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# **MD 140 (REISTERSTOWN ROAD) CAPACITY AND SAFETY IMPROVEMENTS PHASE 2**

## **AIR QUALITY ANALYSIS TECHNICAL REPORT**

June 2016

**Baltimore County, Maryland**



**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION**



**MARYLAND DEPARTMENT OF TRANSPORTATION  
STATE HIGHWAY ADMINISTRATION**

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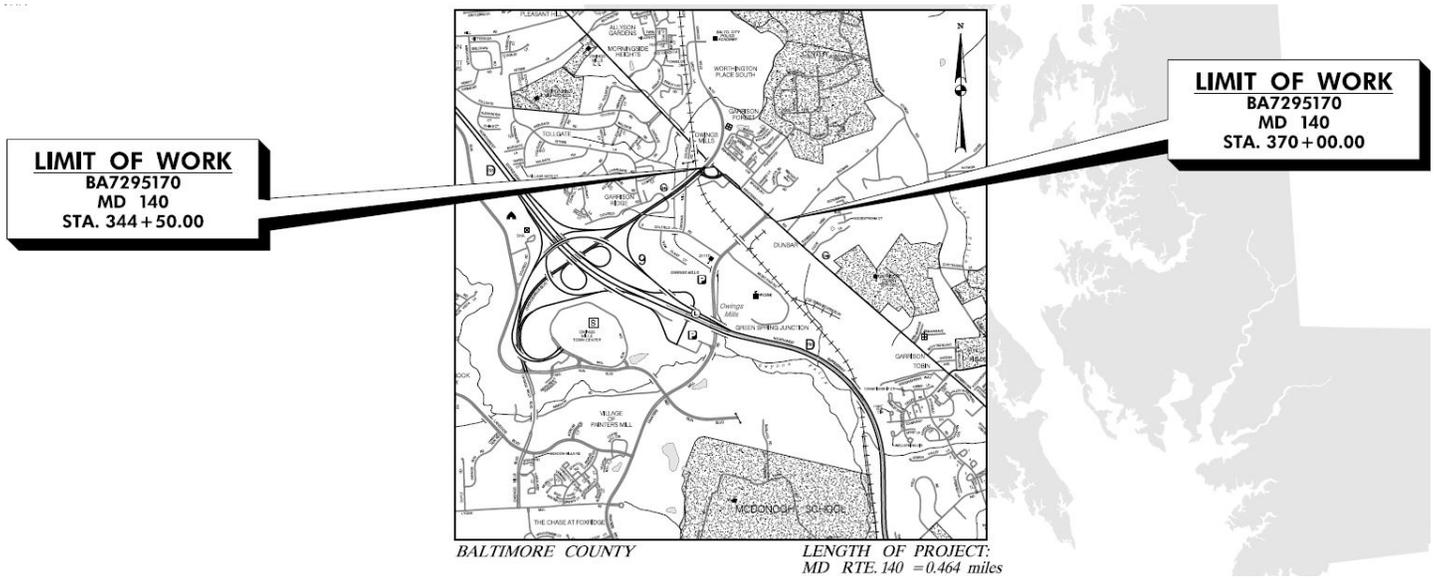
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## I. INTRODUCTION

This report presents the results of a review of air quality impacts associated with proposed improvements to MD 140 (Reisterstown Road) from north of Painters Mill Road to north of MD 940 (Owings Mills Boulevard) in Owings Mills, Baltimore County, Maryland. This study is intended as an evaluation of the project level air quality impacts of the proposed intersection improvements. This evaluation is provided to meet the requirements of the Clean Air Act (CAA) and the National Environmental Policy Act (NEPA).

In the project area, MD 140 is a principal arterial running north to south with two travel lanes in each direction. Land use along the corridor of the project is a mix of commercial and industrial. The overall project extends approximately 0.48 mile along MD 140 (See **Figure 1**).



**FIGURE 1 – Location Map**

The purpose of the project is to improve safety, traffic flow, overall traffic operations, and pedestrian and bicycle access along MD 140. This will be accomplished by adding one 11-foot wide through lane and a bicycle compliant five foot wide shoulder along northbound and southbound MD 140 within the project limits. Additional roadway improvements include sidewalk reconstruction as well as drainage, landscaping, and traffic signal improvements. Signalized intersection improvements will be made at Painters Mill Road, Rosewood Lane and Owings Mills Boulevard. The project also proposes the construction of six new retaining walls. Refer to **Appendix A** for project design plans.

## II. AIR QUALITY BACKGROUND

The Clean Air Act (CAA) Amendments and the Final Transportation Conformity Rule (40 CFR Parts 51 and 93) direct the U.S. Environmental Protection Agency (EPA) to implement environmental policies and regulations that will ensure acceptable levels of air quality. Both the CAA and the Final Transportation Conformity Rule apply to the proposed transportation project because it involves federal action and funding.

According to the CAA, Title I, Section 176 (c) 2, “No federal agency may approve, accept, or fund any transportation plan, program, or project unless such plan, program, or project has been found to conform to any applicable implementation plan in effect under this chapter.” The CAA, Title I, Section 176 (c) 1, defines conformity as; “Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and that such activities will not:

- i. cause or contribute to any new violation of any standard in any area;
- ii. increase the frequency or severity of any existing violation of any standard in any area; or
- iii. delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.”

As required by the CAA, National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants. These pollutants, known as criteria pollutants, are carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM<sub>10</sub> & PM<sub>2.5</sub>), sulfur dioxide (SO<sub>2</sub>), and lead (Pb). These national standards are summarized in **Table 1**. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare, accounting for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

The CAA Amendments require that the EPA publish a designation list of all geographic areas in compliance with the NAAQS, as well as those areas not in compliance with the NAAQS. The designation of an area is made on a pollutant-by-pollutant basis. EPA's area designations consist of attainment, unclassified, maintenance, and nonattainment. Ambient air quality is monitored through a network of stations to determine conditions throughout the country. EPA reviews the monitoring data, designating areas where pollutant levels exceed the NAAQS as nonattainment. After a nonattainment area improves conditions to meet the standard for the corresponding pollutant, it is re-designated as a maintenance area. Typically these designations are applied to entire counties or groups of counties.

To comply with the CAA, EPA has issued proposed rules, guidance clarifications, and final rules concerning transportation conformity and pollutants for which standards have been set.

Following is a summary of recent rules and clarifications:

- *Transportation Conformity Rule PM<sub>2.5</sub> and PM<sub>10</sub> Amendments; Final Rule*, March 24, 2010;
- *Using MOVES in Project-Level Carbon Monoxide Analyses*, December 2010;
- *Transportation Conformity Rule Restructuring Amendments*, March 14, 2012;
- *Transportation Conformity Regulations, as of April 2012*;
- *National Ambient Air Quality Standards for Particulate Matter*, January 15, 2013; and
- *Update to the Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM<sub>2.5</sub> and PM<sub>10</sub> Nonattainment and Maintenance Areas*, November 2015.

EPA has only provided rules and guidance for project level analyses of CO and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>).

**TABLE 1 - National Ambient Air Quality Standards (NAAQS)**

Pollutant	Primary/ Secondary	Primary Standards		Form
		Level	Averaging Time	
Carbon Monoxide 76 FR 54294	Primary	9 ppm	8-hour	Not to be exceeded more than once per year
		35 ppm	1-hour	
Lead 73 FR 669964	Primary and Secondary	0.15 µg/m <sup>3</sup>	Rolling 3-Month Average	Not to be exceeded
Nitrogen Dioxide 77 FR 20218	Primary	100 ppb	1-hour	98 <sup>th</sup> percentile, averaged over 3 years
	Primary and Secondary	53 ppb	Annual	Annual Mean
Particulate Matter (PM <sub>10</sub> ) 78 FR 3086	Primary and Secondary	150 µg/m	24-hour	Not to be exceeded more than once per year on average over 3 years
Particulate Matter (PM <sub>2.5</sub> ) 78 FR 3086	Primary	12.0 µg/m <sup>3</sup>	Annual	Annual mean averaged over 3 years
	Secondary	15.0 µg/m <sup>3</sup>	Annual	Annual mean averaged over 3 years
	Primary and Secondary	35 µg/m <sup>3</sup>	24-hour	98 <sup>th</sup> percentile, averaged over 3 years
Ozone 80 FR 65292	Primary and Secondary	0.070 ppm	8-hour	Annual fourth highest daily maximum 8-hour concentration, averaged over 3 years
Sulfur Dioxide 77 FR 20218	Primary	75 ppb	1-hour	99 <sup>th</sup> percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	0.5 ppm	3-hour	Not to be exceeded more than once per year

In addition to the criteria pollutants for which there are NAAQS, EPA also regulates air toxics. Toxic air pollutants are those pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). The CAA identified 188 air toxics. In 2001 EPA identified a list of 21 Mobile Source Air Toxics (MSATs), and highlighted six of these MSATs as “priority” MSAT. The EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers. These seven MSATs are: acrolein; benzene; 1,3-butadiene; diesel exhaust (organic gases and diesel particulate matter); formaldehyde; naphthalene; and polycyclic organic matter.

### III. ENVIRONMENTAL ANALYSIS

The MD 140 capacity and safety improvements phase 2 project is located in Baltimore County, Maryland, which is part of the Baltimore, MD designated area. A portion of the area, the

Baltimore Central Business District, had been non-attainment for carbon monoxide; however, this area was re-designated as a CO maintenance area October 31, 1995. Since the project is located in Baltimore County, it is not considered within a CO maintenance area. The area was classified as maintenance for the 1997 PM<sub>2.5</sub> standard by EPA on December 16, 2014. Maryland is neither within a PM<sub>10</sub> maintenance nor nonattainment area.

For regional conformity determination, states develop State Implementation Plans (SIPs) to establish a plan for attaining and maintaining the NAAQS, as required by the CAA. Proposed and existing transportation projects and programs are compiled in short term (covering approximately 2-6 years) and long term (covering approximately 20 years) plans called transportation improvement programs (TIPs) and long range plans, respectively, for urbanized areas. As defined by the United States Census Bureau, urbanized areas are geographic areas with a population greater than 50,000. These urbanized areas are governed by Metropolitan Planning Organizations (MPOs). MPOs are policy-making organizations which develop the TIPs and long range plans for their respective urbanized areas. Per 40 CFR 93.115, a project must be included in a long range plan and TIP that conforms to the SIP to achieve regional conformity. For the Baltimore, MD area, the Baltimore Regional Transportation Board (BRTB) serves as the MPO. The current long range plan, *Maximize2040: A Performance-Based Transportation Plan*, was adopted by BRTB on November 25, 2015. The latest amended TIP, covering fiscal years 2016 to 2019, was also adopted by BRTB on November 25, 2015. This assessment includes regional conformity determination for the project.

At the project level, pollutants could possibly have localized (hot-spot) levels above the NAAQS. As outlined by 40 CFR 93.116 in the *Transportation Conformity Regulations, as of April 2012*, any highway or transit project which is proposed to receive funding assistance and/or approval through federal programs or the Federal Highway Administration (FHWA) must not “*cause or contribute to any new localized CO, PM<sub>10</sub>, and/or PM<sub>2.5</sub> violations, increase the frequency or severity of any existing CO, PM<sub>10</sub>, and/or PM<sub>2.5</sub> violations, or delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in CO, PM<sub>10</sub>, and PM<sub>2.5</sub> nonattainment and maintenance areas.*” To determine project level conformity, analyses must be performed for the respective pollutant set in the corresponding nonattainment or maintenance area where a project is located. To make the determination that a project is conforming, consultation in accordance with 40 CFR 93.105 is completed via the Interagency Consultation Group (ICG). The ICG for Maryland State Highway Administration (SHA) projects includes a representative from FHWA, EPA, the Maryland Department of the Environment (MDE), and the appropriate MPO. This assessment includes a project level conformity determination.

#### **IV. ENVIRONMENTAL CONSEQUENCES**

##### **1. Regional Conformity Determination**

The currently approved BRTB long range transportation plan and TIP have been determined to conform to the requirements of the CAA Amendments of 1990 in accordance with 40 CFR 93.114. The current conformity determination is consistent with the final conformity rule found in 40 CFR Parts 51 and 93. The current long range plan includes the full project (MD 140 from Garrison View Road to Owings Mills Boulevard) under the list of Anticipated Highway Projects,

FY (fiscal years) 2020-2029. The current 2016-2019 TIP includes the project under ID 63-0802-41 with a year of operation of 2020. Therefore, the project is included in a regionally conforming long range plan and TIP that meet the requirements of 40 CFR 93.115.

## 2. Project Level Conformity

Although the project is not in a CO nonattainment or maintenance area, a qualitative CO assessment has been included. Also, because Baltimore County is within a maintenance area for PM<sub>2.5</sub>, a project-specific PM<sub>2.5</sub> assessment has been provided.

To assist in analyzing potential project impacts to both CO and PM<sub>2.5</sub> levels, recent ambient air quality data from nearby MDE air monitoring stations has been referenced. The closest MDE air monitoring station to the project is located at the Northwest Police Station in Baltimore, Maryland. Monitoring data is available at other stations in Maryland including those located at Oldtown, Essex, HU-Beltsville, and Padonia. All these stations are located in EPA Region 3. Monitored ambient air quality data at these stations for the years 2012-2014 is presented in **Table 2** (see **Appendix B** for details).

**TABLE 2 – Monitored Ambient Air Quality Data 2012-2014**

Site (ordered from closest to farthest from project limits)			Site 245100040 Oldtown Baltimore MD			Site 240053001 Essex Essex MD			Site 240330030 HU-Beltsville Beltsville MD		
Year			2012	2013	2014	2012	2013	2014	2012	2013	2014
Carbon Monoxide (CO) [ppm]	1-Hour	1st Maximum	2.5	2.4	1.7	2.3	2.4	2.4	1.3	1.0	1.5
		2nd Maximum	2.5	2.0	1.6	2.1	2.2	1.8	1.2	0.9	1.0
		Actual Exceedances	0	0	0	0	0	0	0	0	0
	8-Hour	1st Maximum	2.1	1.6	1.3	1.6	1.6	1.4	1.2	0.9	0.9
		2nd Maximum	1.6	1.3	1.0	1.6	1.4	1.3	0.9	0.9	0.8
		Actual Exceedances	0	0	0	0	0	0	0	0	0
Site (ordered from closest to farthest from project limits)			Site 245100007 Northwest Police Station Baltimore MD			Site 240051007 Padonia Cockeysville MD			Site 245100040 Oldtown Baltimore MD		
Year			2012	2013	2014	2012	2013	2014	2012	2013	2014
Particulate Matter (PM <sub>2.5</sub> ) [ug/m <sup>3</sup> ]	Annual	Weighted Annual Mean	9.3	8.6	8.5	9.1	8.5	8.9	10	9.1	9.2
	24-Hour	98th Percentile	22	20	20	22	20	21	23	23	21

### A. Carbon Monoxide (CO) Assessment

Since the study area is not in a CO nonattainment or maintenance area, a hot-spot conformity determination in conformance with 40 CFR 93.116 is not required, and a qualitative assessment that considers local factors is provided hereinafter.

As shown in **Table 2**, the maximum 1-hour monitored CO concentration of 2.5 ppm occurred in

2012 at Site 245100040, located at the Oldtown monitoring station, in Baltimore, Maryland. This concentration is 7.1 percent of the 1-hour CO NAAQS of 35.0 ppm. The maximum 8-hour monitored CO concentration of 2.1 ppm occurred in the same year at the same site, which is 23.3 percent of the 8-hour NAAQS of 9.0 ppm.

A review of project traffic volumes, summarized in **Table 3** (see **Appendix C** for details), demonstrates that the project will neither increase the traffic volumes nor result in changes in vehicle mix on segments of Painters Mill Road, MD 140, and MD 940. As shown in **Table 3**, none of these roads carry a significant number of trucks; nor is there an increase in the percentage of trucks between the future no-build and build conditions. For the 2036 no-build conditions, the total Painters Mill Road average daily traffic (ADT) volume is 28,100 vehicles and the total average daily number of trucks is 562 vehicles. For the 2036 build conditions, the Painters Mill Road ADT and truck volumes are the same as the no-build conditions. For the 2036 no-build conditions, the total MD 140 average daily traffic (ADT) volume is 42,625 vehicles and the total average daily number of trucks is 1,279 vehicles. For the 2036 build conditions, the MD 140 ADT and truck volumes are the same as the no-build conditions. For the 2036 no-build conditions, the total MD 940 average daily traffic (ADT) volume is 54,050 vehicles and the total average daily number of trucks is 2,162 vehicles. For the 2036 build conditions, the MD 940 ADT and truck volumes are the same as the no-build conditions.

**TABLE 3 - Traffic Data**

<b>Condition</b>	<b>Existing 2016</b>	<b>No-Build 2036</b>	<b>Build 2036</b>
<b>Painters Mill Road W of MD 140</b>			
<b>ADT (vpd)</b>	20,425	28,100	28,100
<b>Percent Trucks (%)</b>	2	2	2
<b>Daily Truck Volumes (vpd)</b>	409	562	562
<b>MD 140 from N of Painters Mill Road to N of MD 940</b>			
<b>ADT (vpd)</b>	38,575	42,625	42,625
<b>Percent Trucks (%)</b>	3	3	3
<b>Daily Truck Volumes (vpd)</b>	1,157	1,279	1,279
<b>MD 940 W of MD 140</b>			
<b>ADT (vpd)</b>	44,300	54,050	54,050
<b>Percent Trucks (%)</b>	4	4	4
<b>Daily Truck Volumes (vpd)</b>	1,772	2,162	2,162

In conclusion, because the data presented in **Table 2** demonstrates maximum recently monitored CO concentrations in the project area are a percentage of the CO NAAQS and the data in **Table 3** demonstrates the improvements will not result in significant changes in vehicle mix or volume relative to the no-build conditions, construction of the project will not cause or contribute to a new violation of the CO NAAQS, increase the frequency or severity of any existing violation, or delay timely attainment of any standard or any required interim emission reductions or other milestones.

## **B. Particulate Matter (PM<sub>2.5</sub>) Assessment**

On March 10, 2006, EPA issued a final rule to address localized impacts of particulate matter: “PM<sub>2.5</sub> and PM<sub>10</sub> Hot-Spot Analyses in Project-Level Transportation Conformity Determinations for the New PM<sub>2.5</sub> and Existing PM<sub>10</sub> National Ambient Air Quality Standards” (71 FR 12468). These rule amendments require the assessment of localized air quality impacts of federally funded or approved transportation projects in PM<sub>10</sub> and PM<sub>2.5</sub> nonattainment and maintenance areas. In November 2013 EPA issued “Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM<sub>2.5</sub> and PM<sub>10</sub> Nonattainment and Maintenance Areas,” which helps state and local agencies complete quantitative PM<sub>2.5</sub> and PM<sub>10</sub> hot-spot analyses for project-level transportation conformity determinations of certain highway and transit projects.

Projects that require hot-spot analysis for PM<sub>2.5</sub> are those that are listed in 40 CFR 93.123(b)(1), which Appendix B to the December 2010 *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM<sub>2.5</sub> and PM<sub>10</sub> Nonattainment and Maintenance Areas* defines as examples of projects of local air quality concern and include:

- (i) *New highway projects that have a significant number of diesel vehicles, and expanded projects that have a significant increase in the number of diesel vehicles;*
- (ii) *Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;*
- (iii) *New bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location;*
- (iv) *Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and*
- (v) *Projects in or affecting locations, areas, or categories of sites which are identified in the PM<sub>10</sub> or PM<sub>2.5</sub> applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violations.*

As discussed in examples outlined in the preamble to the March 10, 2006 final rule, projects of local air quality concern, 40 CFR 93.123(b)(1)(i) and (ii), have been interpreted as applying to projects that would involve a significant increase in the number of diesel transit buses and diesel trucks on the existing facility. As provided in the November 2015 guidance, Appendix B, examples of projects that are of air quality concern and, therefore, covered by 40 CFR 93.123(b)(1)(i) and (ii) include the following:

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) and 8% or more of such AADT is diesel truck traffic;
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal;
- Expansion of an existing highway or other facility that affects a congested intersection (operated at Level-of-Service D, E, or F) that has a significant increase in the number of diesel trucks; and,

- Similar highway projects that involve a significant increase in the number of diesel transit busses and/or diesel trucks.

