 1.90 | B | 1.67 | B |
| Bicycle LOS Score / LOS | 1.12 | A | 1.55 | B | 1.19 | A | 1.85 | B |

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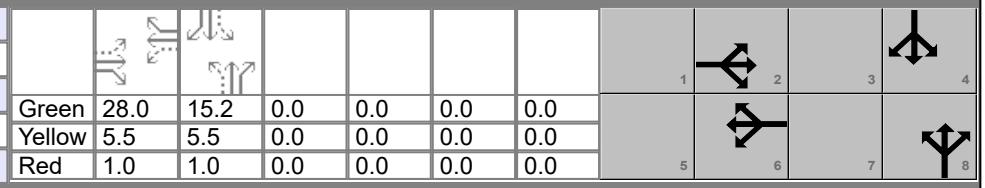
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.97 |
| Urban Street | SR-303 | Analysis Year | 2030 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2030 AM Existing - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 30 | 560 | 80 | 20 | 410 | 50 | 60 | 60 | 30 | 140 | 130 | 50 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 56.2 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |




| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Green | 28.0 | 15.2 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Yellow | 5.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 8.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 34.5 | | 34.5 | | 21.7 | | 21.7 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.1 | | 5.1 |
| Queue Clearance Time ( $g_s$ ), s | | 20.3 | | 13.1 | | 6.0 | | 12.7 |
| Green Extension Time ( $g_e$ ), s | | 7.6 | | 8.6 | | 2.8 | | 2.6 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.27 | | 0.14 | | 0.01 | | 0.03 |

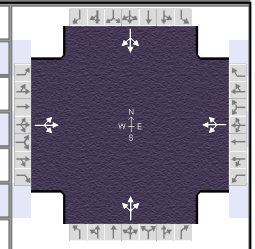
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 691 | | | 495 | | | 155 | | | 330 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1735 | | | 1711 | | | 1554 | | | 1584 | |
| Queue Service Time ( $g_s$ ), s | | 4.1 | | | 0.0 | | | 0.0 | | | 6.6 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 18.3 | | | 11.1 | | | 4.0 | | | 10.7 | |
| Green Ratio ( *g/C* ) | | 0.50 | | | 0.50 | | | 0.27 | | | 0.27 | |
| Capacity ( *c* ), veh/h | | 931 | | | 919 | | | 510 | | | 521 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.742 | | | 0.539 | | | 0.303 | | | 0.633 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 239.1 | | | 150.1 | | | 63.5 | | | 159.1 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 9.1 | | | 5.6 | | | 2.5 | | | 6.3 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.21 | | | 0.19 | | | 0.06 | | | 0.16 | |
| Uniform Delay ( $d_1$ ), s/veh | | 11.6 | | | 9.9 | | | 16.4 | | | 18.7 | |
| Incremental Delay ( $d_2$ ), s/veh | | 1.9 | | | 0.7 | | | 0.5 | | | 1.8 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | | 13.6 | | | 10.6 | | | 16.8 | | | 20.5 | |
| Level of Service (LOS) | | B | | | B | | | B | | | C | |
| Approach Delay, s/veh / LOS | 13.6 | B | | 10.6 | B | | 16.8 | B | | 20.5 | C | |
| Intersection Delay, s/veh / LOS | 14.4 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.65 | B | 1.65 | B | 1.68 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.63 | B | 1.30 | A | 0.74 | A | 1.03 | A |

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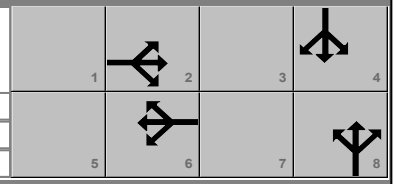
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.98 |
| Urban Street | SR-303 | Analysis Year | 2030 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2030 PM Existing - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 30 | 540 | 80 | 10 | 560 | 140 | 120 | 160 | 40 | 110 | 150 | 70 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 62.7 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| |  | |  | | | | |  | | | | |
| Green | 31.5 | | 18.2 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| Yellow | 5.5 | | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| Red | 1.0 | | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 8.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 38.0 | | 38.0 | | 24.7 | | 24.7 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.2 | | 5.2 |
| Queue Clearance Time ( $g_s$ ), s | | 19.9 | | 22.9 | | 14.6 | | 14.4 |
| Green Extension Time ( $g_e$ ), s | | 9.4 | | 8.6 | | 3.6 | | 3.6 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.38 | | 0.46 | | 0.14 | | 0.13 |

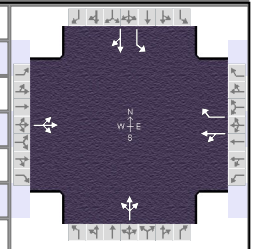
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 663 | | | 724 | | | 327 | | | 337 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1776 | | | 1796 | | | 1488 | | | 1540 | |
| Queue Service Time ( $g_s$ ), s | | 0.0 | | | 0.0 | | | 0.2 | | | 0.0 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 17.9 | | | 20.9 | | | 12.6 | | | 12.4 | |
| Green Ratio ( *g/C* ) | | 0.50 | | | 0.50 | | | 0.29 | | | 0.29 | |
| Capacity ( *c* ), veh/h | | 953 | | | 961 | | | 511 | | | 523 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.696 | | | 0.754 | | | 0.639 | | | 0.643 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 245.3 | | | 282.5 | | | 177 | | | 182 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 9.7 | | | 11.1 | | | 7.1 | | | 7.3 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.22 | | | 0.35 | | | 0.18 | | | 0.18 | |
| Uniform Delay ( $d_1$ ), s/veh | | 12.2 | | | 13.0 | | | 20.0 | | | 20.0 | |
| Incremental Delay ( $d_2$ ), s/veh | | 1.7 | | | 2.5 | | | 1.9 | | | 1.9 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | | 13.8 | | | 15.5 | | | 21.9 | | | 21.9 | |
| Level of Service (LOS) | | B | | | B | | | C | | | C | |
| Approach Delay, s/veh / LOS | 13.8 | B | | 15.5 | B | | 21.9 | C | | 21.9 | C | |
| Intersection Delay, s/veh / LOS | 17.0 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.65 | B | 1.65 | B | 1.68 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.58 | B | 1.68 | B | 1.03 | A | 1.04 | A |

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# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.89 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2050 AM Existing - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 130 | 270 | 30 | 100 | 250 | 150 | 50 | 300 | 60 | 170 | 200 | 50 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 84.2 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1 | 2 | 3 | 4 | |
| Green | 34.3 | 37.4 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5 | 6 | 7 | 8 | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 7.0 | | 8.0 | | 6.0 |
| Phase Duration, s | | 40.8 | | 40.8 | | 43.4 | | 43.4 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.2 | | 3.2 | | 3.3 | | 3.3 |
| Queue Clearance Time ( $g_s$ ), s | | 32.0 | | 25.2 | | 18.2 | | 35.2 |
| Green Extension Time ( $g_e$ ), s | | 2.2 | | 2.2 | | 2.2 | | 2.0 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.01 | | 0.00 | | 0.00 | | 0.02 |

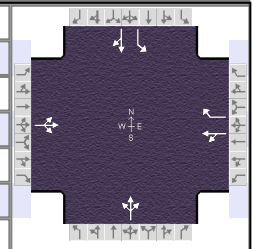
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 483 | | | 393 | 169 | | 461 | | 191 | 281 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1311 | | | 1246 | 1522 | | 1739 | | 895 | 1648 | |
| Queue Service Time ( $g_s$ ), s | | 6.8 | | | 0.0 | 6.2 | | 4.7 | | 17.1 | 9.6 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 30.0 | | | 23.2 | 6.2 | | 16.2 | | 33.2 | 9.6 | |
| Green Ratio ( *g/C* ) | | 0.41 | | | 0.41 | 0.41 | | 0.44 | | 0.44 | 0.44 | |
| Capacity ( *c* ), veh/h | | 590 | | | 563 | 621 | | 820 | | 312 | 732 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.819 | | | 0.699 | 0.272 | | 0.562 | | 0.613 | 0.384 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 345.6 | | | 261.8 | 93.5 | | 248.2 | | 171.3 | 160.6 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 13.2 | | | 9.9 | 3.5 | | 9.8 | | 6.2 | 5.8 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.35 | | | 0.16 | 0.75 | | 0.28 | | 0.76 | 0.18 | |
| Uniform Delay ( $d_1$ ), s/veh | | 23.7 | | | 20.9 | 16.6 | | 17.4 | | 29.9 | 15.7 | |
| Incremental Delay ( $d_2$ ), s/veh | | 2.5 | | | 0.6 | 0.1 | | 0.2 | | 0.7 | 0.1 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | | 26.2 | | | 21.5 | 16.7 | | 17.7 | | 30.7 | 15.8 | |
| Level of Service (LOS) | | C | | | C | B | | B | | C | B | |
| Approach Delay, s/veh / LOS | 26.2 | C | | 20.1 | C | | 17.7 | B | | 21.8 | C | |
| Intersection Delay, s/veh / LOS | 21.4 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.68 | B | 1.91 | B | 1.90 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.28 | A | 1.41 | A | 1.25 | A | 1.27 | A |

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# HCS Signalized Intersection Results Summary

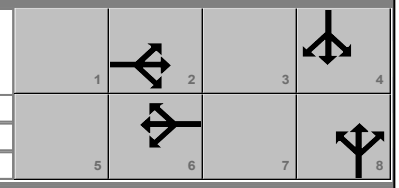
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.96 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2050 PM Existing - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 120 | 240 | 40 | 90 | 400 | 190 | 60 | 260 | 110 | 300 | 380 | 130 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 106.8 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 44.3 | 50.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 7.0 | | 8.0 | | 6.0 |
| Phase Duration, s | | 50.8 | | 50.8 | | 56.0 | | 56.0 |
| Change Period, ( *Y+R c* ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.2 | | 3.2 | | 3.3 | | 3.3 |
| Queue Clearance Time ( *g s* ), s | | 42.5 | | 37.7 | | 38.7 | | 52.0 |
| Green Extension Time ( *g e* ), s | | 1.8 | | 2.2 | | 2.7 | | 0.0 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.28 | | 0.07 | | 0.17 | | 1.00 |

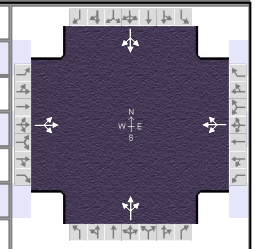
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 417 | | | 510 | 198 | | 448 | | 313 | 531 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1093 | | | 1416 | 1585 | | 1255 | | 1006 | 1802 | |
| Queue Service Time ( *g s* ), s | | 4.7 | | | 0.0 | 8.9 | | 12.9 | | 13.5 | 23.8 | |
| Cycle Queue Clearance Time ( *g c* ), s | | 40.5 | | | 35.7 | 8.9 | | 36.7 | | 50.0 | 23.8 | |
| Green Ratio ( *g/C* ) | | 0.41 | | | 0.41 | 0.41 | | 0.47 | | 0.47 | 0.47 | |
| Capacity ( *c* ), veh/h | | 497 | | | 628 | 658 | | 626 | | 195 | 844 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.838 | | | 0.813 | 0.301 | | 0.716 | | 1.604 | 0.630 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 411.7 | | | 446.4 | 143.1 | | 382.5 | | 914.5 | 366.1 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 16.1 | | | 17.6 | 5.6 | | 15.2 | | 36.3 | 14.5 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.41 | | | 0.27 | 1.14 | | 0.42 | | 4.06 | 0.41 | |
| Uniform Delay ( *d 1* ), s/veh | | 29.5 | | | 28.0 | 20.9 | | 24.3 | | 49.0 | 21.4 | |
| Incremental Delay ( *d 2* ), s/veh | | 8.4 | | | 5.5 | 0.1 | | 3.4 | | 294.5 | 1.2 | |
| Initial Queue Delay ( *d 3* ), s/veh | | 0.0 | | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | | 37.9 | | | 33.5 | 21.0 | | 27.7 | | 343.5 | 22.6 | |
| Level of Service (LOS) | | D | | | C | C | | C | | F | C | |
| Approach Delay, s/veh / LOS | 37.9 | D | | 30.0 | C | | 27.7 | C | | 141.4 | F | |
| Intersection Delay, s/veh / LOS | 69.8 | | | | | | E | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.69 | B | 1.91 | B | 1.91 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.18 | A | 1.66 | B | 1.23 | A | 1.88 | B |

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# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.97 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2050 AM Existing - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 30 | 620 | 90 | 20 | 450 | 60 | 70 | 70 | 30 | 150 | 140 | 60 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 64.8 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1 | 2 | 3 | 4 | |
| Green | 33.4 | 18.4 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Yellow | 5.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5 | 6 | 7 | 8 | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 8.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 39.9 | | 39.9 | | 24.9 | | 24.9 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.1 | | 5.1 |
| Queue Clearance Time ( $g_s$ ), s | | 26.3 | | 16.3 | | 7.8 | | 15.7 |
| Green Extension Time ( $g_e$ ), s | | 7.1 | | 9.5 | | 3.1 | | 2.7 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.54 | | 0.26 | | 0.01 | | 0.10 |

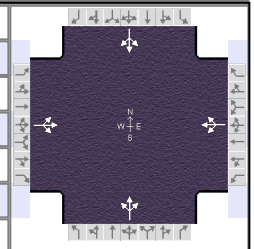
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 763 | | | 546 | | | 175 | | | 361 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1734 | | | 1709 | | | 1460 | | | 1575 | |
| Queue Service Time ( $g_s$ ), s | | 7.9 | | | 0.0 | | | 0.0 | | | 7.9 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 24.3 | | | 14.3 | | | 5.8 | | | 13.7 | |
| Green Ratio ( *g/C* ) | | 0.52 | | | 0.52 | | | 0.28 | | | 0.28 | |
| Capacity ( *c* ), veh/h | | 952 | | | 939 | | | 492 | | | 526 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.801 | | | 0.582 | | | 0.356 | | | 0.686 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 330.3 | | | 205.2 | | | 87.5 | | | 207.3 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 12.6 | | | 7.7 | | | 3.4 | | | 8.2 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.29 | | | 0.26 | | | 0.09 | | | 0.21 | |
| Uniform Delay ( $d_1$ ), s/veh | | 13.4 | | | 11.1 | | | 18.5 | | | 21.4 | |
| Incremental Delay ( $d_2$ ), s/veh | | 4.0 | | | 0.8 | | | 0.6 | | | 2.3 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | | 17.4 | | | 11.9 | | | 19.2 | | | 23.7 | |
| Level of Service (LOS) | | B | | | B | | | B | | | C | |
| Approach Delay, s/veh / LOS | 17.4 | B | | 11.9 | B | | 19.2 | B | | 23.7 | C | |
| Intersection Delay, s/veh / LOS | 17.2 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.65 | B | 1.65 | B | 1.68 | B | 1.68 | B |
| Bicycle LOS Score / LOS | 1.75 | B | 1.39 | A | 0.78 | A | 1.08 | A |

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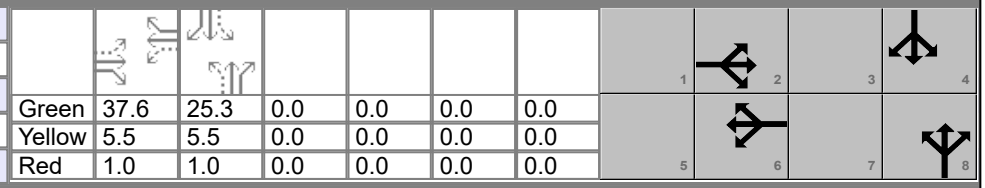
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.98 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2050 PM Existing - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 30 | 590 | 90 | 10 | 620 | 150 | 140 | 190 | 40 | 120 | 170 | 80 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 75.9 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |




| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Green | 37.6 | 25.3 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Yellow | 5.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 8.0 | | 8.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 44.1 | | 44.1 | | 31.8 | | 31.8 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.2 | | 5.2 |
| Queue Clearance Time ( $g_s$ ), s | | 28.1 | | 32.2 | | 22.5 | | 20.6 |
| Green Extension Time ( $g_e$ ), s | | 7.5 | | 5.4 | | 2.7 | | 3.2 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.71 | | 0.87 | | 0.68 | | 0.49 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | | 724 | | | 796 | | | 378 | | | 378 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | | 1760 | | | 1798 | | | 1344 | | | 1422 | |
| Queue Service Time ( $g_s$ ), s | | 0.0 | | | 4.1 | | | 1.9 | | | 0.0 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | | 26.1 | | | 30.2 | | | 20.5 | | | 18.6 | |
| Green Ratio ( *g/C* ) | | 0.50 | | | 0.50 | | | 0.33 | | | 0.33 | |
| Capacity ( *c* ), veh/h | | 922 | | | 940 | | | 513 | | | 536 | |
| Volume-to-Capacity Ratio ( *X* ) | | 0.786 | | | 0.847 | | | 0.736 | | | 0.704 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | | 373 | | | 444.5 | | | 256.8 | | | 246.2 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | | 14.7 | | | 17.5 | | | 10.3 | | | 9.8 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | | 0.33 | | | 0.56 | | | 0.26 | | | 0.25 | |
| Uniform Delay ( $d_1$ ), s/veh | | 16.1 | | | 17.2 | | | 23.4 | | | 22.6 | |
| Incremental Delay ( $d_2$ ), s/veh | | 4.4 | | | 7.0 | | | 4.5 | | | 3.4 | |
| Initial Queue Delay ( $d_3$ ), s/veh | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | | 20.5 | | | 24.2 | | | 27.9 | | | 26.1 | |
| Level of Service (LOS) | | C | | | C | | | C | | | C | |
| Approach Delay, s/veh / LOS | 20.5 | | C | 24.2 | | C | 27.9 | | C | 26.1 | | C |
| Intersection Delay, s/veh / LOS | 23.9 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.66 | B | 1.66 | B | 1.69 | B | 1.69 | B |
| Bicycle LOS Score / LOS | 1.68 | B | 1.80 | B | 1.11 | A | 1.11 | A |

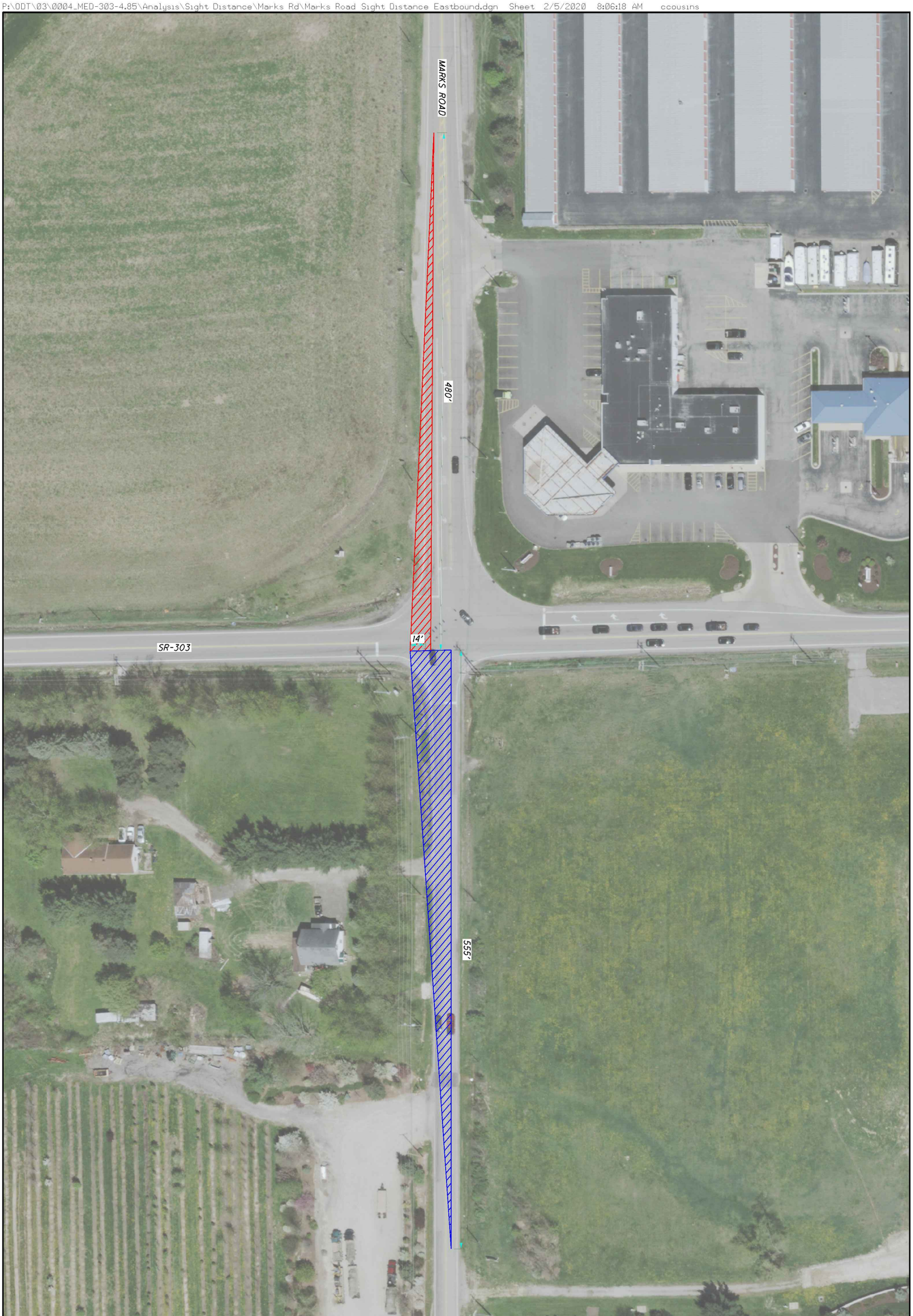
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# Appendix D
## Sight Distance Exhibits

CARPENTER MARTY transportation

Appendix D

P:\ODT\03\0004_MED-303-4.85\Analysis\Sight Distance\Marks Rd\Marks Road Sight Distance Eastbound.dgn Sheet 2/5/2020 8:06:18 AM ccousins




D2 of 9

CARPENTER MARTY transportation

# SIGHT DISTANCE EXHIBIT
# EASTBOUND AT MARKS ROAD

CALCULATED CMC
CHECKED AML

0 40
20 80
HORIZONTAL SCALE IN FEET

N

P:\ODT\03\0004_MED-303-4.85\Analysis\Sight Distance\Marks Rd\Marks Road Sight Distance Westbound.dgn Sheet 2/5/2020 8:08:14 AM ccousins




D3 of 9

11 | 2

CARPENTER MARTY transportation

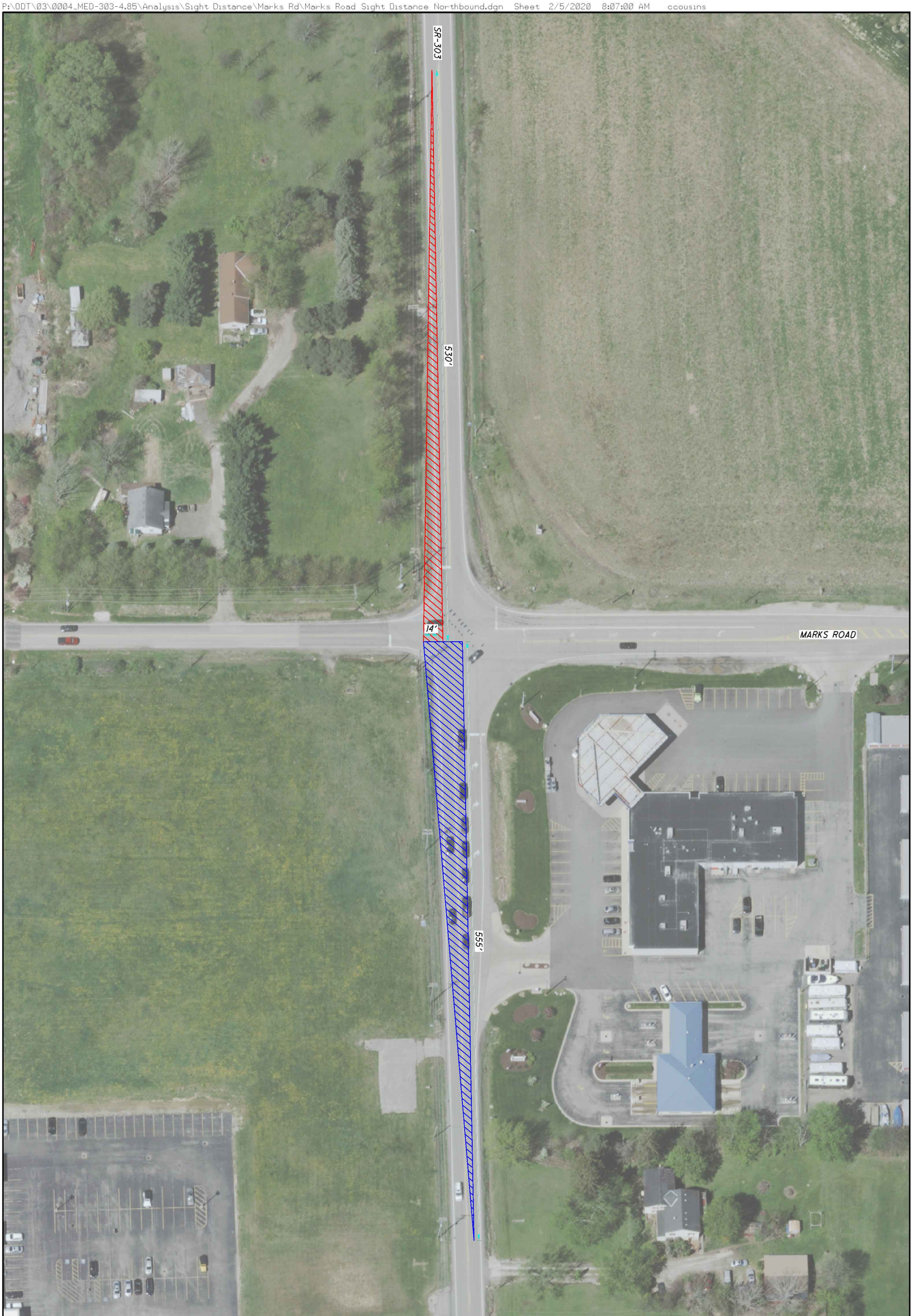
# SIGHT DISTANCE EXHIBIT
# WESTBOUND AT MARKS ROAD

CALCULATED CMC
CHECKED AML

0 40
20 80
HORIZONTAL SCALE IN FEET

N

P:\ODT\03\0004_MED-303-4.85\Analysis\Sight Distance\Marks Rd\Marks Road Sight Distance Northbound.dgn Sheet 2/5/2020 8:07:00 AM ccousins




D4 of 9

3
11

CARPENTER MARTY transportation

# SIGHT DISTANCE EXHIBIT
# NORTHBOUND AT MARKS ROAD

CALCULATED CMC
CHECKED AML

0 40
20 80
HORIZONTAL SCALE IN FEET

N

P:\ODT\03\0004_MED-303-4.85\Analysis\Sight Distance\Marks Rd\Marks Road Sight Distance Southbound.dgn Sheet 2/5/2020 8:07:38 AM ccousins




D5 of 9

4
11

CARPENTER MARTY transportation

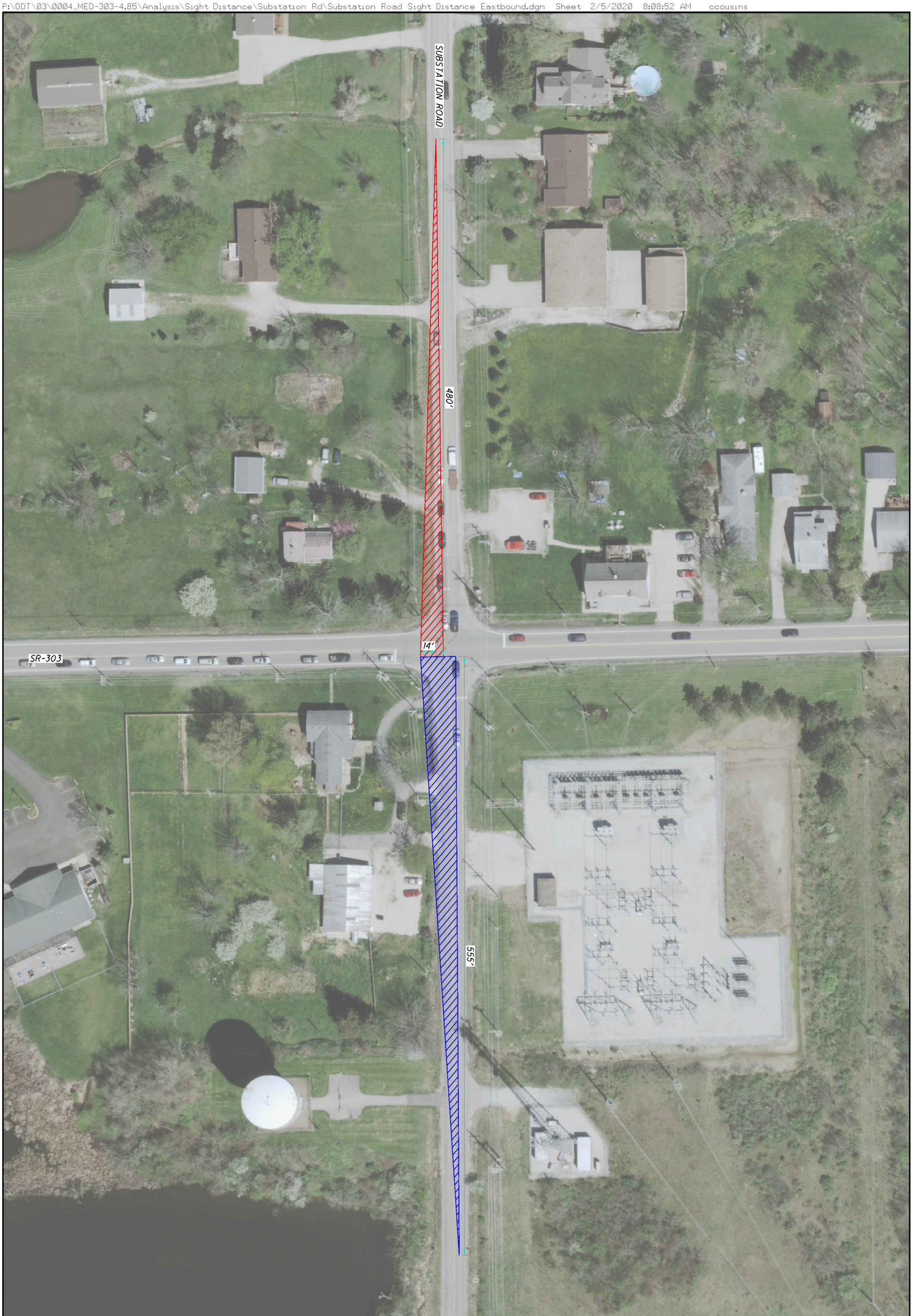
# SIGHT DISTANCE EXHIBIT
# SOUTHBOUND AT MARKS ROAD

