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APPENDICES

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1.0 INTRODUCTION

This analysis has been prepared in support of the following plan set, in order to document design and calculations related to roadway drainage and stormwater management:

- FRA-270-32.92 PID 113663

The goal of FRA-270-32.92 is to improve safety and reduce congestion. Extending westbound left turn queue storage on Easton way approaching Stelzer Road by modifying the existing raised median in this area signalizing the IR-270 southbound off ramp at Easton Way. By widening the IR-270 southbound off ramp to create a two-lane exit and three approaches lanes to the signalized ramp termini extending the south bound off ramps storage and deceleration. The project includes approximately 5,200 feet of constructing a lane, resurfacing, proposed curb and gutter, proposed drainage, proposed traffic control, and post construction BMPs.

2.0 DRAINAGE OUTFALL IDENTIFICATION

Across this project, tributary areas have been delineated using a combination of topographic field surveys and GIS mapping.

In the proposed condition, the roadway profile is maintained to keep the delineation of the existing tributary areas. Ditches will be utilized to collect and expel drainage to its current, respective outfall.

2.1 Outfall 1

On the right side of IR-270 south/Eaton entrance ramp beginning east of the project and continuing until it's outfall at Big Walnut Creek, there is an existing storm sewer than ranges from 42" to 48" within the project limits. The existing condition within the project area is mostly sheet flow to the road drainage system of ditches and pipes. The typical divide is 24 feet east of the centerline of IR-270. In the proposed condition the pattern of flow will be maintained. The existing roadside ditches will be maintained at a lower capacity. Existing pipe will be maintained using extension and headwalls. Existing structures need relocation or replacement will be replaced with manholes. If detention is determined to be needed, detention will be provided with stage 2 submittal of the plans

2.2 Outfall 2

On the right side of IR-270 beginning east of the project and continuing until it's outfall at Big Walnut Creek, there is an existing storm sewer that ranges from 42" to 48" within the project limits. The west trunk line is being maintained and outlet into Big Walnut Creek. The existing condition within the project area is sheet flow divided 24 feet east of the centerline of IR-270. The proposed outlet location is maintained. This maintains the existing drainage pattern which the storm sewer discharges to a ditch which carries the water to the roadside drainage system. If detention is determined to be needed, detention will be provided with stage 2 submittal of the plans

2.3 Outfall 3

On the right side of IR-270 north of the Easton 270 south exit ramp and project limits continuing its outfall to the 270 truck line. There are existing storm sewers that range from 12" to 15" inside of the project limits. The existing storm sewer is being maintained and outlets to the truck line in the middle of IR-270. The existing condition within the project area is sheet flow divided 24 feet east of the centerline of connection ramp B. The existing outlet location is maintained. This maintains the existing drainage pattern which the storm sewer discharges to a ditch which carries the water to the roadside drainage system. If detention is needed, detention will be provided with stage 2 submittal of the plans.

3.0 ROADWAY DRAINAGE DESIGN METHODOLOGY

3.1 Ditches

The drainage areas to the proposed inlets are as shown on the Appendix E Storm Sewer Tributary Map.

Ditch design calculations were completed to comply with requirements per ODOT L&D Manual Vol. 2, Section 1102. Per ODOT L&D Manual Vol. 2 Section 1102.3, the design frequency to determine the depth is a 5-year storm with a 2-year storm to determine the shear stress and width of the ditch lining.

The ditches along IR-270 were designed within the right-of-way to have foreslopes ranging between 6:1 and 2:1 and backslopes ranging between 6:1 and 2:1. These ditches allow for maintaining the existing overall drainage patterns. The ditches are paired with a storm sewer system to keep the design year storm within the ditch and off the traveled way. The appropriate ditch lining has been provided based on the shear stress using CDSS.

See Appendix A for attached Ditch Calculations.

3.2 Spread

The drainage areas to the proposed inlets are as shown on the Appendix E Storm Sewer Tributary Map.

Spread calculations were completed to comply with requirements per ODOT L&D Manual Vol. 2, Section 1103. Per ODOT L&D Manual Vol. 2 Section 1103.2, the design frequency to determine the allowable spread is a 5-year storm being 16.84'. 0' within the through lane (35mph, 3 lanes) and 1.0' from the gutter.

See Appendix B for attached Spread Calculations.

3.3 Storm Sewer

The drainage areas to the proposed inlets are as shown on the Appendix E Storm Sewer Tributary Map. Storm Sewer calculations were completed to comply with requirements per ODOT L&D Manual Vol. 2, Section 1103.

After the contributing areas were determined the storm sewer sizing was checked using a 10-year frequency rainfall event. The HGL check was calculated using a 25-year frequency rainfall event.

See Appendix C for attached Storm Sewer Calculations.

3.4 Culvert Analysis

The drainage areas to the proposed Culverts are as shown on the Appendix F Tributary Map. Culvert calculations were completed to comply with requirements per ODOT L&D Manual Vol. 2, Section 1103.

After the contributing areas were determined the storm sewer sizing was checked using a 25-year frequency rainfall event. The HGL check was calculated using a 100-year frequency rainfall event.

See Appendix E for attached Culvert Calculations.

3.5 BMP

BMP's were calculated using ODOT Location and Design Manual, Volume 2 – Drainage Design, Section 1115. By ODOT L&D Vol2, only water quality is required. The water quality requirement is being met by vegetative bio filters and filter strips.

See Appendix D for attached BMP Calculations.