To assist with the ICG process, SHA has prepared the following assessment of the proposed improvements:

- This project is considered under the following paragraph of 40 CFR 93:
  - 40 CFR 92.123(b)(1)(i), as amended, which includes “*New highway projects that have a significant number of diesel vehicles, and expanded projects that have a significant increase in the number of diesel vehicles.*”
  - 40 CFR 93.123(b)(1)(ii) *Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;*
- The proposed improvements do not meet the criteria set forth in 40 CFR 93.123(b)(1)(i) to be considered a project of local air quality concern based on the following considerations:
  - The proposed project involves widening MD 140 to accommodate a six lane highway.
  - As shown in **Table 3**, neither Painters Mill Road, MD 140, nor MD 940 carry a significant number of trucks; nor is there an increase in the percentage of trucks between the future no-build and build conditions. For the 2036 no-build conditions, the total Painters Mill Road average daily traffic (ADT) volume is 28,100 vehicles and the total average daily number of trucks is 562 vehicles. For the 2036 build conditions, the Painters Mill Road ADT and truck volumes are the same as the no-build conditions. For the 2036 no-build conditions, the total MD 140 average daily traffic (ADT) volume is 42,625 vehicles and the total average daily number of trucks is 1,279 vehicles. For the 2036 build conditions, the MD 140 ADT and truck volumes are the same as the no-build conditions. For the 2036 no-build conditions, the total MD 940 average daily traffic (ADT) volume is 54,050 vehicles and the total average daily number of trucks is 2,162 vehicles. For the 2036 build conditions, the MD 940 ADT and truck volumes are the same as the no-build conditions.
  - Depicted truck percentages represent the amount of light, medium and heavy truck activity along the given roadway segment. Unless predicated by significant land use changes (heavy truck generators), existing truck percentages are used as the primary factor in determining future percentages. The build condition will improve operation of the roadway, relieving system congestion, but will not necessarily induce new truck traffic origin-destination patterns.
- The proposed improvements do not meet the criteria set forth in 40 CFR 93.123(b)(1)(ii) to be considered a project of “air quality concern.”

- **Table 4** depicts existing and projected LOS at intersections within the project limits.
- As shown in **Table 4**, the project will improve LOS from E to D at two intersections within the project limits in the build condition as compared to the operation of the intersections in the no-build condition.
- Therefore, the project does not meet the requirement that the change in LOS is caused by an increase in diesel vehicles “*related to the project.*” Compared to the no-build configuration, the proposed ultimate build alternative provides benefits during both peak hours. Refer to **Appendix C** for additional information.

**TABLE 4 – Traffic Operation Summary**

Intersection	LOS					
	Existing 2015		No-Build 2040		Build 2040	
	AM	PM	AM	PM	AM	PM
MD 140 at MD 940 Ramp/Parking Lot	D	E	D	E	D	D
MD 140 at Rosewood Lane/Shopping Center	A	B	B	B	B	B
MD 140 at Painters Mill Rd/Parking Lot Entrance	D	D	E	E	D	D

Based on review and analysis as discussed above, it is determined that the project will meet the Clean Air Act and 40 CFR 93.109 requirements for Fine Particulate Matter – PM<sub>2.5</sub>. These requirements are met without a hot-spot analysis because the project has not been found to be a project of local air quality concern as outlined under 40 CFR 93.123(b)(1). The project will not cause or contribute to a new violation of the PM<sub>2.5</sub> NAAQS, increase the frequency or severity of any existing violation, or delay timely attainment of any PM<sub>2.5</sub> standard or any required interim PM<sub>2.5</sub> emission reductions or other milestones.

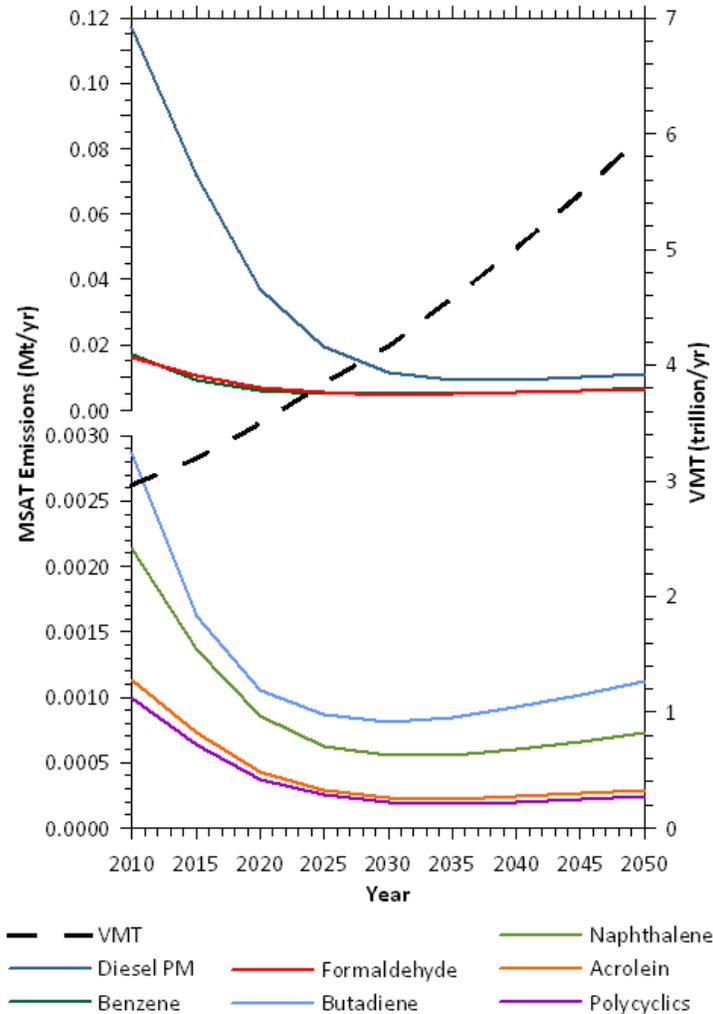
### 3. MSAT Assessment

The FHWA December 2012 *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* requires an assessment of MSATs under specific conditions. Since the projected no-build and build traffic are substantially the same, as reflected in **Table 3**, the project will have no meaningful impacts on traffic volumes or vehicle mixes. Therefore in accordance with the referenced FHWA guidance, the project would be considered a Project with No Meaningful Potential MSAT Effects.

The purpose of the project is to improve safety, traffic flow, overall traffic operations, and pedestrian and bicycle access along MD 140. This project has been determined to generate minimal air quality impacts for CAA criteria pollutants and has not been linked with any special MSAT concerns. As such, this project will not result in substantial changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause an increase in MSAT impacts of the project from that of the no-build alternative.

Moreover, EPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. Based on regulations now in effect, an

analysis of national trends with EPA's Motor Vehicle Emission Simulator (MOVES) model forecasts a combined reduction of over 80 percent in the total annual emission rate for the priority MSAT from 2010 to 2050 while vehicle-miles of travel are projected to increase by over 100 percent (**Figure 2**). This will both reduce the background level of MSAT as well as the possibility of even minor MSAT emissions from this project.



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Source: EPA MOVES2010b model runs conducted during May - June 2012 by FHWA.

**FIGURE 2 - National MSAT Emission Trends 1999 – 2050 for Vehicles Operating on Roadways Using EPA's MOVES2010b Model**

#### 4. Construction Impacts

The construction phase of the proposed project has the potential to impact the local ambient air quality by generating fugitive dust through activities such as demolition and materials handling. The State Highway Administration has addressed this possibility by establishing procedures to

be followed by contractors involved in site work through publishing the *Standard Specifications for Construction and Materials*. The Maryland Air and Radiation Management Administration was consulted to determine the adequacy of the specifications in terms of satisfying the requirements of the *Regulations Governing the Control of Air Pollution in the State of Maryland*. The Maryland Air and Radiation Management Administration found the specifications to be consistent with the requirements of these regulations. Therefore, during the construction period, all appropriate measures (Code of Maryland Regulations 26.11.06.03 D) would be incorporated to minimize the impact of the proposed transportation improvements on the air quality of the area. Mobile source emissions can also be minimized during construction by not permitting idling delivery trucks or other equipment during periods of unloading or other non-active use. The existing number of traffic lanes should be maintained during construction, to the maximum extent possible, and construction schedules should be planned in a manner that will not create traffic disruption and increase air pollutants. Application of these measures will ensure that the construction impact of the project is insignificant.

#### **V. INTERAGENCY CONSULTATION GROUP / PUBLIC COORDINATION**

Copies of this air quality analysis was circulated to FHWA, EPA, MDE, and BRTB staff for a 15 day Interagency Consultation Group review and comment period. FHWA, EPA, and MDE concurred that this project meets the requirements of the CAA and 40 CFR 93 without an additional quantitative hot-spot analysis (**Appendix D**). This air quality analysis will be placed on SHA's website for a 15 day public review and comment period.

## **APPENDIX**

**A - PLANS**

**B - MONITORED AMBIENT AIR QUALITY DATA 2012-2014**

**C - TRAFFIC DATA**

**D - INTERAGENCY CONSULTATION GROUP COORDINATION**

## **APPENDIX A - PLANS**



**Maryland Department of Transportation**  
**STATE HIGHWAY ADMINISTRATION**  
**PLANS OF PROPOSED HIGHWAY**  
**S.H.A. CONTRACT NO. BA7295170**  
**FEDERAL AID PROJECT NO. TBD**  
**MD 140 (REISTERSTOWN ROAD)**  
**CAPACITY AND SAFETY IMPROVEMENTS PHASE 2**

**AASHTO DESIGN CRITERIA**  
 THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH THE 2011 PUBLICATION OF AASHTO'S "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS."

**STANDARD SPECIFICATIONS BOOK, BOOK OF STANDARDS AND MUTCD**

ALL WORK ON THIS PROJECT SHALL CONFORM TO: THE MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATIONS SPECIFICATIONS ENTITLED STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS DATED JULY 2008 REVISIONS THEREOF OR ADDITIONS THERETO; THE SPECIAL PROVISIONS INCLUDED IN THE INVITATION FOR BIDS BOOK; THE ADMINISTRATIONS BOOK OF STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES AND THE LATEST ADOPTED MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)

**RIGHT OF WAY**  
 RIGHT OF WAY AND EASEMENT LINES SHOWN ON THESE PLANS ARE FOR ASSISTANCE IN INTERPRETING THE PLANS. THEY ARE NOT OFFICIAL FOR OFFICIAL RIGHT OF WAY AND EASEMENT INFORMATION, SEE APPROPRIATE RIGHT OF WAY PLATS.

**UTILITIES**  
 THE LOCATION OF UTILITIES SHOWN ON THE PLANS ARE FOR INFORMATION AND GUIDANCE ONLY. NO GUARANTEE IS MADE OF THE ACCURACY OF SAID LOCATIONS.

**COMPLETENESS OF DOCUMENTS**  
 THE STATE HIGHWAY ADMINISTRATION SHALL ONLY BE RESPONSIBLE FOR THE COMPLETENESS OF DOCUMENTS OBTAINED DIRECTLY FROM THE STATE HIGHWAY ADMINISTRATION'S CASHIER'S OFFICE. FAILURE TO ATTACH ADDENDA MAY CAUSE THE BID TO BE IRREGULAR.

**ADA COMPLIANCE**  
 THE DESIGN OF THIS PROJECT HAS INCORPORATED FACILITIES FOR THE ELDERLY AND HANDICAPPED IN COMPLIANCE WITH THE STATE AND FEDERAL LEGISLATION

**ENVIRONMENTAL INFORMATION**  
**MDE # 09-SF-0187**  
 ALL STORMWATER MANAGEMENT FACILITIES CONSTRUCTED FOR CONTRACT NO. BA7295170 SHALL BE INSPECTED AND MAINTAINED IN ACCORDANCE WITH THE STATE HIGHWAY ADMINISTRATIONS BEST MANAGEMENT PRACTICES (BMP) INSPECTION AND REMEDIATION PROGRAM.

SEDIMENT AND EROSION CONTROL REGULATIONS WILL BE STRICTLY ENFORCED DURING CONSTRUCTION.

**STANDARD STABILIZATION NOTE :**  
 FOLLOWING INITIAL SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN THREE (3) CALENDER DAYS AS TO THE SURFACE OF ALL PERIMETER CONTROLS, DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES GREATER THAN 3 HORIZONTAL TO 1 VERTICAL (3:1), AND SEVEN DAYS (7) AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE.

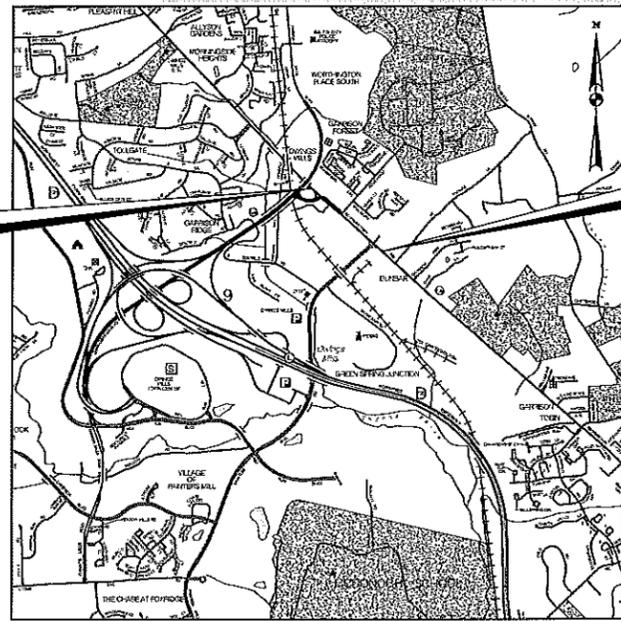
**OWNERS / DEVELOPERS CERTIFICATION :**  
 I / WE HEREBY CERTIFY THAT ANY CLEARING, GRADING, CONSTRUCTION AND/OR DEVELOPMENT WILL BE DONE PURSUANT TO THIS PLAN, AND THAT ANY RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A MARYLAND DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I HEREBY AUTHORIZE THE RIGHT OF ENTRY FOR PERIODIC ON-SITE EVALUATION BY STATE OF MARYLAND, DEPARTMENT OF THE ENVIRONMENT, COMPLIANCE INSPECTORS.

**INDEX OF SHEETS**

SHEET NO.	DWG. NO.	TITLE
1	-	TITLE SHEET
2	AB-1	ABBREVIATIONS /GENERAL NOTE SHEET /CONVENTIONAL SIGNS
3-5	TS-1 to TS-3	TYPICAL SECTIONS
6	PD-1	PAVEMENT DETAILS
7-8	GS-1 TO GS-2	GEOMETRIC LAYOUT
9-11	DE-1 TO DE-3	SIDEWALK & PEDESTRIAN RAMP DETAILS
12-16	CE-1 TO CE-5	CURB ELEVATIONS & LAYOUT
17-23	PS-1 TO PS-8	ROADWAY PLANS
24-28	PR-1 TO PR-5	ROADWAY PROFILES
29-40	MT-1 TO MT-12	MAINTENANCE OF TRAFFIC PLANS AND DETAILS
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71-78	LD-1 TO LD-8	LANDSCAPING PLANS AND DETAILS
79-84	SG-1 TO SG-6	TRAFFIC SIGNAL PLANS
85-88	SN-1 TO SN-3	SIGNING AND PAVEMENT MARKING PLANS AND DETAILS
89	SN-11	SIGNING AND PAVEMENT MARKING QUANTITY TABULATION
90	GT-1	GRADING TABLE AND SUMMARY OF EARTHWORK

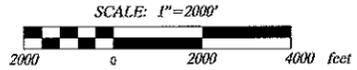
**LIMIT OF WORK**  
 BA7295170  
 MD 140  
 STA. 344 + 50.00

**LIMIT OF WORK**  
 BA7295170  
 MD 140  
 STA. 370 + 00.00



BALTIMORE COUNTY LENGTH OF PROJECT: MD RTE. 140 = 0.464 miles

HORIZONTAL DATUM	NAD 83 / 91
VERTICAL DATUM	NAVD 88



**CONSTRUCTABILITY REVIEW SUBMITTAL**

THE WILSON T. BALLARD COMPANY  
 E. RICHARD FEUSTLE, JR. DATE  
 PE NO. 20645 EXP. 11/19/2016

R-O-W PLAT NUMBERS	SURVEY BOOK NUMBERS
59561	19273
59562	20607
59563	20930
59564	25188
59565	

DESIGN DESIGNATION		
ROADWAY	MD 140	
CONTROLS / YEARS	2013	2033
AVERAGE DAILY TRAFFIC (A.D.T.)	38,500	50,300
DESIGN HOURLY VOLUME (D.H.V.)	9%	9%
DIRECTIONAL DISTRIBUTION	51%	51%
% TRUCKS - A.D.T.	5%	5%
% TRUCKS - D.H.V.	4%	4%
DESIGN SPEED M. P. H.	45 MPH	
FUNCTIONAL CLASSIFICATION	URBAN	
CONTROL OF ACCESS	NONE	
INTENSITY OF DEVELOPMENT	OTHER PRINCIPAL ARTERIAL	
TERRAIN	ROLLING	
ANTICIPATED POSTED SPEED	40 MPH	

REVISIONS NOTE:	
See Sheet No. 2 for List of Revised Sheet Numbers	

REVIEWED AND APPROVAL RECOMMENDED DATE

\_\_\_\_\_  
 CHIEF, HIGHWAY DESIGN DIVISION

APPROVAL RECOMMENDED DATE

\_\_\_\_\_  
 DIRECTOR, OFFICE OF HIGHWAY DEVELOPMENT

APPROVED DATE

\_\_\_\_\_  
 DEPUTY ADMINISTRATION / CHIEF ENGINEER FOR PLANNING, ENGINEERING, REAL ESTATE AND ENVIRONMENT

DRILL HOLES

DRILL HOLES

DRILL HOLES

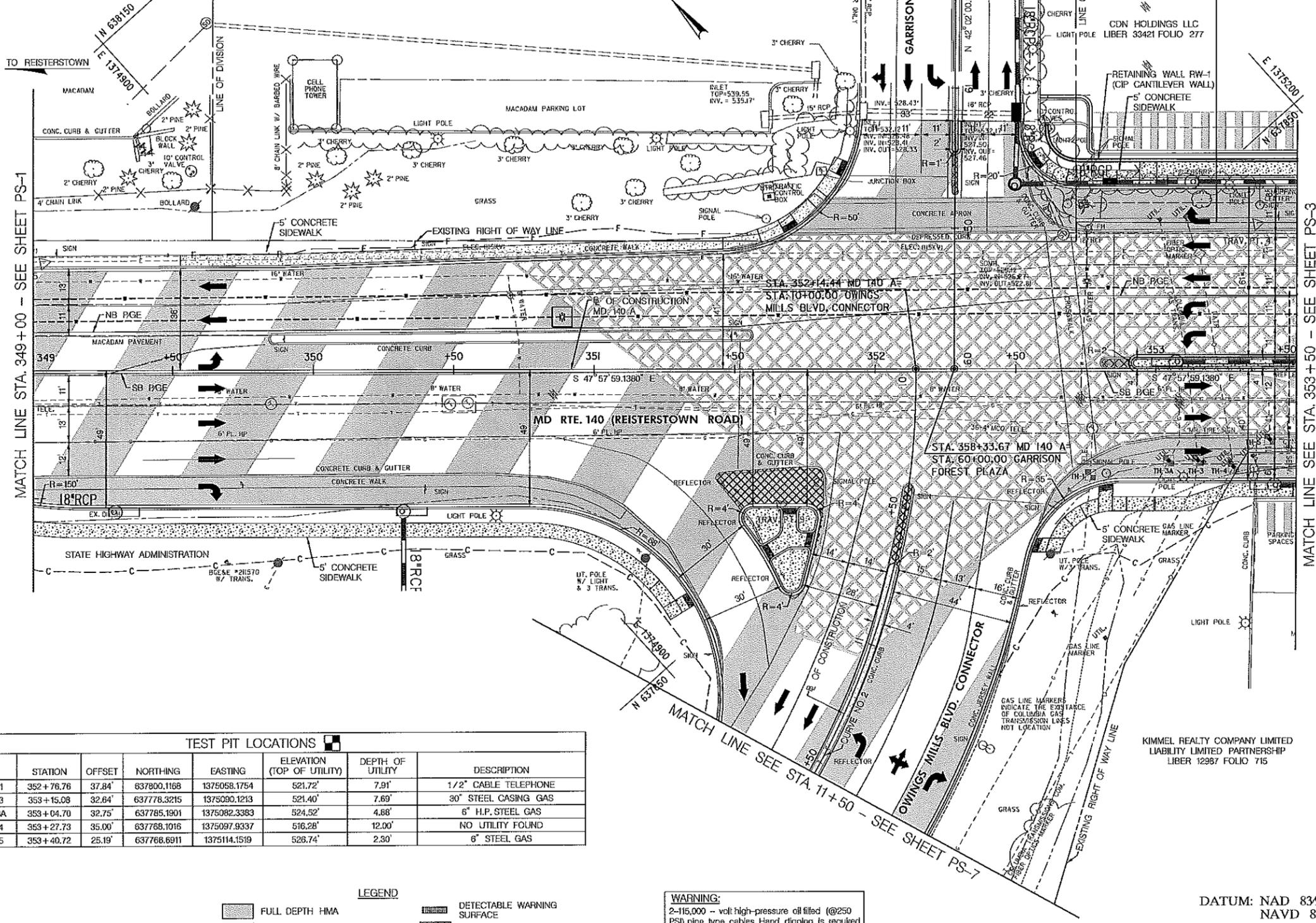
BY: JCW



CURVE DATA						
CURVE	DELTA	Dc	RADIUS	TANGENT	LENGTH	EXTERNAL
C-2	38° 35' 54.2000"	19' 45" 25.8043'	290.00'	101.55'	195.36'	17.27'