CALCULATED CMC
CHECKED AML

0 40
20 80
HORIZONTAL SCALE IN FEET

N

P:\ODT\03\0004_MED-303-4.85\Analysis\Sight Distance\Substation Rd\Substation Road Sight Distance Eastbound.dgn Sheet 2/5/2020 8:08:52 AM ccousins




D6 of 9

11 | 8

CARPENTER MARTY transportation

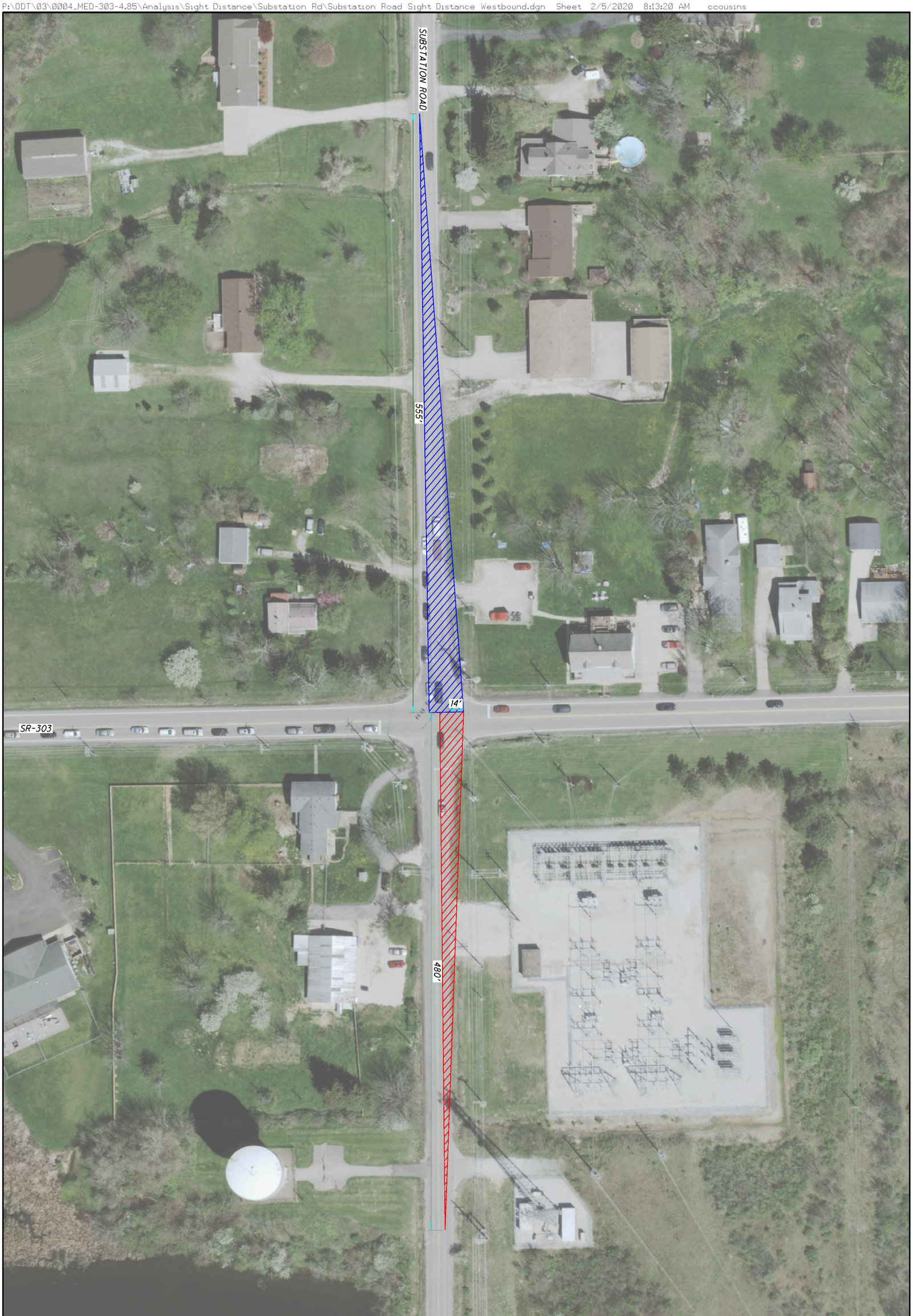
# SIGHT DISTANCE EXHIBIT
## EASTBOUND AT SUBSTATION ROAD

CALCULATED CMC
CHECKED AML

0 40
20 80
HORIZONTAL SCALE IN FEET

N

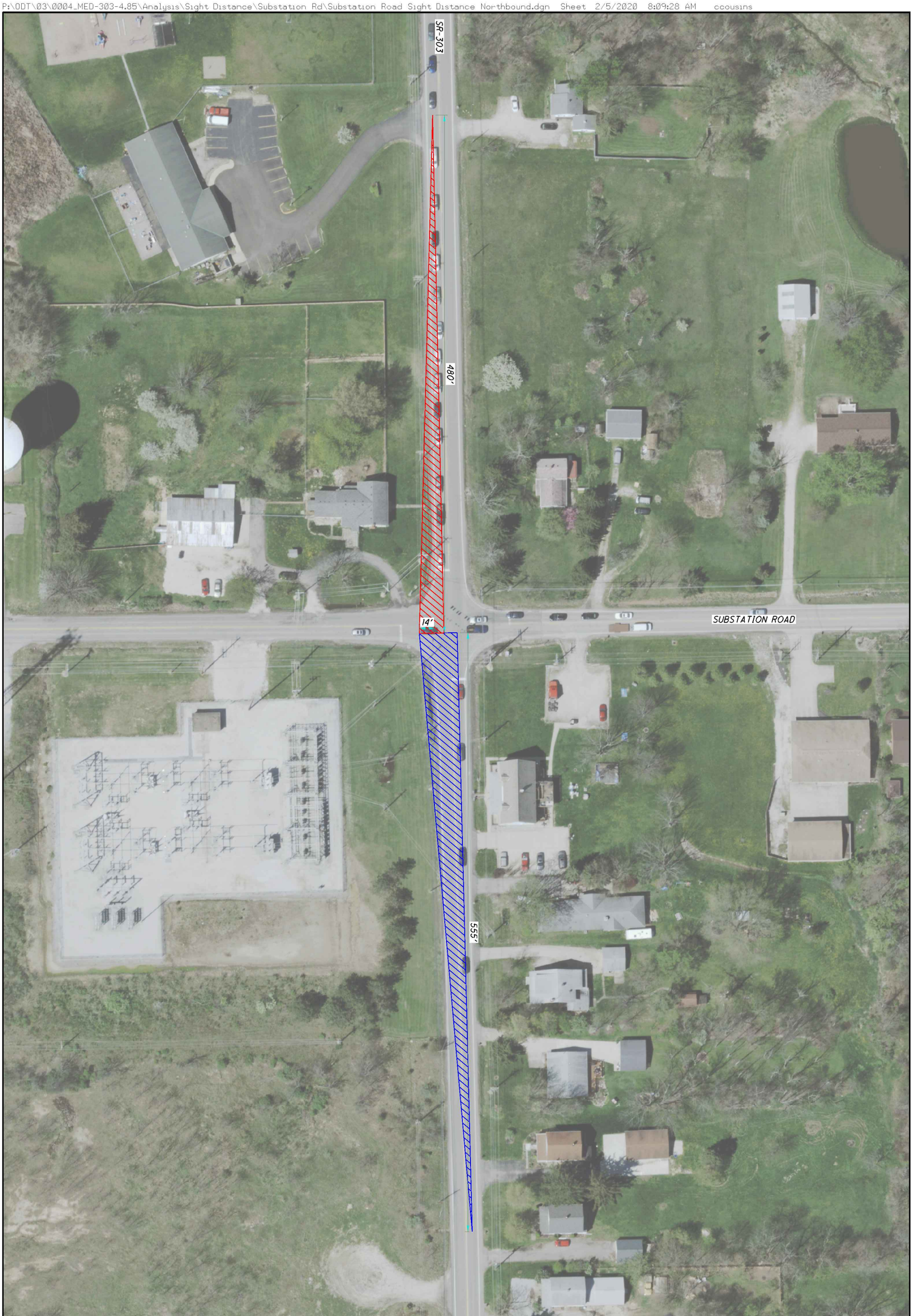
P:\ODT\03\0004_MED-303-4.85\Analysis\Sight Distance\Substation Rd\Substation Road Sight Distance Westbound.dgn Sheet 2/5/2020 8:13:20 AM ccousins




D7 of 9

| | | | | |
|---|---|---|---|---|
| 9 / 11 | CARPENTER MARTY transportation | SIGHT DISTANCE EXHIBIT<br>WESTBOUND AT SUBSTATION ROAD | CALCULATED CMC<br>CHECKED AML | 0 40<br>20 80<br>HORIZONTAL SCALE IN FEET |

P:\ODT\03\0004_MED-303-4.85\Analysis\Sight Distance\Substation Rd\Substation Road Sight Distance Northbound.dgn Sheet 2/5/2020 8:09:28 AM ccousins




D8 of 9

10
11

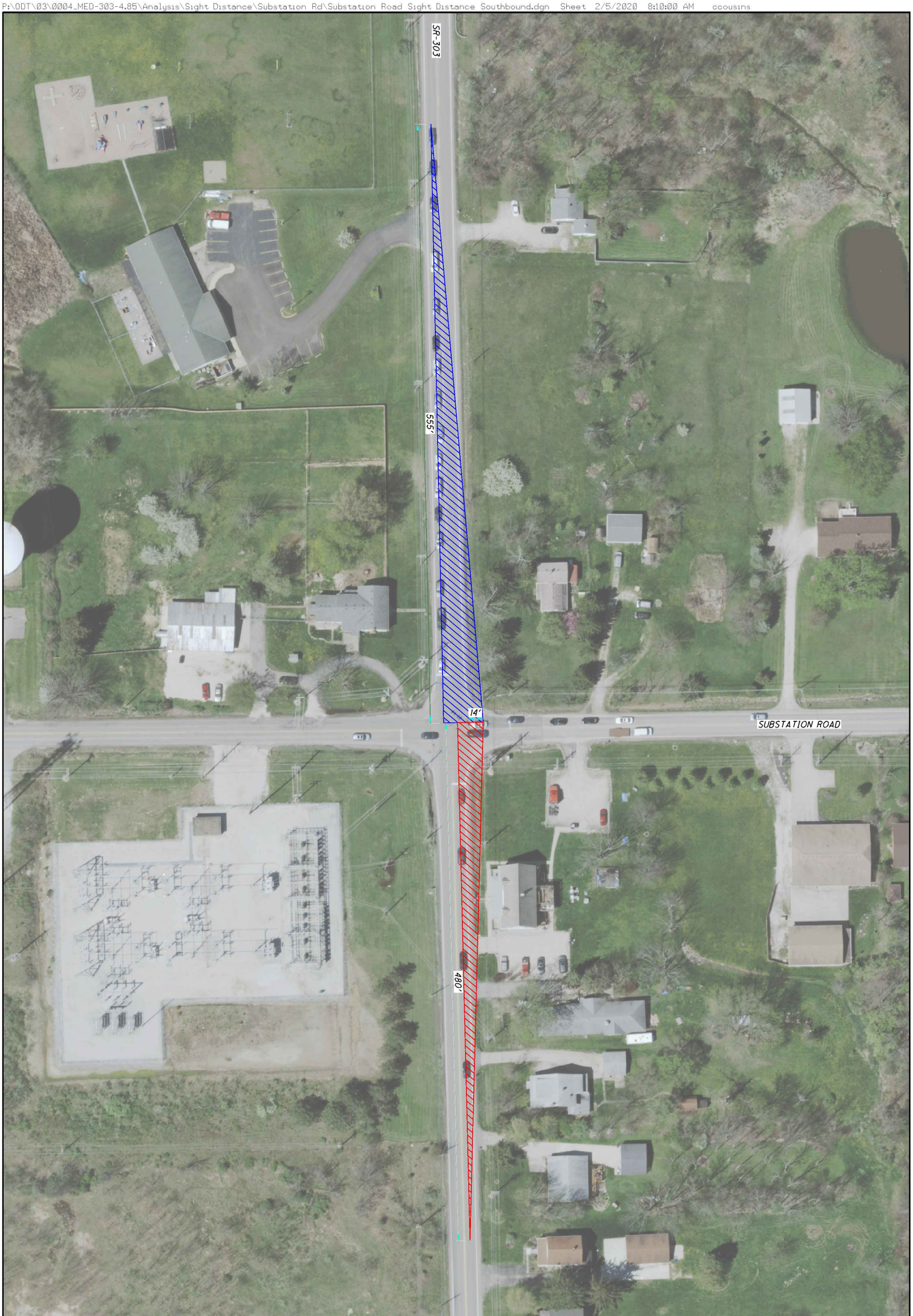
CARPENTER MARTY transportation

# SIGHT DISTANCE EXHIBIT
# NORTHBOUND AT SUBSTATION ROAD

CALCULATED CMC
CHECKED AML

0 40
20 80
HORIZONTAL SCALE IN FEET

N






CARPENTER MARTY transportation

# SIGHT DISTANCE EXHIBIT
# SOUTHBOUND AT SUBSTATION ROAD

CALCULATED CMC
CHECKED AML

0 40
20 80
HORIZONTAL SCALE IN FEET

N

# Appendix E
## HSM Results

Appendix E

CARPENTER MARTY transportation

## Project Information

### General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |
| Perform Benefit Cost Analysis? | Yes | | |

| | |
|---|---|
| **Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition?** | **Yes** |

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

| | |
|---|---|
| **If Yes, are you analyzing the existing or proposed conditions?** | **Existing** |

## Project Elements Description Table

| Project Element ID (Must be Unique) | Site Type | Intersection Control Type | Location Information | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NLFID | Begin Logpoint/ Intersection Midpoint | End Logpoint *(Leave blank for Intersection)* | Length (mi) OR Intersection Radius Buffer (mi) | Cross Route NLFID(s) | Common Name |
| SR303; 4.96 | Urban & Suburban Arterial Intersection | Signalized | SMEDSR00303**C | 4.96 | | 0.05 | CMEDCR000 | SR-303 & Marks Road |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

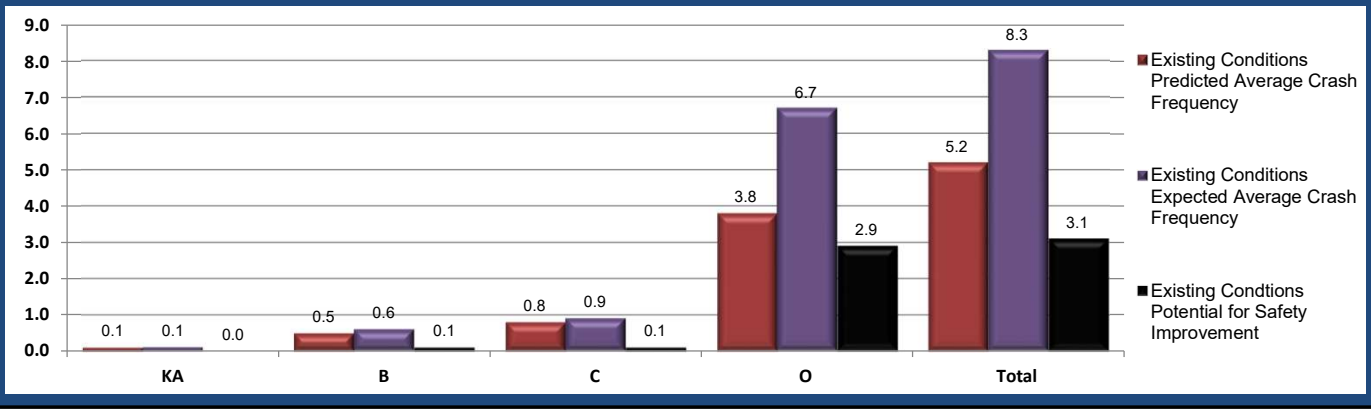
| | Year | AADT | |
|---|---|---|---|
| Present ADT (PADT) | | | veh / day |
| Future ADT (FADT) | | | veh / day |
| Annual Linear Growth Rate | | 0.0074 | |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary of Anticipated Safety Performance of the Project (average crashes/year)




## Project Summary Results (Without Animal Crashes)

| | KA | B | C | O | Total |
|---|---|---|---|---|---|
| $N_{predicted}$ - Existing Conditions | 0.0927 | 0.4939 | 0.7625 | 3.8398 | 5.1889 |
| $N_{expected}$ - Existing Conditions | 0.1071 | 0.5761 | 0.9113 | 6.7415 | 8.3360 |
| $N_{potential\ for\ improvement}$ - Existing Conditions | **0.0144** | **0.0822** | **0.1488** | **2.9017** | **3.1471** |

## Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.0927 | 0.4939 | 0.7625 | 3.8398 | 5.1889 |

## Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.1071 | 0.5761 | 0.9113 | 6.7415 | 8.336 |

## Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | **0.0144** | **0.0822** | **0.1488** | **2.9017** | **3.1471** |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary by Crash Type

| Crash Type | Existing | | | Proposed |
|---|---|---|---|---|
| | Predicted Crash Frequency | Expected Crash Frequency | PSI | Expected Crash Frequency |
| Unknown | 0.0067 | 0.0071 | **0.0003** | |
| Head On | 0.0838 | 0.1276 | **0.0438** | |
| Rear End | 2.2200 | 3.7060 | **1.4860** | |
| Backing | 0.1625 | 0.2884 | **0.1259** | |
| Sideswipe - Meeting | 0.0038 | 0.0063 | **0.0025** | |
| Sideswipe - Passing | 0.6064 | 1.0568 | **0.4504** | |
| Angle | 0.9134 | 1.4671 | **0.5537** | |
| Parked Vehicle | 0.0671 | 0.0706 | **0.0035** | |
| Pedestrian | 0.0117 | 0.0117 | 0.0000 | |
| Animal | 0.0000 | 0.0000 | 0.0000 | |
| Train | 0.0006 | 0.0006 | 0.0000 | |
| Pedalcycles | 0.1705 | 0.1705 | 0.0000 | |
| Other Non-Vehicle | 0.0001 | 0.0001 | 0.0000 | |
| Fixed Object | 0.1866 | 0.1962 | **0.0096** | |
| Other Object | 0.0057 | 0.0060 | **0.0003** | |
| Overturning | 0.0075 | 0.0079 | **0.0004** | |
| Other Non-Collision | 0.0129 | 0.0136 | **0.0007** | |
| Left Turn | 0.4724 | 0.7568 | **0.2844** | |
| Right Turn | 0.2571 | 0.4428 | **0.1857** | |

| Existing Conditions: General Information and Data for Urban And Suburban Arterial Intersection | | | | | |
|---|---|---|---|---|---|
| **General Information** | | | **Location Information** | | |
| Analyst | GMB | | Route | SR303 | |
| Agency or Company | Carpenter Marty Transportation | | Logpoint | 4.96 | |
| Date Performed | 02/20/25 | | Common Name | SR-303 & Marks Road | |
| Intersection | SR303; 4.96 | | Analysis Year | 2023 | |
| Signalized/Unsignalized | Signalized | | | | |
| **Input Data** | | | | **Existing Conditions** | **HSM Base Conditions** |
| Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG) | | | | 4SG | -- |
| AADT major (veh/day) (total entering on major approaches) | $AADT_{MAX}$ = | 67,700 | (veh/day) | 8,880 | -- |
| AADT minor (veh/day) (total entering on minor approaches) | $AADT_{MAX}$ = | 33,400 | (veh/day) | 7,570 | -- |
| | $AADT_{MAX}$ = | N/A | (veh/day) | | -- |
| Intersection lighting (present/not present) | | | | Present | Not Present |
| Calibration factor, $C_i$ | | | | Varies, See Below | 1.00 |
| Data for unsignalized intersections only: | | | | | |
| Number of major-road approaches with left-turn lanes | | | | [redacted] | 0 |
| Number of major-road approaches with right-turn lanes | | | | | 0 |
| | | | | | -- |
| | | | | | -- |
| Data for signalized intersections only: | | | | | |
| Number of approaches with left-turn lanes | | | | 1 | 0 |
| Number of approaches with right-turn lanes | | | | 1 | 0 |
| Number of approaches with left-turn signal phasing | | | | 0 | -- |
| Type of left-turn signal phasing for Leg #1 | | | | Permissive | Permissive |
| Type of left-turn signal phasing for Leg #2 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #3 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #4 | | | | Permissive | -- |
| Number of approaches with right-turn-on-red prohibited | | | | 0 | 0 |
| Intersection red light cameras (present/not present) | | | | Not Present | Not Present |
| Sum of all pedestrian crossing volumes (PedVol) | | | | 50 | -- |
| Maximum number of lanes crossed by a pedestrian ($n_{lanesx}$) | | | | 3 | -- |
| Number of bus stops within 300 m (1,000 ft) of the intersection | | | | 0 | 0 |
| Schools within 300 m (1,000 ft) of the intersection (present/not present) | | | | Not Present | Not Present |
| Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection | | | | 1 to 8 | 0 |
| Locality: | | | | State System | |

## Project Information

### General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |
| Perform Benefit Cost Analysis? | Yes | | |

| | |
|---|---|
| **Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition?** | **Yes** |

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

| | |
|---|---|
| **If Yes, are you analyzing the existing or proposed conditions?** | **Existing** |

## Project Elements Description Table

| Project Element ID (Must be Unique) | Site Type | Intersection Control Type | Location Information | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NLFID | Begin Logpoint/ Intersection Midpoint | End Logpoint *(Leave blank for Intersection)* | Length (mi) OR Intersection Radius Buffer (mi) | Cross Route NLFID(s) | Common Name |
| SR303; 5.88 | Urban & Suburban Arterial Intersection | Signalized | SMEDSR00303**C | 5.88 | | 0.05 | CMEDCR000 | SR-303 & Substation Road |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

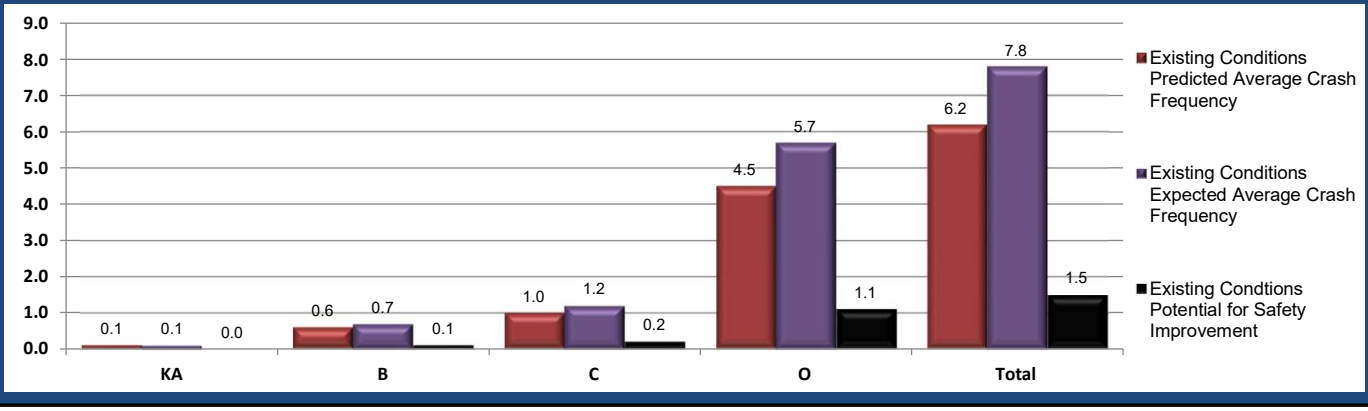
| | Year | AADT | |
|---|---|---|---|
| Present ADT (PADT) | | | veh / day |
| Future ADT (FADT) | | | veh / day |
| Annual Linear Growth Rate | | 0.0074 | |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary of Anticipated Safety Performance of the Project (average crashes/year)




## Project Summary Results (Without Animal Crashes)

| | KA | B | C | O | Total |
|---|---|---|---|---|---|
| $N_{predicted}$ - Existing Conditions | 0.1118 | 0.6103 | 0.9583 | 4.5397 | 6.2201 |
| $N_{expected}$ - Existing Conditions | 0.1351 | 0.7448 | 1.2032 | 5.6804 | 7.7635 |
| $N_{potential\ for\ improvement}$ - Existing Conditions | **0.0233** | **0.1345** | **0.2449** | **1.1407** | **1.5434** |

## Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.1118 | 0.6103 | 0.9583 | 4.5397 | 6.2201 |

## Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.1351 | 0.7448 | 1.2032 | 5.6804 | 7.7635 |

## Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | **0.0233** | **0.1345** | **0.2449** | **1.1407** | **1.5434** |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary by Crash Type

| Crash Type | Existing | | | Proposed |
|---|---|---|---|---|
| | Predicted Crash Frequency | Expected Crash Frequency | PSI | Expected Crash Frequency |
| Unknown | 0.0070 | 0.0080 | **0.0011** | |
| Head On | 0.1034 | 0.1315 | **0.0280** | |
| Rear End | 2.6857 | 3.3908 | **0.7051** | |
| Backing | 0.1937 | 0.2433 | **0.0496** | |
| Sideswipe - Meeting | 0.0046 | 0.0058 | **0.0012** | |
| Sideswipe - Passing | 0.7261 | 0.9135 | **0.1874** | |
| Angle | 1.1147 | 1.4116 | **0.2968** | |
| Parked Vehicle | 0.0704 | 0.0816 | **0.0113** | |
| Pedestrian | 0.0062 | 0.0062 | 0.0000 | |
| Animal | 0.0000 | 0.0000 | 0.0000 | |
| Train | 0.0006 | 0.0007 | **0.0001** | |
| Pedalcycles | 0.2057 | 0.2057 | 0.0000 | |
| Other Non-Vehicle | 0.0001 | 0.0001 | 0.0000 | |
| Fixed Object | 0.1900 | 0.2154 | **0.0254** | |
| Other Object | 0.0060 | 0.0070 | **0.0010** | |
| Overturning | 0.0072 | 0.0077 | **0.0005** | |
| Other Non-Collision | 0.0132 | 0.0150 | **0.0018** | |
| Left Turn | 0.5769 | 0.7306 | **0.1537** | |
| Right Turn | 0.3088 | 0.3888 | **0.0801** | |

| Existing Conditions: General Information and Data for Urban And Suburban Arterial Intersection | | | | | |
|---|---|---|---|---|---|
| **General Information** | | | **Location Information** | | |
| Analyst | GMB | | Route | SR303 | |
| Agency or Company | Carpenter Marty Transportation | | Logpoint | 5.88 | |
| Date Performed | 02/20/25 | | Common Name | SR-303 & Substation Road | |
| Intersection | SR303; 5.88 | | Analysis Year | 2023 | |
| Signalized/Unsignalized | Signalized | | | | |
| **Input Data** | | | | **Existing Conditions** | **HSM Base Conditions** |
| Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG) | | | | 4SG | -- |
| AADT major (veh/day) (total entering on major approaches) | $AADT_{MAX}$ = | 67,700 | (veh/day) | 12,290 | -- |
| AADT minor (veh/day) (total entering on minor approaches) | $AADT_{MAX}$ = | 33,400 | (veh/day) | 2,080 | -- |
| | $AADT_{MAX}$ = | N/A | (veh/day) | | -- |
| Intersection lighting (present/not present) | | | | Present | Not Present |
| Calibration factor, $C_i$ | | | | Varies, See Below | 1.00 |
| Data for unsignalized intersections only: | | | | | |
| Number of major-road approaches with left-turn lanes | | | | [redacted] | 0 |
| Number of major-road approaches with right-turn lanes | | | | | 0 |
| | | | | | -- |
| | | | | | -- |
| Data for signalized intersections only: | | | | | |
| Number of approaches with left-turn lanes | | | | 0 | 0 |
| Number of approaches with right-turn lanes | | | | 0 | 0 |
| Number of approaches with left-turn signal phasing | | | | 0 | -- |
| Type of left-turn signal phasing for Leg #1 | | | | Permissive | Permissive |
| Type of left-turn signal phasing for Leg #2 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #3 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #4 | | | | Permissive | -- |
| Number of approaches with right-turn-on-red prohibited | | | | 0 | 0 |
| Intersection red light cameras (present/not present) | | | | Not Present | Not Present |
| Sum of all pedestrian crossing volumes (PedVol) | | | | 50 | -- |
| Maximum number of lanes crossed by a pedestrian ($n_{lanesx}$) | | | | 2 | -- |
| Number of bus stops within 300 m (1,000 ft) of the intersection | | | | 0 | 0 |
| Schools within 300 m (1,000 ft) of the intersection (present/not present) | | | | Not Present | Not Present |
| Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection | | | | 0 | 0 |
| Locality: | | | | State System | |