GARRISON FOREST ASSOCIATES LP  
CO M LEO STORCH MANAGEMENT CORP  
LIBER 12998 FOLIO 465

GARRISON FOREST ASSOCIATES LP  
CO M LEO STORCH MANAGEMENT CORP  
LIBER 12998 FOLIO 465



STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 10 INCH DEPTH (STD. NO. MD 620.02)		
STATION	L.F.	REMARKS
LT. STA. 349+53 TO LT. STA. 351+94	267	
LT. STA. 352+51 TO LT. STA. 353+50	113	
LT. STA. 352+56 TO LT. STA. 353+50	109	
RT. STA. 349+00 TO RT. STA. 351+46	292	
RT. STA. 351+51 TO RT. STA. 351+80	95	ISLAND
RT. STA. 352+19 TO RT. STA. 353+50	214	
RT. STA. 353+36 TO RT. STA. 353+90	14	

5 INCH CONCRETE SIDEWALK		
STATION	S.F.	REMARKS
LT. STA. 349+53 TO LT. STA. 351+90	1,037	
LT. STA. 352+51 TO LT. STA. 353+50	916	
RT. STA. 349+00 TO RT. STA. 351+36	1,229	
RT. STA. 352+56 TO RT. STA. 353+50	526	
RT. STA. 351+60 TO RT. STA. 351+78	136	ISLAND

GRINDING HOT MIX ASPHALT PAVEMENT 0 INCH TO 2 INCH		
STATION	S.Y.	REMARKS
STA. 349+00 TO STA. 353+50	2,573	

STANDARD MONOLITHIC CONCRETE MEDIAN TYPE A-1 (STD. NO. MD 645.01)		
STATION	L.F.	WIDTH
STA. 60+76 TO STA. 60+88	11	2
LT. STA. 352+90 TO LT. STA. 353+50	60	4
STA. 10+70 TO STA. 61+50	80	4

MATCH LINE STA. 349+00 - SEE SHEET PS-1

MATCH LINE SEE STA. 353+50 - SEE SHEET PS-3

TEST PIT LOCATIONS							
NO.	STATION	OFFSET	NORTHING	EASTING	ELEVATION (TOP OF UTILITY)	DEPTH OF UTILITY	DESCRIPTION
TH # 1	352+76.76	37.84'	837800.1168	1375058.1754	521.72'	7.91'	1/2" CABLE TELEPHONE
TH # 3	353+15.08	32.64'	637778.3215	1375090.1213	521.40'	7.69'	30" STEEL CASING GAS
TH # 3A	353+04.70	32.75'	637785.1901	1375082.3383	524.52'	4.88'	6" H.P. STEEL GAS
TH # 4	353+27.73	35.00'	637768.1016	1375097.9337	516.28'	12.00'	NO UTILITY FOUND
TH # 5	353+40.72	25.19'	637766.6911	1375114.1519	526.74'	2.30'	6" STEEL GAS

LEGEND	
	FULL DEPTH HMA
	RESURFACING
	GRINDING & RESURFACING
	CONCRETE SIDEWALK
	PAVEMENT / SIDEWALK REMOVAL
	DRIVEWAY / PARKING FULL DEPTH HMA
	DRIVEWAY / PARKING GRINDING & RESURFACING
	PROPOSED TRAVEL LANE
	DETECTABLE WARNING SURFACE
	ACCESS ROAD
	RIPRAP
	EXISTING UTILITY POLE
	RELOCATED UTILITY POLE
	SOIL BORING
	UTILITY TEST PIT
	TREE REMOVAL

**WARNING:**  
2-115,000 - volt high-pressure oil filled (@250 PSI) pipe type cables. Hand digging is required when working in the area of the cables and BGE Inspector needs to be present. Call BGE @ 410-291-3094 or 410-291-3121 48 hours prior to excavation to have inspector present. Damage to these cables is extremely costly to those who damage them.



DATUM: NAD 83/91 Horizontal  
NAVD 88 Vertical

CROSS REFERENCE	REVISIONS
ITEM	SHEET NOS.
TYPICAL SHEETS	
SUPERELEVATION SHEETS	
PFE & DRAINAGE SCHEDULE	
GEOMETRIC LAYOUT SHEETS	
ROADWAY PLAN SHEETS	
ROADWAY PROFILE SHEETS	
TRAFFIC CONTROL SHEETS	
EROSION & SEDIMENT CONTROL	
SIGNING & MARKING PLANS	
LANDSCAPE PLAN SHEETS	
UTILITIES	

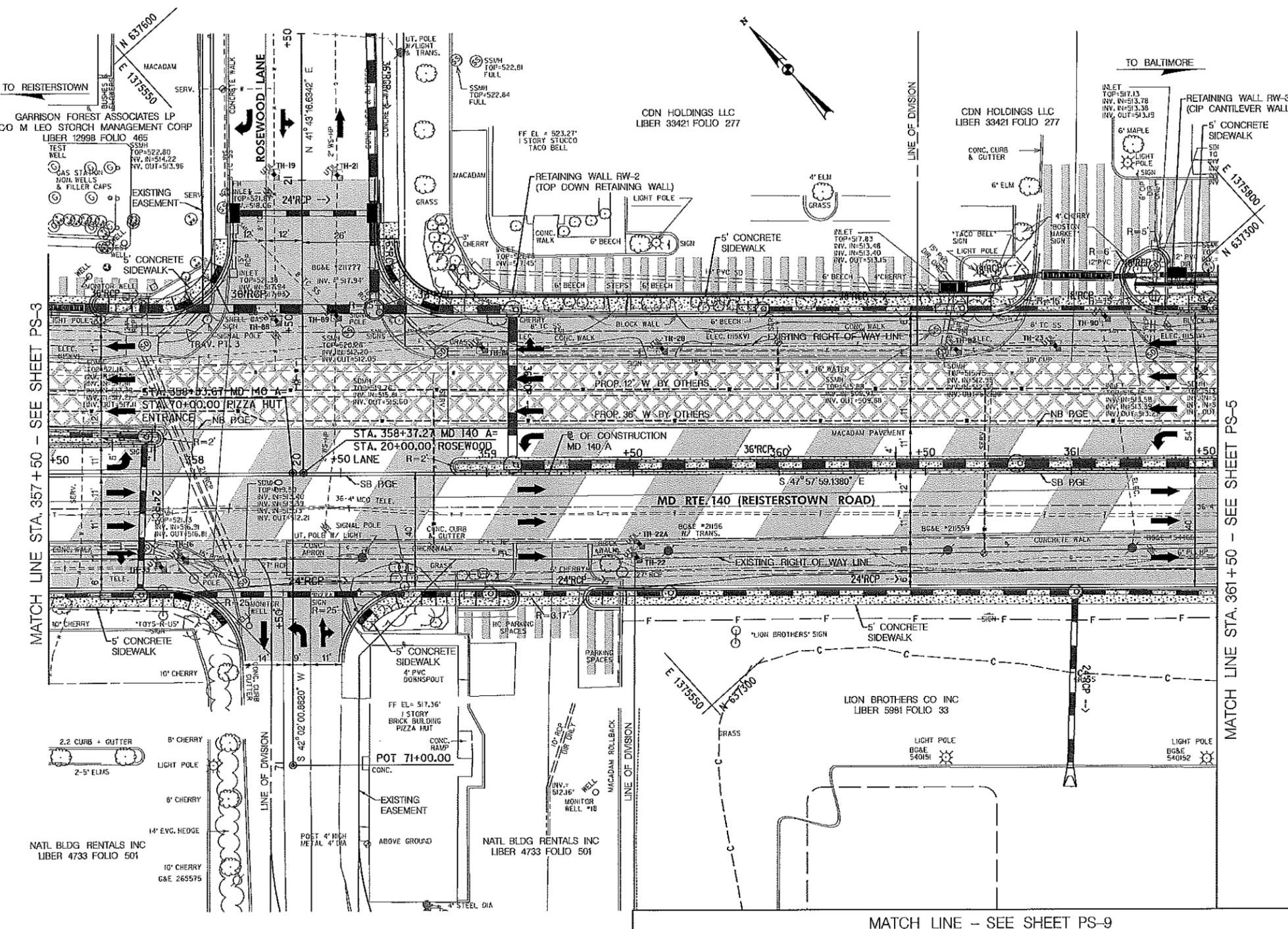
**SHA** STATE OF MARYLAND  
DEPARTMENT OF TRANSPORTATION  
STATE HIGHWAY ADMINISTRATION  
HIGHWAY DESIGN DIVISION

MD 140 (REISTERSTOWN ROAD)  
CAPACITY AND SAFETY IMPROVEMENTS PHASE 2

ROADWAY PLAN	
SCALE 1" = 20'	ADVERTISED DATE _____ CONTRACT NO. BAT205170
DESIGNED BY _____	COUNTY BALTIMORE
DRAWN BY _____	LOGMILE _____
CHECKED BY _____	
F.A.P. NO. SEE TITLE SHEET	
DRAWING NO. PS-2	OF 9 SHEET NO. OF _____

THE WILSON T. BALLARD CO.  
CONSULTING ENGINEERS  
OWINGS MILLS, MARYLAND





STANDARD TYPE A COMBINATION CURB AND GUTTER  
12 INCH GUTTER PAN 10 INCH DEPTH  
(STD. NO. MD 620.02)

STATION	L.F.	REMARKS
LT. STA. 357+66 TO LT. STA. 358+12	106	
LT. STA. 358+63 TO LT. STA. 360+88	274	
LT. STA. 361+55 TO LT. STA. 362+00	90	MEDIAN
LT. STA. 361+77 TO LT. STA. 362+00	185	
RT. STA. 357+50 TO RT. STA. 358+16	80	
RT. STA. 358+50 TO RT. STA. 359+10	97	
RT. STA. 359+34 TO RT. STA. 362+00	281	

5 INCH CONCRETE SIDEWALK

STATION	S.F.	REMARKS
LT. STA. 357+66 TO LT. STA. 358+12	280	
LT. STA. 358+63 TO LT. STA. 360+83	1,174	
LT. STA. 361+21 TO LT. STA. 362+00	377	
LT. STA. 361+77 TO LT. STA. 362+00	138	MEDIAN
RT. STA. 357+50 TO RT. STA. 358+16	311	
RT. STA. 358+56 TO RT. STA. 359+09	271	
RT. STA. 359+35 TO RT. STA. 362+00	1,324	

STANDARD ENTRANCE CONSTRUCTION  
RESIDENTIAL & COMMERCIAL METHOD NO. 2  
(STD. NO. MD 630.02)

STATION	S.Y.	WIDTH
LT. STA. 357+50 TO LT. STA. 357+65	4	15
LT. STA. 360+72 TO LT. STA. 361+30	31	35
RT. STA. 359+10 TO RT. STA. 359+34	19	24

GRINDING HOT MIX ASPHALT PAVEMENT  
0 INCH TO 2 INCH

STATION	S.Y.	REMARKS
STA. 357+50 TO STA. 362+00	1,645	

STANDARD MONOLITHIC CONCRETE  
MEDIAN TYPE A-1  
(STD. NO. MD 645.01)

STATION	L.F.	WIDTH
LT. STA. 357+50 TO LT. STA. 357+88	38	4
LT. STA. 358+89 TO LT. STA. 361+55	267	4

**LEGEND**

	FULL DEPTH HMA		DETECTABLE WARNING SURFACE
	RESURFACING		ACCESS ROAD
	GRINDING & RESURFACING		RIPRAP
	CONCRETE SIDEWALK		EXISTING UTILITY POLE
	PAVEMENT / SIDEWALK REMOVAL		RELOCATED UTILITY POLE
	DRIVEWAY / PARKING FULL DEPTH HMA		SOIL BORING
	DRIVEWAY / PARKING GRINDING & RESURFACING		UTILITY TEST PIT
	PROPOSED TRAVEL LANE		TREE REMOVAL

**WARNING:**  
2-115,000 - volt high-pressure oil filled (@250 PSI) pipe type cables. Hand digging is required when working in the area of the cables and BGE Inspector needs to be present. Call BGE @ 410-291-3094 or 410-291-3121 48 hours prior to excavation to have inspector present. Damage to these cables is extremely costly to those who damage them.

**TEST PIT LOCATIONS**

NO.	STATION	OFFSET	NORTHING	EASTING	ELEVATION (TOP OF UTILITY)	DEPTH OF UTILITY	DESCRIPTION
TH # 16	357+96.14	29.05'	637458.8884	1375449.8361	518.26'	2.33'	6" PLASTIC GAS
TH # 19	358+27.30	-101.88'	637535.2785	1375560.6440	518.68'	4.54'	10" D.I. WATER
TH # 21	358+48.81	-101.65'	637520.6344	1375576.4098	520.01'	3.12'	2" STEEL GAS
TH # 22	359+51.27	29.28'	637354.8492	1375564.9067	513.46'	4.25'	(3)-1" CABLES ELECTRIC
TH # 22A	359+52.10	24.69'	637357.6999	1375568.5940	512.86'	4.95'	6" PLASTIC GAS
TH # 23	360+94.48	-42.57'	637312.3215	1375719.3803	510.22'	4.36'	8" STEEL CONDUIT ELECTRIC
TH # 28	359+59.82	-41.92'	637402.0075	1375618.9235	513.20'	4.70'	8" STEEL CONDUIT ELECTRIC
TH # 33	357+88.59	31.98'	637461.7662	1375442.2695	517.50'	3.39'	1/2" CABLE TELEPHONE
TH # 81	358+98.44	-42.47'	637443.5131	1375573.7048	514.08'	5.40'	8" STEEL CONDUIT ELECTRIC
TH # 82	360+60.46	-41.31'	637334.1669	1375693.2654	511.11'	4.80'	8" STEEL CONDUIT ELECTRIC
TH # 88	359+28.37	-52.01'	637497.6920	1375527.8640	516.36'	4.55'	8" WATER
TH # 89	358+48.86	-53.59'	637485.1490	1375544.1330	516.67'	4.05'	3" GAS
TH # 90	361+11.23	-52.67'	637308.4680	1375738.7630	513.14'	2.24'	ELECTRIC

DATUM: NAD 8391 Horizontal  
NAVD 88 Vertical

CROSS REFERENCE	SHEET NO.	REVISIONS
TYPICAL SHEETS		
SUPERELEVATION SHEETS		
PIPE & DRAINAGE SCHEDULE		
GEOMETRIC LAYOUT SHEETS		
ROADWAY PLAN SHEETS		
ROADWAY PROFILE SHEETS		
TRAFFIC CONTROL SHEETS		
EROSION & SEDIMENT CONTROL		
SIGNING & MARKING PLANS		
LANDSCAPE PLAN SHEETS		
UTILITIES		

**SHA** STATE OF MARYLAND  
DEPARTMENT OF TRANSPORTATION  
STATE HIGHWAY ADMINISTRATION  
HIGHWAY DESIGN DIVISION

MD 140 (REISTERSTOWN ROAD)  
CAPACITY AND SAFETY IMPROVEMENTS PHASE 2

**ROADWAY PLAN**

SCALE 1" = 20' ADVERTISED DATE \_\_\_\_\_ CONTRACT NO. BA7295170

DESIGNED BY \_\_\_\_\_ COUNTY BALTIMORE

DRAWN BY \_\_\_\_\_ LOGMILE \_\_\_\_\_

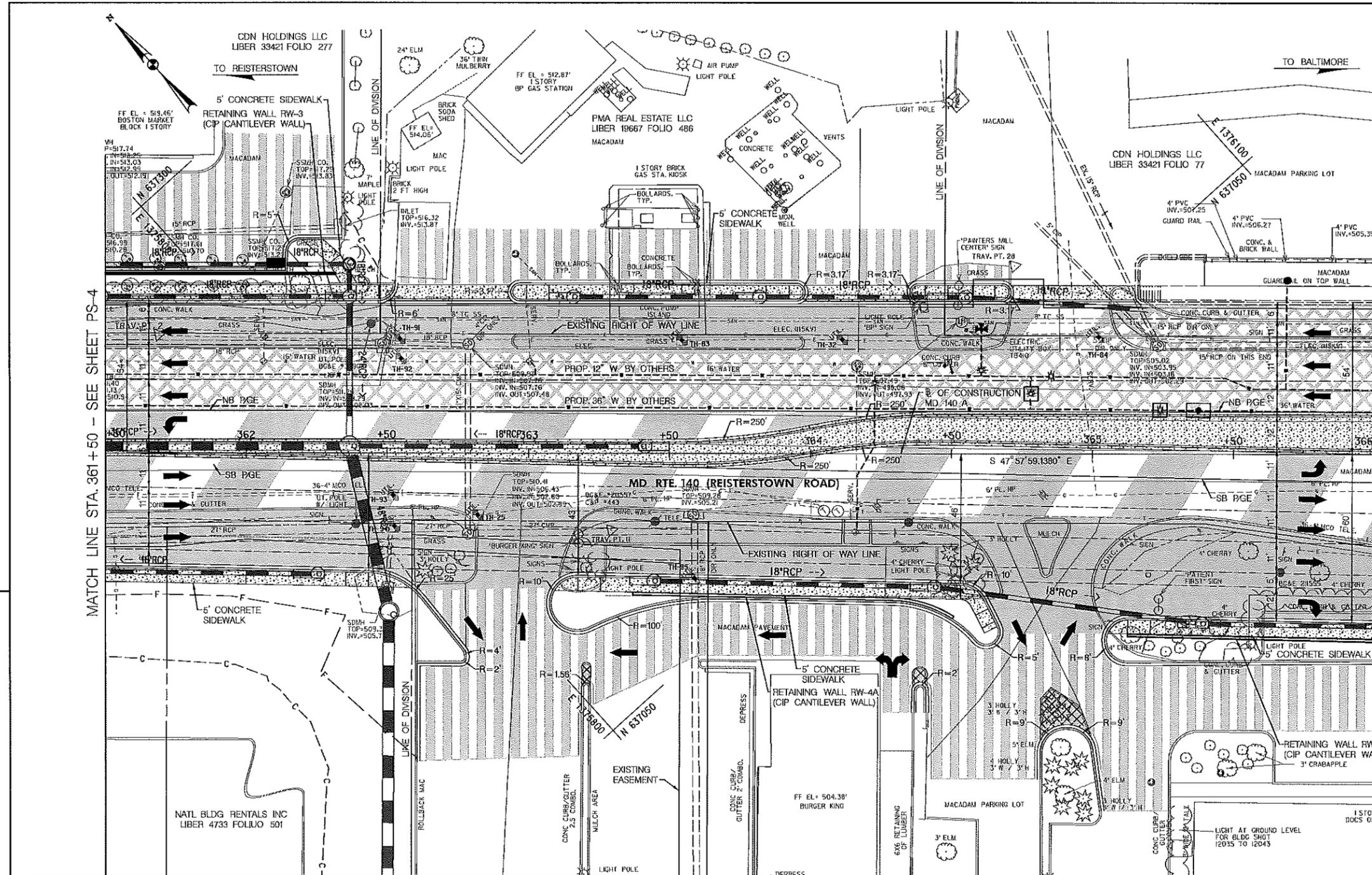
CHECKED BY \_\_\_\_\_

F.A.P. NO. SEE TITLE SHEET

DRAWING NO. PS-4 OF 9 SHEET NO. OF \_\_\_\_\_

THE WILSON T. BALLARD CO.  
CONSULTING ENGINEERS  
OWINGS MILLS, MARYLAND

BY: kld



STANDARD TYPE A COMBINATION CURB AND GUTTER  
12 INCH GUTTER PAN TO INCH DEPTH  
(STD. NO. MD 620.02)

STATION	L.F.	REMARKS
RT. STA. 363+19 TO RT. STA. 363+22	18	ISLAND
RT. STA. 364+37 TO RT. STA. 364+47	22	ISLAND
RT. STA. 364+82 TO RT. STA. 365+03	59	ISLAND
LT. STA. 362+00 TO LT. STA. 362+34	43	
LT. STA. 362+00 TO LT. STA. 362+53	57	
LT. STA. 362+94 TO LT. STA. 363+98	216	MEDIAN
LT. STA. 364+35 TO LT. STA. 364+71	79	
RT. STA. 362+00 TO LT. STA. 366+50	450	MEDIAN
RT. STA. 362+00 TO RT. STA. 362+78	145	
RT. STA. 363+07 TO RT. STA. 364+67	350	
RT. STA. 365+04 TO RT. STA. 366+80	300	

5 INCH CONCRETE SIDEWALK

STATION	S.F.	REMARKS
LT. STA. 362+00 TO LT. STA. 362+52	254	MEDIAN
LT. STA. 362+00 TO LT. STA. 366+80	3,632	
LT. STA. 362+20 TO LT. STA. 362+39	101	
LT. STA. 364+92 TO LT. STA. 363+97	509	
LT. STA. 364+36 TO LT. STA. 364+70	167	
RT. STA. 362+00 TO RT. STA. 362+68	267	
RT. STA. 363+09 TO RT. STA. 364+66	798	
RT. STA. 365+05 TO RT. STA. 366+50	712	

STANDARD ENTRANCE CONSTRUCTION  
RESIDENTIAL & COMMERCIAL METHOD NO. 2  
(STD. NO. MD 630.02)

STATION	S.Y.	WIDTH
LT. STA. 362+54 TO LT. STA. 362+93	26	38
LT. STA. 363+98 TO LT. STA. 364+34	23	35
LT. STA. 364+72 TO LT. STA. 365+15	27	42

GRINDING HOT MIX ASPHALT PAVEMENT  
0 INCH TO 2 INCH

STATION	S.Y.	REMARKS
STA. 362+00 TO STA. 366+50	1,331	

- LEGEND
- FULL DEPTH HMA
  - RESURFACING
  - GRINDING & RESURFACING
  - CONCRETE SIDEWALK
  - PAVEMENT / SIDEWALK REMOVAL
  - DRIVEWAY / PARKING FULL DEPTH HMA
  - DRIVEWAY / PARKING GRINDING & RESURFACING
  - PROPOSED TRAVEL LANE
  - DETECTABLE WARNING SURFACE
  - ACCESS ROAD
  - RIPRAP
  - EXISTING UTILITY POLE
  - RELOCATED UTILITY POLE
  - SOIL BORING
  - UTILITY TEST PIT
  - TREE REMOVAL

**WARNING:**  
2-115,000 - volt high-pressure oil filled (@250 PSI) pipe type cables. Hand digging is required when working in the area of the cables and BGE Inspector needs to be present. Call BGE @ 410-291-3094 or 410-291-3121 48 hours prior to excavation to have Inspector present. Damage to these cables is extremely costly to those who damage them.