## Project Information

### General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |
| Perform Benefit Cost Analysis? | Yes | | |

| | |
|---|---|
| **Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition?** | **Yes** |

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

| | |
|---|---|
| **If Yes, are you analyzing the existing or proposed conditions?** | **Proposed** |

## Project Elements Description Table

| Project Element ID (Must be Unique) | Site Type | Intersection Control Type | Location Information | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NLFID | Begin Logpoint/ Intersection Midpoint | End Logpoint *(Leave blank for Intersection)* | Length (mi) OR Intersection Radius Buffer (mi) | Cross Route NLFID(s) | Common Name |
| SR303; 4.96 | Urban & Suburban Arterial Intersection | Signalized | SMEDSR00303**C | 4.96 | | 0.05 | CMEDCR000 | SR-303 & Marks Road |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

| | Year | AADT | |
|---|---|---|---|
| Present ADT (PADT) | | | veh / day |
| Future ADT (FADT) | | | veh / day |
| Annual Linear Growth Rate | | 0.0074 | |

## Select Other Non-Site Characteristic Based Countermeasures For Entire Project

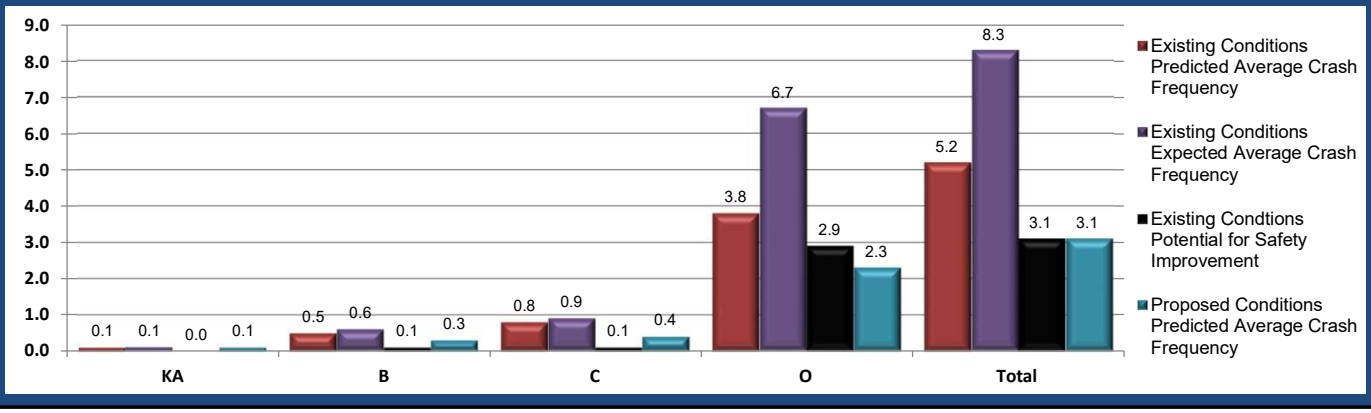
| CMF Nbr | Countermeasure | CMF KA Value | CMF B Value | CMF C Value | CMF O Value | CMF Valid for the Following Site Types |
|---|---|---|---|---|---|---|
| CMF 1 | Improve visibility of signal heads (existing span wire with no backplates) | 0.71 | 0.71 | 0.71 | 0.79 | 7 |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary of Anticipated Safety Performance of the Project (average crashes/year)




## Project Summary Results (Without Animal Crashes)

| | KA | B | C | O | Total |
|---|---|---|---|---|---|
| $N_{predicted}$ - Existing Conditions | 0.0927 | 0.4939 | 0.7625 | 3.8398 | 5.1889 |
| $N_{expected}$ - Existing Conditions | 0.1071 | 0.5761 | 0.9113 | 6.7415 | 8.3360 |
| $N_{potential\ for\ improvement}$ - Existing Conditions | **0.0144** | **0.0822** | **0.1488** | **2.9017** | **3.1471** |
| $N_{predicted}$ - Proposed Conditions | 0.0507 | 0.2687 | 0.4142 | 2.3172 | 3.0508 |

## Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.0927 | 0.4939 | 0.7625 | 3.8398 | 5.1889 |

## Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.1071 | 0.5761 | 0.9113 | 6.7415 | 8.336 |

## Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | **0.0144** | **0.0822** | **0.1488** | **2.9017** | **3.1471** |

## Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.0507 | 0.2687 | 0.4142 | 2.3172 | 3.0508 |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary by Crash Type

| Crash Type | Existing | | | Proposed |
|---|---|---|---|---|
| | Predicted Crash Frequency | Expected Crash Frequency | PSI | Predicted Crash Frequency |
| Unknown | 0.0067 | 0.0071 | **0.0003** | 0.0040 |
| Head On | 0.0838 | 0.1276 | **0.0438** | 0.0481 |
| Rear End | 2.2200 | 3.7060 | **1.4860** | 1.3098 |
| Backing | 0.1625 | 0.2884 | **0.1259** | 0.0977 |
| Sideswipe - Meeting | 0.0038 | 0.0063 | **0.0025** | 0.0022 |
| Sideswipe - Passing | 0.6064 | 1.0568 | **0.4504** | 0.3625 |
| Angle | 0.9134 | 1.4671 | **0.5537** | 0.5328 |
| Parked Vehicle | 0.0671 | 0.0706 | **0.0035** | 0.0399 |
| Pedestrian | 0.0117 | 0.0117 | 0.0000 | 0.0083 |
| Animal | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Train | 0.0006 | 0.0006 | 0.0000 | 0.0003 |
| Pedalcycles | 0.1705 | 0.1705 | 0.0000 | 0.0925 |
| Other Non-Vehicle | 0.0001 | 0.0001 | 0.0000 | 0.0001 |
| Fixed Object | 0.1866 | 0.1962 | **0.0096** | 0.1089 |
| Other Object | 0.0057 | 0.0060 | **0.0003** | 0.0034 |
| Overturning | 0.0075 | 0.0079 | **0.0004** | 0.0042 |
| Other Non-Collision | 0.0129 | 0.0136 | **0.0007** | 0.0076 |
| Left Turn | 0.4724 | 0.7568 | **0.2844** | 0.2754 |
| Right Turn | 0.2571 | 0.4428 | **0.1857** | 0.1531 |

| Proposed Conditions: General Information and Data for Urban And Suburban Arterial Intersection | | | | | |
|---|---|---|---|---|---|
| **General Information** | | | **Location Information** | | |
| Analyst | GMB | | Route | SR303 | |
| Agency or Company | Carpenter Marty Transportation | | Logpoint | 4.96 | |
| Date Performed | 02/20/25 | | Common Name | SR-303 & Marks Road | |
| Intersection | SR303; 4.96 | | Analysis Year | 2023 | |
| Signalized/Unsignalized | Signalized | | | | |
| **Input Data** | | | | **Proposed Conditions** | **HSM Base Conditions** |
| Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG) | | | | 4SG | -- |
| AADT major (veh/day) (total entering on major approaches) | $AADT_{MAX}$ = | 67,700 | (veh/day) | 8,880 | -- |
| AADT minor (veh/day) (total entering on minor approaches) | $AADT_{MAX}$ = | 33,400 | (veh/day) | 7,570 | -- |
| | $AADT_{MAX}$ = | N/A | (veh/day) | | -- |
| Intersection lighting (present/not present) | | | | Present | Not Present |
| Calibration factor, $C_i$ | | | | Varies, See Below | 1.00 |
| Data for unsignalized intersections only: | | | | | |
| Number of major-road approaches with left-turn lanes | | | | [redacted] | 0 |
| Number of major-road approaches with right-turn lanes | | | | | 0 |
| | | | | | -- |
| | | | | | -- |
| Data for signalized intersections only: | | | | | |
| Number of approaches with left-turn lanes | | | | 4 | 0 |
| Number of approaches with right-turn lanes | | | | 0 | 0 |
| Number of approaches with left-turn signal phasing | | | | 0 | -- |
| Type of left-turn signal phasing for Leg #1 | | | | Permissive | Permissive |
| Type of left-turn signal phasing for Leg #2 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #3 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #4 | | | | Permissive | -- |
| Number of approaches with right-turn-on-red prohibited | | | | 0 | 0 |
| Intersection red light cameras (present/not present) | | | | Not Present | Not Present |
| Sum of all pedestrian crossing volumes (PedVol) | | | | 50 | -- |
| Maximum number of lanes crossed by a pedestrian ($n_{lanesx}$) | | | | 3 | -- |
| Number of bus stops within 300 m (1,000 ft) of the intersection | | | | 0 | 0 |
| Schools within 300 m (1,000 ft) of the intersection (present/not present) | | | | Not Present | Not Present |
| Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection | | | | 1 to 8 | 0 |
| Locality: | | | | State System | |

| Proposed Conditions: Summary of Other CMFs (Without Animal Crashes) | | | | | | |
|---|---|---|---|---|---|---|
| CMF Nbr | Countermeasure | KA Value | B Value | C Value | O Value | Total |
| CMF 1 | Improve visibility of signal heads (existing span wire with no backplates) | -0.0207 | -0.1098 | -0.1692 | -0.6160 | -0.9157 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| *Total* | | *-0.0207* | *-0.1098* | *-0.1692* | *-0.616* | *-0.9157* |

| Proposed Intersection: Summary Results (Without Animal Crashes) (Crashes/Year) | | | | | |
|---|---|---|---|---|---|
| | KA | B | C | O | Total |
| $N_{predicted}$ | 0.0714 | 0.3785 | 0.5834 | 2.9332 | 3.9665 |
| $N_{predicted}$ - Proposed Conditions All CMFs | 0.0507 | 0.2687 | 0.4142 | 2.3172 | 3.0508 |

## Project Information

### General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |
| Perform Benefit Cost Analysis? | Yes | | |

| Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition? | Yes |
|---|---|

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

| If Yes, are you analyzing the existing or proposed conditions? | Proposed |
|---|---|

## Project Elements Description Table

| Project Element ID (Must be Unique) | Site Type | Intersection Control Type | Location Information | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NLFID | Begin Logpoint/ Intersection Midpoint | End Logpoint *(Leave blank for Intersection)* | Length (mi) OR Intersection Radius Buffer (mi) | Cross Route NLFID(s) | Common Name |
| SR303; 5.88 | Urban & Suburban Arterial Intersection | Signalized | SMEDSR00303**C | 5.88 | | 0.05 | CMEDCR000 | SR-303 & Substation Road |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

| | Year | AADT | |
|---|---|---|---|
| Present ADT (PADT) | | | veh / day |
| Future ADT (FADT) | | | veh / day |
| Annual Linear Growth Rate | | 0.0074 | |

## Select Other Non-Site Characteristic Based Countermeasures For Entire Project

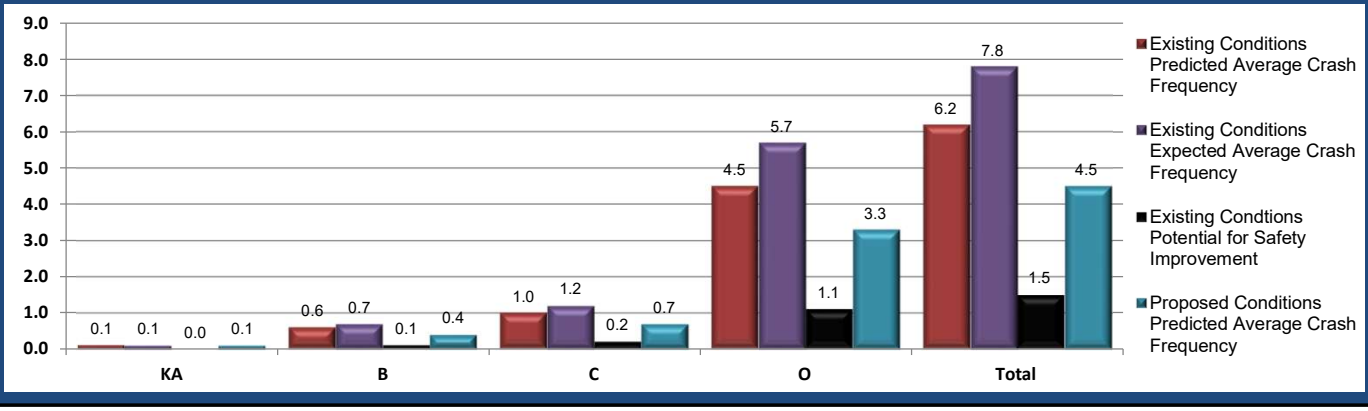
| CMF Nbr | Countermeasure | CMF KA Value | CMF B Value | CMF C Value | CMF O Value | CMF Valid for the Following Site Types |
|---|---|---|---|---|---|---|
| CMF 1 | Improve visibility of signal heads (existing span wire with no backplates) | 0.71 | 0.71 | 0.71 | 0.79 | 7 |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary of Anticipated Safety Performance of the Project (average crashes/year)




## Project Summary Results (Without Animal Crashes)

| | KA | B | C | O | Total |
|---|---|---|---|---|---|
| $N_{predicted}$ - Existing Conditions | 0.1118 | 0.6103 | 0.9583 | 4.5397 | 6.2201 |
| $N_{expected}$ - Existing Conditions | 0.1351 | 0.7448 | 1.2032 | 5.6804 | 7.7635 |
| $N_{potential\ for\ improvement}$ - Existing Conditions | **0.0233** | **0.1345** | **0.2449** | **1.1407** | **1.5434** |
| $N_{predicted}$ - Proposed Conditions | 0.0776 | 0.4231 | 0.6640 | 3.2911 | 4.4558 |

## Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.1118 | 0.6103 | 0.9583 | 4.5397 | 6.2201 |

## Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.1351 | 0.7448 | 1.2032 | 5.6804 | 7.7635 |

## Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | **0.0233** | **0.1345** | **0.2449** | **1.1407** | **1.5434** |

## Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.0776 | 0.4231 | 0.664 | 3.2911 | 4.4558 |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary by Crash Type

| Crash Type | Existing | | | Proposed |
|---|---|---|---|---|
| | Predicted Crash Frequency | Expected Crash Frequency | PSI | Predicted Crash Frequency |
| Unknown | 0.0070 | 0.0080 | **0.0011** | 0.0050 |
| Head On | 0.1034 | 0.1315 | **0.0280** | 0.0733 |
| Rear End | 2.6857 | 3.3908 | **0.7051** | 1.9266 |
| Backing | 0.1937 | 0.2433 | **0.0496** | 0.1402 |
| Sideswipe - Meeting | 0.0046 | 0.0058 | **0.0012** | 0.0033 |
| Sideswipe - Passing | 0.7261 | 0.9135 | **0.1874** | 0.5240 |
| Angle | 1.1147 | 1.4116 | **0.2968** | 0.7956 |
| Parked Vehicle | 0.0704 | 0.0816 | **0.0113** | 0.0507 |
| Pedestrian | 0.0062 | 0.0062 | 0.0000 | 0.0053 |
| Animal | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Train | 0.0006 | 0.0007 | **0.0001** | 0.0004 |
| Pedalcycles | 0.2057 | 0.2057 | 0.0000 | 0.1424 |
| Other Non-Vehicle | 0.0001 | 0.0001 | 0.0000 | 0.0001 |
| Fixed Object | 0.1900 | 0.2154 | **0.0254** | 0.1359 |
| Other Object | 0.0060 | 0.0070 | **0.0010** | 0.0043 |
| Overturning | 0.0072 | 0.0077 | **0.0005** | 0.0050 |
| Other Non-Collision | 0.0132 | 0.0150 | **0.0018** | 0.0095 |
| Left Turn | 0.5769 | 0.7306 | **0.1537** | 0.4116 |
| Right Turn | 0.3088 | 0.3888 | **0.0801** | 0.2225 |

| Proposed Conditions: General Information and Data for Urban And Suburban Arterial Intersection | | | | | |
|---|---|---|---|---|---|
| **General Information** | | | **Location Information** | | |
| Analyst | GMB | | Route | SR303 | |
| Agency or Company | Carpenter Marty Transportation | | Logpoint | 5.88 | |
| Date Performed | 02/20/25 | | Common Name | SR-303 & Substation Road | |
| Intersection | SR303; 5.88 | | Analysis Year | 2023 | |
| Signalized/Unsignalized | Signalized | | | | |
| **Input Data** | | | | **Proposed Conditions** | **HSM Base Conditions** |
| Intersection type (3ST, 3SG, 4ST, 4SG, 3STT, 3aST, 4aST, 3ST (HS), 3SG (HS), 4ST (HS), 4SG (HS), 5SG) | | | | 4SG | -- |
| AADT major (veh/day) (total entering on major approaches) | $AADT_{MAX}$ = | 67,700 | (veh/day) | 12,290 | -- |
| AADT minor (veh/day) (total entering on minor approaches) | $AADT_{MAX}$ = | 33,400 | (veh/day) | 2,080 | -- |
| | $AADT_{MAX}$ = | N/A | (veh/day) | | -- |
| Intersection lighting (present/not present) | | | | Present | Not Present |
| Calibration factor, $C_i$ | | | | Varies, See Below | 1.00 |
| Data for unsignalized intersections only: | | | | | |
| Number of major-road approaches with left-turn lanes | | | | [redacted] | 0 |
| Number of major-road approaches with right-turn lanes | | | | | 0 |
| | | | | | -- |
| | | | | | -- |
| Data for signalized intersections only: | | | | | |
| Number of approaches with left-turn lanes | | | | 2 | 0 |
| Number of approaches with right-turn lanes | | | | 0 | 0 |
| Number of approaches with left-turn signal phasing | | | | 0 | -- |
| Type of left-turn signal phasing for Leg #1 | | | | Permissive | Permissive |
| Type of left-turn signal phasing for Leg #2 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #3 | | | | Permissive | -- |
| Type of left-turn signal phasing for Leg #4 | | | | Permissive | -- |
| Number of approaches with right-turn-on-red prohibited | | | | 0 | 0 |
| Intersection red light cameras (present/not present) | | | | Not Present | Not Present |
| Sum of all pedestrian crossing volumes (PedVol) | | | | 50 | -- |
| Maximum number of lanes crossed by a pedestrian ($n_{lanesx}$) | | | | 2 | -- |
| Number of bus stops within 300 m (1,000 ft) of the intersection | | | | 0 | 0 |
| Schools within 300 m (1,000 ft) of the intersection (present/not present) | | | | Not Present | Not Present |
| Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection | | | | 0 | 0 |
| Locality: | | | | State System | |

| Proposed Conditions: Summary of Other CMFs (Without Animal Crashes) | | | | | | |
|---|---|---|---|---|---|---|
| CMF Nbr | Countermeasure | KA Value | B Value | C Value | O Value | Total |
| CMF 1 | Improve visibility of signal heads (existing span wire with no backplates) | -0.0132 | -0.0718 | -0.1126 | -0.3861 | -0.5837 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| *Total* | | *-0.0132* | *-0.0718* | *-0.1126* | *-0.3861* | *-0.5837* |

| Proposed Intersection: Summary Results (Without Animal Crashes) (Crashes/Year) | | | | | |
|---|---|---|---|---|---|
| | KA | B | C | O | Total |
| $N_{predicted}$ | 0.0908 | 0.4949 | 0.7766 | 3.6772 | 5.0395 |
| $N_{predicted}$ - Proposed Conditions All CMFs | 0.0776 | 0.4231 | 0.6640 | 3.2911 | 4.4558 |

## Project Information

### General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |
| Perform Benefit Cost Analysis? | Yes | | |

| | |
|---|---|
| **Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition?** | **Yes** |

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

| | |
|---|---|
| **If Yes, are you analyzing the existing or proposed conditions?** | **Proposed** |

## Project Elements Description Table

| Project Element ID (Must be Unique) | Site Type | Intersection Control Type | Location Information | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NLFID | Begin Logpoint/ Intersection Midpoint | End Logpoint *(Leave blank for Intersection)* | Length (mi) OR Intersection Radius Buffer (mi) | Cross Route NLFID(s) | Common Name |
| SR303; 4.96 | Roundabout | Unsignalized | SMEDSR00303**C | 4.96 | | 0.05 | CMEDCR000 | SR-303 & Marks Road |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

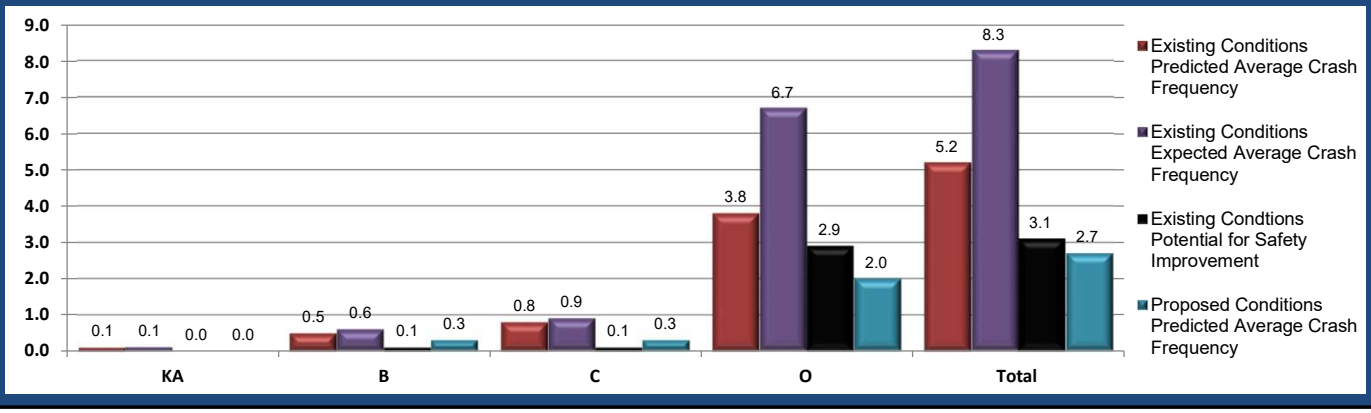
| | Year | AADT | |
|---|---|---|---|
| Present ADT (PADT) | | | veh / day |
| Future ADT (FADT) | | | veh / day |
| Annual Linear Growth Rate | | 0.0074 | |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary of Anticipated Safety Performance of the Project (average crashes/year)




## Project Summary Results (Without Animal Crashes)

| | KA | B | C | O | Total |
|---|---|---|---|---|---|
| $N_{predicted}$ - Existing Conditions | 0.0927 | 0.4939 | 0.7625 | 3.8398 | 5.1889 |
| $N_{expected}$ - Existing Conditions | 0.1071 | 0.5761 | 0.9113 | 6.7415 | 8.3360 |
| $N_{potential\ for\ improvement}$ - Existing Conditions | **0.0144** | **0.0822** | **0.1488** | **2.9017** | **3.1471** |
| $N_{expected}$ - Proposed Conditions | 0.0320 | 0.2694 | 0.3337 | 2.0392 | 2.6743 |

## Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.0927 | 0.4939 | 0.7625 | 3.8398 | 5.1889 |

## Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.1071 | 0.5761 | 0.9113 | 6.7415 | 8.336 |

## Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | **0.0144** | **0.0822** | **0.1488** | **2.9017** | **3.1471** |

## Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 4.96 | SR-303 & Marks Road | 0.032 | 0.2694 | 0.3337 | 2.0392 | 2.6743 |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary by Crash Type

| Crash Type | Existing | | | Proposed |
|---|---|---|---|---|
| | Predicted Crash Frequency | Expected Crash Frequency | PSI | Predicted Crash Frequency |
| Unknown | 0.0067 | 0.0071 | **0.0003** | 0.0681 |
| Head On | 0.0838 | 0.1276 | **0.0438** | 0.0064 |
| Rear End | 2.2200 | 3.7060 | **1.4860** | 0.4617 |
| Backing | 0.1625 | 0.2884 | **0.1259** | 0.0206 |
| Sideswipe - Meeting | 0.0038 | 0.0063 | **0.0025** | 0.0000 |
| Sideswipe - Passing | 0.6064 | 1.0568 | **0.4504** | 0.7938 |
| Angle | 0.9134 | 1.4671 | **0.5537** | 0.7501 |
| Parked Vehicle | 0.0671 | 0.0706 | **0.0035** | 0.0000 |
| Pedestrian | 0.0117 | 0.0117 | 0.0000 | 0.0064 |
| Animal | 0.0000 | 0.0000 | 0.0000 | 0.0270 |
| Train | 0.0006 | 0.0006 | 0.0000 | 0.0000 |
| Pedalcycles | 0.1705 | 0.1705 | 0.0000 | 0.0064 |
| Other Non-Vehicle | 0.0001 | 0.0001 | 0.0000 | 0.0000 |
| Fixed Object | 0.1866 | 0.1962 | **0.0096** | 0.2702 |
| Other Object | 0.0057 | 0.0060 | **0.0003** | 0.0000 |
| Overturning | 0.0075 | 0.0079 | **0.0004** | 0.0064 |
| Other Non-Collision | 0.0129 | 0.0136 | **0.0007** | 0.0476 |
| Left Turn | 0.4724 | 0.7568 | **0.2844** | 0.0668 |
| Right Turn | 0.2571 | 0.4428 | **0.1857** | 0.1698 |

| Proposed Conditions: General Information and Data for Roundabout Intersection | | | |
|---|---|---|---|
| **General Information** | | **Location Information** | |
| Analyst | GMB | Route | SR303 |
| Agency or Company | Carpenter Marty Transportation | Logpoint | 4.96 |
| Date Performed | 02/20/25 | Common Name | SR-303 & Marks Road |
| Intersection | SR303; 4.96 | Analysis Year | 2023 |
| Signalized/Unsignalized | Unsignalized | | |

| Input Data | | | | | Proposed Conditions | HSM Base Conditions |
|---|---|---|---|---|---|---|
| Area Type (Rural, Urban) | | | | | Urban | -- |
| Number of Legs (3 or 4) | | | | | 4 | -- |
| Single-Lane or Multi-lane Roundabout | | | | | Single-Lane | -- |
| Total Entering AADT (veh/day) | | | | | 16,450 | -- |
| Inscribed Circle Diameter (feet) | | | | | 110 | 0 |
| Presence of Outbound Only Leg (present/not present) | | | | | Not Present | Not Present |
| Calibration Factor, $C_i$ | | | | | Varies, See Below | 1.00 |
| Locality: | | | | | State System | -- |
| Leg 1 | Leg 1 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 4,400 | -- |
| | Bypass lane (present/not present) - Leg 1 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 1 | | | | 1 | -- |
| | Entry width (feet) - Leg 1 | | | | 34 | 24-34 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 1 | | | | 2 | -- |
| Leg 2 | Leg 2 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 3,820 | -- |
| | Bypass lane (present/not present) - Leg 2 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 2 | | | | 0 | -- |
| | Entry width (feet) - Leg 2 | | | | 22 | 16-25 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 2 | | | | 1 | -- |
| Leg 3 | Leg 3 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 3,170 | -- |
| | Bypass lane (present/not present) - Leg 3 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 3 | | | | 1 | -- |
| | Entry width (feet) - Leg 3 | | | | 21 | 16-25 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 3 | | | | 1 | -- |
| Leg 4 | Leg 4 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 5,060 | -- |
| | Bypass lane (present/not present) - Leg 4 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 4 | | | | 1 | -- |
| | Entry width (feet) - Leg 4 | | | | 21 | 16-25 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 4 | | | | 1 | -- |

## Project Information

### General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |
| Perform Benefit Cost Analysis? | Yes | | |

| | |
|---|---|
| **Do the proposed improvements fundamentally change the conditions of the base safety performance function (SPF), Or is crash data unavailable for the analysis condition, Or is only predicted (and not expected) analysis needed for the existing or proposed condition?** | **Yes** |

(Examples: unsignalized to signalized, undivided to divided, increase or decrease in the number of lanes, change the number of approaches to an intersection, significant realignment of the roadway)

| | |
|---|---|
| **If Yes, are you analyzing the existing or proposed conditions?** | **Proposed** |

## Project Elements Description Table

| Project Element ID (Must be Unique) | Site Type | Intersection Control Type | Location Information | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NLFID | Begin Logpoint/ Intersection Midpoint | End Logpoint *(Leave blank for Intersection)* | Length (mi) OR Intersection Radius Buffer (mi) | Cross Route NLFID(s) | Common Name |
| SR303; 5.88 | Roundabout | Unsignalized | SMEDSR00303**C | 5.88 | | 0.05 | CMEDCR000 | SR-303 & Substation Road |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Traffic Volume Growth Rate Calculation For Benefit Cost Analysis

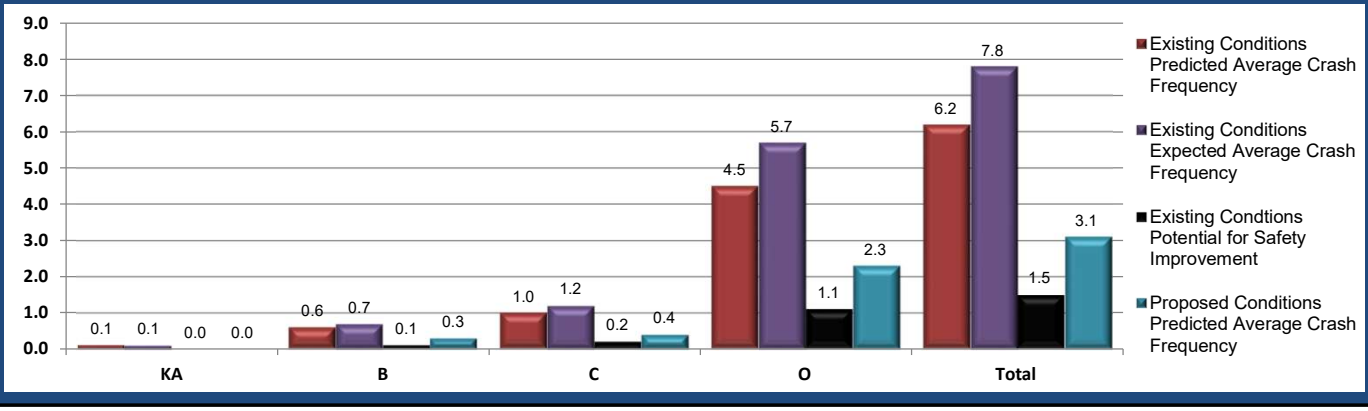
| | Year | AADT | |
|---|---|---|---|
| Present ADT (PADT) | | | veh / day |
| Future ADT (FADT) | | | veh / day |
| Annual Linear Growth Rate | | 0.0074 | |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary of Anticipated Safety Performance of the Project (average crashes/year)




## Project Summary Results (Without Animal Crashes)

| | KA | B | C | O | Total |
|---|---|---|---|---|---|
| $N_{predicted}$ - Existing Conditions | 0.1118 | 0.6103 | 0.9583 | 4.5397 | 6.2201 |
| $N_{expected}$ - Existing Conditions | 0.1351 | 0.7448 | 1.2032 | 5.6804 | 7.7635 |
| $N_{potential\ for\ improvement}$ - Existing Conditions | **0.0233** | **0.1345** | **0.2449** | **1.1407** | **1.5434** |
| $N_{expected}$ - Proposed Conditions | 0.0374 | 0.3135 | 0.3879 | 2.3390 | 3.0778 |

## Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.1118 | 0.6103 | 0.9583 | 4.5397 | 6.2201 |

## Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.1351 | 0.7448 | 1.2032 | 5.6804 | 7.7635 |

## Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | **0.0233** | **0.1345** | **0.2449** | **1.1407** | **1.5434** |

## Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

| Project Element ID | Common Name | Crash Severity Level | | | | |
|---|---|---|---|---|---|---|
| | | KA | B | C | O | Total |
| SR303; 5.88 | SR-303 & Substation Road | 0.0374 | 0.3135 | 0.3879 | 2.339 | 3.0778 |

# Project Safety Performance Report

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

## Summary by Crash Type

| Crash Type | Existing | | | Proposed |
|---|---|---|---|---|
| | Predicted Crash Frequency | Expected Crash Frequency | PSI | Predicted Crash Frequency |
| Unknown | 0.0070 | 0.0080 | **0.0011** | 0.0783 |
| Head On | 0.1034 | 0.1315 | **0.0280** | 0.0075 |
| Rear End | 2.6857 | 3.3908 | **0.7051** | 0.5322 |
| Backing | 0.1937 | 0.2433 | **0.0496** | 0.0236 |
| Sideswipe - Meeting | 0.0046 | 0.0058 | **0.0012** | 0.0000 |
| Sideswipe - Passing | 0.7261 | 0.9135 | **0.1874** | 0.9127 |
| Angle | 1.1147 | 1.4116 | **0.2968** | 0.8629 |
| Parked Vehicle | 0.0704 | 0.0816 | **0.0113** | 0.0000 |
| Pedestrian | 0.0062 | 0.0062 | 0.0000 | 0.0075 |
| Animal | 0.0000 | 0.0000 | 0.0000 | 0.0311 |
| Train | 0.0006 | 0.0007 | **0.0001** | 0.0000 |
| Pedalcycles | 0.2057 | 0.2057 | 0.0000 | 0.0075 |
| Other Non-Vehicle | 0.0001 | 0.0001 | 0.0000 | 0.0000 |
| Fixed Object | 0.1900 | 0.2154 | **0.0254** | 0.3109 |
| Other Object | 0.0060 | 0.0070 | **0.0010** | 0.0000 |
| Overturning | 0.0072 | 0.0077 | **0.0005** | 0.0075 |
| Other Non-Collision | 0.0132 | 0.0150 | **0.0018** | 0.0548 |
| Left Turn | 0.5769 | 0.7306 | **0.1537** | 0.0772 |
| Right Turn | 0.3088 | 0.3888 | **0.0801** | 0.1952 |

| Proposed Conditions: General Information and Data for Roundabout Intersection | | | |
|---|---|---|---|
| **General Information** | | **Location Information** | |
| Analyst | GMB | Route | SR303 |
| Agency or Company | Carpenter Marty Transportation | Logpoint | 5.88 |
| Date Performed | 02/20/25 | Common Name | SR-303 & Substation Road |
| Intersection | SR303; 5.88 | Analysis Year | 2023 |
| Signalized/Unsignalized | Unsignalized | | |

| Input Data | | | | | Proposed Conditions | HSM Base Conditions |
|---|---|---|---|---|---|---|
| Area Type (Rural, Urban) | | | | | Urban | -- |
| Number of Legs (3 or 4) | | | | | 4 | -- |
| Single-Lane or Multi-lane Roundabout | | | | | Single-Lane | -- |
| Total Entering AADT (veh/day) | | | | | 17,140 | -- |
| Inscribed Circle Diameter (feet) | | | | | 105 | 0 |
| Presence of Outbound Only Leg (present/not present) | | | | | Not Present | Not Present |
| Calibration Factor, $C_i$ | | | | | Varies, See Below | 1.00 |
| Locality: | | | | | State System | -- |
| Leg 1 | Leg 1 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 2,080 | -- |
| | Bypass lane (present/not present) - Leg 1 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 1 | | | | 2 | -- |
| | Entry width (feet) - Leg 1 | | | | 21 | 16-25 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 1 | | | | 1 | -- |
| Leg 2 | Leg 2 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 2,770 | -- |
| | Bypass lane (present/not present) - Leg 2 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 2 | | | | 4 | -- |
| | Entry width (feet) - Leg 2 | | | | 20 | 16-25 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 2 | | | | 1 | -- |
| Leg 3 | Leg 3 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 5,990 | -- |
| | Bypass lane (present/not present) - Leg 3 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 3 | | | | 3 | -- |
| | Entry width (feet) - Leg 3 | | | | 21 | 16-25 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 3 | | | | 1 | -- |
| Leg 4 | Leg 4 Entering AADT (veh/day) | $AADT_{MAX}$ = | 19,733 | (veh/day) | 6,300 | -- |
| | Bypass lane (present/not present) - Leg 4 | | | | Not Present | -- |
| | Number of driveways or unsignalized access points - Leg 4 | | | | 0 | -- |
| | Entry width (feet) - Leg 4 | | | | 21 | 16-25 ft |
| | Number of entering lanes (1 lane, 2 lanes) - Leg 4 | | | | 1 | -- |

# CMF / CRF Details

**CMF ID: 3941**

## Improve signal visibility

**Description: Includes such treatments as larger signal heads and reflective backboards.**

**Prior Condition: Unknown**

**Category: Intersection traffic control**

**Study: *A full Bayes multivariate intervention model with random parameters among matched pairs for before-after safety evaluation*, El-Basyouny and Sayed, 2011**

| | |
|---|---|
| **Star Quality Rating:** | ★★★☆☆ [View score details] |

| Crash Modification Factor (CMF) | |
|---|---|
| **Value:** | 0.71 |
| **Adjusted Standard Error:** | |
| **Unadjusted Standard Error:** | |

| Crash Reduction Factor (CRF) | |
|---|---|
| **Value:** | 29 *(This value indicates a **decrease** in crashes)* |
| **Adjusted Standard Error:** | |

| | |
|---|---|
| **Unadjusted Standard Error:** | |

## Applicability

| | |
|---|---|
| **Crash Type:** | All |
| **Crash Severity:** | Fatal,Serious injury,Minor injury |
| **Roadway Types:** | Not Specified |
| **Number of Lanes:** | |
| **Road Division Type:** | |
| **Speed Limit:** | |
| **Area Type:** | Urban |
| **Traffic Volume:** | |
| **Time of Day:** | All |

***If countermeasure is intersection-based***

| | |
|---|---|
| **Intersection Type:** | Roadway/roadway (not interchange related) |
| **Intersection Geometry:** | Not specified |
| **Traffic Control:** | Signalized |
| **Major Road Traffic Volume:** | |
| **Minor Road Traffic Volume:** | |

## Development Details

| | |
|---|---|
| **Date Range of Data Used:** | 2001 to 2008 |
| **Municipality:** | |
| **State:** | |

| | |
|---|---|
| **Country:** | Canada |
| **Type of Methodology Used:** | Before/after using empirical Bayes or full Bayes |
| **Sample Size Used:** | Site-years |
| **Before Sample Size Used:** | 37 Site-years |
| **After Sample Size Used:** | 26 Site-years |

## Other Details

| | |
|---|---|
| **Included in Highway Safety Manual?** | No |
| **Date Added to Clearinghouse:** | Jun-04-2012 |
| **Comments:** | |

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

*The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in the CMF Clearinghouse. The information contained in the CMF Clearinghouse does not constitute a standard, specification, or regulation, nor is it a substitute for sound engineering judgment.*

# CMF / CRF Details

**CMF ID: 3943**

## Improve signal visibility

**Description: Includes such treatments as larger signal heads and reflective backboards.**

**Prior Condition: Unknown**

**Category: Intersection traffic control**

**Study: *A full Bayes multivariate intervention model with random parameters among matched pairs for before-after safety evaluation*, El-Basyouny and Sayed, 2011**

| | |
|---|---|
| **Star Quality Rating:** | ★★★☆☆ [View score details] |

| Crash Modification Factor (CMF) | |
|---|---|
| **Value:** | 0.79 |
| **Adjusted Standard Error:** | |
| **Unadjusted Standard Error:** | |

| Crash Reduction Factor (CRF) | |
|---|---|
| **Value:** | 21 *(This value indicates a **decrease** in crashes)* |
| **Adjusted Standard Error:** | |

| | |
|---|---|
| **Unadjusted Standard Error:** | |

## Applicability

| | |
|---|---|
| **Crash Type:** | All |
| **Crash Severity:** | Property damage only (PDO) |
| **Roadway Types:** | Not Specified |
| **Number of Lanes:** | |
| **Road Division Type:** | |
| **Speed Limit:** | |
| **Area Type:** | Urban |
| **Traffic Volume:** | |
| **Time of Day:** | All |

***If countermeasure is intersection-based***

| | |
|---|---|
| **Intersection Type:** | Roadway/roadway (not interchange related) |
| **Intersection Geometry:** | Not specified |
| **Traffic Control:** | Signalized |
| **Major Road Traffic Volume:** | |
| **Minor Road Traffic Volume:** | |

## Development Details

| | |
|---|---|
| **Date Range of Data Used:** | 2001 to 2008 |
| **Municipality:** | |
| **State:** | |

| | |
|---|---|
| **Country:** | Canada |
| **Type of Methodology Used:** | Before/after using empirical Bayes or full Bayes |
| **Sample Size Used:** | Site-years |
| **Before Sample Size Used:** | 37 Site-years |
| **After Sample Size Used:** | 26 Site-years |

## Other Details

| | |
|---|---|
| **Included in Highway Safety Manual?** | No |
| **Date Added to Clearinghouse:** | Jun-04-2012 |
| **Comments:** | |

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

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# Appendix F
## Turn Lane Length Calculations

CARPENTER MARTY transportation

## Left Turn Lane Length Calculations

| | | | | |
|---|---|---|---|---|
| AM Peak | **Design Speed** | 55 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 130 | **VPH** | |
| | **Advancing Traffic** | 430 | **VPH** | |
| | **Left Turn Percentage** | 30% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 3 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 315 | 265 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 660 | | |
| PM Peak | **Design Speed** | 55 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 120 | **VPH** | |
| | **Advancing Traffic** | 400 | **VPH** | |
| | **Left Turn Percentage** | 30% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 2 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 285 | 235 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 660 | | |

## Left Turn Lane Length Calculations

| | | | | |
|---|---|---|---|---|
| AM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 100 | **VPH** | |
| | **Advancing Traffic** | 500 | **VPH** | |
| | **Left Turn Percentage** | 20% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 2 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 245 | 195 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |
| PM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 90 | **VPH** | |
| | **Advancing Traffic** | 680 | **VPH** | |
| | **Left Turn Percentage** | 13% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 2 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 245 | 195 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |



STATE OF OHIO DEPARTMENT OF TRANSPORTATION

## Left Turn Lane Length Calculations

| | | | | |
|---|---|---|---|---|
| AM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 50 | **VPH** | |
| | **Advancing Traffic** | 410 | **VPH** | |
| | **Left Turn Percentage** | 12% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 1 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 225 | 175 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |
| PM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 60 | **VPH** | |
| | **Advancing Traffic** | 430 | **VPH** | |
| | **Left Turn Percentage** | 14% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 1 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 225 | 175 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |



STATE OF OHIO DEPARTMENT OF TRANSPORTATION

## Left Turn Lane Length Calculations

| | | | | |
|---|---|---|---|---|
| AM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 170 | **VPH** | |
| | **Advancing Traffic** | 420 | **VPH** | |
| | **Left Turn Percentage** | 40% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 3 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 295 | 245 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |
| PM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 300 | **VPH** | |
| | **Advancing Traffic** | 810 | **VPH** | |
| | **Left Turn Percentage** | 37% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 5 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 345 | 295 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |



STATE OF OHIO DEPARTMENT OF TRANSPORTATION

## Left Turn Lane Length Calculations

| | | | | |
|---|---|---|---|---|
| AM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 30 | **VPH** | |
| | **Advancing Traffic** | 740 | **VPH** | |
| | **Left Turn Percentage** | 4% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 1 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 225 | 175 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |
| PM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 30 | **VPH** | |
| | **Advancing Traffic** | 710 | **VPH** | |
| | **Left Turn Percentage** | 4% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 1 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 225 | 175 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |



STATE OF OHIO DEPARTMENT OF TRANSPORTATION

## Left Turn Lane Length Calculations

| | | | | |
|---|---|---|---|---|
| AM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 20 | **VPH** | |
| | **Advancing Traffic** | 530 | **VPH** | |
| | **Left Turn Percentage** | 4% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 1 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 225 | 175 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |
| PM Peak | **Design Speed** | 50 | **mph** | |
| | **Traffic Control** | Signalized - 2 Phase | | |
| | **Cycle Length** | Unknown | | |
| | **Cycles Per Hour** | 60 | ***Assume 60*** | |
| | **Turn Lane Volume** | 10 | **VPH** | |
| | **Advancing Traffic** | 780 | **VPH** | |
| | **Left Turn Percentage** | 1% | | |
| | **Location Type** | Intersection | | |
| | **Condition** | B or C | | |
| | **Vehicles/Cycle** | 1 | | Without Diverging Taper |
| | **Turn Lane Length** | See Column to Right | 225 | 175 |
| | **Offset Width** | 12 | | |
| | **Approach Taper** | 600 | | |



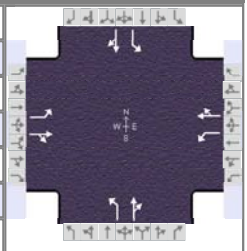
STATE OF OHIO DEPARTMENT OF TRANSPORTATION

# Appendix G
## Proposed Conditions Capacity Analysis

CARPENTER MARTY transportation

# HCS Signalized Intersection Results Summary

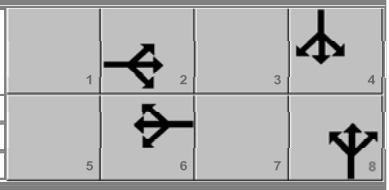
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.89 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2050 AM Improved - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 130 | 270 | 30 | 100 | 250 | 150 | 50 | 300 | 60 | 170 | 200 | 50 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 77.3 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 32.4 | 32.4 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 6.0 | | 6.0 | | 6.0 | | 6.0 |
| Phase Duration, s | | 38.9 | | 38.9 | | 38.4 | | 38.4 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.3 | | 3.3 | | 3.3 | | 3.3 |
| Queue Clearance Time ( $g_s$ ), s | | 30.1 | | 19.5 | | 14.7 | | 30.3 |
| Green Extension Time ( $g_e$ ), s | | 2.3 | | 2.4 | | 2.2 | | 2.1 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.01 | | 0.00 | | 0.00 | | 0.00 |

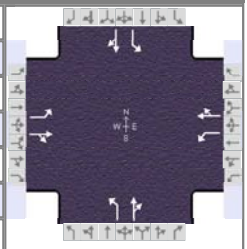
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 146 | 337 | | 112 | 449 | | 56 | 404 | | 191 | 281 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 911 | 1779 | | 1002 | 1683 | | 1107 | 1830 | | 895 | 1648 | |
| Queue Service Time ( $g_s$ ), s | 11.7 | 10.5 | | 7.0 | 16.4 | | 2.9 | 12.7 | | 15.6 | 9.2 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 28.1 | 10.5 | | 17.5 | 16.4 | | 12.0 | 12.7 | | 28.3 | 9.2 | |
| Green Ratio ( *g/C* ) | 0.42 | 0.42 | | 0.42 | 0.42 | | 0.42 | 0.42 | | 0.42 | 0.42 | |
| Capacity ( *c* ), veh/h | 282 | 746 | | 377 | 705 | | 426 | 767 | | 322 | 691 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.519 | 0.452 | | 0.298 | 0.637 | | 0.132 | 0.527 | | 0.594 | 0.407 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 111 | 172 | | 72 | 248 | | 31 | 207 | | 153 | 151 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 4.2 | 6.6 | | 2.7 | 9.4 | | 1.2 | 8.2 | | 5.5 | 5.5 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.42 | 0.17 | | 0.37 | 0.15 | | 0.18 | 0.23 | | 0.52 | 0.17 | |
| Uniform Delay ( $d_1$ ), s/veh | 29.0 | 16.1 | | 22.4 | 17.8 | | 19.9 | 16.7 | | 27.3 | 15.7 | |
| Incremental Delay ( $d_2$ ), s/veh | 0.6 | 0.2 | | 0.2 | 0.4 | | 0.1 | 0.2 | | 0.7 | 0.1 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 29.5 | 16.2 | | 22.5 | 18.2 | | 20.0 | 17.0 | | 27.9 | 15.9 | |
| Level of Service (LOS) | C | B | | C | B | | B | B | | C | B | |
| Approach Delay, s/veh / LOS | 20.3 | C | | 19.0 | B | | 17.3 | B | | 20.7 | C | |
| Intersection Delay, s/veh / LOS | 19.3 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.90 | B | 1.90 | B | 1.90 | B | 1.90 | B |
| Bicycle LOS Score / LOS | 1.28 | A | 1.41 | A | 1.25 | A | 1.27 | A |

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# HCS Signalized Intersection Results Summary

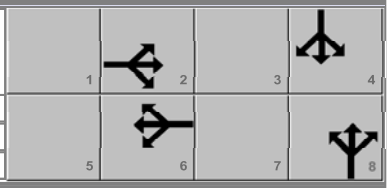
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.96 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Marks Road | File Name | 2050 PM Improved - Marks.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 120 | 240 | 40 | 90 | 400 | 190 | 60 | 260 | 110 | 300 | 380 | 130 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 74.5 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 30.0 | 32.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.5 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 6.0 | | 6.0 | | 6.0 | | 6.0 |
| Phase Duration, s | | 36.5 | | 36.5 | | 38.0 | | 38.0 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.0 | | 6.0 |
| Max Allow Headway ( *MAH* ), s | | 3.3 | | 3.3 | | 3.3 | | 3.3 |
| Queue Clearance Time ( $g_s$ ), s | | 32.0 | | 25.7 | | 24.4 | | 34.0 |
| Green Extension Time ( $g_e$ ), s | | 0.0 | | 2.6 | | 0.0 | | 0.0 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 1.00 | | 0.01 | | 1.00 | | 1.00 |

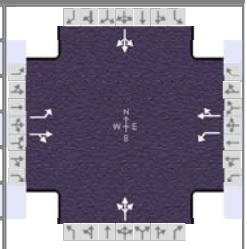
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 125 | 292 | | 94 | 615 | | 63 | 385 | | 313 | 531 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 801 | 1809 | | 1088 | 1768 | | 879 | 1789 | | 1006 | 1802 | |
| Queue Service Time ( $g_s$ ), s | 6.3 | 8.6 | | 5.0 | 23.7 | | 4.6 | 11.7 | | 20.3 | 17.8 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 30.0 | 8.6 | | 13.6 | 23.7 | | 22.4 | 11.7 | | 32.0 | 17.8 | |
| Green Ratio ( *g/C* ) | 0.40 | 0.40 | | 0.40 | 0.40 | | 0.43 | 0.43 | | 0.43 | 0.43 | |
| Capacity ( *c* ), veh/h | 164 | 728 | | 410 | 712 | | 265 | 769 | | 371 | 774 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.761 | 0.400 | | 0.229 | 0.863 | | 0.236 | 0.501 | | 0.842 | 0.686 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 133 | 139 | | 53 | 349 | | 41 | 186 | | 278 | 275 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 5.2 | 5.4 | | 2.1 | 13.7 | | 1.6 | 7.4 | | 11.0 | 10.9 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.50 | 0.14 | | 0.27 | 0.21 | | 0.23 | 0.21 | | 0.94 | 0.31 | |
| Uniform Delay ( $d_1$ ), s/veh | 35.6 | 15.8 | | 20.7 | 20.4 | | 26.2 | 15.5 | | 28.3 | 17.2 | |
| Incremental Delay ( $d_2$ ), s/veh | 16.9 | 0.1 | | 0.1 | 3.0 | | 0.2 | 0.2 | | 15.1 | 2.1 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Control Delay ( *d* ), s/veh | 52.4 | 16.0 | | 20.8 | 23.4 | | 26.4 | 15.6 | | 43.5 | 19.3 | |
| Level of Service (LOS) | D | B | | C | C | | C | B | | D | B | |
| Approach Delay, s/veh / LOS | 26.9 | C | | 23.0 | C | | 17.1 | B | | 28.3 | C | |
| Intersection Delay, s/veh / LOS | 24.4 | | | | | | C | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.90 | B | 1.90 | B | 1.90 | B | 1.90 | B |
| Bicycle LOS Score / LOS | 1.18 | A | 1.66 | B | 1.23 | A | 1.88 | B |

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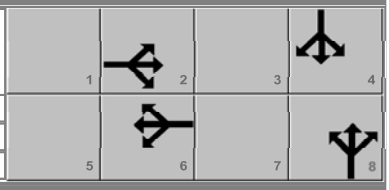
# HCS Signalized Intersection Results Summary

| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | AM Peak | PHF | 0.97 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2050 AM Improved - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 30 | 620 | 90 | 20 | 450 | 60 | 70 | 70 | 30 | 150 | 140 | 60 |

| Signal Information | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cycle, s | 64.1 | Reference Phase | 2 | | | | | | | | | |
| Offset, s | 0 | Reference Point | End | | | | | | | | | |
| Uncoordinated | Yes | Simult. Gap E/W | On | Green | 32.8 | 18.2 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| Force Mode | Fixed | Simult. Gap N/S | On | Yellow | 5.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| | | | | Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 6.0 | | 6.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 39.3 | | 39.3 | | 24.7 | | 24.7 |
| Change Period, ( *Y+R c* ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.1 | | 5.1 |
| Queue Clearance Time ( *g s* ), s | | 24.0 | | 25.6 | | 7.7 | | 15.5 |
| Green Extension Time ( *g e* ), s | | 7.7 | | 7.2 | | 3.1 | | 2.7 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 0.45 | | 0.50 | | 0.01 | | 0.10 |

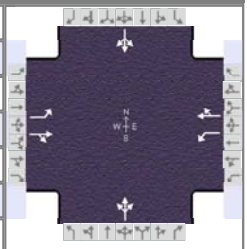
| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 31 | 732 | | 21 | 526 | | | 175 | | | 361 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 849 | 1771 | | 690 | 1744 | | | 1464 | | | 1575 | |
| Queue Service Time ( *g s* ), s | 1.7 | 22.0 | | 1.6 | 13.5 | | | 0.0 | | | 7.8 | |
| Cycle Queue Clearance Time ( *g c* ), s | 15.1 | 22.0 | | 23.6 | 13.5 | | | 5.7 | | | 13.5 | |
| Green Ratio ( *g/C* ) | 0.51 | 0.51 | | 0.51 | 0.51 | | | 0.28 | | | 0.28 | |
| Capacity ( *c* ), veh/h | 370 | 908 | | 229 | 895 | | | 495 | | | 528 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.084 | 0.806 | | 0.090 | 0.588 | | | 0.354 | | | 0.683 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 14 | 313 | | 12 | 195 | | | 86 | | | 204 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 0.5 | 11.9 | | 0.5 | 7.3 | | | 3.4 | | | 8.1 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.08 | 0.28 | | 0.07 | 0.24 | | | 0.09 | | | 0.20 | |
| Uniform Delay ( *d 1* ), s/veh | 16.2 | 13.0 | | 22.8 | 10.9 | | | 18.3 | | | 21.1 | |
| Incremental Delay ( *d 2* ), s/veh | 0.1 | 4.2 | | 0.2 | 0.9 | | | 0.6 | | | 2.2 | |
| Initial Queue Delay ( *d 3* ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | 16.3 | 17.1 | | 23.0 | 11.8 | | | 18.9 | | | 23.3 | |
| Level of Service (LOS) | B | B | | C | B | | | B | | | C | |
| Approach Delay, s/veh / LOS | 17.1 | B | | 12.2 | B | | 18.9 | B | | 23.3 | C | |
| Intersection Delay, s/veh / LOS | 17.0 | | | | | | B | | | | | |

| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.65 | B | 1.65 | B | 1.91 | B | 1.91 | B |
| Bicycle LOS Score / LOS | 1.75 | B | 1.39 | A | 0.78 | A | 1.08 | A |

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# HCS Signalized Intersection Results Summary

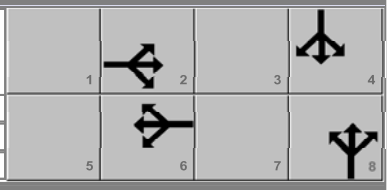
| General Information | | | | Intersection Information | |
|---|---|---|---|---|---|
| Agency | CMTran | | | Duration, h | 0.250 |
| Analyst | LRY | Analysis Date | Jan 23, 2025 | Area Type | Other |
| Jurisdiction | ODOT | Time Period | PM Peak | PHF | 0.98 |
| Urban Street | SR-303 | Analysis Year | 2050 | Analysis Period | 1> 7:00 |
| Intersection | SR-303 & Substation Ro… | File Name | 2050 PM Improved - Substation.xus | | |
| Project Description | SR-303 Safety Study Update | | | | |



| Demand Information | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Demand ( *v* ), veh/h | 30 | 590 | 90 | 10 | 620 | 150 | 140 | 190 | 40 | 120 | 170 | 80 |

| Signal Information | | | |
|---|---|---|---|
| Cycle, s | 77.4 | Reference Phase | 2 |
| Offset, s | 0 | Reference Point | End |
| Uncoordinated | Yes | Simult. Gap E/W | On |
| Force Mode | Fixed | Simult. Gap N/S | On |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Green | 38.6 | 25.7 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Yellow | 5.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Red | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | |




| Timer Results | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Assigned Phase | | 2 | | 6 | | 8 | | 4 |
| Case Number | | 6.0 | | 6.0 | | 8.0 | | 8.0 |
| Phase Duration, s | | 45.1 | | 45.1 | | 32.2 | | 32.2 |
| Change Period, ( $Y+R_c$ ), s | | 6.5 | | 6.5 | | 6.5 | | 6.5 |
| Max Allow Headway ( *MAH* ), s | | 5.0 | | 5.0 | | 5.2 | | 5.2 |
| Queue Clearance Time ( $g_s$ ), s | | 34.9 | | 31.8 | | 23.1 | | 21.1 |
| Green Extension Time ( $g_e$ ), s | | 3.7 | | 5.6 | | 2.6 | | 3.1 |
| Phase Call Probability | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Max Out Probability | | 1.00 | | 0.85 | | 0.76 | | 0.54 |

| Movement Group Results | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Assigned Movement | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Adjusted Flow Rate ( *v* ), veh/h | 31 | 694 | | 10 | 786 | | | 378 | | | 378 | |
| Adjusted Saturation Flow Rate ( *s* ), veh/h/ln | 689 | 1827 | | 750 | 1807 | | | 1334 | | | 1414 | |
| Queue Service Time ( $g_s$ ), s | 3.2 | 23.7 | | 0.9 | 29.8 | | | 2.1 | | | 0.0 | |
| Cycle Queue Clearance Time ( $g_c$ ), s | 32.9 | 23.7 | | 24.6 | 29.8 | | | 21.1 | | | 19.1 | |
| Green Ratio ( *g/C* ) | 0.50 | 0.50 | | 0.50 | 0.50 | | | 0.33 | | | 0.33 | |
| Capacity ( *c* ), veh/h | 172 | 913 | | 238 | 903 | | | 508 | | | 532 | |
| Volume-to-Capacity Ratio ( *X* ) | 0.178 | 0.760 | | 0.043 | 0.870 | | | 0.744 | | | 0.710 | |
| Back of Queue ( *Q* ), ft/ln ( 95 th percentile) | 24 | 353 | | 7 | 457 | | | 265 | | | 253 | |
| Back of Queue ( *Q* ), veh/ln ( 95 th percentile) | 0.9 | 13.9 | | 0.3 | 18.0 | | | 10.6 | | | 10.1 | |
| Queue Storage Ratio ( *RQ* ) ( 95 th percentile) | 0.14 | 0.31 | | 0.04 | 0.57 | | | 0.27 | | | 0.25 | |
| Uniform Delay ( $d_1$ ), s/veh | 31.7 | 15.6 | | 25.5 | 17.1 | | | 24.0 | | | 23.1 | |
| Incremental Delay ( $d_2$ ), s/veh | 0.7 | 3.8 | | 0.1 | 9.0 | | | 4.9 | | | 3.7 | |
| Initial Queue Delay ( $d_3$ ), s/veh | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | | | 0.0 | |
| Control Delay ( *d* ), s/veh | 32.4 | 19.4 | | 25.6 | 26.2 | | | 28.9 | | | 26.9 | |
| Level of Service (LOS) | C | B | | C | C | | | C | | | C | |
| Approach Delay, s/veh / LOS | 20.0 | B | | 26.2 | C | | 28.9 | C | | 26.9 | C | |
| Intersection Delay, s/veh / LOS | 24.8 | | | | | | C | | | | | |