TEST PIT LOCATIONS

NO.	STATION	OFFSET	NORTHING	EASTING	ELEVATION (TOP OF UTILITY)	DEPTH OF UTILITY	DESCRIPTION
TH # 25	362+82.05	21.92'	637138.8362	1375815.5215	506.60'	3.30'	6" PLASTIC GAS
TH # 32	364+11.02	-40.35'	637098.7317	1375963.0074	503.73'	3.84'	8" STEEL CONDUIT ELECTRIC
TH # 83	363+54.35	-40.10'	637186.4931	1375910.7434	505.15'	4.05'	8" STEEL CONDUIT ELECTRIC
TH # 84	365+02.02	-41.38'	637038.5533	1375021.2704	501.11'	4.53'	8" STEEL CONDUIT ELECTRIC
TH # 91	362+54.37	-40.53'	637203.6480	1375836.9040	506.30'	4.36'	115 KV ELECTRIC
TH # 92	362+54.82	-33.52'	637198.1550	1375832.5220	506.94'	3.74'	16" WATER
TH # 93	362+52.15	14.02'	637164.0930	1375797.9460	505.83'	5.02'	36-4 MCO TELEPHONE
TH # 94	362+52.69	25.96'	637155.5600	1375790.9280	506.14'	5.03'	6" PLASTIC GAS
TH # 95	363+59.08	44.32'	637070.7400	1375857.6030	501.99'	3.59'	18" RCP

DATUM: NAD 8391 Horizontal  
NAVD 88 Vertical

CROSS REFERENCE	SHEET NOS.	REVISIONS
TYPICAL SHEETS		
SUPERELEVATION SHEETS		
PIPE & DRAINAGE SCHEDULE		
GEOMETRIC LAYOUT SHEETS		
ROADWAY PLAN SHEETS		
ROADWAY PROFILE SHEETS		
TRAFFIC CONTROL SHEETS		
EROSION & SEDIMENT CONTROL		
SIGNING & MARKING PLANS		
LANDSCAPE PLAN SHEETS		
UTILITIES		

**SHA** STATE OF MARYLAND  
DEPARTMENT OF TRANSPORTATION  
STATE HIGHWAY ADMINISTRATION  
HIGHWAY DESIGN DIVISION

MD 140 (REISTERSTOWN ROAD)  
CAPACITY AND SAFETY IMPROVEMENTS PHASE 2

**ROADWAY PLAN**

SCALE: 1" = 20', ADVERTISED DATE: \_\_\_\_\_ CONTRACT NO. BA7295170

DESIGNED BY: \_\_\_\_\_ COUNTY: BALTIMORE

DRAWN BY: \_\_\_\_\_ LOGMILE: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_

F.A.P. NO. SEE TITLE SHEET

DRAWING NO. PS-5 OF 9 SHEET NO. OF \_\_\_\_\_

THE WILSON T. BALLARD CO.  
CONSULTING ENGINEERS  
OWINGS MILLS, MARYLAND



TEST PIT LOCATIONS

NO.	STATION	OFFSET	NORTHING	EASTING	ELEVATION (TOP OF UTILITY)	DEPTH OF UTILITY	DESCRIPTION
TH # 36	366+61.51	44.38'	636868.0609	1376082.3272	497.78'	2.09'	1" CABLE ELEC. 3" PLASTIC WATER
TH # 37	366+92.28	45.96'	636846.3063	1376104.1274	491.42'	7.18'	3" WIDE DUCT BANK
TH # 38	367+25.99	49.62'	636821.3568	1376126.4760	TOP OF MANHOLE	SEE DETAIL	VERIZON VAULT (SEE THIS SHEET FOR DETAIL)
TH # 39	367+69.60	-48.01'	636864.3291	1376224.4674	494.94'	1.70'	(3)-2" CABLES TELEPHONE F.O.
TH # 40	367+93.46	55.00'	636771.8448	1376173.2233	487.35'	5.86'	20" C.I. WATER
TH # 41	368+20.86	71.61'	636753.2586	1376192.7848	487.41'	5.12'	6" PLASTIC GAS
TH # 43	369+03.77	-19.60'	636764.7682	1376315.5089	488.59'	3.40'	30" C.I. WATER
TH # 45	369+34.74	32.97'	636705.0452	1376302.9536	488.36'	3.22'	6" PLASTIC GAS
TH # 46	369+33.33	-12.58'	636739.6512	1376332.6091	489.33'	2.45'	8" STEEL CONDUIT ELECTRIC
TH # 48	369+31.17	-20.49'	636746.9468	1376336.3476	488.60'	3.16'	16" C.I. WATER
TH # 96	369+28.01	-29.51'	636755.7435	1376340.0936	NF 480.84'	10.34'	8" SANITARY SEWER
TH # 97	369+20.21	-30.62'	636761.8223	1376335.0852	482.24'	9.30'	(4)-1/2" CABLES TELEPHONE F.O.
TH # 98	369+22.03	-25.80'	636757.0342	1376333.1778	484.85'	7.22'	16" WATER
TH # 99	369+38.58	-16.31'	636738.8640	1376339.0110	488.18'	3.39'	16" WATER
TH # 100	369+39.17	-12.42'	636735.6240	1376336.8010	489.51'	2.25'	115 KV ELECTRIC
TH # 101	369+39.48	-9.94'	636733.5570	1376335.3840	489.57'	2.27'	115 KV ELECTRIC
TH # 108	369+36.11	44.57'	636695.4810	1376296.2280	487.66'	3.65'	36-4" MCO TELEPHONE
TH # 109	369+44.39	79.11'	636684.3200	1376279.1260	487.96'	4.12'	TELEPHONE F.O.

STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 10 INCH DEPTH (STD. NO. MD 620.02)		
STATION	L.F.	REMARKS
LT. STA. 366+50 TO RT. STA. 367+67	238	MEDIAN
RT. STA. 366+50 TO RT. STA. 37+50	168	
RT. STA. 378+48 TO RT. STA. 367+72	80	ISLAND

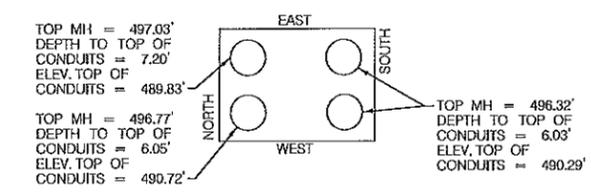
5 INCH CONCRETE SIDEWALK		
STATION	S.F.	REMARKS
LT. STA. 366+50 TO RT. STA. 367+65	1,420	MEDIAN
RT. STA. 366+50 TO RT. STA. 37+50	814	
RT. STA. 367+49 TO RT. STA. 367+71	310	ISLAND

GRINDING HOT MIX ASPHALT PAVEMENT 0 INCH TO 2 INCH		
STATION	S.F.	REMARKS
STA. 366+50 TO RT. STA. 37+50	1,625	

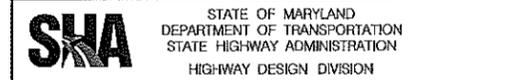
  

STANDARD MONOLITHIC CONCRETE MEDIAN TYPE A-1 (STD. NO. MD 645.01)		
STATION	L.F.	WIDTH
RT. STA. 30+67 TO RT. STA. 31+23	56	4



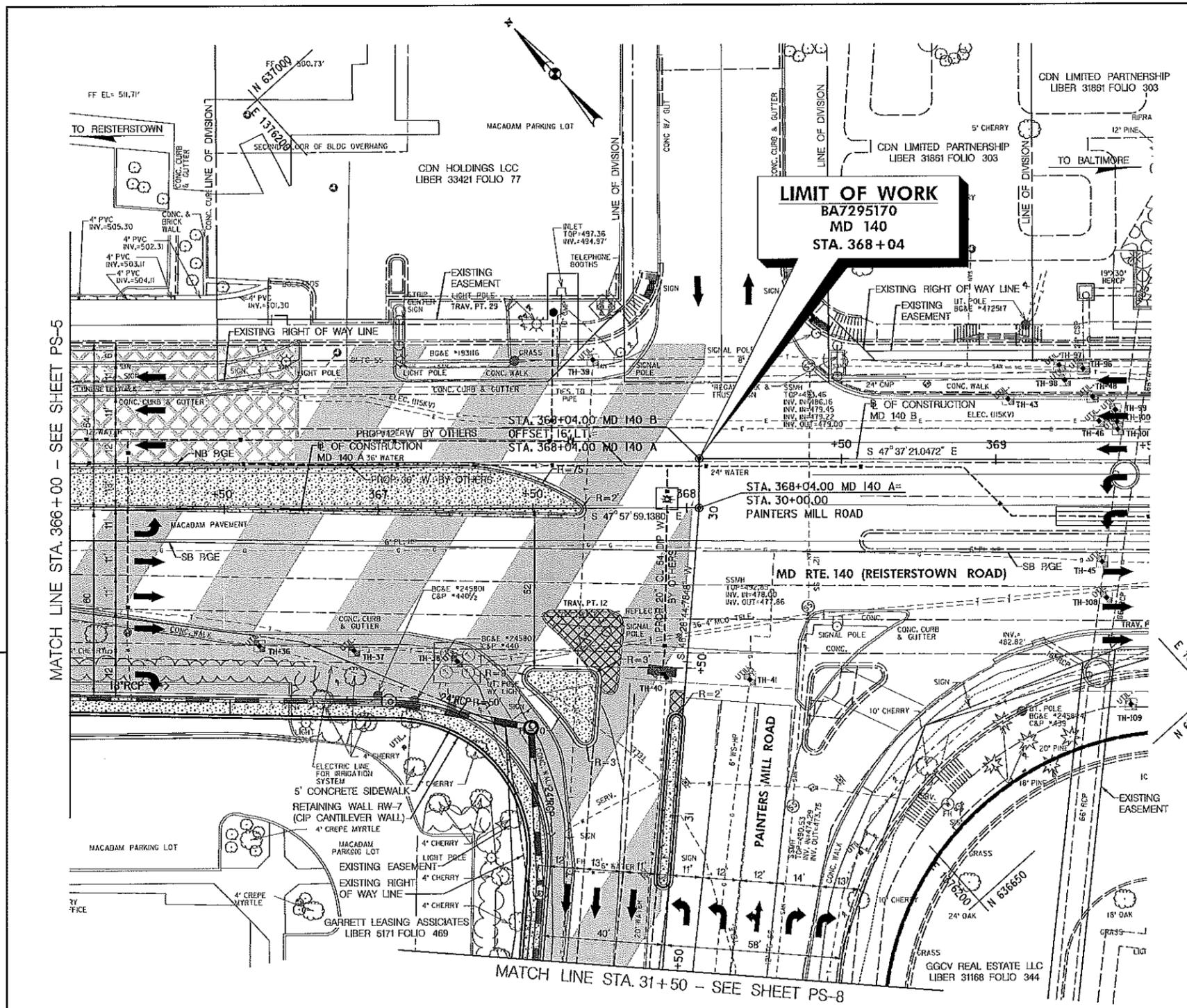
TEST PIT 38 VERIZON AS BUILT  
VAULT DETAIL (PLAN VIEW)

DATUM: NAD 8391 Horizontal  
NAVD 88 Vertical



MD 140 (REISTERSTOWN ROAD)  
CAPACITY AND SAFETY IMPROVEMENTS PHASE 2

ROADWAY PLAN	
SCALE 1" = 20'	ADVERTISED DATE _____ CONTRACT NO. BA7295170
DESIGNED BY _____	COUNTY BALTIMORE
DRAWN BY _____	LOGMILE _____
CHECKED BY _____	
F.A.P. NO. SEE TITLE SHEET	
DRAWING NO. PS-6	OF 9 SHEET NO. OF _____



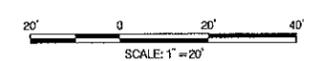
**LIMIT OF WORK**  
BA7295170  
MD 140  
STA. 368+04

**WARNING:**  
2-115,000 - volt high-pressure oil filled (@250 PSI) pipe type cables. Hand digging is required when working in the area of the cables and BGE inspector needs to be present. Call BGE @ 410-291-3094 or 410-291-3121 48 hours prior to excavation to have inspector present. Damage to these cables is extremely costly to those who damage them.

LEGEND			
[Symbol]	FULL DEPTH HMA	[Symbol]	DETECTABLE WARNING SURFACE
[Symbol]	RESURFACING	[Symbol]	ACCESS ROAD
[Symbol]	GRINDING & RESURFACING	[Symbol]	RIPRAP
[Symbol]	CONCRETE SIDEWALK	[Symbol]	EXISTING UTILITY POLE
[Symbol]	PAVEMENT / SIDEWALK REMOVAL	[Symbol]	RELOCATED UTILITY POLE
[Symbol]	DRIVEWAY / PARKING FULL DEPTH HMA	[Symbol]	SOIL BORING
[Symbol]	DRIVEWAY / PARKING GRINDING & RESURFACING	[Symbol]	UTILITY TEST PIT
[Symbol]	PROPOSED TRAVEL LANE	[Symbol]	TREE REMOVAL

THE WILSON T. BALLARD CO.  
CONSULTING ENGINEERS  
OWINGS MILLS, MARYLAND

BY: JCW

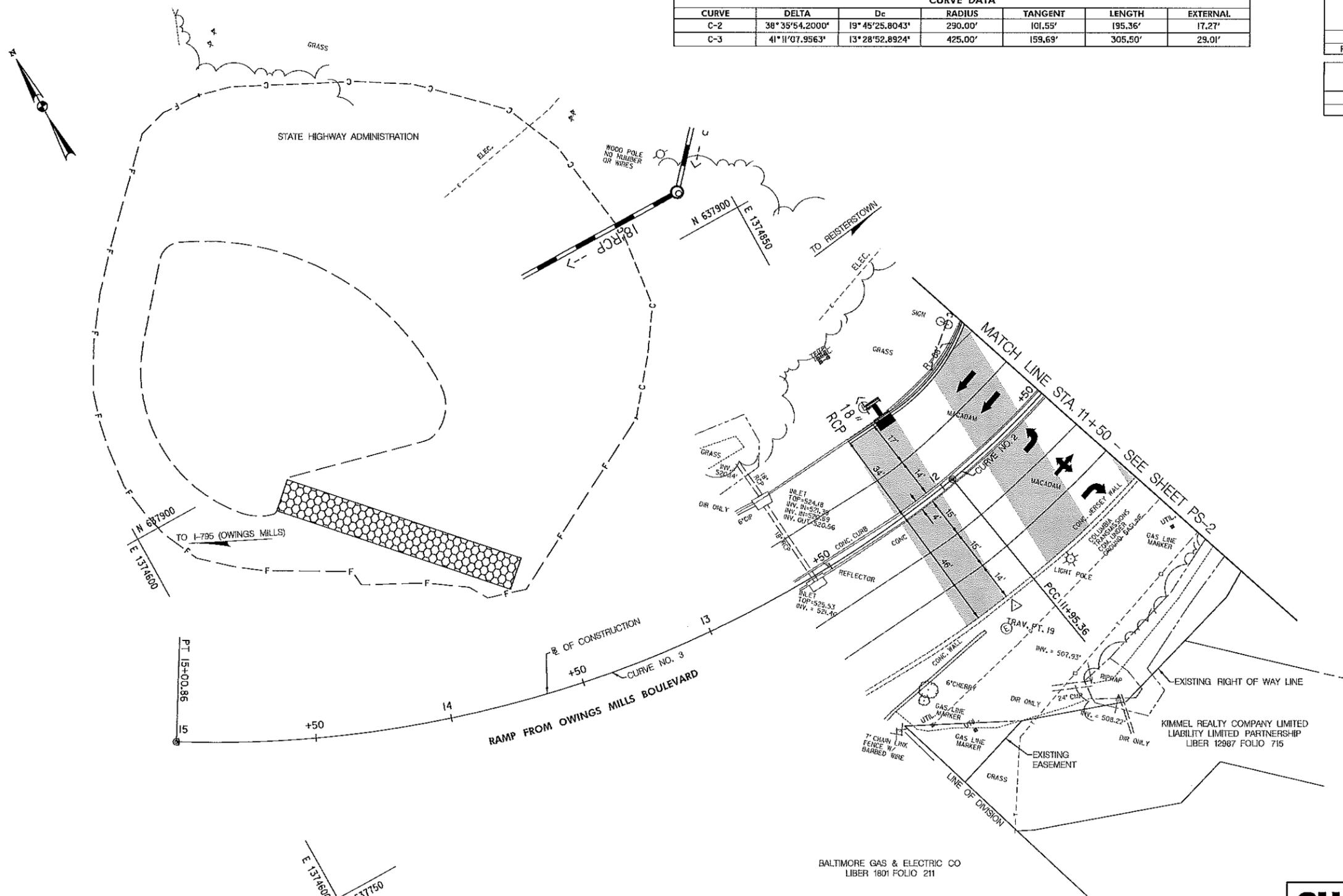


CURVE DATA						
CURVE	DELTA	Dc	RADIUS	TANGENT	LENGTH	EXTERNAL
C-2	38°35'54.2000"	19°45'25.8043'	290.00'	101.55'	195.36'	17.27'
C-3	41°11'07.9563'	13°28'52.8924'	425.00'	159.69'	305.50'	29.01'

STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 10 INCH DEPTH (STD. NO. MD 620.02)		
STATION	L.F.	REMARKS
RT. STA. 11+50 TO RT. STA. 12+18	62	

GRINDING HOT MIX ASPHALT PAVEMENT 0 INCH TO 2 INCH		
STATION	S.Y.	REMARKS
STA. 11+50 TO STA. 12+22	612	

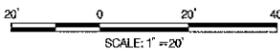


**WARNING:**  
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**LEGEND**

	FULL DEPTH HMA		DETECTABLE WARNING SURFACE
	RESURFACING		ACCESS ROAD
	GRINDING & RESURFACING		RIPRAP
	CONCRETE SIDEWALK		EXISTING UTILITY POLE
	PAVEMENT / SIDEWALK REMOVAL		RELOCATED UTILITY POLE
	DRIVEWAY / PARKING FULL DEPTH HMA		SOIL BORING
	DRIVEWAY / PARKING GRINDING & RESURFACING		UTILITY TEST PIT
	PROPOSED TRAVEL LANE		TREE REMOVAL

DATUM: NAD 83/91 Horizontal  
 NAVD 88 Vertical



THE WILSON T. BALLARD CO.  
 CONSULTING ENGINEERS  
 OWINGS MILLS, MARYLAND

**SHA** STATE OF MARYLAND  
 DEPARTMENT OF TRANSPORTATION  
 STATE HIGHWAY ADMINISTRATION  
 HIGHWAY DESIGN DIVISION

MD 140 (REISTERSTOWN ROAD)  
 CAPACITY AND SAFETY IMPROVEMENTS PHASE 2

CROSS REFERENCE	REVISIONS
ITEM SHEET No.	
TYPICAL SHEETS	
SURFELEVATION SHEETS	
PIPE & DRAINAGE SCHEDULE	
GEOMETRIC LAYOUT SHEETS	
ROADWAY PLAN SHEETS	
ROADWAY PROFILE SHEETS	
TRAFFIC CONTROL SHEETS	
EROSION & SEDIMENT CONTROL	
SIGNING & IMPROVEMENT PLANS	
LANDSCAPE PLAN SHEETS	
UTILITIES	

**ROADWAY PLAN**

SCALE 1" = 20', ADVERTISED DATE \_\_\_\_\_ CONTRACT NO. BA7285170

DESIGNED BY \_\_\_\_\_ COUNTY BALTIMORE

DRAWN BY \_\_\_\_\_ LOGMILE \_\_\_\_\_

CHECKED BY \_\_\_\_\_

F.A.P. NO. SEE TITLE SHEET

DRAWING NO. PS-7 OF 9 SHEET NO. OF

TEST PIT LOCATIONS							
NO.	STATION	OFFSET	NORTHING	EASTING	ELEVATION (TOP OF UTILITY)	DEPTH OF UTILITY	DESCRIPTION
TH # 60	32+76.00	46.02'	636648.9499	1375988.0539	478.22'	3.10'	2" PLASTIC GAS
TH # 62	31+53.43	32.71'	636723.6990	1376084.0993	484.66'	3.32'	(3)-2" PLASTIC CONDUIT TELEPHONE F.O.
TH # 63	31+60.04	-51.87'	636657.8184	1376137.5460	482.72'	5.16'	(3)-2" PLASTIC CONDUIT TELEPHONE F.O.
TH # 64	33+02.48	-38.78'	636569.2193	1376025.2445	467.75'	12.02'	(4)-2" PLASTIC CONDUIT TELEPHONE
TH # 65	32+99.82	39.83'	636628.0550	1375973.0405	474.49'	5.45'	(3)-2" PLASTIC CONDUIT TELEPHONE F.O.
TH # 119	32+56.65	35.42'	636655.0870	1376007.9150	477.36'	4.75'	12" CABLES TELEPHONE F.O.

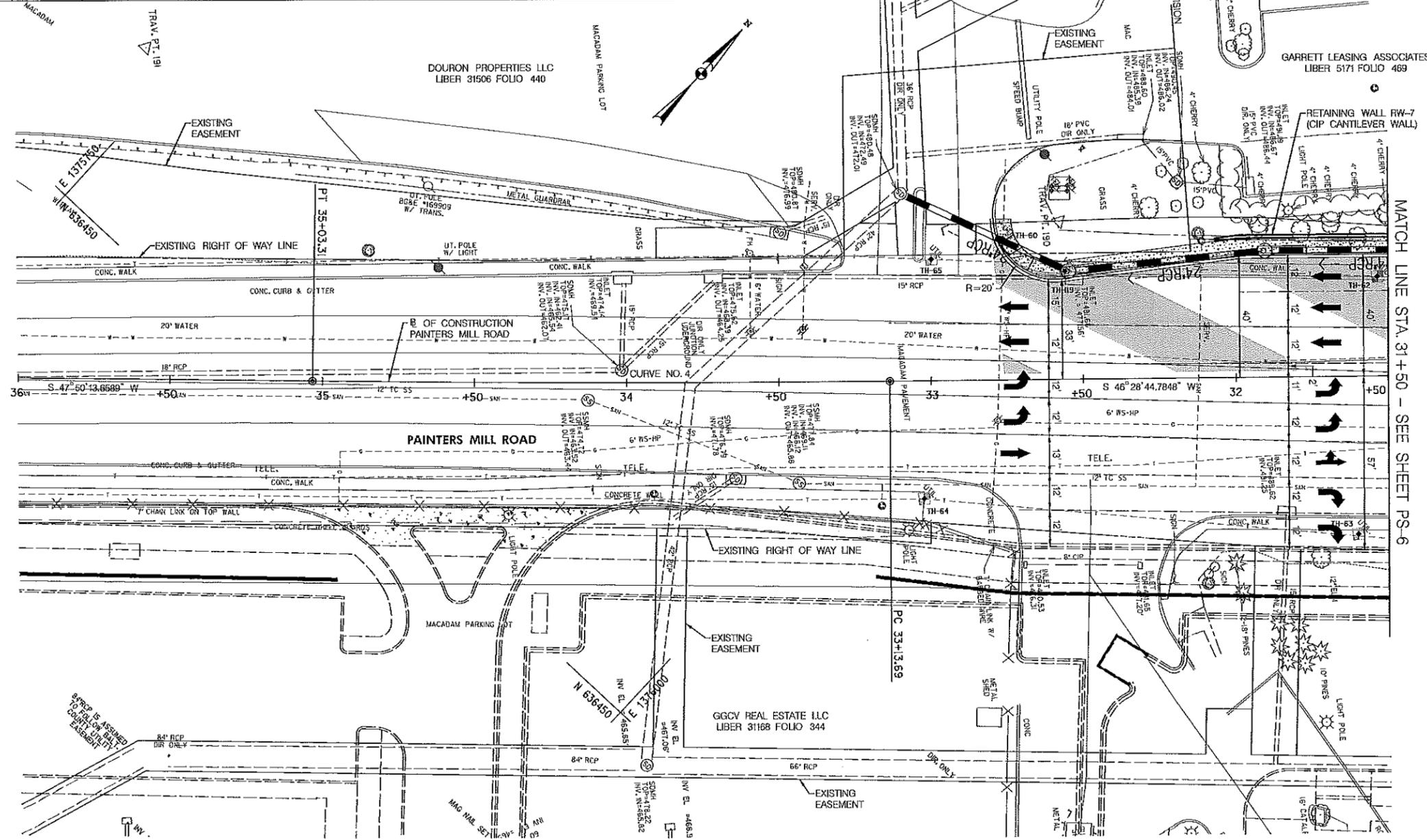
STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 10 INCH DEPTH (STD. NO. MD 620.02)		
STATION	L.F.	REMARKS
RT. STA. 31+50 TO RT. STA. 32+79	141	

5 INCH CONCRETE SIDEWALK		
STATION	S.F.	REMARKS
RT. STA. 31+50 TO RT. STA. 32+79	680	

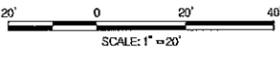
GRINDING HOT MIX ASPHALT PAVEMENT 0 INCH TO 2 INCH		
STATION	S.Y.	REMARKS
RT. STA. 31+50 TO RT. STA. 32+80	440	



CURVE DATA						
CURVE	DELTA	Dc	RADIUS	TANGENT	LENGTH	EXTERNAL
C-4	2°26'03.1450"	0°57'17.7468"	6000.00'	127.47'	254.91'	1.35'

- LEGEND**
- FULL DEPTH HMA
  - RESURFACING
  - GRINDING & RESURFACING
  - CONCRETE SIDEWALK
  - PAVEMENT / SIDEWALK REMOVAL
  - DRIVEWAY / PARKING FULL DEPTH HMA
  - DRIVEWAY / PARKING GRINDING & RESURFACING
  - PROPOSED TRAVEL LANE
  - DETECTABLE WARNING SURFACE
  - ACCESS ROAD
  - RIPRAP
  - EXISTING UTILITY POLE
  - RELOCATED UTILITY POLE
  - SOIL BORING
  - UTILITY TEST PIT
  - TREE REMOVAL

**WARNING:**  
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DATUM: NAD 8391 Horizontal  
 NAVD 88 Vertical

CROSS REFERENCE	SHEET NOS.
TYPICAL SHEETS	
SUPERELEVATION SHEETS	
PIPE & DRAINAGE SCHEDULE	
GEOMETRIC LAYOUT SHEETS	
ROADWAY PLAN SHEETS	
ROADWAY PROFILE SHEETS	
TRAFFIC CONTROL SHEETS	
EROSION & SEDIMENT CONTROL	
SIGNING & MARKING PLANS	
LANDSCAPE PLAN SHEETS	
UTILITIES	

REVISIONS	
NO.	DESCRIPTION

**SHA** STATE OF MARYLAND  
 DEPARTMENT OF TRANSPORTATION  
 STATE HIGHWAY ADMINISTRATION  
 HIGHWAY DESIGN DIVISION

MD 140 (REISTERSTOWN ROAD)  
 CAPACITY AND SAFETY IMPROVEMENTS PHASE 2

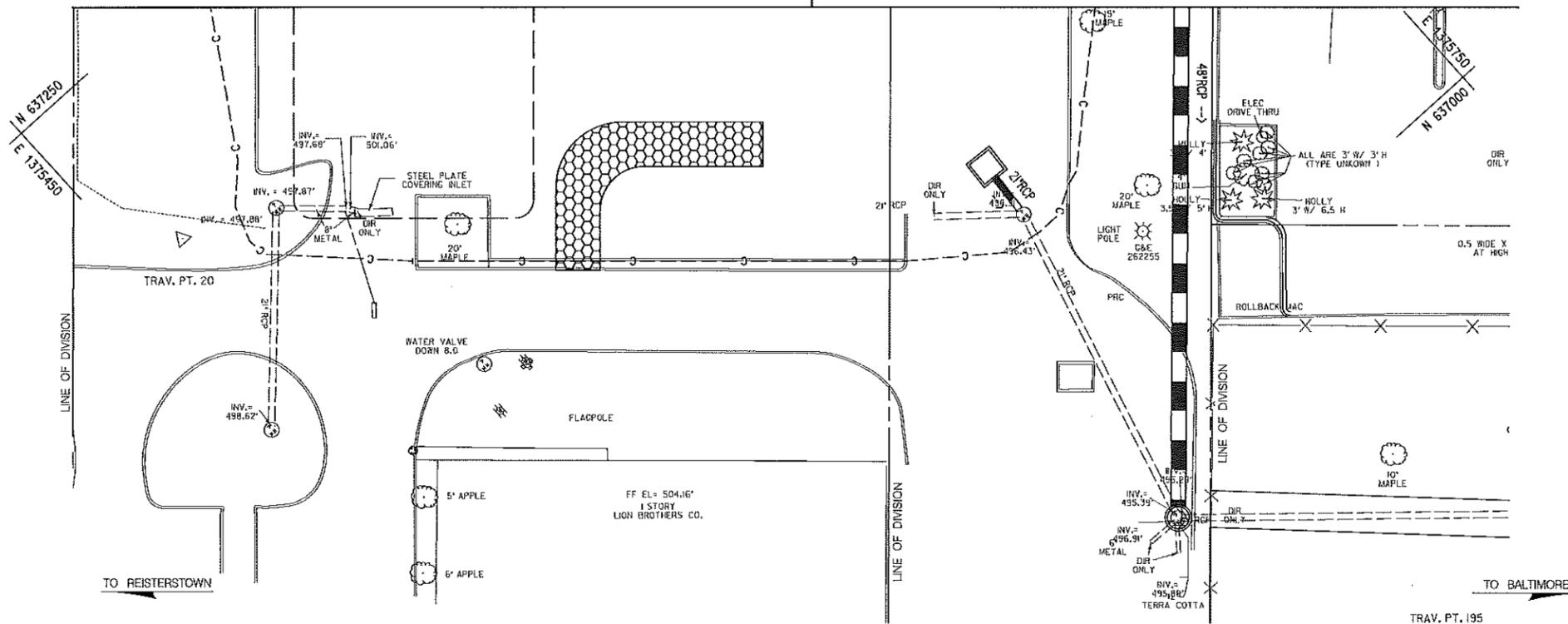
**ROADWAY PLAN**

SCALE 1" = 20'	ADVERTISED DATE	CONTRACT NO. BA7285170
DESIGNED BY	COUNTY BALTIMORE	
DRAWN BY	LOGMILE	
CHECKED BY		
F.A.P. NO.	SEE TITLE SHEET	
DRAWING NO. PS-8	OF 9	SHEET NO. OF

THE WILSON T. BALLARD CO.  
 CONSULTING ENGINEERS  
 OWINGS MILLS, MARYLAND

MATCH LINE - SEE SHEET PS-4

MATCH LINE - SEE SHEET PS-5



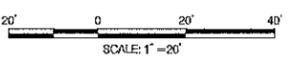
**WARNING:**  
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**LEGEND**

- |   |                            |
|---|----------------------------|
| FULL DEPTH HMA                            | DETECTABLE WARNING SURFACE |
| RESURFACING                               | ACCESS ROAD                |
| GRINDING & RESURFACING                    | RIPRAP                     |
| CONCRETE SIDEWALK                         | EXISTING UTILITY POLE      |
| PAVEMENT / SIDEWALK REMOVAL               | RELOCATED UTILITY POLE     |
| DRIVEWAY / PARKING FULL DEPTH HMA         | SOIL BORING                |
| DRIVEWAY / PARKING GRINDING & RESURFACING | UTILITY TEST PIT           |
| PROPOSED TRAVEL LANE                      | TREE REMOVAL               |

THE WILSON T. BALLARD CO.  
 CONSULTING ENGINEERS  
 OWINGS MILLS, MARYLAND

DATUM: NAD 83/91 Horizontal  
 NAVD 88 Vertical



**SHA** STATE OF MARYLAND  
 DEPARTMENT OF TRANSPORTATION  
 STATE HIGHWAY ADMINISTRATION  
 HIGHWAY DESIGN DIVISION  
 MD 140 (REISTERSTOWN ROAD)  
 CAPACITY AND SAFETY IMPROVEMENTS PHASE 2

**ROADWAY PLAN**

SCALE: 1" = 20'	ADVERTISED DATE: _____	CONTRACT NO. BAZ295170
DESIGNED BY: _____	COUNTY: BALTIMORE	
DRAWN BY: _____	LOGMILE: _____	
CHECKED BY: _____		
F.A.P. NO. SEE TITLE SHEET		
DRAWING NO. PS-9	OF 9	SHEET NO. OF

CROSS REFERENCE	SHEET NOS.	REVISIONS
TYPICAL SHEETS		
SUPERELEVATION SHEETS		
PIPE & DRAINAGE SCHEDULE		
GEOMETRIC LAYOUT SHEETS		
ROADWAY PLAN SHEETS		
ROADWAY PROFILE SHEETS		
TRAFFIC CONTROL SHEETS		
EROSION & SEDIMENT CONTROL		
SIGNING & MARKING PLANS		
LANDSCAPE PLAN SHEETS		
UTILITIES		

PLOTTED: Monday, February 22, 2016 AT 04:03 PM  
 FILE: c:\pwworkspace\ballard\2016\140\140-PS-9-140-140.dwg

**APPENDIX B - MONITORED AMBIENT AIR QUALITY DATA 2012-2014**

## Monitor Values Report

**Geographic Area:** Maryland

**Pollutant:** CO

**Year:** 2012

**Exceptional Events:** Included (if any)

Obs	First Max 8hr	Second Max 8hr	Days 8hr Max >STD	First Max 1hr	Second Max 1hr	Days 1hr Max >STD	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8485	1.6	1.6	0	2.3	2.1	0	None	1	240053001	600 Dorsey Avenue	Essex	Baltimore	MD	03
5921	0.3	0.3	0	0.3	0.3	0	None	1	240190004	University Of Maryland For Environmental And Estuarine Studies	Not in a City	Dorchester	MD	03
8182	0.4	0.4	0	1.8	0.8	0	None	1	240230002	Piney Run, Frostburg Reservoir, Finzel	Grantsville	Garrett	MD	03
8571	1.2	0.9	0	1.3	1.2	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8626	2.1	1.6	0	2.5	2.5	0	None	1	245100040	Oldtown Fire Station, 1100 Hillen Street	Baltimore	Baltimore (City)	MD	03

Get detailed information about this report, including column descriptions, at [http://www.epa.gov/airquality/airdata/ad\\_about\\_reports.html#mon](http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon)

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated daily by state, local, and tribal organizations who own and submit the data. Please contact the appropriate air quality monitoring agency to report any data problems.  
<[http://www.epa.gov/airquality/airdata/ad\\_contacts.html](http://www.epa.gov/airquality/airdata/ad_contacts.html)>

Readers are cautioned not to rank order geographic areas based on AirData reports. Air pollution levels measured at a particular monitoring site are not necessarily representative of the air quality for an entire county or urban area.

This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: January 20, 2016

## Monitor Values Report

**Geographic Area:** Maryland

**Pollutant:** CO

**Year:** 2013

**Exceptional Events:** Included (if any)

Obs	First Max 8hr	Second Max 8hr	Days 8hr Max >STD	First Max 1hr	Second Max 1hr	Days 1hr Max >STD	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8716	1.6	1.4	0	2.4	2.2	0	None	1	240053001	600 Dorsey Avenue	Essex	Baltimore	MD	03
8477	0.3	0.3	0	1	0.4	0	None	1	240190004	University Of Maryland For Environmental And Estuarine Studies	Not in a City	Dorchester	MD	03
8626	0.3	0.3	0	0.5	0.4	0	None	1	240230002	Piney Run, Frostburg Reservoir, Finzel	Grantsville	Garrett	MD	03
8689	0.9	0.9	0	1	0.9	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8359	1.6	1.3	0	2.4	2	0	None	1	245100040	Oldtown Fire Station, 1100 Hillen Street	Baltimore	Baltimore (City)	MD	03

Get detailed information about this report, including column descriptions, at [http://www.epa.gov/airquality/airdata/ad\\_about\\_reports.html#mon](http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon)

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Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: January 20, 2016

## Monitor Values Report

**Geographic Area:** Maryland

**Pollutant:** CO

**Year:** 2014

**Exceptional Events:** Included (if any)

Obs	First Max 8hr	Second Max 8hr	Days 8hr Max >STD	First Max 1hr	Second Max 1hr	Days 1hr Max >STD	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
8460	1.4	1.3	0	2.4	1.8	0	None	1	240053001	600 Dorsey Avenue	Essex	Baltimore	MD	03
8196	0.4	0.3	0	0.4	0.4	0	None	1	240190004	University Of Maryland For Environmental And Estuarine Studies	Not in a City	Dorchester	MD	03
8104	0.3	0.3	0	0.4	0.3	0	None	1	240230002	Piney Run, Frostburg Reservoir, Finzel	Grantsville	Garrett	MD	03
6248	0.9	0.8	0	1.1	0.9	0	None	1	240270006	Interstate 95 South Welocme Center	North Laurel	Howard	MD	03
6989	0.9	0.8	0	1.5	1	0	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
8533	1.3	1	0	1.7	1.6	0	None	1	245100040	Oldtown Fire Station, 1100 Hillen Street	Baltimore	Baltimore (City)	MD	03

Get detailed information about this report, including column descriptions, at [http://www.epa.gov/airquality/airdata/ad\\_about\\_reports.html#mon](http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon)

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Source: U.S. EPA AirData <http://www.epa.gov/airdata>  
Generated: January 20, 2016