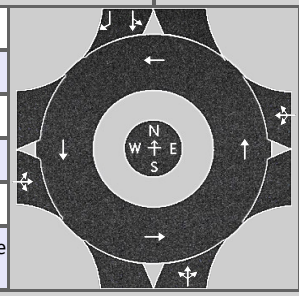
| Multimodal Results | EB | | WB | | NB | | SB | |
|---|---|---|---|---|---|---|---|---|
| Pedestrian LOS Score / LOS | 1.66 | B | 1.66 | B | 1.91 | B | 1.91 | B |
| Bicycle LOS Score / LOS | 1.68 | B | 1.80 | B | 1.11 | A | 1.11 | A |

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# HCS Roundabouts Report

## General Information

| | |
|---|---|
| Analyst | LRY |
| Agency or Co. | CMTran |
| Date Performed | |
| Analysis Year | 2050 |
| Time Analyzed | AM Peak |
| Project Description | MED-303 Safety Study Update |




## Site Information

| | |
|---|---|
| Intersection | SR-303 & Marks Road |
| E/W Street Name | SR-303 |
| N/S Street Name | Marks Road |
| Analysis Time Period, hrs | 0.25 |
| Peak Hour Factor | 0.89 |
| Jurisdiction | ODOT |

## Volume Adjustments and Site Characteristics

| Approach | EB | | | | WB | | | | NB | | | | SB | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Number of Lanes (N) | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| Lane Assignment | | | LTR | | | | LTR | | | | LTR | | LT | | R | |
| Volume (V), veh/h | 0 | 130 | 270 | 30 | 0 | 100 | 250 | 150 | 0 | 50 | 300 | 60 | 0 | 170 | 200 | 50 |
| Percent Heavy Vehicles, % | 6 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 1 | 1 | 1 | 1 | 13 | 13 | 13 | 13 |
| Flow Rate ($v_{PCE}$), pc/h | 0 | 155 | 322 | 36 | 0 | 120 | 301 | 180 | 0 | 57 | 340 | 68 | 0 | 216 | 254 | 63 |
| Right-Turn Bypass | None | | | | None | | | | None | | | | None | | | |
| Conflicting Lanes | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| Pedestrians Crossing, p/h | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| Proportion of CAVs | 0 | | | | | | | | | | | | | | | |

## Critical and Follow-Up Headway Adjustment

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Critical Headway, s | | 4.9763 | | | 4.9763 | | | 4.9763 | | 4.5436 | 4.5436 | |
| Follow-Up Headway, s | | 2.6087 | | | 2.6087 | | | 2.6087 | | 2.5352 | 2.5352 | |

## Flow Computations, Capacity and v/c Ratios

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Entry Flow ($v_e$), pc/h | | 513 | | | 601 | | | 465 | | 470 | 63 | |
| Entry Volume, veh/h | | 484 | | | 562 | | | 460 | | 416 | 56 | |
| Circulating Flow ($v_c$), pc/h | 590 | | | 552 | | | 693 | | | 478 | | |
| Exiting Flow ($v_{ex}$), pc/h | 606 | | | 421 | | | 675 | | | 410 | | |
| Capacity ($c_{pce}$), pc/h | | 756 | | | 786 | | | 681 | | 919 | 919 | |
| Capacity (c), veh/h | | 713 | | | 734 | | | 674 | | 813 | 813 | |
| v/c Ratio (x) | | 0.68 | | | 0.76 | | | 0.68 | | 0.51 | 0.07 | |

## Delay and Level of Service

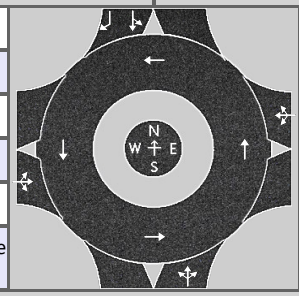
| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Lane Control Delay (d), s/veh | | 18.4 | | | 22.8 | | | 19.5 | | 11.5 | 5.1 | |
| Lane LOS | | C | | | C | | | C | | B | A | |
| 95% Queue, veh | | 5.3 | | | 7.3 | | | 5.4 | | 3.0 | 0.2 | |
| Approach Delay, s/veh \| LOS | 18.4 | C | | 22.8 | C | | 19.5 | C | | 10.8 | B | |
| Intersection Delay, s/veh \| LOS | 18.1 | C | | | | | | | | | | |


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# HCS Roundabouts Report

## General Information

| | |
|---|---|
| Analyst | LRY |
| Agency or Co. | CMTran |
| Date Performed | |
| Analysis Year | 2050 |
| Time Analyzed | PM Peak |
| Project Description | MED-303 Safety Study Update |




## Site Information

| | |
|---|---|
| Intersection | SR-303 & Marks Road |
| E/W Street Name | SR-303 |
| N/S Street Name | Marks Road |
| Analysis Time Period, hrs | 0.25 |
| Peak Hour Factor | 0.96 |
| Jurisdiction | ODOT |

## Volume Adjustments and Site Characteristics

| Approach | EB | | | | WB | | | | NB | | | | SB | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Number of Lanes (N) | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| Lane Assignment | | | LTR | | | | LTR | | | | LTR | | LT | | R | |
| Volume (V), veh/h | 0 | 120 | 240 | 40 | 0 | 90 | 400 | 190 | 0 | 60 | 260 | 110 | 0 | 300 | 380 | 130 |
| Percent Heavy Vehicles, % | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Flow Rate ($v_{PCE}$), pc/h | 0 | 129 | 258 | 43 | 0 | 96 | 425 | 202 | 0 | 63 | 274 | 116 | 0 | 316 | 400 | 137 |
| Right-Turn Bypass | None | | | | None | | | | None | | | | None | | | |
| Conflicting Lanes | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| Pedestrians Crossing, p/h | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| Proportion of CAVs | 0 | | | | | | | | | | | | | | | |

## Critical and Follow-Up Headway Adjustment

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Critical Headway, s | | 4.9763 | | | 4.9763 | | | 4.9763 | | 4.5436 | 4.5436 | |
| Follow-Up Headway, s | | 2.6087 | | | 2.6087 | | | 2.6087 | | 2.5352 | 2.5352 | |

## Flow Computations, Capacity and v/c Ratios

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Entry Flow ($v_e$), pc/h | | 430 | | | 723 | | | 453 | | 716 | 137 | |
| Entry Volume, veh/h | | 417 | | | 709 | | | 449 | | 709 | 136 | |
| Circulating Flow ($v_c$), pc/h | 812 | | | 466 | | | 703 | | | 584 | | |
| Exiting Flow ($v_{ex}$), pc/h | 690 | | | 625 | | | 605 | | | 539 | | |
| Capacity ($c_{pce}$), pc/h | | 603 | | | 858 | | | 674 | | 835 | 835 | |
| Capacity (c), veh/h | | 585 | | | 841 | | | 667 | | 826 | 826 | |
| v/c Ratio (x) | | 0.71 | | | 0.84 | | | 0.67 | | 0.86 | 0.16 | |

## Delay and Level of Service

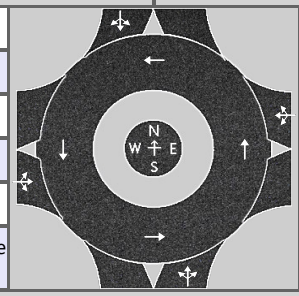
| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Lane Control Delay (d), s/veh | | 23.5 | | | 26.7 | | | 19.1 | | 28.7 | 6.0 | |
| Lane LOS | | C | | | D | | | C | | D | A | |
| 95% Queue, veh | | 5.8 | | | 10.0 | | | 5.2 | | 10.5 | 0.6 | |
| Approach Delay, s/veh \| LOS | 23.5 | C | | 26.7 | D | | 19.1 | C | | 25.0 | D | |
| Intersection Delay, s/veh \| LOS | 24.2 | C | | | | | | | | | | |


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# HCS Roundabouts Report

## General Information

| | |
|---|---|
| Analyst | LRY |
| Agency or Co. | CMTran |
| Date Performed | |
| Analysis Year | 2050 |
| Time Analyzed | AM Peak |
| Project Description | MED-303 Safety Study Update |




## Site Information

| | |
|---|---|
| Intersection | SR-303 & Substation Road |
| E/W Street Name | SR-303 |
| N/S Street Name | Substation Road |
| Analysis Time Period, hrs | 0.25 |
| Peak Hour Factor | 0.97 |
| Jurisdiction | ODOT |

## Volume Adjustments and Site Characteristics

| Approach | EB | | | | WB | | | | NB | | | | SB | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Number of Lanes (N) | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Lane Assignment | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (V), veh/h | 0 | 30 | 620 | 90 | 0 | 20 | 450 | 60 | 0 | 70 | 70 | 30 | 0 | 150 | 140 | 60 |
| Percent Heavy Vehicles, % | 6 | 6 | 6 | 6 | 8 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| Flow Rate ($v_{PCE}$), pc/h | 0 | 33 | 678 | 98 | 0 | 22 | 501 | 67 | 0 | 74 | 74 | 32 | 0 | 156 | 146 | 62 |
| Right-Turn Bypass | None | | | | None | | | | None | | | | None | | | |
| Conflicting Lanes | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| Pedestrians Crossing, p/h | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| Proportion of CAVs | 0 | | | | | | | | | | | | | | | |

## Critical and Follow-Up Headway Adjustment

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Critical Headway, s | | 4.9763 | | | 4.9763 | | | 4.9763 | | | 4.9763 | |
| Follow-Up Headway, s | | 2.6087 | | | 2.6087 | | | 2.6087 | | | 2.6087 | |

## Flow Computations, Capacity and v/c Ratios

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Entry Flow ($v_e$), pc/h | | 809 | | | 590 | | | 180 | | | 364 | |
| Entry Volume, veh/h | | 763 | | | 546 | | | 176 | | | 360 | |
| Circulating Flow ($v_c$), pc/h | 324 | | | 181 | | | 867 | | | 597 | | |
| Exiting Flow ($v_{ex}$), pc/h | 866 | | | 637 | | | 174 | | | 266 | | |
| Capacity ($c_{pce}$), pc/h | | 992 | | | 1147 | | | 570 | | | 751 | |
| Capacity (c), veh/h | | 936 | | | 1062 | | | 559 | | | 743 | |
| v/c Ratio (x) | | 0.82 | | | 0.51 | | | 0.32 | | | 0.48 | |

## Delay and Level of Service

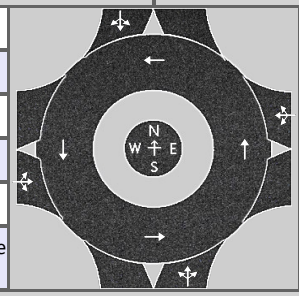
| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Lane Control Delay (d), s/veh | | 22.4 | | | 9.5 | | | 11.0 | | | 11.7 | |
| Lane LOS | | C | | | A | | | B | | | B | |
| 95% Queue, veh | | 9.3 | | | 3.0 | | | 1.3 | | | 2.7 | |
| Approach Delay, s/veh \| LOS | 22.4 | C | | 9.5 | A | | 11.0 | B | | 11.7 | B | |
| Intersection Delay, s/veh \| LOS | 15.4 | C | | | | | | | | | | |


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# HCS Roundabouts Report

## General Information

| | |
|---|---|
| Analyst | LRY |
| Agency or Co. | CMTran |
| Date Performed | |
| Analysis Year | 2050 |
| Time Analyzed | PM Peak |
| Project Description | MED-303 Safety Study Update |




## Site Information

| | |
|---|---|
| Intersection | SR-303 & Substation Road |
| E/W Street Name | SR-303 |
| N/S Street Name | Substation Road |
| Analysis Time Period, hrs | 0.25 |
| Peak Hour Factor | 0.98 |
| Jurisdiction | ODOT |

## Volume Adjustments and Site Characteristics

| Approach | EB | | | | WB | | | | NB | | | | SB | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | U | L | T | R | U | L | T | R | U | L | T | R | U | L | T | R |
| Number of Lanes (N) | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Lane Assignment | | | LTR | | | | LTR | | | | LTR | | | | LTR | |
| Volume (V), veh/h | 0 | 30 | 590 | 90 | 0 | 10 | 620 | 150 | 0 | 140 | 190 | 40 | 0 | 120 | 170 | 80 |
| Percent Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Flow Rate ($v_{PCE}$), pc/h | 0 | 31 | 614 | 94 | 0 | 10 | 645 | 156 | 0 | 143 | 194 | 41 | 0 | 122 | 173 | 82 |
| Right-Turn Bypass | None | | | | None | | | | None | | | | None | | | |
| Conflicting Lanes | 1 | | | | 1 | | | | 1 | | | | 1 | | | |
| Pedestrians Crossing, p/h | 0 | | | | 0 | | | | 0 | | | | 0 | | | |
| Proportion of CAVs | 0 | | | | | | | | | | | | | | | |

## Critical and Follow-Up Headway Adjustment

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Critical Headway, s | | 4.9763 | | | 4.9763 | | | 4.9763 | | | 4.9763 | |
| Follow-Up Headway, s | | 2.6087 | | | 2.6087 | | | 2.6087 | | | 2.6087 | |

## Flow Computations, Capacity and v/c Ratios

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Entry Flow ($v_e$), pc/h | | 739 | | | 811 | | | 378 | | | 377 | |
| Entry Volume, veh/h | | 725 | | | 795 | | | 378 | | | 377 | |
| Circulating Flow ($v_c$), pc/h | 305 | | | 368 | | | 767 | | | 798 | | |
| Exiting Flow ($v_{ex}$), pc/h | 777 | | | 870 | | | 381 | | | 277 | | |
| Capacity ($c_{pce}$), pc/h | | 1011 | | | 948 | | | 631 | | | 611 | |
| Capacity (c), veh/h | | 991 | | | 930 | | | 631 | | | 611 | |
| v/c Ratio (x) | | 0.73 | | | 0.86 | | | 0.60 | | | 0.62 | |

## Delay and Level of Service

| Approach | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass | Left | Right | Bypass |
| Lane Control Delay (d), s/veh | | 16.5 | | | 26.1 | | | 16.8 | | | 18.0 | |
| Lane LOS | | C | | | D | | | C | | | C | |
| 95% Queue, veh | | 6.8 | | | 10.8 | | | 4.0 | | | 4.2 | |
| Approach Delay, s/veh \| LOS | 16.5 | C | | 26.1 | D | | 16.8 | C | | 18.0 | C | |
| Intersection Delay, s/veh \| LOS | 20.1 | | | | | | C | | | | | |

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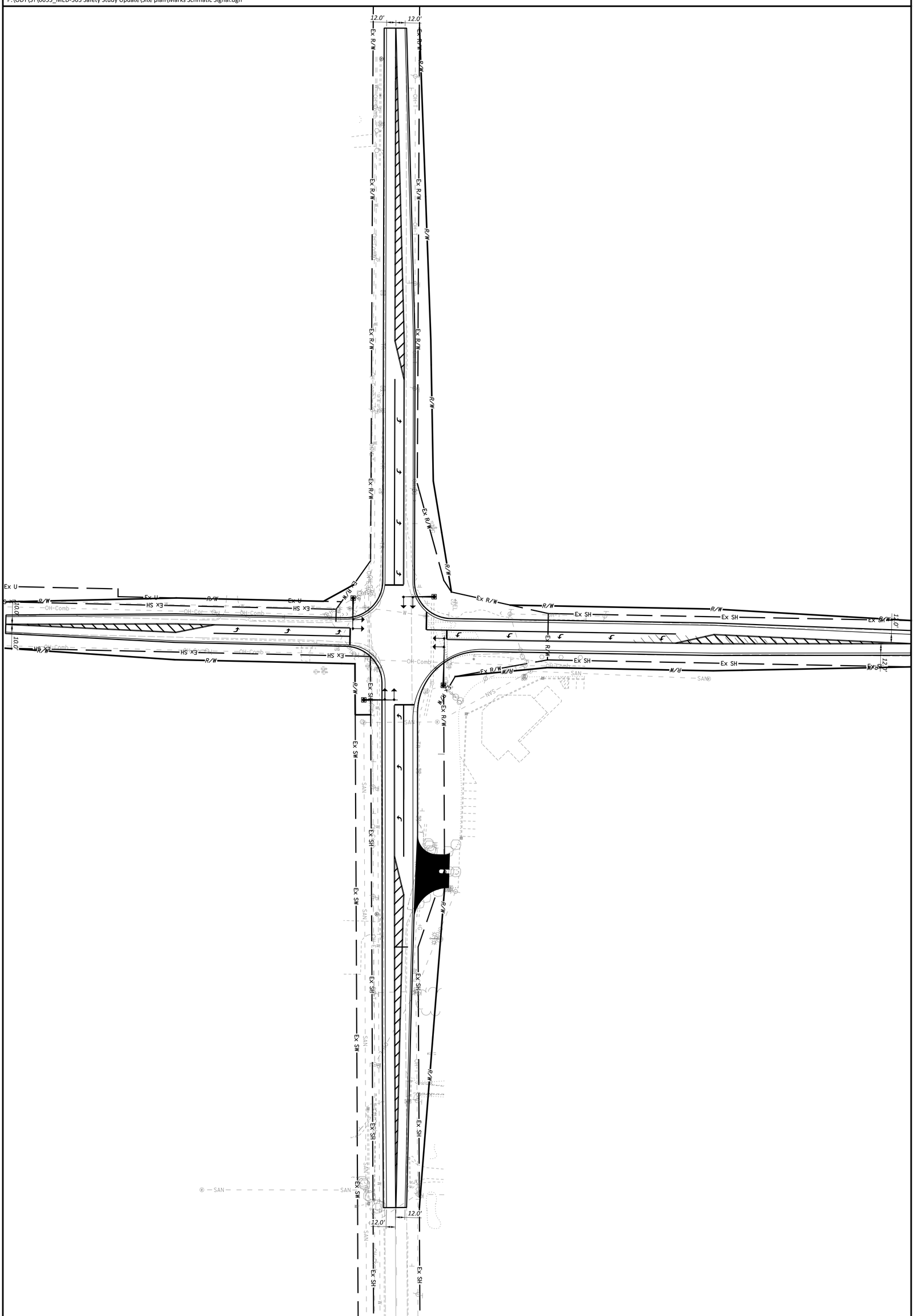
# Appendix H
## Detailed Concept Plans

CARPENTER MARTY transportation

Appendix H

# MED-303

MODEL: Design PAPERSIZE: 34x22 (in.) DATE: 4/10/2025 TIME: 9:09:25 AM USER: wshannon
P:\ODT\ST\0053_MED-303 Safety Study Update\Site plan\Marks Schmatic Signal.dgn




H2 of 9

| SHEET | TOTAL |
|---|---|
| 1 | 1 |

PROJECT ID: N/A

REVIEWER: BAA 04/03/25

DESIGNER: WCS

DESIGN AGENCY: CARPENTER MARTY transportation

## MARKS ROAD
## SIGNAL ALTERNATTE

HORIZONTAL SCALE IN FEET

0 40
20 80

W2-6-36
R3-8LT_R-36
R6-5P-30
R1-2-36
R6-1R-36
M6-2-30
M1-5-30-3
303
M3-2-24
EAST
ONE WAY
ONLY
Ex R/W
R/W
Ex SH
SAN
OH-Comb
OH-T
MARKS ROAD
D3-1-48
R6-1R-36
ONE WAY
R1-2-36
R6-5P-30
W2-6-36
COMBINATION CURB AND GUTTER TYPE 2
TYPE 9 CURB
110' INSCRIBED DIAMETER
TYPE 6 CURB
Ex SW
Ex U
D3-H3-48
MARKS ROAD
R6-1R-36
ONE WAY
R1-2-36
W2-6-36
WEST
M3-4-24
303
M1-5-30-3
M6-2-30
W2-6-36

HORIZONTAL SCALE IN FEET
0 15 30 60

# 110' INSCRIBED DIAMETER CHICANE ROUNDABOUT MARKS ROAD

MED-303

MODEL: Design PAPERSIZE: 34x22 (in.) DATE: 4/30/2025 TIME: 8:26:31 AM USER: wshannon
P:\ODT\ST\0053_MED-303 Safety Study Update\Site plan\Marks Schematic RAB Curve.dgn

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
WCS

REVIEWER
BAA 04/11/25

PROJECT ID
N/A

SHEET 1 TOTAL 1

# 120' INSCRIBED DIAMETER STRAIGHT ROUNDABOUT MARKS ROAD

HORIZONTAL SCALE IN FEET
0 15 30 60

W2-6-36
R3-8LT_R-36
Ex SH
Ex R/W
R/W
R6-SP-30
R1-2-36
M6-2-30
M1-5-30-3
303
M3-2-24
EAST
R6-1R-36
ONE WAY
MARKS ROAD
D3-H3-48
COMBINATION CURB AND GUTTER TYPE 2
120' INSCRIBED DIAMETER
TYPE 6 CURB
TYPE 9 CURB
Ex SW
WEST
M3-4-24
Ex U
Ex Comb
OH Comb
SAN

DESIGN AGENCY
CARPENTER MARTY transportation

DESIGNER
WCS

REVIEWER
BAA 04/11/25

PROJECT ID
N/A

SHEET 1 TOTAL 1

MED-303

MODEL: Design PAPERSIZE: 34x22 (in.) DATE: 4/30/2025 TIME: 8:28:17 AM USER: wshannon
P:\ODT\ST\0053_MED-303 Safety Study Update\Site plan\Marks Schematic RAB Straight.dgn

| MARKS ROAD STRAIGHT ROUNDABOUT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ENTRY ANGLE (DEGREES) | R1 | R2 | R3 | R4 | R5 | V1 | V2 | V3 | V4 | V5 |
| RECOMMENDED | 20 TO 30 | | | | | | 25 | 15 TO 20 | 15 TO 20 | 10 TO 15 | CAN VARY |
| APPROACH 1 | 21.96 | 260.58 | 103.88 | 265.91 | 47.00 | 110.10 | 27.96 | 19.74 | 29.62 | 13.01 | 19.91 |
| APPROACH 2 | 19.60 | 243.54 | 100.88 | 267.00 | 47.00 | 124.01 | 27.03 | 19.45 | 29.68 | 13.01 | 21.13 |
| APPROACH 3 | 21.26 | 263.17 | 117.53 | 125.19 | 47.00 | 113.86 | 28.10 | 20.99 | 21.23 | 13.01 | 20.25 |
| APPROACH 4 | 21.42 | 289.52 | 104.76 | 251.24 | 47.00 | 101.05 | 29.47 | 17.73 | 28.79 | 13.01 | 19.07 |

MARKS ROAD

APPROACH 1

APPROACH 2

APPROACH 4

SR-303

Ex R/W

R/W

Ex SH

Ex SW

Ex U

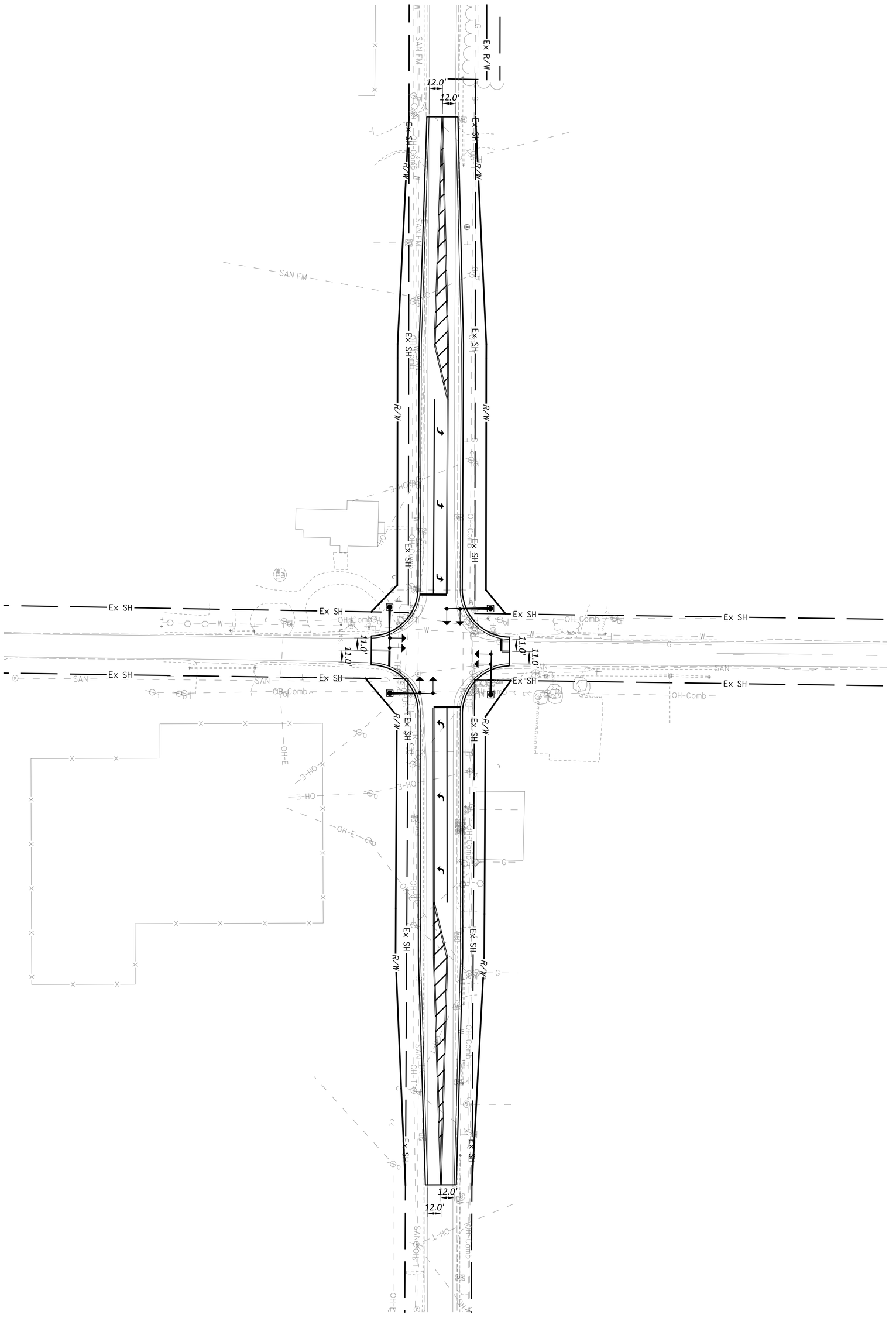
## 120' INSCRIBED DIA. STRAIGHT MARKS ROUNDABOUT

### LEGEND

- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE TRUCK APRON
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE CURB/ISLAND
- PROPOSED CONCRETE DRIVEWAY
- R/W — PROPOSED RIGHT OF WAY
- Ex R/W — EXISTING RIGHT OF WAY

# MED-303

MODEL: Design PAPERSIZE: 34x22 (in.) DATE: 4/3/2025 TIME: 2:56:57 PM USER: wshannon
P:\ODT\ST\0053_MED-303 Safety Study Update\Site plan\Substation Schematic Signal.dgn