## Monitor Values Report

**Geographic Area:** Maryland

**Pollutant:** PM2.5

**Year:** 2012

**Exceptional Events:** Included (if any)

**Duration Description=24 HOUR**

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	119	30.1	23.4	23	21.7	23	10.2	None	1	240031003	Anne Arundel Co. Public Works Bldg, 7409 Baltimore Annapolis Blvd.	Glen Burnie	Anne Arundel	MD	03
24 HOUR	112	29.5	22.6	21.5	18.3	22	8.9	None	1	240051007	Padonia Elementary School, 9834 Greenside Drive	Cockeysville	Baltimore	MD	03
24 HOUR	41	21	18	16.8	13.7	21	9.1	None	2	240051007	Padonia Elementary School, 9834 Greenside Drive	Cockeysville	Baltimore	MD	03
24 HOUR	116	28.2	25.5	24.7	23.6	25	10.7	None	1	240053001	600 Dorsey Avenue	Essex	Baltimore	MD	03
24 HOUR	121	25	22.3	21.7	20.8	22	8.5	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	43	25	22.1	15.4	13.9	25	8.3	None	2	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	97	24.7	23.8	15	14.7	24	7.8	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	35	14.8	14.7	14.2	12.6	15	7.8	None	2	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	121	23.8	22.5	22.1	21.8	22	9.3	None	1	245100007	Northwest Police Station, 5271 Reistertown Road	Baltimore	Baltimore (City)	MD	03
24 HOUR	111	23.7	22.6	22.5	20	23	9.6	None	1	245100008	Baltimore City Fire Dept.-Truck Company 20; 5714 Eastern Avenue	Baltimore	Baltimore (City)	MD	03
24 HOUR	304	26.3	25.5	24.4	23.7	23	10	None	1	245100040	Oldtown Fire Station, 1100 Hillen Street	Baltimore	Baltimore (City)	MD	03

Get detailed information about this report, including column descriptions, at [http://www.epa.gov/airquality/airdata/ad\\_about\\_reports.html#mon](http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon)

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<[http://www.epa.gov/airquality/airdata/ad\\_contacts.html](http://www.epa.gov/airquality/airdata/ad_contacts.html)>

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This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: July 17, 2015

## Monitor Values Report

**Geographic Area:** Maryland

**Pollutant:** PM2.5

**Year:** 2013

**Exceptional Events:** Included (if any)

**Duration Description=24 HOUR**

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	116	30.4	26.3	22.1	20.2	22	9.1	None	1	240031003	Anne Arundel Co. Public Works Bldg, 7409 Baltimore Annapolis Blvd.	Glen Burnie	Anne Arundel	MD	03
24 HOUR	111	26.5	24.7	19.9	19.7	20	8.5	None	1	240051007	Padonia Elementary School, 9834 Greenside Drive	Cockeysville	Baltimore	MD	03
24 HOUR	53	26.9	20	17.9	17.8	20	8.5	None	2	240051007	Padonia Elementary School, 9834 Greenside Drive	Cockeysville	Baltimore	MD	03
24 HOUR	113	35.2	29.4	26.8	23.4	27	9.5	None	1	240053001	600 Dorsey Avenue	Essex	Baltimore	MD	03
24 HOUR	121	22.2	20.1	18.6	17.5	19	7.8	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	32	21.7	18.5	16.4	12.7	22	8.2	None	2	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	106	23.5	20.4	17.2	15.5	17	7.5	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	50	16.6	15	15	14.7	17	7.9	None	2	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	116	28.6	27	20.4	18.8	20	8.6	None	1	245100007	Northwest Police Station, 5271 Reistertown Road	Baltimore	Baltimore (City)	MD	03
24 HOUR	114	32	28.7	24.3	22.8	24	9.4	None	1	245100008	Baltimore City Fire Dept.-Truck Company 20; 5714 Eastern Avenue	Baltimore	Baltimore (City)	MD	03
24 HOUR	303	34.6	29.8	29.7	27.7	23	9.1	None	1	245100040	Oldtown Fire Station, 1100 Hillen Street	Baltimore	Baltimore (City)	MD	03

Get detailed information about this report, including column descriptions, at [http://www.epa.gov/airquality/airdata/ad\\_about\\_reports.html#mon](http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon)

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Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: July 17, 2015

## Monitor Values Report

**Geographic Area:** Maryland

**Pollutant:** PM2.5

**Year:** 2014

**Exceptional Events:** Included (if any)

**Duration Description=24 HOUR**

Duration Description	Obs	First Max	Second Max	Third Max	Fourth Max	98th Percentile	Weighted Annual Mean	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24 HOUR	120	24.1	23	22.9	22.5	23	9.1	None	1	240031003	Anne Arundel Co. Public Works Bldg, 7409 Baltimore Annapolis Blvd.	Glen Burnie	Anne Arundel	MD	03
24 HOUR	115	23	21.4	20.8	20.6	21	8.9	None	1	240051007	Padonia Elementary School, 9834 Greenside Drive	Cockeysville	Baltimore	MD	03
24 HOUR	58	21.4	21.2	19	16.2	21	7.7	None	2	240051007	Padonia Elementary School, 9834 Greenside Drive	Cockeysville	Baltimore	MD	03
24 HOUR	110	25.9	23.3	21.6	21.3	22	9.7	None	1	240053001	600 Dorsey Avenue	Essex	Baltimore	MD	03
24 HOUR	119	22	18.1	17.4	16.2	17	7.8	None	1	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	29	13.9	13	12.9	10.7	14	6.7	None	2	240330030	Howard University'S Beltsville Laboratory, 12003 Old Baltimore Pike	Beltsville	Prince George's	MD	03
24 HOUR	115	20.4	17.1	15.4	14	15	7.8	None	1	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	57	17.3	15.9	13.2	13.1	16	7.1	None	2	240338003	Pg County Equestrian Center, 14900 Pennsylvania Ave.	Greater Upper Marlboro	Prince George's	MD	03
24 HOUR	122	22.4	20.9	20.3	19.7	20	8.5	None	1	245100007	Northwest Police Station, 5271 Reistertown Road	Baltimore	Baltimore (City)	MD	03
24 HOUR	110	23.7	22.1	22	21.2	22	9.3	None	1	245100008	Baltimore City Fire Dept.-Truck Company 20; 5714 Eastern Avenue	Baltimore	Baltimore (City)	MD	03
24 HOUR	322	30.4	27.4	26.4	26.1	21	9.2	None	1	245100040	Oldtown Fire Station, 1100 Hillen Street	Baltimore	Baltimore (City)	MD	03

Get detailed information about this report, including column descriptions, at [http://www.epa.gov/airquality/airdata/ad\\_about\\_reports.html#mon](http://www.epa.gov/airquality/airdata/ad_about_reports.html#mon)

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated daily by state, local, and tribal organizations who own and submit the data. Please contact the appropriate air quality monitoring agency to report any data problems.  
<[http://www.epa.gov/airquality/airdata/ad\\_contacts.html](http://www.epa.gov/airquality/airdata/ad_contacts.html)>

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This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Source: U.S. EPA AirData <<http://www.epa.gov/airdata>>  
Generated: July 17, 2015

## **APPENDIX C - TRAFFIC DATA**



## Titlesheet and Loadometer Summary

Date: **02/29/2016**  
 FMIS: **BA729A21**  
 DSED#: **16-01-030**  
 Project: **Painters Mill Rd W of MD 140**  
 MP to 2.06

	<u>2016</u>	<u>2036</u>
Average Daily Traffic (ADT):	20,425	28,100
Design Hour Volume (DHV):	9%	9%
Directional Distribution of DHV:	56%	56%
Percent Trucks – ADT:	2%	2%
Percent Trucks – DHV:	1%	1%



Aerial Source: Google Earth

**Below Data for Office of Materials Technology Use Only**

**Location of Count:** PAINTERS MILL RD -.16 MILE SOUTH OF MD 140  
**Selected WIM Station:** 5010-88 **Count Mile-Point:** 1.90  
**Loadometer File Location:** S:\SHA\OPPE\PPD\Travel Forecasting\Loadometers\BA\ Painters  
 \Painters Mill Rd w of MD 140 [LINK](#)

**Existing % Breakdown of Class 9 through Class 13**

Time	% Class 9-13
0:00	0.00%
1:00	0.00%
2:00	0.00%
3:00	0.00%
4:00	3.45%
5:00	0.00%
6:00	10.34%
7:00	13.79%
8:00	10.34%
9:00	13.79%
10:00	17.25%
11:00	0.00%
12:00	3.45%
13:00	3.45%
14:00	0.00%
15:00	0.00%
16:00	10.34%
17:00	3.45%
18:00	0.00%
19:00	3.45%
20:00	6.90%
21:00	0.00%
22:00	0.00%
23:00	0.00%
<b>Total</b>	<b>100.00%</b>

**Federal Highway Class Average Daily Traffic (ADT) and Design Hourly Volume (DHV) Details**

FHWA Class	2016 ADT	2016 DHV	2036 ADT	2036 DHV
1: Motorcycles	13	1	18	1
2: Cars	18,266	1,702	25,128	2,343
3: Pickup/Van	1,738	116	2,392	160
4: Buses	108	0	149	0
5: Single-unit 2 axle trucks	221	11	304	15
6: Single unit 3 axle trucks	47	6	64	8
7: Single unit 4+ axle trucks	5	1	7	1
8: Single trailer 3-4axle trucks	15	1	21	1
9: Single trailer 5 axle trucks	9	0	12	0
10: Single trailer 6+axle trucks	1	0	2	0
11: Multi-trailer ≥5 axle trucks	0	0	0	0
12: Multi-trailer 6 axle trucks	0	0	0	0
13: Multi-trailer 7+axle trucks	2	0	3	0
<b>Total</b>	<b>20,425</b>	<b>1,838</b>	<b>28,100</b>	<b>2,529</b>

Worksheet by: Jim Yang

Approved by: *Derek Gunn*  
 Mr. Derek Gunn  
 tel. 410-545-5642  
 Travel Forecasting and Analysis  
 Data Services Engineering Division



## Titlesheet and Loadometer Summary

Date: **2/24/2016**  
 FMIS: **BA729A21**  
 DSED#: **16-01-030**  
 Project: **MD 940 west of MD 140**  
 MP to 1.48



	<u>2016</u>	<u>2036</u>
Average Daily Traffic (ADT):	44,300	54,050
Design Hour Volume (DHV):	9%	9%
Directional Distribution of DHV:	51%	51%
Percent Trucks – ADT:	4%	4%
Percent Trucks – DHV:	2%	2%

### Below Data for Office of Materials Technology Use Only

**Location of Count:** MD 940 - .40 mile north of IS 795  
**Selected WIM Station:** 5010-88 **Count Mile-Point:** 1.11  
**Loadometer File Location:** S:\SHA\OPPE\PPD\Travel Forecasting\Loadometers\BA\ MD 940 MD 940 west of MD 140 [LINK](#)

#### Existing % Breakdown of Class 9 through Class 13

Time	% Class 9-13
0:00	1.87%
1:00	1.87%
2:00	1.87%
3:00	2.67%
4:00	2.67%
5:00	5.61%
6:00	4.81%
7:00	5.35%
8:00	5.88%
9:00	10.46%
10:00	9.09%
11:00	9.36%
12:00	6.68%
13:00	4.81%
14:00	7.49%
15:00	4.55%
16:00	3.21%
17:00	2.67%
18:00	1.07%
19:00	1.07%
20:00	2.14%
21:00	1.60%
22:00	1.60%
23:00	1.60%
<b>Total</b>	<b>100.00%</b>

#### Federal Highway Class Average Daily Traffic (ADT) and Design Hourly Volume (DHV) Details

FHWA Class	2016 ADT	2016 DHV	2036 ADT	2036 DHV
1: Motorcycles	4	0	5	0
2: Cars	37,922	3,627	46,268	4,404
3: Pickup/Van	4,602	298	5,615	364
4: Buses	270	7	330	30
5: Single-unit 2 axle trucks	990	45	1,209	55
6: Single unit 3 axle trucks	154	0	188	0
7: Single unit 4+ axle trucks	57	0	69	0
8: Single trailer 3-4axle trucks	124	5	150	6
9: Single trailer 5 axle trucks	172	5	210	6
10: Single trailer 6+axle trucks	2	0	3	0
11: Multi-trailer ≥5 axle trucks	0	0	0	0
12: Multi-trailer 6 axle trucks	1	0	1	0
13: Multi-trailer 7+axle trucks	2	0	2	0
<b>Total</b>	<b>44,300</b>	<b>3,987</b>	<b>54,050</b>	<b>4,865</b>

Worksheet by: Jim Yang

Approved by: *Derek Gunn*  
 Mr. Derek Gunn  
 tel. 410-545-5642  
 Travel Forecasting and Analysis  
 Data Services Engineering Division



## Titlesheet and Loadometer Summary

Date: **02/29/2016**  
 FMIS: **BA729A21**  
 DSED#: **16-01-030**  
 Project: **MD 140 from north of Painters Mill Rd to north of MD 940**  
**MP 4.96 to 5.36**



Aerial Source: Google Earth

	<u>2016</u>	<u>2036</u>
Average Daily Traffic (ADT):	38,575	42,625
Design Hour Volume (DHV):	8%	8%
Directional Distribution of DHV:	53%	53%
Percent Trucks – ADT:	3%	3%
Percent Trucks – DHV:	1%	1%

**Below Data for Office of Materials Technology Use Only**

**Location of Count:** MD 140 south of Painters Mill Rd  
**Selected WIM Station:** 5010-88 **Count Mile-Point:** 4.90  
**Loadometer File Location:** S:\SHA\OPPE\PPD\Travel Forecasting\Loadometers\BA\ MD 140  
 MD 140 from north of Painters Mill Rd to north of MD 940 [LINK](#)

**Existing % Breakdown of Class 9 through Class 13**

Time	% Class 9-13
0:00	0.96%
1:00	0.96%
2:00	1.92%
3:00	1.92%
4:00	0.96%
5:00	4.81%
6:00	5.77%
7:00	8.65%
8:00	8.65%
9:00	5.77%
10:00	10.60%
11:00	9.62%
12:00	1.92%
13:00	9.62%
14:00	6.73%
15:00	6.73%
16:00	3.85%
17:00	2.88%
18:00	1.92%
19:00	1.92%
20:00	1.92%
21:00	0.00%
22:00	0.96%
23:00	0.96%
<b>Total</b>	<b>100.00%</b>

**Federal Highway Class Average Daily Traffic (ADT) and Design Hourly Volume (DHV) Details**

FHWA Class	2016 ADT	2016 DHV	2036 ADT	2036 DHV
1: Motorcycles	39	2	43	2
2: Cars	34,314	2,859	37,917	3,160
3: Pickup/Van	3,065	185	3,387	204
4: Buses	160	0	177	0
5: Single-unit 2 axle trucks	701	31	773	34
6: Single unit 3 axle trucks	163	6	180	7
7: Single unit 4+ axle trucks	35	2	39	2
8: Single trailer 3-4axle trucks	39	0	44	0
9: Single trailer 5 axle trucks	47	1	52	1
10: Single trailer 6+axle trucks	4	0	4	0
11: Multi-trailer ≥5 axle trucks	0	0	0	0
12: Multi-trailer 6 axle trucks	1	0	1	0
13: Multi-trailer 7+axle trucks	7	0	8	0
<b>Total</b>	<b>38,575</b>	<b>3,086</b>	<b>42,625</b>	<b>3,410</b>

Worksheet by: Jim Yang

Approved by: *Derek Gunn*  
 Mr. Derek Gunn  
 tel. 410-545-5642  
 Travel Forecasting and Analysis  
 Data Services Engineering Division

Larry Hogan, *Governor*  
Boyd K. Rutherford, *Lt. Governor*



Pete K. Rahn, *Secretary*  
Gregory C. Johnson, P.E., *Administrator*

## **MEMORANDUM**

**TO:** Ms. Barb Solberg, Chief  
Highway Design Division  
Office of Highway Development

**ATTN:** Mr. Jason Stolicny  
Project Manager

**FROM:** Lisa Shemer, Assistant Division Chief  
Data Services Engineering Division – Travel Forecasting & Analysis  
Office of Planning and Preliminary Engineering

**DATE:** February 10, 2016

**SUBJECT:** MD 140 Improvement Study  
Project No. BA729B22  
Baltimore County  
Capacity and Storage Length Analysis of Short- and Long-Term Improvements

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## **PURPOSE & SUMMARY**

The purpose of this memorandum is to summarize capacity and storage length analyses of proposed short-term and long-term improvements to MD 140 (Reisterstown Road) from MD 940 (Owings Mills Boulevard) to south of Garrison View Road in Baltimore County. Previous studies performed for the MD 140 corridor in 2011 and 2012 (“MD 140 Improvement Study: Analysis of Short Term Improvements”, and “Reisterstown Road [MD 140] Transportation Needs Study,” respectively) assessed current (as of 2011/2012) and projected traffic operations, and evaluated the operational impact of potential transportation improvements within the corridor. These previous studies indicated a need for increased capacity along MD 140 between Garrison View Road and MD 940, as well as Painters Mill Road, due to heavy congestion and significant queuing that is observed today, as well as existing and potential future redevelopment and rezoning (i.e. Foundry Row, Owings Mills Transit Oriented Development, and Owings Mills Mall Redevelopment) that would contribute to further deterioration in traffic operations.

## **ANALYSIS**

### *STUDY AREA*

The study area of the 2012 Reisterstown Road (MD 140) Transportation Needs Study included the MD 140 roadway network between MD 940 and I-695 (Baltimore Beltway). The primary routes in this network included:

- MD 140
- MD 940 between Dolfield Road and MD 140
- Painters Mill Road between Red Run Boulevard and MD 140

My telephone number/toll-free number is \_\_\_\_\_

Maryland Relay Service for Impaired Hearing or Speech 1.800.735.2258 Statewide Toll Free

Street Address: 707 North Calvert Street • Baltimore, Maryland 21202 • Phone 410.545.0300 • [www.roads.maryland.gov](http://www.roads.maryland.gov)

Secondary routes of note included:

- Garrison View Road
- Green Valley Road

For the purposes of this memorandum, the study area has been reduced to include the following intersections, which would be expected to be impacted greatest operationally by the proposed short and long term improvements:

- MD 140 at St. Thomas Shopping Center (signalized)
- MD 140 at Garrison View Road/Foundry Row Entrance (signalized)
- MD 140 at St. Thomas Lane (unsignalized)
- MD 140 at Painters Mill Road (signalized)
- MD 140 at Rosewood Lane (signalized)
- MD 140 at MD 940 Ramp (signalized)
- Painters Mill Road at Foundry Row Entrance (signalized)
- Painters Mill Road at Music Fair Road (signalized)

A map of the study area can be found in Appendix A.

#### *BACKGROUND*

Foundry Row is a 50-acre redevelopment of the former Solo Cup Factory, located at the intersection of MD 140 and Painters Mill Roads in Baltimore County. Final site plans for the development were approved in February 2014 and include 356,000 sq ft of retail space and 48,000 sq ft of office space (see Appendix B). Wegmans, L.A. Fitness, and Sports Authority serve as the development's anchor tenants.

The existing traffic counts used to run the capacity analysis were collected in 2011, and documented in a memorandum released to the Office of Highway Development on October 13, 2011 (see Appendix C). In November 2012, these datasets were refined in a report to the Maryland General Assembly Senate Budget and Taxation Committee and House Appropriations Committee. This report identified severe congestion within portions of the study area during the AM and PM peak hours. The areas experiencing the heaviest congestion (Level of Service E or F) include: Painters Mill Road between South Dolfield Road and Red Run Boulevard; and MD 140 between MD 940 Ramp and Painters Mill Road.

The 2012 Report to the Maryland General Assembly also identified short-term and long-term actions to relieve network congestion. The short term improvements were assumed to be in place by 2020, and included projects to be completed by both SHA and the group developing Foundry Row (Greenberg Gibbons Commercial and Vanguard Retail Property Development). The development group's projects focused on providing additional turning lanes in and out of Foundry Row. SHA's projects, in turn, involved adding additional through capacity on MD 140 between Painters Mill Road and Garrison View Road in the short-term. The long-term improvements were assumed to be in place by 2035, and also involved adding capacity (both through and turning) to MD 140, specifically in the section between Painters Mill Road and MD 940 Ramp. Diagrams illustrating all the improvements are provided in Appendix B.

*DEVELOPMENT SCENARIOS*

The four development scenarios discussed in this memorandum all assume that Foundry Row Development is completed as it is currently designed. As a result, there is no analysis of future traffic conditions in which the traffic generated by Foundry Row and the development group’s improvements are absent (i.e. a true “no build” scenario). However, the memorandum does include an analysis of existing traffic conditions. The timing and composition of each of the development scenarios is described in Table 1.

<b>TABLE 1. ROADWAY IMPROVEMENT SCENARIOS</b>			
SCENARIO	BUILD YEAR	ENTITY	IMPROVEMENTS
1	2020	Foundry Row	<ul style="list-style-type: none"> <li>• Provide a second NB left turn lane from MD 140 to WB Painters Mill Road</li> <li>• Provide a second EB right turn lane from Painters Mill Road to SB MD 140, and signalize both lanes.</li> <li>• Convert the WB approach of St. Thomas Lane at MD 140 to a right turn out only. Install a median along MD 140 to prohibit left turns from SB MD 140 to EB St. Thomas Lane, and left turns from WB St. Thomas Lane to SB MD 140.</li> <li>• Provide a third SB through lane along MD 140 from just south of Painters Mill Road to Garrison View Road/Foundry Row Entrance.</li> <li>• Provide an exclusive right, shared through left, and exclusive left turn lane configuration along EB Foundry Row Entrance/Garrison View Road at MD 140.</li> <li>• Provide a new right-in, right-out access point to/from Foundry Row along EB Painters Mill Road, west of MD 140.</li> <li>• Provide a new signalized intersection access to Foundry Row along Painters Mill Road, west of MD 140 and west of the right-in, right-out access point.</li> </ul>
		SHA	No Improvement
2	2020	Foundry Row	Same as Scenario 1
		SHA	<ul style="list-style-type: none"> <li>• Provide a third NB through lane from south of Garrison View Road to approximately 325 ft. north of MD 140.</li> </ul>
3	2040	Foundry Row	Same as Scenario 1
		SHA	
4	2040	Foundry Row	Same as Scenario 1
		SHA	<ul style="list-style-type: none"> <li>• Scenario 2 Improvements</li> <li>• Provide a third through lane along NB and SB MD 140 from Painters Mill Road to the Ramp to MD 940/Shopping Center Entrance. Along NB MD 140, the third through lane drops as a right turn only lane at the Ramp to MD 940/Shopping Center Entrance intersection.</li> </ul>

*ARTERIAL CAPACITY*

Arterial segment Level of Service (LOS) calculations were generated using Synchro/SimTraffic analysis software. The Synchro software platform models operations at signalized and unsignalized intersections using the methodology from the *2000 Highway Capacity Manual*. SimTraffic is a microscopic traffic simulator that models traffic conditions defined in Synchro and records a variety of measures of effectiveness (MOEs). The selected MOE utilized as part of this evaluation includes LOS. Table 2 summarizes the results of existing (2015) AM and PM peak hour capacity analysis, by arterial segment and direction, for MD 140 and Painters Mill Road. Tables 3 through 6 provide the summaries for the four development scenarios. The simulation reports used to generate these tables can be found in Appendix D.

TABLE 2. EXISTING CONDITION - ARTERIAL SEGMENT LOS				
PERIOD	PRIMARY ROUTE	DIRECTION	SEGMENT	LOS
AM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	B
			Garrison View Rd to St. Thomas Ln	B
			St. Thomas Ln to Painters Mill Rd	C
			Painters Mill Rd to Rosewood Ln	B
			Rosewood Ln to Owings Mill Blvd Ramp	D
		SB	Owings Mill Blvd Ramp to Rosewood Ln	D
			Rosewood Ln to Painters Mill Rd	F
			Painters Mill Rd to St. Thomas Lane	B
			St. Thomas Lane to Garrison View Rd	B
			Garrison View Rd to St. Thomas Shopping Center	B
	Painters Mill Rd	EB	Music Fair Road to MD 140	D
		WB	MD 140 to Music Fair Road	A
PM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	B
			Garrison View Rd to St. Thomas Ln	B
			St. Thomas Ln to Painters Mill Rd	C
			Painters Mill Rd to Rosewood Ln	C
			Rosewood Ln to Owings Mill Blvd Ramp	D
		SB	Owings Mill Blvd Ramp to Rosewood Ln	F
			Rosewood Ln to Painters Mill Rd	C
			Painters Mill Rd to St. Thomas Lane	D
			St. Thomas Lane to Garrison View Rd	B
			Garrison View Rd to St. Thomas Shopping Center	B
	Painters Mill Rd	EB	Music Fair Road to MD 140	D
		WB	MD 140 to Music Fair Road	C

TABLE 3. SCENARIO 1 - ARTERIAL SEGMENT LOS				
PERIOD	PRIMARY ROUTE	DIRECTION	SEGMENT	LOS
AM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	B
			Garrison View Rd to St. Thomas Ln	D
			St. Thomas Ln to Painters Mill Rd	C
			Painters Mill Rd to Rosewood Ln	B
			Rosewood Ln to Owings Mill Blvd Ramp	D
		SB	Owings Mill Blvd Ramp to Rosewood Ln	F
			Rosewood Ln to Painters Mill Rd	F
			Painters Mill Rd to St. Thomas Lane	B
			St. Thomas Lane to Garrison View Rd	D
			Garrison View Rd to St. Thomas Shopping Center	B
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	D
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	B
			Foundry Row Entrance to Music Fair Road	C
PM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	F
			Garrison View Rd to St. Thomas Ln	C
			St. Thomas Ln to Painters Mill Rd	E
			Painters Mill Rd to Rosewood Ln	D
			Rosewood Ln to Owings Mill Blvd Ramp	F
		SB	Owings Mill Blvd Ramp to Rosewood Ln	F
			Rosewood Ln to Painters Mill Rd	F
			Painters Mill Rd to St. Thomas Lane	B
			St. Thomas Lane to Garrison View Rd	E
			Garrison View Rd to St. Thomas Shopping Center	C
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	D
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	A
			Foundry Row Entrance to Music Fair Road	E

TABLE 4. SCENARIO 2 - ARTERIAL SEGMENT LOS				
PERIOD	PRIMARY ROUTE	DIRECTION	SEGMENT	LOS
AM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	C
			Garrison View Rd to St. Thomas Ln	B
			St. Thomas Ln to Painters Mill Rd	B
			Painters Mill Rd to Rosewood Ln	B
			Rosewood Ln to Owings Mill Blvd Ramp	D
		Owings Mill Blvd Ramp to Rosewood Ln	F	
		Rosewood Ln to Painters Mill Rd	F	
		Painters Mill Rd to St. Thomas Lane	C	
		St. Thomas Lane to Garrison View Rd	D	
		Garrison View Rd to St. Thomas Shopping Center	B	
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	D
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	B
			Foundry Row Entrance to Music Fair Road	C
PM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	D
			Garrison View Rd to St. Thomas Ln	C
			St. Thomas Ln to Painters Mill Rd	F
			Painters Mill Rd to Rosewood Ln	F
			Rosewood Ln to Owings Mill Blvd Ramp	F
		Owings Mill Blvd Ramp to Rosewood Ln	F	
		Rosewood Ln to Painters Mill Rd	F	
		Painters Mill Rd to St. Thomas Lane	C	
		St. Thomas Lane to Garrison View Rd	E	
		Garrison View Rd to St. Thomas Shopping Center	C	
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	D
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	A
			Foundry Row Entrance to Music Fair Road	E

TABLE 5. SCENARIO 3 - ARTERIAL SEGMENT LOS				
PERIOD	PRIMARY ROUTE	DIRECTION	SEGMENT	LOS
AM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	C
			Garrison View Rd to St. Thomas Ln	C
			St. Thomas Ln to Painters Mill Rd	C
			Painters Mill Rd to Rosewood Ln	B
			Rosewood Ln to Owings Mill Blvd Ramp	D
		Owings Mill Blvd Ramp to Rosewood Ln	F	
		Rosewood Ln to Painters Mill Rd	F	
		Painters Mill Rd to St. Thomas Lane	B	
		St. Thomas Lane to Garrison View Rd	D	
		Garrison View Rd to St. Thomas Shopping Center	B	
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	C
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	B
			Foundry Row Entrance to Music Fair Road	C
PM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	F
			Garrison View Rd to St. Thomas Ln	D
			St. Thomas Ln to Painters Mill Rd	F
			Painters Mill Rd to Rosewood Ln	F
			Rosewood Ln to Owings Mill Blvd Ramp	F
		Owings Mill Blvd Ramp to Rosewood Ln	F	
		Rosewood Ln to Painters Mill Rd	F	
		Painters Mill Rd to St. Thomas Lane	B	
		St. Thomas Lane to Garrison View Rd	E	
		Garrison View Rd to St. Thomas Shopping Center	C	
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	D
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	A
			Foundry Row Entrance to Music Fair Road	E

TABLE 6. SCENARIO 4 - ARTERIAL SEGMENT LOS				
PERIOD	PRIMARY ROUTE	DIRECTION	SEGMENT	LOS
AM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	C
			Garrison View Rd to St. Thomas Ln	B
			St. Thomas Ln to Painters Mill Rd	C
			Painters Mill Rd to Rosewood Ln	C
			Rosewood Ln to Owings Mill Blvd Ramp	E
		SB	Owings Mill Blvd Ramp to Rosewood Ln	C
			Rosewood Ln to Painters Mill Rd	F
			Painters Mill Rd to St. Thomas Lane	C
			St. Thomas Lane to Garrison View Rd	E
			Garrison View Rd to St. Thomas Shopping Center	B
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	B
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	B
			Foundry Row Entrance to Music Fair Road	E
PM PEAK	MD 140	NB	St. Thomas Shopping Center to Garrison View Rd	C
			Garrison View Rd to St. Thomas Ln	C
			St. Thomas Ln to Painters Mill Rd	E
			Painters Mill Rd to Rosewood Ln	D
			Rosewood Ln to Owings Mill Blvd Ramp	F
		SB	Owings Mill Blvd Ramp to Rosewood Ln	C
			Rosewood Ln to Painters Mill Rd	F
			Painters Mill Rd to St. Thomas Lane	C
			St. Thomas Lane to Garrison View Rd	E
			Garrison View Rd to St. Thomas Shopping Center	C
	Painters Mill Rd	EB	Music Fair Road to Foundry Row Entrance	D
			Foundry Row Entrance to MD 140	E
		WB	MD 140 to Foundry Row Entrance	C
			Foundry Row Entrance to Music Fair Road	F

*INTERSECTION CAPACITY*

Intersection Level of Service (LOS) calculations were performed using Synchro/SimTraffic traffic analysis software as well. The selected MOEs utilized as part of this evaluation included intersection delay, LOS, and intersection volume-to-capacity ratio. Table 7 summarizes the results of existing AM and PM peak hour capacity analysis, and Tables 8 through 11 summarize the results of the development scenarios. The intersection capacity reports used to create these tables are provided in Appendix E.

PERIOD	INTERSECTION	DELAY (s)	LOS	V/C RATIO
AM PEAK	MD 140 at MD 940 Ramp/Parking Lot	44	D	0.68
	MD 140 at Rosewood Lane/Shopping Center	10	A	0.59
	MD 140 at Painters Mill Rd/Parking Lot Entrance	49	D	1.01
	MD 140 at St. Thomas Lane	40	E	0.68
	MD 140 at Garrison View Road/Foundry Row Entrance	7	A	0.63
	MD 140 at St. Thomas Shopping Center	9	A	0.64
PM PEAK	MD 140 at MD 940 Ramp/Parking Lot	72	E	0.86
	MD 140 at Rosewood Lane/Shopping Center	16	B	0.74
	MD 140 at Painters Mill Rd/Parking Lot Entrance	53	D	1
	MD 140 at St. Thomas Lane	57	F	0.80
	MD 140 at Garrison View Road/Foundry Row Entrance	5	A	0.56
	MD 140 at St. Thomas Shopping Center	8	A	0.64

PERIOD	INTERSECTION	DELAY (s)	LOS	V/C RATIO
AM PEAK	MD 140 at MD 940 Ramp/Parking Lot	50	D	0.85
	MD 140 at Rosewood Lane/Shopping Center	10	A	0.73
	MD 140 at Painters Mill Rd/Parking Lot Entrance	63	E	1.05
	MD 140 at St. Thomas Lane	18	C	0.57
	MD 140 at Garrison View Road/Foundry Row Entrance	20	B	0.84
	MD 140 at St. Thomas Shopping Center	5	A	0.66
PM PEAK	MD 140 at MD 940 Ramp/Parking Lot	59	E	1.01
	MD 140 at Rosewood Lane/Shopping Center	18	B	0.9
	MD 140 at Painters Mill Rd/Parking Lot Entrance	61	E	1.05
	MD 140 at St. Thomas Lane	22	C	0.54
	MD 140 at Garrison View Road/Foundry Row Entrance	42	D	0.95
	MD 140 at St. Thomas Shopping Center	9	A	0.77

PERIOD	INTERSECTION	DELAY (s)	LOS	V/C RATIO
AM PEAK	MD 140 at MD 940 Ramp/Parking Lot	50	D	0.85
	MD 140 at Rosewood Lane/Shopping Center	10	A	0.73
	MD 140 at Painters Mill Rd/Parking Lot Entrance	62	E	1.05
	MD 140 at St. Thomas Lane	15	B	0.49
	MD 140 at Garrison View Road/Foundry Row Entrance	19	B	0.84
	MD 140 at St. Thomas Shopping Center	5	A	0.66
PM PEAK	MD 140 at MD 940 Ramp/Parking Lot	58	E	1.01
	MD 140 at Rosewood Lane/Shopping Center	20	B	0.90
	MD 140 at Painters Mill Rd/Parking Lot Entrance	60	E	1.05
	MD 140 at St. Thomas Lane	12	B	0.32
	MD 140 at Garrison View Road/Foundry Row Entrance	33	C	0.86
	MD 140 at St. Thomas Shopping Center	9	A	0.77

PERIOD	INTERSECTION	DELAY (s)	LOS	V/C RATIO
AM PEAK	MD 140 at MD 940 Ramp/Parking Lot	52	D	0.88
	MD 140 at Rosewood Lane/Shopping Center	10	B	0.75
	MD 140 at Painters Mill Rd/Parking Lot Entrance	70	E	1.09
	MD 140 at St. Thomas Lane	17	C	0.55
	MD 140 at Garrison View Road/Foundry Row Entrance	20	B	0.84
	MD 140 at St. Thomas Shopping Center	6	A	0.68
PM PEAK	MD 140 at MD 940 Ramp/Parking Lot	62	E	1.03
	MD 140 at Rosewood Lane/Shopping Center	20	B	0.93
	MD 140 at Painters Mill Rd/Parking Lot Entrance	65	E	1.08
	MD 140 at St. Thomas Lane	22	C	0.54
	MD 140 at Garrison View Road/Foundry Row Entrance	46	D	0.97
	MD 140 at St. Thomas Shopping Center	10	A	0.82

PERIOD	INTERSECTION	DELAY (s)	LOS	V/C RATIO
AM PEAK	MD 140 at MD 940 Ramp/Parking Lot	46	D	0.73
	MD 140 at Rosewood Lane/Shopping Center	11	B	0.54
	MD 140 at Painters Mill Rd/Parking Lot Entrance	41	D	0.93
	MD 140 at St. Thomas Lane	15	B	0.50
	MD 140 at Garrison View Road/Foundry Row Entrance	18	B	0.85
	MD 140 at St. Thomas Shopping Center	10	B	0.85
PM PEAK	MD 140 at MD 940 Ramp/Parking Lot	49	D	0.97
	MD 140 at Rosewood Lane/Shopping Center	15	B	0.71
	MD 140 at Painters Mill Rd/Parking Lot Entrance	49	D	0.95
	MD 140 at St. Thomas Lane	12	B	0.33
	MD 140 at Garrison View Road/Foundry Row Entrance	35	D	0.87
	MD 140 at St. Thomas Shopping Center	10	A	0.83

*STORAGE LENGTH ANALYSIS*

A storage length analysis was performed to determine the necessary storage for three intersections along MD 140: Painters Mill Road, Garrison View Road/Foundry Row Entrance, and St. Thomas Shopping Center Entrance. The storage length analysis was performed using SimTraffic software. The results are summarized in Tables 12 through 16.

<b>TABLE 12. EXISTING CONDITION STORAGE LENGTH ANALYSIS</b>				
PERIOD	INTERSECTION	MOVEMENT	STORAGE CHARACTERISTICS (ft)	
			EXISTING STORAGE	95% QUEUE
AM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	225
		MD 140 SB Left	250	175
		MD 140 SB Right	500	50
	MD 140 at Rosewood Lane	MD 140 NB Left	250	25
		MD 140 SB Left	225	150
	MD 140 at Painters Mill Road	Painters Mill EB Left	400	150
		Painters Mills EB Right	150	250
		MD 140 NB Left	550	550
		MD 140 SB Right	150	400
	MD 140 at Garrison View Road	MD 140 SB Left	125	25
		MD 140 NB Left	200	125
		MD 140 SB Right	150	50
PM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 SB Left	150	25
		MD 140 NB Left	275	225
		MD 140 SB Right	500	50
	MD 140 at Rosewood Lane	MD 140 NB Left	250	50
		MD 140 SB Left	225	175
	MD 140 at Painters Mill Road	Painters Mill EB Left	400	300
		Painters Mills EB Right	150	250
		MD 140 NB Left	550	450
		MD 140 SB Right	150	400
	MD 140 at Garrison View Road	MD 140 SB Left	125	50
MD 140 NB Left		200	25	
MD 140 SB Left		150	75	
		MD 140 SB Right	150	25

TABLE 13. SCENARIO 1 STORAGE LENGTH ANALYSIS						
PERIOD	INTERSECTION	MOVEMENT	STORAGE CHARACTERISTICS (ft)			
			PROPOSED STORAGE	95% QUEUE	RECOMMENDED STORAGE	
AM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	275	No Change	
		MD 140 SB Left	250	250	300	
		MD 140 SB Right	500	725	750	
	MD 140 at Rosewood Lane	MD 140 NB Left	250	25	No Change	
		MD 140 SB Left	225	200	No Change	
	MD 140 at Painters Mill Road	Painters Mill EB Left	400	200	No Change	
		Painters Mill EB Right	400	275	No Change	
		MD 140 SB Right	150	400	400	
		MD 140 SB Left	125	25	No Change	
	MD 140 at Garrison View Rd	MD 140 NB Left	550	675	675	
		MD 140 SB Left	400	125	No Change	
	PM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 SB Left	250	300	300
			MD 140 NB Left	275	>275	No Change
			MD 140 SB Right	500	725	750
MD 140 at Rosewood Lane		MD 140 NB Left	225	225	No Change	
		MD 140 SB Left	250	75	No Change	
MD 140 at Painters Mill Road		Painters Mill EB Left	400	300	No Change	
		Painters Mill EB Right	400	400	No Change	
		MD 140 SB Right	150	400	400	
		MD 140 SB Left	125	50	No Change	
MD 140 at Garrison View Rd		MD 140 NB Left	550	450	675	
		MD 140 SB Left	400	275	No Change	
MD 140 at Garrison View Rd		MD 140 NB Left	250	250	300	

**TABLE 14. SCENARIO 2 STORAGE LENGTH ANALYSIS**

PERIOD	INTERSECTION	MOVEMENT	STORAGE CHARACTERISTICS (ft)		
			PROPOSED STORAGE	95% QUEUE	RECOMMENDED STORAGE
AM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	250	No Change
		MD 140 SB Left	250	275	300
		MD 140 SB Right	500	750	750
	MD 140 at Rosewood Lane	MD 140 NB Left	250	25	No Change
		MD 140 SB Left	225	225	No Change
	MD 140 at Painters Mill Road	Painters Mill EB Left	400	200	No Change
		Painters Mill EB Right	400	300	No Change
		MD 140 SB Right	150	400	400
		MD 140 SB Left	125	25	No Change
	MD 140 at Garrison View Rd	MD 140 NB Left	550	625	675
		MD 140 SB Left	400	125	No Change
	PM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	>275
MD 140 SB Left			250	300	300
MD 140 SB Right			500	750	750
MD 140 at Rosewood Lane		MD 140 NB Left	250	175	No Change
		MD 140 SB Left	225	325	No Change
MD 140 at Painters Mill Road		Painters Mill EB Left	400	300	No Change
		Painters Mill EB Right	400	400	No Change
		MD 140 SB Right	150	225	400
		MD 140 SB Left	125	50	No Change
MD 140 at Garrison View Rd		MD 140 NB Left	550	525	675
		MD 140 SB Left	400	225	No Change
			MD 140 NB Left	250	250