H6 of 9

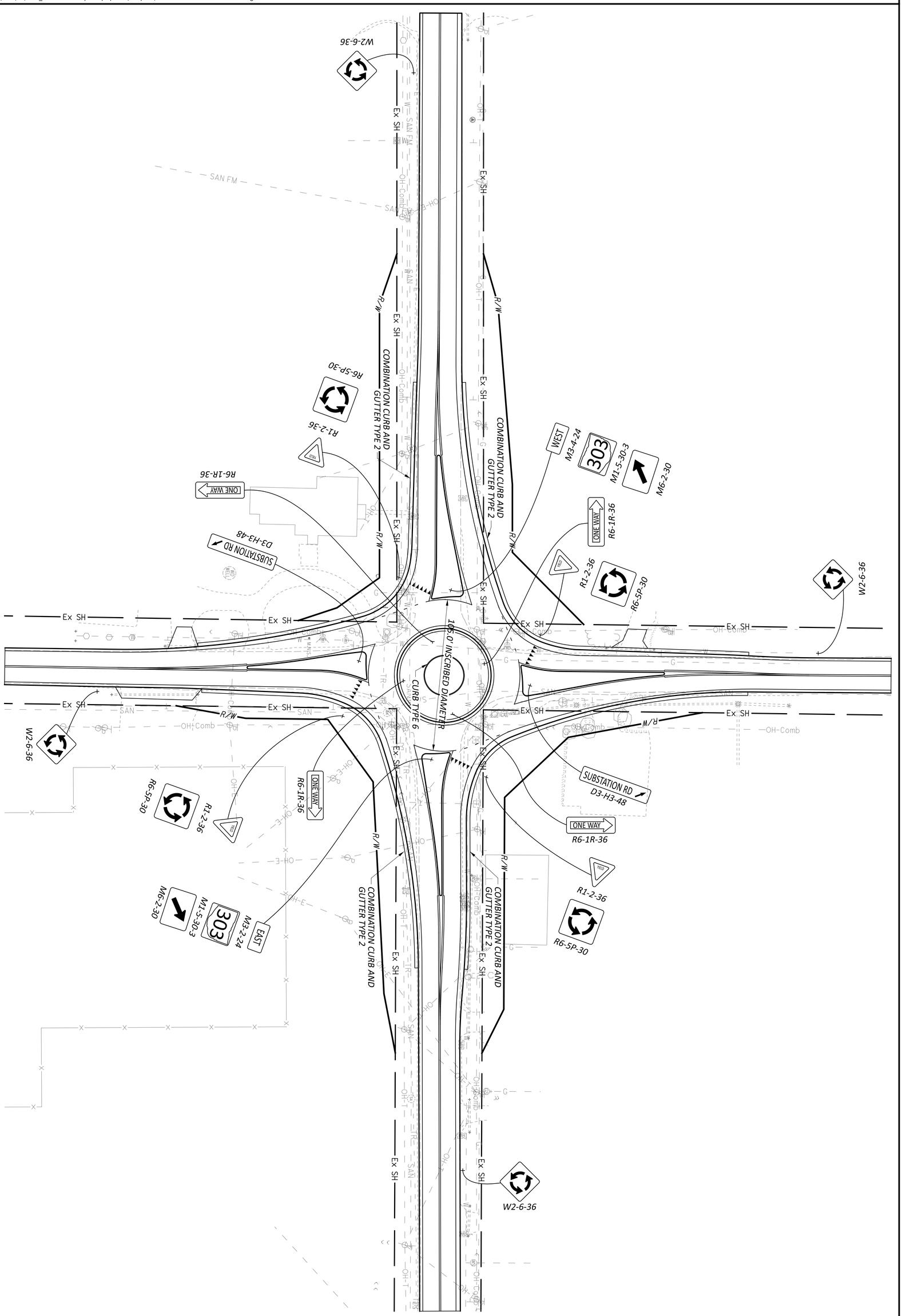
| SHEET | PROJECT ID | REVIEWER | DESIGNER | DESIGN AGENCY |
|---|---|---|---|---|
| 1 / TOTAL 1 | N/A | BAA 04/03/25 | WCS | CARPENTER MARTY transportation |

## SUBSTATION ROAD SIGNAL ALTERNATTE

HORIZONTAL SCALE IN FEET
0 40
20 80

# MED-303

MODEL: Design PAPERSIZE: 34x22 (in.) DATE: 4/30/2025 TIME: 8:22:44 AM USER: wshannon
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| SHEET | TOTAL |
|---|---|
| 1 | 1 |

PROJECT ID: N/A

REVIEWER: BAA 04/11/25

DESIGNER: WCS

DESIGN AGENCY: CARPENTER MARTY transportation

## 105' INSCRIBED DIAMETER
## CHICANE ROUNDABOUT SUBSTATION ROAD

HORIZONTAL SCALE IN FEET
0 30
15 60

H7 of 9

# 120' INSCRIBED DIAMETER STRAIGHT ROUNDABOUT SUBSTATION ROAD

HORIZONTAL SCALE IN FEET
0 15 30 60

W2-6-36
10'
10'
Ex SH
R/W
OH-Comb
M6-2-30
M1-5-30-3
303
M3-4-24
WEST
R6-1R-36
ONE WAY
R6-5P-30
R1-2-36
SUBSTATION RD
D3-H3-48
R6-1R-36
ONE WAY
R1-2-36
R6-5P-30
EAST
M3-2-24
303
M1-5-30-3
M6-2-30
W2-6-36
COMBINATION CURB AND GUTTER TYPE 2
120' INSCRIBED DIAMETER
TYPE 6 CURB
TYPE 9 CURB
12'
12'
12'
12'
SAN FM
OH-E
OH-T
TR
SAN
W
G
OH
Ex SH
R/W
OH-Comb
W2-6-36
R6-5P-30
R1-2-36
SUBSTATION RD
D3-H3-48
R6-1R-36
ONE WAY
R6-1R-36
ONE WAY
R1-2-36
R6-5P-30
EAST
M3-2-24
303
M1-5-30-3
M6-2-30
W2-6-36
COMBINATION CURB AND GUTTER TYPE 2
10'
10'

MED-303

MODEL: Design PAPERSIZE: 34x22 (in.) DATE: 4/30/2025 TIME: 8:18:02 AM USER: wshannon
P:\ODT\ST\0053_MED-303 Safety Study Update\Site plan\Substation Schematic RAB Straight.dgn

DESIGN AGENCY
CARPENTER MARTY transportation

| | |
|---|---|
| DESIGNER | WCS |
| REVIEWER | BAA 04/11/25 |
| PROJECT ID | N/A |
| SHEET | 1 |
| TOTAL | 1 |

| SUBSTATION ROAD STRAIGHT ROUNDABOUT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ENTRY ANGLE (DEGREES) | R1 | R2 | R3 | R4 | R5 | V1 | V2 | V3 | V4 | V5 |
| RECOMMENDED | 20 TO 30 | | | | | | 25.00 | 15 TO 20 | 15 TO 20 | 10 TO 15 | CAN VARY |
| APPROACH 1 | 21.65 | 283.41 | 103.89 | 277.11 | 47.00 | 114.77 | 29.16 | 19.74 | 30.24 | 13.01 | 20.33 |
| APPROACH 2 | 22.80 | 291.04 | 103.89 | 269.00 | 47.00 | 119.47 | 29.55 | 19.74 | 29.79 | 13.01 | 20.74 |
| APPROACH 3 | 21.89 | 279.37 | 103.89 | 284.15 | 47.00 | 115.29 | 28.95 | 19.74 | 30.62 | 13.01 | 20.37 |
| APPROACH 4 | 20.46 | 286.80 | 103.27 | 251.26 | 47.00 | 119.49 | 29.33 | 17.60 | 28.80 | 13.01 | 20.74 |

SUBSTATION ROAD

APPROACH 1

APPROACH 2

APPROACH 3

APPROACH 4

SR-303

Ex SH

Ex R/W

R/W

Ex U

## 120' INSCRIBED DIA. STRAIGHT SUBSTATION ROUNDABOUT

### LEGEND

- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE TRUCK APRON
- PROPOSED LANDSCAPED AREA
- PROPOSED CONCRETE CURB/ISLAND
- PROPOSED CONCRETE DRIVEWAY
- R/W — PROPOSED RIGHT OF WAY
- Ex R/W — EXISTING RIGHT OF WAY

# Appendix I
## Cost Estimates

CARPENTER MARTY transportation

**Roadway Improvements - Signal Improvements Marks Road**

| Item | Description | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 201 | Clearing and Grubbing | 1 | LUMP | $ 5,000.00 | $ 5,000.00 |
| 202 | Pavement Removed | 1100 | SY | $ 16.00 | $ 17,600.00 |
| 203 | Earthwork | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| 204 | Subgrade Compaction | 2902 | SY | $ 3.50 | $ 10,157.00 |
| 441 | Full Depth Pavement (Asphalt) | 2902 | SY | $ 115.00 | $ 333,730.00 |
| 442 | Asphalt Overlay | 8958 | SY | $ 27.00 | $ 241,866.00 |
| 452 | Concrete Drive | 270 | SY | $ 110.00 | $ 29,700.00 |
| 609 | Curb, Type 6 | 60 | FT | $ 40.00 | $ 2,400.00 |
| 611 | Drainage | 1 | LUMP | $ 80,000.00 | $ 80,000.00 |
| 630 | Signage | 1 | LUMP | $ 5,000.00 | $ 5,000.00 |
| 632 | Traffic Signal Installation with Lighting | 1 | LUMP | $ 250,000.00 | $ 250,000.00 |
| 644 | Pavement Markings | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| 659 | Seeding and Mulching | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 832 | Erosion Control | 1 | LUMP | $ 10,000.00 | $ 10,000.00 |
| | | | **Itemized Subtotal** | | **$ 1,040,460.00** |

| Incidentals | | | | | |
|---|---|---|---|---|---|
| 614 | Maintenance of Traffic | 1 | LUMP | $ 50,000.00 | $ 50,000.00 |
| 623 | Construction Layout Stakes | 1 | LUMP | $ 5,000.00 | $ 5,000.00 |
| 624 | Mobilization | 1 | LUMP | $ 40,000.00 | $ 40,000.00 |
| | | | **Incidentals Subtotal** | | **$ 95,000.00** |
| | | | **Contingency (25%)** | | **$ 283,900.00** |
| | | | **Construction Subtotal** | | **$ 1,419,360.00** |

| | |
|---|---|
| **Engineering Design (25%)** | **$ 354,900.00** |
| **Environmental, Geotechnical, Miscellaneous Federal Requirements (10%)** | **$ 142,000.00** |
| **Right-of-Way* (Includes 30% Contingency)** | **$ 290,200.00** |
| **Subtotal** | **$ 2,206,500.00** |
| **Inflation* (22.4%)** | **$ 494,300.00** |
| **Total** | **$ 2,700,800.00** |

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2030 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

| Acquisition | Parcel | Unit (Acreage) | Cost/Unit ($$/Acre) | Acreage | Cost | Subtotal Land Value | Structure Value (If Taken) | Damages (Loss in Value to the Residue) | Subtotal Structures & Damages | Total Non-Labor Acquisition Costs | Parcel Count | Total Takes | Partial Takes | No. of Structures Impacted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | | | | | | | | | | | | | | |
| Commercial | 025-01B-44-013 | 0.271 | $18,820 | 8.52 | $160,350 | $5,100 | | | $0 | $5,100 | | | | |
| | 025-01D-05-008 | 0.061 | $57,151 | 2.58 | $147,450 | $3,486 | | | $0 | $3,486 | | | | |
| | 001-02C-01-012 | 0.114 | $130,969 | 14.74 | $1,930,480 | $14,930 | | | $0 | $14,930 | | | | |
| | 001-02A-29-028 | 0.057 | $453,782 | 2.20 | $998,320 | $25,866 | | | $0 | $25,866 | | | | |
| | 001-02A-29-027 | 0.052 | $316,297 | 1.11 | $351,090 | $16,447 | | | $0 | $16,447 | | | | |
| | 001-02A-29-026 | 0.037 | $392,047 | 4.45 | $1,744,610 | $14,506 | | | $0 | $14,506 | | | | |
| | 001-02A-29-008 | 0.012 | $104,043 | 2.31 | $240,340 | $1,249 | | | $0 | $1,249 | | | | |
| Industrial | | | | | | | | | | | | | | |
| Agricultural | 025-01D-05-010 | 0.010 | $9,556 | 21.24 | $202,970 | $96 | | | $0 | $96 | | | | |

| Relocation | Unit (Displacement) | RHP/RSP | | | Move Cost | Re-establishment | Total Non-Labor RAP Costs | |
|---|---|---|---|---|---|---|---|---|
| **Residential** | | | | | | | | Estimate amount of time necessary to relocate all RAP |
| Owner Occupant | 0 | $34,000 | | | acquisition begins =<$6,000 | | $0 | Estimated number of years until project wide R/W |
| Tenant | 0 | $10,000 | | | $1750 | | $0 | |
| **Commercial/Farm/NPO** | | | | | | | | |
| Owner | 0 | | | | $15,000 | $10,000 | $0 | |
| Tenant | 0 | | | | $15,000 | $10,000 | $0 | |
| **Personal Property** | 0 | | | | $22,750 | | $0 | |

| [[(total of acquisition cost) x 0.09]x0.025] + [[(total of acquisition cost) x 0.15] x 1.20] + [[(total of acquisition cost) x 0.10] x 1.50] = | Contingency (Incidentals, Admin. Review, & Appropriation) | $27,138 |
|---|---|---|
| | **Total Non-Labor R/W Costs** | **$108,818** |

RHP - Replacement Housing Payment
RSP - Rent Supplemental Payment
NPO - Non-Profit Organization

| Labor (External) | Unit (Parcels) | Unit Price | | | Total Cost |
|---|---|---|---|---|---|
| **Titles** | 8 | $1,000 | | | $8,000 |
| **Appraisals** | | | | | |
| Simple | 0 | $750 | | | $0 |
| Detailed | 8 | $4,500 | | | $36,000 |
| **Appraisal Review** | | | | | |
| Simple | 0 | $500 | | | $0 |
| Detailed | 8 | $2,000 | | | $16,000 |
| **Negotiations** | 8 | $1,800 | | | $14,400 |
| **Relocations** | | | | | |
| Personal Property | 0 | $2,000 | | | $0 |
| Residential | 0 | $8,000 | | | $0 |
| Commericial/Farm/NPO | 0 | $6,000 | | | $0 |
| **Closings** | 8 | $500 | | | $4,000 |
| **Package Billing & Review** | 8 | $500 | | | $4,000 |
| **Project Management** | 8 | $4,000 | | | $32,000 |
| **Asbestos Testing & Abatement** | 0 | $5,000 | | | $0 |
| | **Total Labor Costs** | | | | **$114,400** |

| This R/W Cost Estimate Prepared by | Date |
|---|---|
| Carpenter Marty Transportation | 4/23/2025 |

| | |
|---|---|
| **Total Labor Costs** | $114,400 |
| **Total Non-Labor R/W Costs** | $108,818 |
| **Contingency** | 30% |
| **TOTAL R/W COSTS** | **$290,200** |

CARPENTER MARTY transportation

**Marks Road**
**Roundabout**
**110' Inscribed Dia.**
**Chicane Splitter Islands**

| Item | Description | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 201 | Clearing and Grubbing | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 202 | Pavement Removed | 6290 | SY | $ 16.00 | $ 100,640.00 |
| 203 | Earthwork | 1 | LUMP | $ 50,000.00 | $ 50,000.00 |
| 204 | Subgrade Compaction | 6535 | SY | $ 3.50 | $ 22,872.50 |
| 441 | Full Depth Pavement (Asphalt) | 6535 | SY | $ 115.00 | $ 751,525.00 |
| 442 | Asphalt Overlay | 1675 | SY | $ 27.00 | $ 45,225.00 |
| 452 | Concrete Truck Apron | 300 | SY | $ 150.00 | $ 45,000.00 |
| 452 | Concrete Drive | 350 | SY | $ 110.00 | $ 38,500.00 |
| 609 | Concrete Traffic Island | 380 | SY | $ 140.00 | $ 53,200.00 |
| 609 | Combination Curb and Gutter, Type 2 | 1460 | FT | $ 40.00 | $ 58,400.00 |
| 609 | Curb, Type 6 | 170 | FT | $ 40.00 | $ 6,800.00 |
| 609 | Curb, Type 9 | 210 | FT | $ 40.00 | $ 8,400.00 |
| 611 | Drainage | 1 | LUMP | $ 240,000.00 | $ 240,000.00 |
| 625 | Lighting | 1 | LUMP | $ 120,000.00 | $ 120,000.00 |
| 630 | Signage | 1 | LUMP | $ 10,000.00 | $ 10,000.00 |
| 644 | Pavement Markings | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 659 | Seeding and Mulching | 1 | LUMP | $ 25,000.00 | $ 25,000.00 |
| 832 | Erosion Control | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| | | | **Itemized Subtotal** | | **$ 1,625,570.00** |

| Incidentals | | | | | |
|---|---|---|---|---|---|
| 614 | Maintenance of Traffic | 1 | LUMP | $ 75,000.00 | $ 75,000.00 |
| 623 | Construction Layout Stakes | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 624 | Mobilization | 1 | LUMP | $ 100,000.00 | $ 100,000.00 |
| | | | **Incidentals Subtotal** | | **$ 190,000.00** |

| | | |
|---|---|---|
| **Contingency (25%)** | **$** | **453,900.00** |
| **Construction Subtotal** | **$** | **2,269,470.00** |
| **Engineering Design (25%)** | **$** | **567,400.00** |
| **Environmental, Geotechnical, Miscellaneous Federal Requirements (10%)** | **$** | **227,000.00** |
| **Right-of-Way* (Includes 30% Contingency)** | **$** | **227,900.00** |
| **Subtotal** | **$** | **3,291,800.00** |
| **Inflation* (22.4%)** | **$** | **737,400.00** |
| **Total** | **$** | **4,029,200.00** |

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2030 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

| Acquisition | Parcel | Unit (Acreage) | Cost/Unit ($/Acre) | Acreage | Cost | Subtotal Land Value | Structure Value (If Taken) | Damages (Loss in Value to the Residue) | Subtotal Structures & Damages | Total Non-Labor Acquisition Costs | Parcel Count | Total Takes | Partial Takes | No. of Structures Impacted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | | | | | | | | | | | | | | |
| Commercial | 025-01B-44-013 | 0.191 | $18,820 | 8.52 | $160,350 | $3,595 | | | $0 | $3,595 | | | | |
| | 025-01D-05-009 | 0.050 | $82,521 | 2.34 | $193,100 | $4,126 | | | $0 | $4,126 | | | | |
| | 025-01D-05-008 | 0.211 | $57,151 | 2.58 | $147,450 | $12,059 | | | $0 | $12,059 | | | | |
| | 001-02C-01-012 | 0.362 | $130,969 | 14.74 | $1,930,480 | $47,411 | | | $0 | $47,411 | | | | |
| | 001-02A-29-028 | 0.023 | $453,782 | 2.20 | $998,320 | $10,437 | | | | | | | | |
| | 001-02A-29-027 | 0.052 | $316,297 | 1.11 | $351,090 | $16,447 | | | | | | | | |
| Industrial | | | | | | | | | | | | | | |
| Agricultural | | | | | | | | | | | | | | |

| Relocation | Unit (Displacement) | RHP/RSP | | | | Move Cost | Re-establishment | | Total Non-Labor RAP Costs |
|---|---|---|---|---|---|---|---|---|---|
| **Residential** | | | | | | | | | |
| Owner Occupant | 0 | $34,000 | | | acquisition begins = | $6,000 | | | $0 |
| Tenant | 0 | $10,000 | | | | $1750 | | | $0 |
| **Commercial/Farm/NPO** | | | | | | | | | |
| Owner | 0 | | | | | $15,000 | $10,000 | | $0 |
| Tenant | 0 | | | | | $15,000 | $10,000 | | $0 |
| **Personal Property** | 0 | | | | | $22,750 | | | $0 |

Estimate amount of time necessary to relocate all RAP
Estimated number of years until project wide R/W

| | | | | | | |
|---|---|---|---|---|---|---|
| [[(total of acquisition cost) x 0.09]x0.025] + [[(total of acquisition cost) x 0.15] x 1.20] + [[(total of acquisition cost) x 0.10] x 1.50] = | | | | | **Contingency** (Incidentals, Admin, Review, & Appropriation) | **$22,324** |
| | | | | | **Total Non-Labor R/W Costs** | **$89,515** |

RHP - Replacement Housing Payment
RSP - Rent Supplemental Payment
NPO - Non-Profit Organization

| Labor (External) | Unit (Parcels) | Unit Price | | | Total Cost |
|---|---|---|---|---|---|
| **Titles** | 6 | $1,000 | | | $6,000 |
| **Appraisals** | | | | | |
| Simple | 0 | $750 | | | $0 |
| Detailed | 6 | $4,500 | | | $27,000 |
| | | | | | |
| **Appraisal Review** | | | | | |
| Simple | 0 | $500 | | | $0 |
| Detailed | 6 | $2,000 | | | $12,000 |
| | | | | | |
| **Negotiations** | 6 | $1,800 | | | $10,800 |
| **Relocations** | | | | | |
| Personal Property | 0 | $2,000 | | | $0 |
| Residential | 0 | $8,000 | | | $0 |
| Commericial/Farm/NPO | 0 | $6,000 | | | $0 |
| **Closings** | 6 | $500 | | | $3,000 |
| **Package Billing & Review** | 6 | $500 | | | $3,000 |
| **Project Management** | 6 | $4,000 | | | $24,000 |
| **Asbestos Testing & Abatement** | 0 | $5,000 | | | $0 |
| | **Total Labor Costs** | | | | **$85,800** |

| This R/W Cost Estimate Prepared by | Date |
|---|---|
| Carpenter Marty Transportation | 4/23/2025 |

| | |
|---|---|
| **Total Labor Costs** | $85,800 |
| **Total Non-Labor R/W Costs** | $89,515 |
| **Contingency** | 30% |
| **TOTAL R/W COSTS** | **$227,900** |

CARPENTER MARTY transportation

**Marks Road**
**Roundabout**
**120' Inscribed Dia.**
**Straight Splitter Islands**

| Item | Description | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 201 | Clearing and Grubbing | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 202 | Pavement Removed | 6600 | SY | $ 16.00 | $ 105,600.00 |
| 203 | Earthwork | 1 | LUMP | $ 50,000.00 | $ 50,000.00 |
| 204 | Subgrade Compaction | 5590 | SY | $ 3.50 | $ 19,565.00 |
| 441 | Full Depth Pavement (Asphalt) | 5590 | SY | $ 115.00 | $ 642,850.00 |
| 442 | Asphalt Overlay | 1890 | SY | $ 27.00 | $ 51,030.00 |
| 452 | Concrete Truck Apron | 240 | SY | $ 150.00 | $ 36,000.00 |
| 452 | Concrete Drive | 315 | SY | $ 110.00 | $ 34,650.00 |
| 609 | Concrete Traffic Island | 440 | SY | $ 140.00 | $ 61,600.00 |
| 609 | Combination Curb and Gutter, Type 2 | 1320 | FT | $ 40.00 | $ 52,800.00 |
| 609 | Curb, Type 6 | 250 | FT | $ 40.00 | $ 10,000.00 |
| 609 | Curb, Type 9 | 270 | FT | $ 40.00 | $ 10,800.00 |
| 611 | Drainage | 1 | LUMP | $ 240,000.00 | $ 240,000.00 |
| 625 | Lighting | 1 | LUMP | $ 120,000.00 | $ 120,000.00 |
| 630 | Signage | 1 | LUMP | $ 10,000.00 | $ 10,000.00 |
| 644 | Pavement Markings | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 659 | Seeding and Mulching | 1 | LUMP | $ 25,000.00 | $ 25,000.00 |
| 832 | Erosion Control | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| | | | **Itemized Subtotal** | | **$ 1,519,900.00** |

| | Incidentals | | | | |
|---|---|---|---|---|---|
| 614 | Maintenance of Traffic | 1 | LUMP | $ 75,000.00 | $ 75,000.00 |
| 623 | Construction Layout Stakes | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 624 | Mobilization | 1 | LUMP | $ 100,000.00 | $ 100,000.00 |
| | | | **Incidentals Subtotal** | | **$ 190,000.00** |

| | |
|---|---|
| **Contingency (25%)** | **$ 427,500.00** |
| **Construction Subtotal** | **$ 2,137,400.00** |
| **Engineering Design (25%)** | **$ 534,400.00** |
| **Environmental, Geotechnical, Miscellaneous Federal Requirements (10%)** | **$ 213,800.00** |
| **Right-of-Way* (Includes 30% Contingency)** | **$ 221,700.00** |
| **Subtotal** | **$ 3,107,300.00** |
| **Inflation* (22.4%)** | **$ 696,100.00** |
| **Total** | **$ 3,803,400.00** |

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2030 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

| Acquisition | Parcel | Unit (Acreage) | Cost/Unit ($/Acre) | Acreage | Cost | Subtotal Land Value | Structure Value (If Taken) | Damages (Loss in Value to the Residue) | Subtotal Structures & Damages | Total Non-Labor Acquisition Costs | Parcel Count | Total Takes | Partial Takes | No. of Structures Impacted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | | | | | | | | | | | | | | |
| Commercial | 025-01B-44-013 | 0.100 | $18,820 | 8.52 | $160,350 | $1,882 | | | $0 | $1,882 | | | | |
| | 025-01D-05-009 | 0.050 | $82,521 | 2.34 | $193,100 | $4,126 | | | $0 | $4,126 | | | | |
| | 025-01D-05-008 | 0.242 | $57,151 | 2.58 | $147,450 | $13,831 | | | $0 | $13,831 | | | | |
| | 001-02C-01-012 | 0.334 | $130,969 | 14.74 | $1,930,480 | $43,744 | | | $0 | $43,744 | | | | |
| | 001-02A-29-028 | 0.050 | $453,782 | 2.20 | $998,320 | $22,689 | | | | | | | | |
| | 001-02A-29-027 | 0.020 | $316,297 | 1.11 | $351,090 | $6,326 | | | | | | | | |
| Industrial | | | | | | | | | | | | | | |
| Agricultural | | | | | | | | | | | | | | |

| Relocation | Unit (Displacement) | RHP/RSP | | | | Move Cost | Re-establishment | | Total Non-Labor RAP Costs |
|---|---|---|---|---|---|---|---|---|---|
| **Residential** | | | | | | | | | |
| Owner Occupant | 0 | $34,000 | | | acquisition begins = | $6,000 | | | $0 |
| Tenant | 0 | $10,000 | | | | $1750 | | | $0 |
| **Commercial/Farm/NPO** | | | | | | | | | |
| Owner | 0 | | | | | $15,000 | $10,000 | | $0 |
| Tenant | 0 | | | | | $15,000 | $10,000 | | $0 |
| **Personal Property** | 0 | | | | | $22,750 | | | $0 |

Estimate amount of time necessary to relocate all RAP
Estimated number of years until project wide R/W

[[(total of acquisition cost) x 0.09]x0.025] + [[(total of acquisition cost) x 0.15] x 1.20] + [[(total of acquisition cost) x 0.10] x 1.50] =

**Contingency** (Incidentals, Admin. Review, & Appropriation) **$21,125**

**Total Non-Labor R/W Costs** **$84,708**

RHP - Replacement Housing Payment
RSP - Rent Supplemental Payment
NPO - Non-Profit Organization

| Labor (External) | Unit (Parcels) | Unit Price | | | Total Cost |
|---|---|---|---|---|---|
| **Titles** | 6 | $1,000 | | | $6,000 |
| **Appraisals** | | | | | |
| Simple | 0 | $750 | | | $0 |
| Detailed | 6 | $4,500 | | | $27,000 |
| | | | | | |
| **Appraisal Review** | | | | | |
| Simple | 0 | $500 | | | $0 |
| Detailed | 6 | $2,000 | | | $12,000 |
| | | | | | |
| **Negotiations** | 6 | $1,800 | | | $10,800 |
| **Relocations** | | | | | |
| Personal Property | 0 | $2,000 | | | $0 |
| Residential | 0 | $8,000 | | | $0 |
| Commericial/Farm/NPO | 0 | $6,000 | | | $0 |
| **Closings** | 6 | $500 | | | $3,000 |
| **Package Billing & Review** | 6 | $500 | | | $3,000 |
| **Project Management** | 6 | $4,000 | | | $24,000 |
| **Asbestos Testing & Abatement** | 0 | $5,000 | | | $0 |
| | **Total Labor Costs** | | | | **$85,800** |

| This R/W Cost Estimate Prepared by | Date |
|---|---|
| Carpenter Marty Transportation | 4/23/2025 |

| | |
|---|---|
| **Total Labor Costs** | $85,800 |
| **Total Non-Labor R/W Costs** | $84,708 |
| **Contingency** | 30% |
| **TOTAL R/W COSTS** | **$221,700** |

**Roadway Improvements - Signal Improvements Substation Road**

| Item | Description | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 201 | Clearing and Grubbing | 1 | LUMP | $ 5,000.00 | $ 5,000.00 |
| 202 | Pavement Removed | 430 | SY | $ 16.00 | $ 6,880.00 |
| 203 | Earthwork | 1 | LUMP | $ 10,000.00 | $ 10,000.00 |
| 204 | Subgrade Compaction | 1531 | SY | $ 3.50 | $ 5,358.50 |
| 441 | Full Depth Pavement (Asphalt) | 1531 | SY | $ 115.00 | $ 176,065.00 |
| 442 | Asphalt Overlay | 3015 | SY | $ 27.00 | $ 81,405.00 |
| 611 | Drainage | 1 | LUMP | $ 60,000.00 | $ 60,000.00 |
| 630 | Signage | 1 | LUMP | $ 5,000.00 | $ 5,000.00 |
| 632 | Traffic Signal Installation with Lighting | 1 | LUMP | $ 250,000.00 | $ 250,000.00 |
| 644 | Pavement Markings | 1 | LUMP | $ 8,000.00 | $ 8,000.00 |
| 659 | Seeding and Mulching | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 832 | Erosion Control | 1 | LUMP | $ 10,000.00 | $ 10,000.00 |
| | | | **Itemized Subtotal** | | **$ 632,710.00** |
| **Incidentals** | | | | | |
| 614 | Maintenance of Traffic | 1 | LUMP | $ 25,000.00 | $ 25,000.00 |
| 623 | Construction Layout Stakes | 1 | LUMP | $ 5,000.00 | $ 5,000.00 |
| 624 | Mobilization | 1 | LUMP | $ 40,000.00 | $ 40,000.00 |
| | | | **Incidentals Subtotal** | | **$ 70,000.00** |
| | | | | **Contingency (25%)** | **$ 175,700.00** |
| | | | **Construction Subtotal** | | **$ 878,410.00** |
| | | | | **Engineering Design (25%)** | **$ 219,700.00** |
| | | | | **Environmental, Geotechnical, Miscellaneous Federal Requirements (10%)** | **$ 87,900.00** |
| | | | | **Right-of-Way* (Includes 30% Contingency)** | **$ 710,800.00** |
| | | | | **Subtotal** | **$ 1,896,900.00** |
| | | | | **Inflation* (22.4%)** | **$ 425,000.00** |
| | | | | **Total** | **$ 2,321,900.00** |