**TABLE 15. SCENARIO 3 STORAGE LENGTH ANALYSIS**

PERIOD	INTERSECTION	MOVEMENT	STORAGE CHARACTERISTICS (ft)			
			PROPOSED STORAGE	95% QUEUE	RECOMMENDED STORAGE	
AM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	275	No Change	
		MD 140 SB Left	250	250	300	
		MD 140 SB Right	500	725	750	
	MD 140 at Rosewood Lane	MD 140 NB Left	250	25	No Change	
		MD 140 SB Left	225	225	No Change	
	MD 140 at Painters Mill Road	Painters Mill EB Left	400	200	No Change	
		Painters Mill EB Right	400	275	No Change	
		MD 140 SB Right	150	250	400	
		MD 140 SB Left	125	50	No Change	
	MD 140 at Garrison View Rd	MD 140 NB Left	550	675	675	
		MD 140 SB Left	400	150	No Change	
			MD 140 NB Left	250	300	300
	PM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	>275	No Change
MD 140 SB Left			250	250	300	
MD 140 SB Right			500	750	750	
MD 140 at Rosewood Lane		MD 140 NB Left	250	175	No Change	
		MD 140 SB Left	225	275	No Change	
MD 140 at Painters Mill Road		Painters Mill EB Left	400	375	No Change	
		Painters Mill EB Right	400	375	No Change	
		MD 140 SB Right	150	400	400	
		MD 140 SB Left	125	50	No Change	
MD 140 at Garrison View Rd		MD 140 NB Left	550	475	675	
		MD 140 SB Left	400	250	No Change	
			MD 140 NB Left	250	300	300

**TABLE 16. SCENARIO 4 STORAGE LENGTH ANALYSIS**

PERIOD	INTERSECTION	MOVEMENT	STORAGE CHARACTERISTICS (ft)		
			PROPOSED STORAGE	95% QUEUE	RECOMMENDED STORAGE
AM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	250	No Change
		MD 140 SB Left	250	150	300
		MD 140 SB Right	500	50	750
	MD 140 at Rosewood Lane	MD 140 NB Left	250	25	No Change
		MD 140 SB Left	225	100	No Change
	MD 140 at Painters Mill Road	Painters Mill EB Left	400	150	No Change
		Painters Mill EB Right	400	375	No Change
		MD 140 SB Right	150	200	400
		MD 140 SB Left	125	50	No Change
	MD 140 at Garrison View Rd	MD 140 NB Left	550	575	675
		MD 140 SB Left	400	175	No Change
			MD 140 NB Left	250	275
PM PEAK	MD 140 at Owings Mill Blvd Ramp	MD 140 NB Left	275	>275	No Change
		MD 140 SB Left	250	225	300
		MD 140 SB Right	500	750	750
	MD 140 at Rosewood Lane	MD 140 NB Left	250	75	No Change
		MD 140 SB Left	225	175	No Change
	MD 140 at Painters Mill Road	Painters Mill EB Left	400	225	No Change
		Painters Mill EB Right	400	350	No Change
		MD 140 SB Right	150	250	400
		MD 140 SB Left	125	50	No Change
	MD 140 at Garrison View Rd	MD 140 NB Left	550	450	675
		MD 140 SB Left	400	250	No Change
			MD 140 NB Left	250	250

*EFFECTIVENESS OF PROPOSED IMPROVEMENTS*

Scenario 1 captures both the increased traffic volumes expected to be experienced along the MD 140 corridor when Foundry Row is complete, as well as the improvements Foundry Row is expected to construct. Even with these improvements, however, the development of Foundry Row will increase congestion and reduce the level of service experienced throughout the study area network, as compared to existing traffic volumes and lane configurations. During the AM peak period, the intersections of MD 140 and Painters Mill Rd and Garrison View Road would be the most heavily impacted (falling from LOS D to E and from A to B, respectively). Arterial LOS along northbound MD 140 is expected to degrade from LOS B to D from Garrison View Road to St. Thomas Lane; along southbound MD 140, it is expected to degrade from LOS D to F from MD 940 Ramp to Rosewood Lane, and from LOS B to D from St. Thomas Lane to Garrison View Road.

During the PM peak period, for the intersection of MD 140 and Garrison View Road, the level of service is expected to fall from A to D. Arterial LOS along northbound MD 140 is expected to degrade from LOS B to F from St. Thomas Shopping Center to Garrison View Road, from LOS C to E from St. Thomas Lane to Painters Mill Road, and from LOS C to D from Painters Mill Road to Rosewood Lane; along southbound MD 140, it is expected to degrade from LOS C to F from Rosewood Lane to Painters Mill Road, improve from LOS D to B from Painters Mill Road to St. Thomas Lane, and degrade from LOS B to E from St. Thomas Lane to Garrison View Road.

With regards to the storage capacity of turning bays, excessive queuing is expected within the northbound left turn bays from MD 140 onto Garrison View Road, Painters Mill Road, and MD 940 Ramp, and within the southbound right turn bay from MD 140 onto Painters Mill Rd. In all cases, through queues are expected to periodically block access to the turning lanes, thus forcing turning queues to temporarily queue in the through lanes. In the case of

northbound MD 140 at the MD 940 Ramp, left turn queues periodically extend beyond available storage bays, thus preventing through vehicles from continuing through the MD 940 intersection.

Scenario 2 builds upon Scenario 1 by including SHA's short-term improvements, including a third northbound through-lane from Garrison View Road to approximately 325 feet north of Painters Mill Road. Intersection level of service is not expected to improve or degrade significantly as a result of the improvements provided in Scenario 2 (as compared to Scenario 1). During the AM peak period, the addition of the third through lane is expected to improve the arterial LOS experienced on MD 140 from Garrison View Road to Painters Mill Road. The LOS experienced by northbound traffic in this area would improve at least one full grade (compared to Scenario 1). Northbound MD 140 would be expected to improve its arterial LOS from D to B from Garrison View Road to St. Thomas Lane, and from LOS C to B from St. Thomas Lane to Painters Mill Road.

During the PM peak period, intersection level of service is not expected to improve or degrade significantly as a result of the improvements provided in Scenario 2 (as compared to Scenario 1). Arterial LOS along northbound MD 140 is expected to improve from LOS F to D from St. Thomas Shopping Center to Garrison View Road, but is expected to degrade from LOS E to F from St. Thomas Lane to Painters Mill Road, and from LOS D to F from Painters Mill Road to Rosewood Lane. The degradation in LOS is the result of additional traffic that is able to process through the northbound MD 140 arterial segment, due to the additional (third) through lane that is provided. When the additional traffic reaches the traffic signal at the MD 940 ramp, excessive through and/or left turn queues are expected to occasionally block access to the northbound left turn lanes and/or through lane, resulting in deteriorating operations and queuing back to Painters Mill Road. Operations along MD 140 northbound immediately prior to Painters Mill Road are also somewhat affected by through vehicles desiring to merge from the new third through lane, into the adjacent through lane, prior to the (third) through lane drop north of Painters Mill Road. As a result, northbound operations are expected to improve from St. Thomas Shopping Center to St. Thomas Lane, but degrade from St. Thomas Lane through the MD 940 Ramp.

With regard to the storage capacity of turning bays, excessive queuing is expected within the northbound left turn bays from MD 140 onto Garrison View Rd, Painters Mill Rd, and the Ramp to MD 940, and within the southbound right turn bay from MD 140 onto Painters Mill Rd. In all cases, through queues are expected to periodically block access to the turning lanes, thus forcing turning queues to temporarily queue in the through lanes. In the case of northbound MD 140 at the MD 940 Ramp, left turn queues periodically extend beyond available storage bays, thus preventing through vehicles from continuing through the MD 940 Ramp intersection.

Scenario 3 includes the same improvements as Scenario 1, but adjusts the traffic volumes to reflect demographic and development conditions in 2040. During the PM peak, arterial LOS along northbound MD 140 is expected to degrade from LOS C to D from Garrison View Road to St. Thomas Lane, from LOS E to F from St. Thomas Lane to Painters Mill Road, and from LOS D to F from Painters Mill Road to Rosewood Lane (compared to Scenario 1). With regard to the storage capacity of turning bays, excessive queuing is expected within the northbound left turn bays from MD 140 onto Garrison View Rd, Painters Mill Rd and the MD 940 Ramp, and within the southbound right turn bay from MD 140 onto Painters Mill Rd during the AM and/or PM peak hours. In all cases, through queues are expected to periodically block access to the turning lanes, thus forcing turning queues to temporarily queue in the through lanes. In the case of northbound MD 140 at the MD 940 Ramp, left turn queues periodically extend beyond available storage bays, thus preventing through vehicles from continuing through the MD 940 Ramp intersection.

Scenario 4 adds to the improvements proposed in Scenario 2, and then adjusts the traffic volumes to reflect demographic and development conditions in 2040. The principal improvement introduced in Scenario 4 is the construction of a third northbound and southbound through lane on MD 140 between MD 940 and Painters Mill Road. The addition of these lanes is expected to improve the levels of service experienced at the intersection of Painters Mill and MD 140 from E to D during both the AM and PM peak periods (versus Scenarios 1, 2, and 3). Similar improvements are expected at the intersection of MD 940 and MD 140 during the PM peak period. During the AM peak, the arterial LOS along northbound MD 140 is expected to degrade from LOS D to E from Rosewood lane to MD 940 Ramp (compared to Scenario 3); along southbound MD 140, LOS is expected to improve from LOS F to C from MD 940 Ramp to Rosewood Lane, and from LOS D to E from St. Thomas Lane to Garrison View Road. During the PM peak, the arterial LOS along northbound MD 140 is expected to improve from LOS F to C from St. Thomas Shopping Center to Garrison View Road, from LOS D to C from Garrison View Road to St.

Thomas Lane, from LOS F to E from St. Thomas Lane to Painters Mill Road, and from LOS F to D from Painters Mill Road to Rosewood Lane; the arterial LOS along southbound MD 140 is expected to improve from F to C from MD 940 Ramp to Rosewood Lane.

Failing arterial segments are expected to continue to occur along southbound MD 140 from Rosewood Lane to Painters Mill Road during the AM peak, along northbound MD 140 from Rosewood Lane to MD 940 Ramp during the PM peak, and along southbound MD 140 from Rosewood Lane to Painters Mill Road during the PM peak. LOS F is expected along northbound MD 140 from Rosewood Lane to MD 940 Ramp at least partially due to the lane drop of the third through lane as a right turn lane at the shopping center entrance opposite the MD 940 Ramp. Vehicles desiring to continue north on MD 140 are forced to change lanes prior to the MD 940 Ramp intersection, along with vehicles in the through lanes desiring to turn left at the MD 940 Ramp. Periodic blockage of one of the northbound through lanes due to the left turn queues exceeding the available left turn storage also contributes to the failing LOS. Excessive southbound through and right turn queuing contributes to the arterial LOS along MD 140 between Rosewood Lane and Painters Mill Road.

A potential additional improvement that could address the traffic operational issues exhibited along MD 140 northbound between Rosewood Lane and the MD 940 Ramp in Scenario 4 involves a reconfiguration of the northbound approach lane configuration. In Scenario 4, the MD 140 northbound approach lane configuration consists of two exclusive left turn pocket lanes, two through lanes, and one right turn lane. The third through lane that begins just south of Garrison View Road is aligned to drop as the right turn lane at the MD 940 Ramp intersection. A new scenario would shift the alignment of the roadway such that instead of one of the through lanes dropping as the right turn lane, one of the through lanes would drop as the left turn lane, resulting in one pocket left turn lane, and one left turn lane with continuous storage. The final northbound MD 140 lane configuration would be one exclusive left turn pocket lane, one continuous left turn lane (from which one of the through lanes would feed into), two through lanes that continue through the MD 940 Ramp intersection, and an exclusive right turn pocket lane. Due to the significantly heavier northbound left turn volume that is expected at this intersection (as compared to the northbound right turn volume), and the additional left turn storage that would be provided, it is expected that such a scenario would improve traffic operations along northbound MD 140 from Rosewood Lane to MD 940 Ramp, with potential residual benefits upstream. It is recommended that this new scenario be analyzed in the future.

## **CONCLUSION**

The opening of Foundry Row and other background developments is expected to increase traffic volumes and degrade traffic operations on both MD 140 and Painters Mill Road. When comparing short-term improvement Scenarios 1 (Foundry Row Improvements) and 2 (Foundry Row Improvements and SHA Improvements), both are not expected to fully mitigate the congestion experienced on MD 140 from south of Garrison View Road to MD 940 Ramp. The addition of the abbreviated northbound third through lane on MD 140 in Scenario 2 would provide some benefit to arterial LOS during the AM peak between Garrison View Road and Painters Mill Road, and during the PM peak from St. Thomas Shopping Center to St. Thomas Lane. However, during the PM peak, while the third lane is expected to allow greater throughput from south of Garrison View Road, this additional throughput is expected to degrade the arterial LOS from St. Thomas Lane through the MD 940 Ramp. Scenario 2 provides a modest benefit to operations during the AM peak, and is expected to provide both operational benefits and disbenefits during the PM peak (as compared to Scenario 1).

Long-term improvements in Scenario 4 (including SHA's ultimate improvements) provide a clearer benefit to traffic operations along MD 140, as compared to Scenario 3 (which only includes the Foundry Row improvements). Arterial LOS is improved for most segments, although northbound MD 140 from Rosewood Lane to MD 940 Ramp continues to experience failing operations, along with southbound MD 140 from Rosewood Lane to Painters Mill Road. A few isolated turning movements are also expected to exceed storage in the AM and/or PM peak. A potential additional improvement that could address the traffic operational issues exhibited along MD 140 northbound between Rosewood Lane and the MD 940 Ramp in Scenario 4 involves a reconfiguration of the northbound approach lane configuration. A new scenario would shift the alignment of the roadway such that instead of one of the through lanes dropping as the right turn lane, one of the through lanes would drop as the left turn lane, resulting in one pocket left turn lane, and one left turn lane with continuous storage. It is recommended that such an improvement be analyzed and considered in the future, due to its potential benefit to traffic operations.

Ms. Barb Solberg  
Page 18

If you have any questions or concerns, please contact the writer at 410-545-5645 or Ms. Lisa Shemer, Assistant Chief, Data Services Engineering Division at 410-545-5640.

By: William D. Tardy  
Will Tardy  
Travel Forecasting & Analysis  
Data Services Engineering Division

Attachments:

Appendix A: Study Area Map  
Appendix B: Foundry Row Site Plan and Scenario Lane Configurations  
Appendix C: 2011 Traffic Summary  
Appendix D: Arterial Capacity Reports  
Appendix E: Intersection Capacity Reports  
Appendix F: Queuing Reports

cc: Mr. Derek Gunn  
Ms. Kelly Kosino  
Ms. Erin Kuhn  
Mr. William Stroud  
Mr. Eric Sideras  
Ms. Lisa Shemer  
Mr. Ted Yurek

## **APPENDIX D - INTERAGENCY CONSULTATION GROUP COORDINATION**

## Nicole M. Hebert

---

**From:** Christina Brandt <CBrandt@sha.state.md.us>  
**Sent:** Friday, June 03, 2016 6:59 AM  
**To:** Nicole M. Hebert  
**Subject:** FW: MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

Here you go!

---

**From:** [Jeanette.Mar@dot.gov](mailto:Jeanette.Mar@dot.gov) [<mailto:Jeanette.Mar@dot.gov>]  
**Sent:** Friday, May 20, 2016 2:52 PM  
**To:** Christina Brandt <[CBrandt@sha.state.md.us](mailto:CBrandt@sha.state.md.us)>  
**Subject:** RE: MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

Hi Chrissy:

FHWA concurs that the MD 140 from Painters Mill Rd to North of Owings Mill Blvd. project meets the requirements of the CAA and 40 CFR 93 and does not need an additional quantitative hot-spot analysis.

Thanks!

*Jeanette*

Jeanette Mar  
Environmental Program Manager  
FHWA - Maryland Division  
10 South Howard Street, Suite 2450  
Baltimore, MD 21201  
phone (410) 779-7152  
fax (410) 962-4054

---

**From:** Christina Brandt [<mailto:CBrandt@sha.state.md.us>]  
**Sent:** Wednesday, April 27, 2016 7:19 AM  
**To:** 'Brian Hug -MDE-'; 'Rudnick.Barbara@epamail.epa.gov'; 'Becoat, gregory'; 'Khadr, Asrah'; 'Kevin Magerr'; 'Alexandra Brun -MDE-'; Mar, Jeanette (FHWA); 'Sara Tomlinson'  
**Cc:** 'Shawn Burnett'; 'Nicole M. Hebert'  
**Subject:** MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

## Nicole M. Hebert

---

**From:** Christina Brandt <CBrandt@sha.state.md.us>  
**Sent:** Tuesday, May 03, 2016 11:36 AM  
**To:** Shawn Burnett; Nicole M. Hebert  
**Subject:** FW: MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

---

**From:** Khadr, Asrah [<mailto:Khadr.Asrah@epa.gov>]  
**Sent:** Tuesday, May 03, 2016 11:36 AM  
**To:** Christina Brandt <[CBrandt@sha.state.md.us](mailto:CBrandt@sha.state.md.us)>  
**Cc:** Rudnick, Barbara <[Rudnick.Barbara@epa.gov](mailto:Rudnick.Barbara@epa.gov)>; Becoat, gregory <[becoat.gregory@epa.gov](mailto:becoat.gregory@epa.gov)>  
**Subject:** RE: MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

EPA concurs with SHA's recommendation that this project does not require a quantitative hot-spot analysis.

---

**From:** Christina Brandt [<mailto:CBrandt@sha.state.md.us>]  
**Sent:** Wednesday, April 27, 2016 7:19 AM  
**To:** 'Brian Hug -MDE-' <[brian.hug@maryland.gov](mailto:brian.hug@maryland.gov)>; Rudnick, Barbara <[Rudnick.Barbara@epa.gov](mailto:Rudnick.Barbara@epa.gov)>; Becoat, gregory <[becoat.gregory@epa.gov](mailto:becoat.gregory@epa.gov)>; Khadr, Asrah <[Khadr.Asrah@epa.gov](mailto:Khadr.Asrah@epa.gov)>; Magerr, Kevin <[Magerr.Kevin@epa.gov](mailto:Magerr.Kevin@epa.gov)>; 'Alexandra Brun -MDE-' <[alexandra.brun@maryland.gov](mailto:alexandra.brun@maryland.gov)>; 'jeanette.mar@dot.gov' <[jeanette.mar@dot.gov](mailto:jeanette.mar@dot.gov)>; 'Sara Tomlinson' <[stomlinson@baltometro.org](mailto:stomlinson@baltometro.org)>  
**Cc:** 'Shawn Burnett' <[sburnett@wtbco.com](mailto:sburnett@wtbco.com)>; 'Nicole M. Hebert' <[nhebert@wtbco.com](mailto:nhebert@wtbco.com)>  
**Subject:** MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

Good Morning,

Attached is the Draft Air Quality Technical Report for the MD 140 from Painters Mill Rd to North of Owings Mills Blvd. project in Baltimore County, Maryland.

SHA is requesting concurrence that this project meets the requirements of the Clean Air Act and 40 CFR 93 without an additional quantitative hot-spot analysis. The current 2016-2019 TIP includes the project under ID 63-0802-41 with a year of operation of 2020.

Please review and provide concurrence/comments by May 12, 2016 . Please let me know if you have any questions.

## Nicole M. Hebert

---

**From:** Christina Brandt <CBrandt@sha.state.md.us>  
**Sent:** Friday, April 29, 2016 10:58 AM  
**To:** Shawn Burnett; Nicole M. Hebert  
**Subject:** FW: MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

**From:** Alexandra Brun -MDE- [<mailto:alexandra.brun@maryland.gov>]  
**Sent:** Friday, April 29, 2016 10:25 AM  
**To:** Christina Brandt <[CBrandt@sha.state.md.us](mailto:CBrandt@sha.state.md.us)>  
**Subject:** Re: MD 140 from Painters Mill Rd to North of Owings Mills Blvd. Project - Air Quality Interagency Consultation

Good Morning Christina,

MDE has reviewed the technical report and concurs that this project meets the requirements of the Clean Air Act and 40 CFR 93 without an additional quantitative hot-spot analysis.

Thank you,

Alex

On Wed, Apr 27, 2016 at 7:19 AM, Christina Brandt <[CBrandt@sha.state.md.us](mailto:CBrandt@sha.state.md.us)> wrote:

Good Morning,

Attached is the Draft Air Quality Technical Report for the MD 140 from Painters Mill Rd to North of Owings Mills Blvd. project in Baltimore County, Maryland.

SHA is requesting concurrence that this project meets the requirements of the Clean Air Act and 40 CFR 93 without an additional quantitative hot-spot analysis. The current 2016-2019 TIP includes the project under ID 63-0802-41 with a year of operation of 2020.

Please review and provide concurrence/comments by May 12, 2016 . Please let me know if you have any questions.

Thank you,

Chrissy

Chrissy Brandt

*Environmental Manager – Team Leader*

*OPPE-Environmental Planning Division*

*MD State Highway Administration*

*707 North Calvert Street, Baltimore, MD 21202*

*[410-545-2874](tel:410-545-2874) / [cbrandt@sha.state.md.us](mailto:cbrandt@sha.state.md.us)*

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