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2030 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

| Acquisition | Parcel | Unit (Acreage) | Cost/Unit ($$/Acre) | Acreage | Cost | Subtotal Land Value | Structure Value (If Taken) | Damages (Loss in Value to the Residue) | Subtotal Structures & Damages | Total Non-Labor Acquisition Costs | Parcel Count | Total Takes | Partial Takes | No. of Structures Impacted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 001-02A-30-016 | 0.083 | $39,216 | 3.06 | $120,000 | $3,255 | | | | $3,255 | 1 | | 1 | |
| | 001-02A-30-15 | 0.001 | $228,000 | 0.50 | $114,000 | $228 | | | | $228 | 1 | | 1 | |
| | 001-02A-30-029 | 0.660 | $290,409 | 0.66 | $191,670 | $191,670 | | | | $191,670 | 1 | 1 | | 1 |
| | 001-02A-31-001 | 0.015 | $386,525 | 0.59 | $228,050 | $5,798 | | | | $5,798 | 1 | | 1 | |
| Commercial | 001-02C-02-011 | 0.068 | $82,040 | 2.52 | $206,740 | $5,579 | | | | $5,579 | 1 | | 1 | |
| | 001-02C-02-14 | 0.078 | $53,880 | 2.50 | $134,700 | $4,203 | | | | $4,203 | 1 | | 1 | |
| | 001-02A-30-010 | 0.029 | $85,714 | 0.35 | $30,000 | $2,486 | | | | $2,486 | 1 | | 1 | |
| | 001-02C-02-018 | 0.014 | $23,559 | 32.25 | $759,780 | $330 | | | | $330 | 1 | | 1 | |
| Industrial | | | | | | | | | | | | | | |
| Agricultural | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

| Relocation | Unit (Displacement) | RHP/RSP | | | Move Cost | Re-establishment | | Total Non-Labor RAP Costs |
|---|---|---|---|---|---|---|---|---|
| **Residential** | | | | | | | | |
| Owner Occupant | 1 | $34,000 | | | acquisition begins =3$6,000 | | | $40,000 |
| Tenant | 4 | $10,000 | | | $1750 | | | $47,000 |
| **Commercial/Farm/NPO** | | | | | | | | |
| Owner | 0 | | | | $15,000 | $10,000 | | $0 |
| Tenant | 0 | | | | $15,000 | $10,000 | | $0 |
| **Personal Property** | 0 | | | | $22,750 | | | $0 |

[[(total of acquisition cost) x 0.09]x0.025] + [[(total of acquisition cost) x 0.15] x 1.20] + [[(total of acquisition cost) x 0.10] x 1.50] =

**Contingency** (Incidentals, Admin, Review, & Appropriation) **$99,857**

**Total Non-Labor R/W Costs** **$400,406**

Estimate amount of time necessary to relocate all RAP

Estimated number of years until project wide R/W

RHP - Replacement Housing Payment
RSP - Rent Supplemental Payment
NPO - Non-Profit Organization

| Labor (External) | Unit (Parcels) | Unit Price | | | Total Cost |
|---|---|---|---|---|---|
| **Titles** | 8 | $1,000 | | | $8,000 |
| **Appraisals** | | | | | |
| Simple | 0 | $750 | | | $0 |
| Detailed | 8 | $4,500 | | | $36,000 |
| | | | | | |
| **Appraisal Review** | | | | | |
| Simple | 0 | $500 | | | $0 |
| Detailed | 8 | $2,000 | | | $16,000 |
| | | | | | |
| **Negotiations** | 8 | $1,800 | | | $14,400 |
| **Relocations** | | | | | |
| Personal Property | 0 | $2,000 | | | $0 |
| Residential | 4 | $8,000 | | | $32,000 |
| Commericial/Farm/NPO | 0 | $6,000 | | | $0 |
| **Closings** | 8 | $500 | | | $4,000 |
| **Package Billing & Review** | 8 | $500 | | | $4,000 |
| **Project Management** | 8 | $4,000 | | | $32,000 |
| **Asbestos Testing & Abatement** | 0 | $5,000 | | | $0 |
| | **Total Labor Costs** | | | | **$146,400** |

| This R/W Cost Estimate Prepared by | Date |
|---|---|
| Carpenter Marty Transportation | 4/23/2025 |

| | |
|---|---|
| **Total Labor Costs** | $146,400 |
| **Total Non-Labor R/W Costs** | $400,406 |
| **Contingency** | 30% |
| **TOTAL R/W COSTS** | **$710,800** |

CARPENTER MARTY transportation

**Substation Road**
**Roundabout**
**105' Inscribed Dia.**
**Chicane Splitter Islands**

## Roadway Improvements - Roundabout Substation Road

| Item | Description | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 201 | Clearing and Grubbing | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| 202 | Pavement Removed | 3090 | SY | $ 16.00 | $ 49,440.00 |
| 203 | Earthwork | 1 | LUMP | $ 40,000.00 | $ 40,000.00 |
| 204 | Subgrade Compaction | 3485 | SY | $ 3.50 | $ 12,197.50 |
| 441 | Full Depth Pavement (Asphalt) | 3485 | SY | $ 115.00 | $ 400,775.00 |
| 442 | Asphalt Overlay | 3235 | SY | $ 27.00 | $ 87,345.00 |
| 452 | Concrete Truck Apron | 270 | SY | $ 150.00 | $ 40,500.00 |
| 452 | Concrete Drive | 100 | SY | $ 110.00 | $ 11,000.00 |
| 609 | Concrete Traffic Island | 380 | SY | $ 140.00 | $ 53,200.00 |
| 609 | Combination Curb and Gutter, Type 2 | 1280 | FT | $ 40.00 | $ 51,200.00 |
| 609 | Curb, Type 6 | 90 | FT | $ 40.00 | $ 3,600.00 |
| 609 | Curb, Type 9 | 210 | FT | $ 40.00 | $ 8,400.00 |
| 611 | Drainage | 1 | LUMP | $ 225,000.00 | $ 225,000.00 |
| 630 | Signage | 1 | LUMP | $ 10,000.00 | $ 10,000.00 |
| 632 | Lighting | 1 | LUMP | $ 120,000.00 | $ 120,000.00 |
| 644 | Pavement Markings | 1 | LUMP | $ 11,000.00 | $ 11,000.00 |
| 659 | Seeding and Mulching | 1 | LUMP | $ 8,000.00 | $ 8,000.00 |
| 832 | Erosion Control | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| | | | **Itemized Subtotal** | | **$ 1,171,660.00** |

| | | | | | |
|---|---|---|---|---|---|
| **Incidentals** | | | | | |
| 614 | Maintenance of Traffic | 1 | LUMP | $ 75,000.00 | $ 75,000.00 |
| 623 | Construction Layout Stakes | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 624 | Mobilization | 1 | LUMP | $ 100,000.00 | $ 100,000.00 |
| | | | **Incidentals Subtotal** | | **$ 190,000.00** |
| | | | | **Contingency (25%)** | **$ 340,500.00** |
| | | | **Construction Subtotal** | | **$ 1,702,160.00** |
| | | | | **Engineering Design (25%)** | **$ 425,600.00** |
| | | | | **Environmental, Geotechnical, Miscellaneous Federal Requirements (10%)** | **$ 170,300.00** |
| | | | | **Right-of-Way* (Includes 30% Contingency)** | **$ 720,100.00** |
| | | | | **Subtotal** | **$ 3,018,200.00** |
| | | | | **Inflation* (22.4%)** | **$ 676,100.00** |
| | | | | **Total** | **$ 3,694,300.00** |

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2030 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

CARPENTER MARTY transportation

Substation Road
Roundabout Right-of-Way Cost Estimate

| Acquisition | Parcel | Unit (Acreage) | Cost/Unit ($/Acre) | Acreage | Cost | Subtotal Land Value | Structure Value (If Taken) | Damages (Loss in Value to the Residue) | Subtotal Structures & Damages | Total Non-Labor Acquisition Costs | Parcel Count | Total Takes | Partial Takes | No. of Structures Impacted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 001-02A-30-016 | 0.119 | $39,216 | 3.06 | $120,000 | $4,667 | | | $0 | $4,667 | | | 1 | |
| | 001-02A-30-029 | 0.660 | $290,409 | 0.66 | $191,670 | $191,670 | | | $0 | $191,670 | | 1 | | |
| | 001-02A-31-001 | 0.005 | $386,525 | 0.59 | $228,050 | $1,933 | | | $0 | $1,933 | | | 1 | |
| Commercial | 001-02C-02-011 | 0.082 | $82,040 | 2.52 | $206,740 | $6,727 | | | $0 | $6,727 | | | 1 | |
| | 001-02C-02-14 | 0.099 | $53,880 | 2.50 | $134,700 | $5,334 | | | $0 | $5,334 | | | 1 | |
| | 001-02A-30-010 | 0.350 | $85,714 | 0.35 | $30,000 | $30,000 | | | $0 | $30,000 | | 1 | | |
| Industrial | | | | | | | | | | | | | | |
| Agricultural | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

| Relocation | Unit (Displacement) | RHP/RSP | | | Move Cost | Re-establishment | Total Non-Labor RAP Costs |
|---|---|---|---|---|---|---|---|
| **Residential** | | | | | | | |
| Owner Occupant | 1 | $34,000 | | | acquisition begins = $6,000 | | $40,000 |
| Tenant | 4 | $10,000 | | | $1750 | | $47,000 |
| **Commercial/Farm/NPO** | | | | | | | |
| Owner | 0 | | | | $15,000 | $10,000 | $0 |
| Tenant | 0 | | | | $15,000 | $10,000 | $0 |
| **Personal Property** | 0 | | | | $22,750 | | $0 |

Estimate amount of time necessary to relocate all RAP
Estimated number of years until project wide R/W

| | | |
|---|---|---|
| [[(total of acquisition cost) x 0.09]x0.025] + [[(total of acquisition cost) x 0.15] x 1.20] + [[(total of acquisition cost) x 0.10] x 1.50] = | **Contingency** (Incidentals, Admin, Review, & Appropriation) | **$108,756** |
| | **Total Non-Labor R/W Costs** | **$436,087** |

RHP - Replacement Housing Payment
RSP - Rent Supplemental Payment
NPO - Non-Profit Organization

| Labor (External) | Unit (Parcels) | Unit Price | | | Total Cost |
|---|---|---|---|---|---|
| **Titles** | 6 | $1,000 | | | $6,000 |
| **Appraisals** | | | | | |
| Simple | 0 | $750 | | | $0 |
| Detailed | 6 | $4,500 | | | $27,000 |
| | | | | | |
| **Appraisal Review** | | | | | |
| Simple | 0 | $500 | | | $0 |
| Detailed | 6 | $2,000 | | | $12,000 |
| | | | | | |
| **Negotiations** | 6 | $1,800 | | | $10,800 |
| **Relocations** | | | | | |
| Personal Property | 0 | $2,000 | | | $0 |
| Residential | 4 | $8,000 | | | $32,000 |
| Commericial/Farm/NPO | 0 | $6,000 | | | $0 |
| **Closings** | 6 | $500 | | | $3,000 |
| **Package Billing & Review** | 6 | $500 | | | $3,000 |
| **Project Management** | 6 | $4,000 | | | $24,000 |
| **Asbestos Testing & Abatement** | 0 | $5,000 | | | $0 |
| | **Total Labor Costs** | | | | **$117,800** |

| This R/W Cost Estimate Prepared by | Date |
|---|---|
| Carpenter Marty Transportation | 4/23/2025 |

| | |
|---|---|
| **Total Labor Costs** | $117,800 |
| **Total Non-Labor R/W Costs** | $436,087 |
| **Contingency** | 30% |
| **TOTAL R/W COSTS** | **$720,100** |

CARPENTER MARTY transportation

**Substation Road**
**Roundabout**
**120' Inscribed Dia.**
**Straight Splitter Islands**

| Item | Description | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 201 | Clearing and Grubbing | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| 202 | Pavement Removed | 3150 | SY | $ 16.00 | $ 50,400.00 |
| 203 | Earthwork | 1 | LUMP | $ 40,000.00 | $ 40,000.00 |
| 204 | Subgrade Compaction | 3435 | SY | $ 3.50 | $ 12,022.50 |
| 441 | Full Depth Pavement (Asphalt) | 3435 | SY | $ 115.00 | $ 395,025.00 |
| 442 | Asphalt Overlay | 3160 | SY | $ 27.00 | $ 85,320.00 |
| 452 | Concrete Truck Apron | 290 | SY | $ 150.00 | $ 43,500.00 |
| 452 | Concrete Drive | 160 | SY | $ 110.00 | $ 17,600.00 |
| 609 | Concrete Traffic Island | 430 | SY | $ 140.00 | $ 60,200.00 |
| 609 | Combination Curb and Gutter, Type 2 | 960 | FT | $ 40.00 | $ 38,400.00 |
| 609 | Curb, Type 6 | 180 | FT | $ 40.00 | $ 7,200.00 |
| 609 | Curb, Type 9 | 270 | FT | $ 40.00 | $ 10,800.00 |
| 611 | Drainage | 1 | LUMP | $ 225,000.00 | $ 225,000.00 |
| 630 | Signage | 1 | LUMP | $ 10,000.00 | $ 10,000.00 |
| 632 | Lighting | 1 | LUMP | $ 120,000.00 | $ 120,000.00 |
| 644 | Pavement Markings | 1 | LUMP | $ 11,000.00 | $ 11,000.00 |
| 659 | Seeding and Mulching | 1 | LUMP | $ 8,000.00 | $ 8,000.00 |
| 832 | Erosion Control | 1 | LUMP | $ 20,000.00 | $ 20,000.00 |
| | | | **Itemized Subtotal** | | **$ 1,174,470.00** |

| Incidentals | | | | | |
|---|---|---|---|---|---|
| 614 | Maintenance of Traffic | 1 | LUMP | $ 75,000.00 | $ 75,000.00 |
| 623 | Construction Layout Stakes | 1 | LUMP | $ 15,000.00 | $ 15,000.00 |
| 624 | Mobilization | 1 | LUMP | $ 100,000.00 | $ 100,000.00 |
| | | | **Incidentals Subtotal** | | **$ 190,000.00** |
| | | | **Contingency (25%)** | | **$ 341,200.00** |
| | | | **Construction Subtotal** | | **$ 1,705,670.00** |

| | |
|---|---|
| **Engineering Design (25%)** | **$ 426,500.00** |
| **Environmental, Geotechnical, Miscellaneous Federal Requirements (10%)** | **$ 170,600.00** |
| **Right-of-Way* (Includes 30% Contingency)** | **$ 727,400.00** |
| **Subtotal** | **$ 3,030,200.00** |
| **Inflation* (22.4%)** | **$ 678,800.00** |
| **Total** | **$ 3,709,000.00** |

Note: Cost estimate does not include utility relocation costs.

*Inflation based on 2030 Construction. Note, inflation rates have been irregularly high recently. If the proposed project is not immediately moved forward, this cost estimate will likely need revised as time passes.

CARPENTER MARTY transportation

Substation Road
Roundabout Right-of-Way Cost Estimate

| Acquisition | Parcel | Unit (Acreage) | Cost/Unit ($/Acre) | Acreage | Cost | Subtotal Land Value | Structure Value (If Taken) | Damages (Loss in Value to the Residue) | Subtotal Structures & Damages | Total Non-Labor Acquisition Costs | Parcel Count | Total Takes | Partial Takes | No. of Structures Impacted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 001-02A-30-016 | 0.120 | $39,216 | 3.06 | $120,000 | $4,706 | | | $0 | $4,706 | | | 1 | |
| | 001-02A-30-029 | 0.660 | $290,409 | 0.66 | $191,670 | $191,670 | | | $0 | $191,670 | | 1 | | |
| | 001-02A-31-001 | 0.005 | $386,525 | 0.59 | $228,050 | $1,933 | | | $0 | $1,933 | | | 1 | |
| Commercial | 001-02C-02-011 | 0.104 | $82,040 | 2.52 | $206,740 | $8,532 | | | $0 | $8,532 | | | 1 | |
| | 001-02C-02-14 | 0.143 | $53,880 | 2.50 | $134,700 | $7,705 | | | $0 | $7,705 | | | 1 | |
| | 001-02A-30-010 | 0.350 | $85,714 | 0.35 | $30,000 | $30,000 | | | $0 | $30,000 | | 1 | | |
| Industrial | | | | | | | | | | | | | | |
| Agricultural | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

| Relocation | Unit (Displacement) | RHP/RSP | | | | Move Cost | Re-establishment | | Total Non-Labor RAP Costs |
|---|---|---|---|---|---|---|---|---|---|
| **Residential** | | | | | | | | | |
| Owner Occupant | 1 | $34,000 | | | acquisition begins = | $6,000 | | | $40,000 |
| Tenant | 4 | $10,000 | | | | $1750 | | | $47,000 |
| **Commercial/Farm/NPO** | | | | | | | | | |
| Owner | 0 | | | | | $15,000 | $10,000 | | $0 |
| Tenant | 0 | | | | | $15,000 | $10,000 | | $0 |
| **Personal Property** | 0 | | | | | $22,750 | | | $0 |

Estimate amount of time necessary to relocate all RAP
Estimated number of years until project wide R/W

[[(total of acquisition cost) x 0.09]x0.025] + [[(total of acquisition cost) x 0.15] x 1.20] + [[(total of acquisition cost) x 0.10] x 1.50] =

**Contingency** (Incidentals, Admin, Review, & Appropriation) **$110,156**

**Total Non-Labor R/W Costs** **$441,702**

RHP - Replacement Housing Payment
RSP - Rent Supplemental Payment
NPO - Non-Profit Organization

| Labor (External) | Unit (Parcels) | Unit Price | | | Total Cost |
|---|---|---|---|---|---|
| **Titles** | 6 | $1,000 | | | $6,000 |
| **Appraisals** | | | | | |
| Simple | 0 | $750 | | | $0 |
| Detailed | 6 | $4,500 | | | $27,000 |
| | | | | | |
| **Appraisal Review** | | | | | |
| Simple | 0 | $500 | | | $0 |
| Detailed | 6 | $2,000 | | | $12,000 |
| | | | | | |
| **Negotiations** | 6 | $1,800 | | | $10,800 |
| **Relocations** | | | | | |
| Personal Property | 0 | $2,000 | | | $0 |
| Residential | 4 | $8,000 | | | $32,000 |
| Commericial/Farm/NPO | 0 | $6,000 | | | $0 |
| **Closings** | 6 | $500 | | | $3,000 |
| **Package Billing & Review** | 6 | $500 | | | $3,000 |
| **Project Management** | 6 | $4,000 | | | $24,000 |
| **Asbestos Testing & Abatement** | 0 | $5,000 | | | $0 |
| | **Total Labor Costs** | | | | **$117,800** |

| This R/W Cost Estimate Prepared by | Date |
|---|---|
| Carpenter Marty Transportation | 4/23/2025 |

| | |
|---|---|
| **Total Labor Costs** | $117,800 |
| **Total Non-Labor R/W Costs** | $441,702 |
| **Contingency** | 30% |
| **TOTAL R/W COSTS** | **$727,400** |

# Appendix J
## ICE Analysis

CARPENTER MARTY transportation

| Organization Information | |
|---|---|
| **Analyst:** | LRY |
| **Agency/Company:** | CMTran |
| **Date Performed:** | 3/3/2025 |
| **Intersection:** | SR-303 & Marks Road |
| **Route:** | 303 |
| **Logpoint:** | |
| **Common Name:** | Center Road |
| **Analysis Type** | At-Grade Intersection |

**At-Grade Control Strategies**

| Control # | Include | Short Name | Description | Notes |
|---|---|---|---|---|
| 1 | No | MinorStop | Minor Road Stop | |
| 2 | No | AllStop | All Way Stop | |
| 3 | Yes | TrafficSignal | Traffic Signal | Existing Conditions |
| 4 | Yes | TrafficSignalAlt | Traffic Signal (Alt.) | Alternative 1 |
| 5 | Yes | Roundabout | Roundabout | Alternative 2A |
| 6 | No | DLT | Displaced Left Turn (DLT) | |
| 7 | No | MUT | Median U-Turn (MUT) | |
| 8 | No | SignalRCUT | Signalized Restricted Crossing U-Turn (RCUT) | |
| 9 | No | UnsignalRCUT | Unsignalized Restricted Crossing U-Turn (RCUT) | |
| 10 | No | GreenT | Continuous Green-T Intersection | |
| 11 | No | Jughandle | Jughandle | |
| 12 | No | Quadrant Itx | Quadrant Roadway Intersection | Note that no safety information is available |
| 13 | No | Other1 | Other 1 | Safety information must be provided |
| 14 | No | Other2 | Other 2 | Safety information must be provided |
| | | | | |

| | | Open Year | Design Year |
|---|---|---|---|
| | Operating Cycle | 2030 | 2050 |
| | Yearly Growth Rate for Volumes | | 0.5% |
| | **Peak Hour Start** | **From** | **To** |
| Enter peak period begin and end times: | AM peak | 7:00 AM | 8:00 AM |
| | PM peak | 5:00 PM | 6:00 PM |
| | Weekend peak | | |

| Select facility type: | Urban Major Collector | At intersections of vary |
|---|---|---|

| Specify total volumes or turning counts? | Total Volumes | (Select from drop-down menu) |
|---|---|---|
| | Enter the total entering volume (i.e. sum of turning movement counts) for the peak hours. If data is not available for the weekend peak hour please leave blank. | |

| | **Units** | **Year** | |
|---|---|---|---|
| | | **Opening** | **Design** |
| | | **2030** | **2050** |
| | | **Intersection 1** | |
| AM peak hour volume | veh/hr. | 1,690 | 1,760 |
| PM peak hour volume | veh/hr. | 2,190 | 2,320 |
| Weekend peak hour volume: | veh/hr. | | |
| Average annual auto occupancy | Passengers per vehicle | 1.0 | 1.0 |
| Average annual % trucks | Average % | 2.0% | 2.0% |

| Type | Category | Unit valuation | Default value | Override value | Use value | Override date | Notes/References |
|---|---|---|---|---|---|---|---|
| **Existing (Base) year for discounting** | N/A | N/A | N/A | 2030 | 2030 | | All costs will be discounted to the Base Year for Discounting. *Enter the year in the "Override Value" column.* |
| **Opening Year** | N/A | N/A | N/A | 2030 | 2030 | | |
| **Design Year** | N/A | N/A | N/A | 2050 | 2050 | | |
| **Discount rate** | N/A | Percent | 0.04 | | 0.04 | | Typical Value |
| **Value of time** | Person (weekday)<br>Person (weekend)<br>Trucks | $ per person hour<br>$ per person hour<br>$ per truck hour | $ 18.12<br>$ 18.12<br>$ 52.14 | | $ 18.12<br>$ 18.12<br>$ 52.14 | | 2019 TTI Urban Mobility Report |
| **Crashes** | Fatal & Injury Crashes<br>Property damage only crashes | $ per crash<br>$ per crash | $ 110,820<br>$ 11,008 | | $ 110,820<br>$ 11,008 | | ODOT 2023 data<br>ODOT 2023 data |

These following values define the planning & construction and the operating & maintenance costs of the control strategy alternatives. A single total cost is required for planning and construction. Default values are provided for all operating & maintenance cost, but can be overridden by the user.

| At-Grade Intersections | Total Design & Construction | Total Right of Way Costs | Operating & Maintenance | Signal Retiming | Power | Lighting | Signal Maintenance | Roundabout Landscaping | Other | Other 2 | Other 3 | Other 4 | Other 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Signal | $ - | $ - | Cost<br>Period | $ 5,000<br>Every 6.5 years | $ 2,000<br>1 (yearly) | $ 1,000<br>1 (yearly) | $ 3,000<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) |
| Traffic Signal (Alt.) | $ 2,410,600 | $ 290,200 | Cost<br>Period | $ 5,000<br>Every 6.5 years | $ 2,000<br>1 (yearly) | $ 1,000<br>1 (yearly) | $ 3,000<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) |
| Roundabout | $ 3,801,300 | $ 227,900 | Cost<br>Period | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ 3,000<br>1 (yearly) | $ -<br>1 (yearly) | $ 2,000<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) | $ -<br>1 (yearly) |

## Safety Information

Enter ECAT results into the table below.

| At-Grade Intersection | Crash Type | Opening Year | Design Year |
|---|---|---|---|
| Traffic Signal | Total | | 5.19 |
| | Fatal & Injury | | 1.35 |
| Traffic Signal (Alt.) | Total | | 3.05 |
| | Fatal & Injury | | 0.73 |
| Roundabout | Total | | 2.67 |
| | Fatal & Injury | | 0.64 |

| At-Grade Intersections | | | Opening Year | | | Design Year | | |
|---|---|---|---|---|---|---|---|---|
| | | | Average vehicle delay | | | Average vehicle delay | | |
| **Control Strategy** | Delay Type | Units | AM peak | PM peak | Weekend peak | AM peak | PM peak | Weekend peak |
| Traffic Signal | Single Input | sec/veh | 18.5 | 29.7 | | 21.4 | 69.8 | |
| Traffic Signal (Alt.) | Single Input | sec/veh | 17.9 | 21.9 | | 19.3 | 24.4 | |
| Roundabout | Single Input | sec/veh | 15.9 | 18.5 | | 18.1 | 24.2 | |

| | |
|---|---|
| **Analyst:** | LRY |
| **Agency/Company:** | CMTran |
| **Intersection:** | SR-303 & Marks Road |
| **Route:** | 303 |
| **Logpoint:** | |
| **Common Name:** | Center Road |
| **Date Performed:** | 3/3/2025 |
| **Analysis Type** | At-Grade Intersection |

## Analysis Summary

| Cost Categories | Net Present Value of Costs | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Planning, Construction & Right of Way Costs | $ - | $ 2,468,640 | $ 3,846,880 |
| Post-Opening Costs | $ 95,545 | $ 95,545 | $ 72,952 |
| Auto Passenger Delay | $ 12,951,293 | $ 7,761,367 | $ 7,055,136 |
| Truck Delay | $ 760,554 | $ 455,780 | $ 414,307 |
| Safety | $ 94,302 | $ 52,430 | $ 45,557 |
| **Total cost** | **$13,901,693** | **$10,833,761** | **$11,434,831** |

| Select Base Case for Benefit-Cost Comparison: (Choose from list) | Traffic Signal | Note: The "Benefit-Cost Ratio" is only applicable for im |
|---|---|---|

| Benefit Categories | Net Present Value of Benefits Relative to Base Case | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Auto Passenger Delay | | $ 5,189,926 | $ 5,896,157 |
| Truck Delay | | $ 304,774 | $ 346,247 |
| Safety | | $ 41,872 | $ 48,745 |
| **Net Present Value of Benefits** | | **$ 5,536,572** | **$ 6,291,149** |
| **Net Present Value of Costs** | | **$ 2,468,640** | **$ 3,824,287** |
| **Net Present Value of Improvement** | | **$ 3,067,932** | **$ 2,466,862** |
| **Benefit-Cost (B/C) Ratio** | | **2.24** | **1.65** |
| **Delay B/C** | | **2.23** | **1.63** |
| **Safety B/C** | | **0.02** | **0.01** |

| Type | Category | Unit valuation | Default value | Override value | Use value | Override date | Notes/References |
|---|---|---|---|---|---|---|---|
| **Existing (Base) year for discounting** | N/A | N/A | N/A | 2030 | 2030 | | All costs will be discounted to the Base Year for Discounting. *Enter the year in the "Override Value" column.* |
| **Opening Year** | N/A | N/A | N/A | 2030 | 2030 | | |
| **Design Year** | N/A | N/A | N/A | 2050 | 2050 | | |
| **Discount rate** | N/A | Percent | 0.04 | | 0.04 | | Typical Value |
| **Value of time** | Person (weekday)<br>Person (weekend)<br>Trucks | $ per person hour<br>$ per person hour<br>$ per truck hour | $ 18.12<br>$ 18.12<br>$ 52.14 | | $ 18.12<br>$ 18.12<br>$ 52.14 | | 2019 TTI Urban Mobility Report |
| **Crashes** | Fatal & Injury Crashes<br>Property damage only crashes | $ per crash<br>$ per crash | $ 110,820<br>$ 11,008 | | $ 110,820<br>$ 11,008 | | ODOT 2023 data<br>ODOT 2023 data |

These following values define the planning & construction and the operating & maintenance costs of the control strategy alternatives. A single total cost is required for planning and construction. Default values are provided for all operating & maintenance cost, but can be overridden by the user.

| At-Grade Intersections | Total Design & Construction | Total Right of Way Costs | Operating & Maintenance | Signal Retiming | Power | Lighting | Signal Maintenance | Roundabout Landscaping | Other | Other 2 | Other 3 | Other 4 | Other 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Signal | $ - | $ - | Cost | $ 5,000 | $ 2,000 | $ 1,000 | $ 3,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| | | | Period | Every 6.5 years | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) |
| Traffic Signal (Alt.) | $ 2,410,600 | $ 290,200 | Cost | $ 5,000 | $ 2,000 | $ 1,000 | $ 3,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| | | | Period | Every 6.5 years | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) |
| Roundabout | $ 3,581,700 | $ 221,700 | Cost | $ - | $ - | $ 3,000 | $ - | $ 2,000 | $ - | $ - | $ - | $ - | $ - |
| | | | Period | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) |

## Safety Information

Enter ECAT results into the table below.

| At-Grade Intersection | Crash Type | Opening Year | Design Year |
|---|---|---|---|
| Traffic Signal | Total | | 5.19 |
| | Fatal & Injury | | 1.35 |
| Traffic Signal (Alt.) | Total | | 3.05 |
| | Fatal & Injury | | 0.73 |
| Roundabout | Total | | 2.67 |
| | Fatal & Injury | | 0.64 |

| | |
|---|---|
| **Analyst:** | LRY |
| **Agency/Company:** | CMTran |
| **Intersection:** | SR-303 & Marks Road |
| **Route:** | 303 |
| **Logpoint:** | |
| **Common Name:** | Center Road |
| **Date Performed:** | 3/3/2025 |
| **Analysis Type** | At-Grade Intersection |

## Analysis Summary

| Cost Categories | Net Present Value of Costs | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Planning, Construction & Right of Way Costs | $ - | $ 2,468,640 | $ 3,626,040 |
| Post-Opening Costs | $ 95,545 | $ 95,545 | $ 72,952 |
| Auto Passenger Delay | $ 12,951,293 | $ 7,761,367 | $ 7,055,136 |
| Truck Delay | $ 760,554 | $ 455,780 | $ 414,307 |
| Safety | $ 94,302 | $ 52,430 | $ 45,557 |
| **Total cost** | **$13,901,693** | **$10,833,761** | **$11,213,991** |

| Select Base Case for Benefit-Cost Comparison: (Choose from list) | Traffic Signal | Note: The "Benefit-Cost Ratio" is only applicable for im |
|---|---|---|

| Benefit Categories | Net Present Value of Benefits Relative to Base Case | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Auto Passenger Delay | | $ 5,189,926 | $ 5,896,157 |
| Truck Delay | | $ 304,774 | $ 346,247 |
| Safety | | $ 41,872 | $ 48,745 |
| **Net Present Value of Benefits** | | **$ 5,536,572** | **$ 6,291,149** |
| **Net Present Value of Costs** | | **$ 2,468,640** | **$ 3,603,447** |
| **Net Present Value of Improvement** | | **$ 3,067,932** | **$ 2,687,702** |
| **Benefit-Cost (B/C) Ratio** | | 2.24 | 1.75 |
| **Delay B/C** | | 2.23 | 1.73 |
| **Safety B/C** | | 0.02 | 0.01 |

| Organization Information | |
|---|---|
| **Analyst:** | LRY |
| **Agency/Company:** | CMTran |
| **Date Performed:** | 3/3/2025 |
| **Intersection:** | SR-303 & Substation Road |
| **Route:** | 303 |
| **Logpoint:** | |
| **Common Name:** | Center Road |
| **Analysis Type** | At-Grade Intersection |

**At-Grade Control Strategies**

| Control # | Include | Short Name | Description | Notes |
|---|---|---|---|---|
| 1 | No | MinorStop | Minor Road Stop | |
| 2 | No | AllStop | All Way Stop | |
| 3 | Yes | TrafficSignal | Traffic Signal | Existing Conditions |
| 4 | Yes | TrafficSignalAlt | Traffic Signal (Alt.) | Alternative 1 |
| 5 | Yes | Roundabout | Roundabout | Alternative 2 |
| 6 | No | DLT | Displaced Left Turn (DLT) | |
| 7 | No | MUT | Median U-Turn (MUT) | |
| 8 | No | SignalRCUT | Signalized Restricted Crossing U-Turn (RCUT) | |
| 9 | No | UnsignalRCUT | Unsignalized Restricted Crossing U-Turn (RCUT) | |
| 10 | No | GreenT | Continuous Green-T Intersection | |
| 11 | No | Jughandle | Jughandle | |
| 12 | No | Quadrant Itx | Quadrant Roadway Intersection | Note that no safety information is available |
| 13 | No | Other1 | Other 1 | Safety information must be provided |
| 14 | No | Other2 | Other 2 | Safety information must be provided |
| | | | | |

| | Open Year | Design Year |
|---|---|---|
| Operating Cycle | 2030 | 2050 |
| Yearly Growth Rate for Volumes | | 0.5% |

| | Peak Hour Start | From | To |
|---|---|---|---|
| Enter peak period begin and end times: | AM peak | 7:00 AM | 8:00 AM |
| | PM peak | 5:00 PM | 6:00 PM |
| | Weekend peak | | |

| Select facility type: | Urban Major Collector | At intersections of vary |
|---|---|---|

| Specify total volumes or turning counts? | Total Volumes | (Select from drop-down menu) |
|---|---|---|

Enter the total entering volume (i.e. sum of turning movement counts) for the peak hours. If data is not available for the weekend peak hour please leave blank.

| | Units | Year | |
|---|---|---|---|
| | | Opening | Design |
| | | 2030 | 2050 |
| | | Intersection 1 | |
| AM peak hour volume | veh/hr. | 1,620 | 1,790 |
| PM peak hour volume | veh/hr. | 2,010 | 2,230 |
| Weekend peak hour volume: | veh/hr. | | |
| Average annual auto occupancy | Passengers per vehicle | 1.0 | 1.0 |
| Average annual % trucks | Average % | 5.0% | 5.0% |

| Type | Category | Unit valuation | Default value | Override value | Use value | Override date | Notes/References |
|---|---|---|---|---|---|---|---|
| **Existing (Base) year for discounting** | N/A | N/A | N/A | 2030 | 2030 | | All costs will be discounted to the Base Year for Discounting. *Enter the year in the "Override Value" column.* |
| **Opening Year** | N/A | N/A | N/A | 2030 | 2030 | | |
| **Design Year** | N/A | N/A | N/A | 2050 | 2050 | | |
| **Discount rate** | N/A | Percent | 0.04 | | 0.04 | | Typical Value |
| **Value of time** | Person (weekday)<br>Person (weekend)<br>Trucks | $ per person hour<br>$ per person hour<br>$ per truck hour | $ 18.12<br>$ 18.12<br>$ 52.14 | | $ 18.12<br>$ 18.12<br>$ 52.14 | | 2019 TTI Urban Mobility Report |
| **Crashes** | Fatal & Injury Crashes<br>Property damage only crashes | $ per crash<br>$ per crash | $ 110,820<br>$ 11,008 | | $ 110,820<br>$ 11,008 | | ODOT 2023 data<br>ODOT 2023 data |

These following values define the planning & construction and the operating & maintenance costs of the control strategy alternatives. A single total cost is required for planning and construction. Default values are provided for all operating & maintenance cost, but can be overridden by the user.

| At-Grade Intersections | Total Design & Construction | Total Right of Way Costs | Operating & Maintenance | Signal Retiming | Power | Lighting | Signal Maintenance | Roundabout Landscaping | Other | Other 2 | Other 3 | Other 4 | Other 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Signal | $ - | $ - | Cost | $ 5,000 | $ 2,000 | $ 1,000 | $ 3,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| | | | Period | Every 6.5 years | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) |
| Traffic Signal (Alt.) | $ 1,611,100 | $ 710,800 | Cost | $ 5,000 | $ 2,000 | $ 1,000 | $ 3,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| | | | Period | Every 6.5 years | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) |
| Roundabout | $ 2,974,200 | $ 720,100 | Cost | $ - | $ - | $ 3,000 | $ - | $ 2,000 | $ - | $ - | $ - | $ - | $ - |
| | | | Period | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) | 1 (yearly) |

## Safety Information

Enter ECAT results into the table below.

| At-Grade Intersection | Crash Type | Opening Year | Design Year |
|---|---|---|---|
| Traffic Signal | Total | | 6.22 |
| | Fatal & Injury | | 2.38 |
| Traffic Signal (Alt.) | Total | | 4.46 |
| | Fatal & Injury | | 2.14 |
| Roundabout | Total | | 3.08 |
| | Fatal & Injury | | 1.04 |

| | | | Opening Year | | | Design Year | | |
|---|---|---|---|---|---|---|---|---|
| **At-Grade Intersections** | | | Average vehicle delay | | | Average vehicle delay | | |
| **Control Strategy** | Delay Type | Units | AM peak | PM peak | Weekend peak | AM peak | PM peak | Weekend peak |
| Traffic Signal | Single Input | sec/veh | 14.4 | 17.0 | | 17.2 | 23.9 | |
| Traffic Signal (Alt.) | Single Input | sec/veh | 14.3 | 17.6 | | 17.0 | 24.8 | |
| Roundabout | Single Input | sec/veh | 12.1 | 14.4 | | 15.4 | 20.1 | |

| | |
|---|---|
| **Analyst:** | LRY |
| **Agency/Company:** | CMTran |
| **Intersection:** | SR-303 & Substation Road |
| **Route:** | 303 |
| **Logpoint:** | |
| **Common Name:** | Center Road |
| **Date Performed:** | 3/3/2025 |
| **Analysis Type** | At-Grade Intersection |

## Analysis Summary

| Cost Categories | Net Present Value of Costs | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Planning, Construction & Right of Way Costs | $ - | $ 1,753,260 | $ 3,118,220 |
| Post-Opening Costs | $ 95,545 | $ 95,545 | $ 72,952 |
| Auto Passenger Delay | $ 6,306,210 | $ 6,439,330 | $ 5,366,115 |
| Truck Delay | $ 955,053 | $ 975,214 | $ 812,679 |
| Safety | $ 151,637 | $ 130,549 | $ 67,992 |
| **Total cost** | **$7,508,446** | **$9,393,898** | **$9,437,958** |

| Select Base Case for Benefit-Cost Comparison: (Choose from list) | Traffic Signal | Note: The "Benefit-Cost Ratio" is only applicable for im |
|---|---|---|

| Benefit Categories | Net Present Value of Benefits Relative to Base Case | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Auto Passenger Delay | | $ (133,120) | $ 940,095 |
| Truck Delay | | $ (20,161) | $ 142,374 |
| Safety | | $ 21,088 | $ 83,646 |
| **Net Present Value of Benefits** | | **$ (132,192)** | **$ 1,166,115** |
| **Net Present Value of Costs** | | **$ 1,753,260** | **$ 3,095,627** |
| **Net Present Value of Improvement** | | **$ (1,885,452)** | **$ (1,929,512)** |
| **Benefit-Cost (B/C) Ratio** | | **Control Strategy not preferred. Benefits are less than base case and cost is greater than base case.** | **0.38** |
| **Delay B/C** | | **Control Strategy not preferred. Benefits are less than base case and cost is greater than base case.** | **0.35** |
| **Safety B/C** | | **0.01** | **0.03** |

| Type | Category | Unit valuation | Default value | Override value | Use value | Override date | Notes/References |
|---|---|---|---|---|---|---|---|
| **Existing (Base) year for discounting** | N/A | N/A | N/A | 2030 | 2030 | | All costs will be discounted to the Base Year for Discounting. *Enter the year in the "Override Value" column.* |
| **Opening Year** | N/A | N/A | N/A | 2030 | 2030 | | |
| **Design Year** | N/A | N/A | N/A | 2050 | 2050 | | |
| **Discount rate** | N/A | Percent | 0.04 | | 0.04 | | Typical Value |
| **Value of time** | Person (weekday)<br>Person (weekend)<br>Trucks | $ per person hour<br>$ per person hour<br>$ per truck hour | $ 18.12<br>$ 18.12<br>$ 52.14 | | $ 18.12<br>$ 18.12<br>$ 52.14 | | 2019 TTI Urban Mobility Report |
| **Crashes** | Fatal & Injury Crashes<br>Property damage only crashes | $ per crash<br>$ per crash | $ 110,820<br>$ 11,008 | | $ 110,820<br>$ 11,008 | | ODOT 2023 data<br>ODOT 2023 data |

These following values define the planning & construction and the operating & maintenance costs of the control strategy alternatives. A single total cost is required for planning and construction. Default values are provided for all operating & maintenance cost, but can be overridden by the user.

| At-Grade Intersections | Total Design & Construction | Total Right of Way Costs | Operating & Maintenance | Signal Retiming | Power | Lighting | Signal Maintenance | Roundabout Landscaping | Other | Other 2 | Other 3 | Other 4 | Other 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Signal | $ - | $ - | Cost Period | $ 5,000 Every 6.5 years | $ 2,000 1 (yearly) | $ 1,000 1 (yearly) | $ 3,000 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) |
| Traffic Signal (Alt.) | $ 1,611,100 | $ 710,800 | Cost Period | $ 5,000 Every 6.5 years | $ 2,000 1 (yearly) | $ 1,000 1 (yearly) | $ 3,000 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) |
| Roundabout | $ 2,981,600 | $ 727,400 | Cost Period | $ - 1 (yearly) | $ - 1 (yearly) | $ 3,000 1 (yearly) | $ - 1 (yearly) | $ 2,000 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) | $ - 1 (yearly) |

## Safety Information

Enter ECAT results into the table below.

| At-Grade Intersection | Crash Type | Opening Year | Design Year |
|---|---|---|---|
| Traffic Signal | Total | | 6.22 |
| | Fatal & Injury | | 2.38 |
| Traffic Signal (Alt.) | Total | | 4.46 |
| | Fatal & Injury | | 2.14 |
| Roundabout | Total | | 3.08 |
| | Fatal & Injury | | 1.04 |

| | |
|---|---|
| **Analyst:** | LRY |
| **Agency/Company:** | CMTran |
| **Intersection:** | SR-303 & Substation Road |
| **Route:** | 303 |
| **Logpoint:** | |
| **Common Name:** | Center Road |
| **Date Performed:** | 3/3/2025 |
| **Analysis Type** | At-Grade Intersection |

## Analysis Summary

| Cost Categories | Net Present Value of Costs | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Planning, Construction & Right of Way Costs | $ - | $ 1,753,260 | $ 3,127,080 |
| Post-Opening Costs | $ 95,545 | $ 95,545 | $ 72,952 |
| Auto Passenger Delay | $ 6,306,210 | $ 6,439,330 | $ 5,366,115 |
| Truck Delay | $ 955,053 | $ 975,214 | $ 812,679 |
| Safety | $ 151,637 | $ 130,549 | $ 67,992 |
| **Total cost** | **$7,508,446** | **$9,393,898** | **$9,446,818** |

| Select Base Case for Benefit-Cost Comparison: (Choose from list) | Traffic Signal | Note: The "Benefit-Cost Ratio" is only applicable for im |
|---|---|---|

| Benefit Categories | Net Present Value of Benefits Relative to Base Case | | |
|---|---|---|---|
| | Traffic Signal | Traffic Signal (Alt.) | Roundabout |
| Auto Passenger Delay | | $ (133,120) | $ 940,095 |
| Truck Delay | | $ (20,161) | $ 142,374 |
| Safety | | $ 21,088 | $ 83,646 |
| **Net Present Value of Benefits** | | **$ (132,192)** | **$ 1,166,115** |
| **Net Present Value of Costs** | | **$ 1,753,260** | **$ 3,104,487** |
| **Net Present Value of Improvement** | | **$ (1,885,452)** | **$ (1,938,372)** |
| **Benefit-Cost (B/C) Ratio** | | **Control Strategy not preferred. Benefits are less than base case and cost is greater than base case.** | **0.38** |
| **Delay B/C** | | **Control Strategy not preferred. Benefits are less than base case and cost is greater than base case.** | **0.35** |
| **Safety B/C** | | **0.01** | **0.03** |

# Appendix K
## ECAT Benefit-Cost Analysis

CARPENTER MARTY transportation

# Project Cost Estimate

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

| | |
|---|---|
| Engineering Design % | 35% |
| Contingency % | 25% |

| Countermeasures | Construction Costs | Right of Way Costs | Engineering Design Costs | Contingency Amount | Total Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value |
|---|---|---|---|---|---|---|---|
| | | | $0.00 | $0.00 | **$0.00** | | |
| Marks Turn Lanes | $838,885.00 | $290,200.00 | $395,179.75 | $282,271.25 | **$1,806,536.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| CMF 1 - Improve visibility of signal heads (existing span wire with no backplates) | $250,000.00 | | $87,500.00 | $62,500.00 | **$400,000.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| **Totals** | **$1,088,885.00** | **$290,200.00** | **$482,679.75** | **$344,771.25** | **$2,206,536.00** | **$0.00** | **$0.00** |

| | |
|---|---|
| Inflation % | 22% |

| | |
|---|---|
| Final Costruction Cost: | **$2,700,800.06** |

*Final construction cost should match the Project Cost Estimate

# Safety Benefit - Cost Analysis

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

**Select Site Types to be used in Benefit-Cost Analysis:**

**All Sites**

**Comments:**

## Countermeasure Service Lives, Costs, and Safety Benefits

| Countermeasures | Service Life (Years) | Initial Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value | Net Present Cost of Countermeasure | Total Cost of Countermeasures | Summary of Annual Crash Modifications | Net Present Value of Safety Benefits |
|---|---|---|---|---|---|---|---|---|
| | 20 | $0.00 | | | $0.00 | $0.00 | -1.222 | $404,348 |
| Marks Turn Lanes | 20 | $1,806,536.00 | | | $1,806,536.00 | $1,806,536.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| CMF 1 - Improve visibility of signal heads (existing span wire with no backplates) | 20 | $400,000.00 | | | $400,000.00 | $400,000.00 | -0.916 | $387,041 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| **Totals** | | **$2,206,536.00** | **$0.00** | **$0.00** | **$2,206,536.00** | **$2,206,536.00** | **-2.138** | **$791,389** |

### Benefit - Cost Calculator

| | |
|---|---|
| Net Present Value of Project | $2,206,536.00 |
| Net Present Value of Safety Benefits | $791,389.13 |
| Net Benefit | ($1,415,146.87) |
| Benefit / Cost Ratio | 0.36 |

### Expected Annual Crash Adjustment

| | |
|---|---|
| Number of Fatal & Incapacitating Injury Crashes | -0.042 |
| Number of Injury Crashes | -0.616 |
| Number of Total Crashes | -2.138 |

**Comments:**

# Project Cost Estimate

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

| | |
|---|---|
| Engineering Design % | 35% |
| Contingency % | 25% |

| Countermeasures | Construction Costs | Right of Way Costs | Engineering Design Costs | Contingency Amount | Total Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value |
|---|---|---|---|---|---|---|---|
| Substation Turn Lanes | $224,811.00 | $710,800.00 | $327,463.85 | $233,902.75 | **$1,496,977.60** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| CMF 1 - Improve visibility of signal heads (existing span wire with no backplates) | $250,000.00 | | $87,500.00 | $62,500.00 | **$400,000.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| **Totals** | **$474,811.00** | **$710,800.00** | **$414,963.85** | **$296,402.75** | $1,896,977.60 | **$0.00** | **$0.00** |

| | |
|---|---|
| Inflation % | 22% |

| | |
|---|---|
| Final Costruction Cost: | **$2,321,900.58** |

*Final construction cost should match the Project Cost Estimate

# Safety Benefit - Cost Analysis

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

**Select Site Types to be used in Benefit-Cost Analysis:**

**All Sites**

**Comments:**

## Countermeasure Service Lives, Costs, and Safety Benefits

| Countermeasures | Service Life (Years) | Initial Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value | Net Present Cost of Countermeasure | Total Cost of Countermeasures | Summary of Annual Crash Modifications | Net Present Value of Safety Benefits |
|---|---|---|---|---|---|---|---|---|
| Substation Turn Lanes | 20 | $1,496,977.60 | | | $1,496,977.60 | $1,496,977.60 | -1.181 | $404,001 |
| | 20 | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| CMF 1 - Improve visibility of signal heads (existing span wire with no backplates) | 20 | $400,000.00 | | | $400,000.00 | $400,000.00 | -0.584 | $252,024 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| **Totals** | | **$1,896,977.60** | **$0.00** | **$0.00** | **$1,896,977.60** | **$1,896,977.60** | **-1.764** | **$656,026** |

### Benefit - Cost Calculator

| | |
|---|---|
| Net Present Value of Project | $1,896,977.60 |
| Net Present Value of Safety Benefits | $656,025.51 |
| Net Benefit | ($1,240,952.09) |
| Benefit / Cost Ratio | 0.35 |

### Expected Annual Crash Adjustment

| | |
|---|---|
| Number of Fatal & Incapacitating Injury Crashes | -0.034 |
| Number of Injury Crashes | -0.516 |
| Number of Total Crashes | -1.764 |

**Comments:**

# Project Cost Estimate

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

| | |
|---|---|
| Engineering Design % | 35% |
| Contingency % | 25% |

| Countermeasures | Construction Costs | Right of Way Costs | Engineering Design Costs | Contingency Amount | Total Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value |
|---|---|---|---|---|---|---|---|
| 2A Marks Chicane Roundabout | $1,829,494.00 | $227,900.00 | $720,087.90 | $514,348.50 | **$3,291,830.40** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| **Totals** | **$1,829,494.00** | **$227,900.00** | **$720,087.90** | **$514,348.50** | $3,291,830.40 | **$0.00** | **$0.00** |

| | |
|---|---|
| Inflation % | 22% |

| | |
|---|---|
| Final Costruction Cost: | **$4,029,200.41** |

*Final construction cost should match the Project Cost Estimate

# Safety Benefit - Cost Analysis

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

**Select Site Types to be used in Benefit-Cost Analysis:**

**All Sites**

**Comments:**

## Countermeasure Service Lives, Costs, and Safety Benefits

| Countermeasures | Service Life (Years) | Initial Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value | Net Present Cost of Countermeasure | Total Cost of Countermeasures | Summary of Annual Crash Modifications | Net Present Value of Safety Benefits |
|---|---|---|---|---|---|---|---|---|
| 2A Marks Chicane Roundabout | 20 | $3,291,830.40 | | | $3,291,830.40 | $3,291,830.40 | -2.515 | $984,781 |
| | 20 | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| **Totals** | | **$3,291,830.40** | **$0.00** | **$0.00** | **$3,291,830.40** | **$3,291,830.40** | **-2.515** | **$984,781** |

### Benefit - Cost Calculator

| | |
|---|---|
| Net Present Value of Project | $3,291,830.40 |
| Net Present Value of Safety Benefits | $984,781.43 |
| Net Benefit | ($2,307,048.97) |
| Benefit / Cost Ratio | 0.30 |

### Expected Annual Crash Adjustment

| | |
|---|---|
| Number of Fatal & Incapacitating Injury Crashes | -0.061 |
| Number of Injury Crashes | -0.714 |
| Number of Total Crashes | -2.515 |

**Comments:**

# Project Cost Estimate

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

| | |
|---|---|
| Engineering Design % | 35% |
| Contingency % | 25% |

| Countermeasures | Construction Costs | Right of Way Costs | Engineering Design Costs | Contingency Amount | Total Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value |
|---|---|---|---|---|---|---|---|
| | | | $0.00 | $0.00 | **$0.00** | | |
| 2A Substation Chicane Roundabout | $1,166,287.00 | $720,100.00 | $660,235.45 | $471,596.75 | **$3,018,219.20** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| **Totals** | **$1,166,287.00** | **$720,100.00** | **$660,235.45** | **$471,596.75** | $3,018,219.20 | **$0.00** | **$0.00** |

| | |
|---|---|
| Inflation % | 22% |

| | |
|---|---|
| Final Costruction Cost: | **$3,694,300.30** |

*Final construction cost should match the Project Cost Estimate

# Safety Benefit - Cost Analysis

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

**Select Site Types to be used in Benefit-Cost Analysis:**

**All Sites**

**Comments:**

## Countermeasure Service Lives, Costs, and Safety Benefits

| Countermeasures | Service Life (Years) | Initial Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value | Net Present Cost of Countermeasure | Total Cost of Countermeasures | Summary of Annual Crash Modifications | Net Present Value of Safety Benefits |
|---|---|---|---|---|---|---|---|---|
| | 20 | $0.00 | | | $0.00 | $0.00 | -3.142 | $1,261,613 |
| 2A Substation Chicane Roundabout | 20 | $3,018,219.20 | | | $3,018,219.20 | $3,018,219.20 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| **Totals** | | **$3,018,219.20** | **$0.00** | **$0.00** | **$3,018,219.20** | **$3,018,219.20** | **-3.142** | **$1,261,613** |

### Benefit - Cost Calculator

| | |
|---|---|
| Net Present Value of Project | $3,018,219.20 |
| Net Present Value of Safety Benefits | $1,261,612.86 |
| Net Benefit | ($1,756,606.34) |
| Benefit / Cost Ratio | 0.42 |

### Expected Annual Crash Adjustment

| | |
|---|---|
| Number of Fatal & Incapacitating Injury Crashes | -0.074 |
| Number of Injury Crashes | -0.942 |
| Number of Total Crashes | -3.142 |

**Comments:**

# Project Cost Estimate

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

| | |
|---|---|
| Engineering Design % | 35% |
| Contingency % | 25% |

| Countermeasures | Construction Costs | Right of Way Costs | Engineering Design Costs | Contingency Amount | Total Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value |
|---|---|---|---|---|---|---|---|
| 2B Marks Straight Roundabout | $1,720,396.00 | $221,700.00 | $679,733.60 | $485,524.00 | **$3,107,353.60** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| **Totals** | **$1,720,396.00** | **$221,700.00** | **$679,733.60** | **$485,524.00** | $3,107,353.60 | **$0.00** | **$0.00** |

| | |
|---|---|
| Inflation % | 22% |

| | |
|---|---|
| Final Costruction Cost: | **$3,803,400.81** |

*Final construction cost should match the Project Cost Estimate

# Safety Benefit - Cost Analysis

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Marks Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

**Select Site Types to be used in Benefit-Cost Analysis:**

**All Sites**

**Comments:**

## Countermeasure Service Lives, Costs, and Safety Benefits

| Countermeasures | Service Life (Years) | Initial Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value | Net Present Cost of Countermeasure | Total Cost of Countermeasures | Summary of Annual Crash Modifications | Net Present Value of Safety Benefits |
|---|---|---|---|---|---|---|---|---|
| 2B Marks Straight Roundabout | 20 | $3,107,353.60 | | | $3,107,353.60 | $3,107,353.60 | -2.515 | $984,781 |
| | 20 | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| **Totals** | | **$3,107,353.60** | **$0.00** | **$0.00** | **$3,107,353.60** | **$3,107,353.60** | **-2.515** | **$984,781** |

### Benefit - Cost Calculator

| | |
|---|---|
| Net Present Value of Project | $3,107,353.60 |
| Net Present Value of Safety Benefits | $984,781.43 |
| Net Benefit | ($2,122,572.17) |
| Benefit / Cost Ratio | 0.32 |

### Expected Annual Crash Adjustment

| | |
|---|---|
| Number of Fatal & Incapacitating Injury Crashes | -0.061 |
| Number of Injury Crashes | -0.714 |
| Number of Total Crashes | -2.515 |

**Comments:**

# Project Cost Estimate

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

| | |
|---|---|
| Engineering Design % | 35% |
| Contingency % | 25% |

| Countermeasures | Construction Costs | Right of Way Costs | Engineering Design Costs | Contingency Amount | Total Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value |
|---|---|---|---|---|---|---|---|
| | | | $0.00 | $0.00 | **$0.00** | | |
| 2B Substation Straight Roundabout | $1,166,493.00 | $727,400.00 | $662,862.55 | $473,473.25 | **$3,030,228.80** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| | | | $0.00 | $0.00 | **$0.00** | | |
| **Totals** | **$1,166,493.00** | **$727,400.00** | **$662,862.55** | **$473,473.25** | $3,030,228.80 | **$0.00** | **$0.00** |

| | |
|---|---|
| Inflation % | 22% |

| | |
|---|---|
| Final Costruction Cost: | **$3,709,000.05** |

*Final construction cost should match the Project Cost Estimate

# Safety Benefit - Cost Analysis

## General Information

| | | | |
|---|---|---|---|
| Project Name | MED-303 | Contact Email | gbalsamo@cmtran.com |
| Project Description | SR-303 at Substation Rd | Contact Phone | 614-565-2429 |
| Reference Number | | Date Performed | 2/20/2025 |
| Analyst | GMB | Analysis Year | 2023 |
| Agency/Company | Carpenter Marty Transportation | | |

**Select Site Types to be used in Benefit-Cost Analysis:**

**All Sites**

**Comments:**

## Countermeasure Service Lives, Costs, and Safety Benefits

| Countermeasures | Service Life (Years) | Initial Cost of Countermeasure | Annual Maintenance & Energy Costs | Salvage Value | Net Present Cost of Countermeasure | Total Cost of Countermeasures | Summary of Annual Crash Modifications | Net Present Value of Safety Benefits |
|---|---|---|---|---|---|---|---|---|
| | 20 | $0.00 | | | $0.00 | $0.00 | -3.142 | $1,261,613 |
| 2B Substation Straight Roundabout | 20 | $3,030,228.80 | | | $3,030,228.80 | $3,030,228.80 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | | |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| | | $0.00 | | | $0.00 | $0.00 | 0.000 | $0 |
| **Totals** | | **$3,030,228.80** | **$0.00** | **$0.00** | **$3,030,228.80** | **$3,030,228.80** | **-3.142** | **$1,261,613** |

### Benefit - Cost Calculator

| | |
|---|---|
| Net Present Value of Project | $3,030,228.80 |
| Net Present Value of Safety Benefits | $1,261,612.86 |
| Net Benefit | ($1,768,615.94) |
| Benefit / Cost Ratio | 0.42 |

### Expected Annual Crash Adjustment

| | |
|---|---|
| Number of Fatal & Incapacitating Injury Crashes | -0.074 |
| Number of Injury Crashes | -0.942 |
| Number of Total Crashes | -3.142 |

**Comments:**