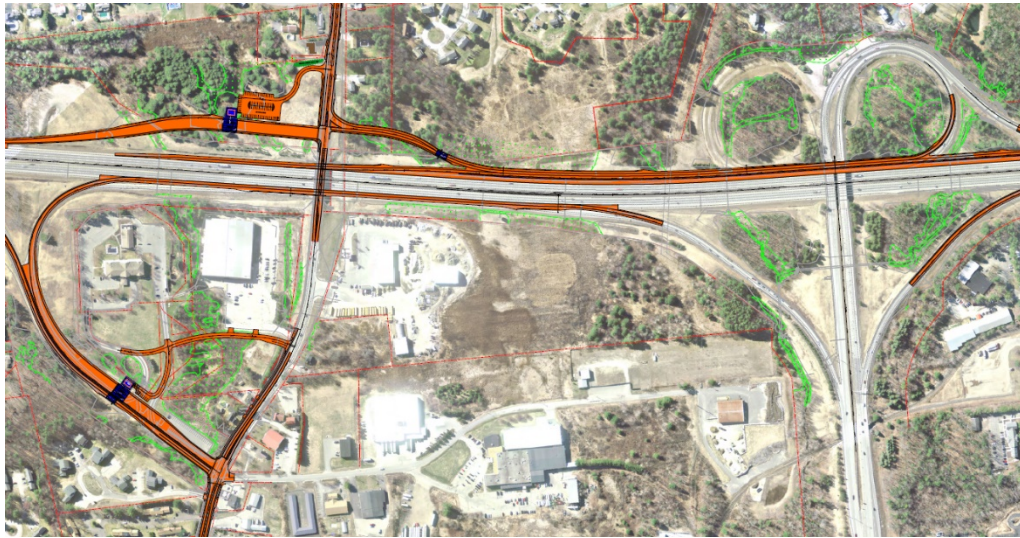


Preliminary Design Report

Contract
Interchange Improvements
Exits 35 & 36
Saco, Maine



Prepared for:
The Maine Turnpike
Authority

January 2021

PRELIMINARY DESIGN REPORT

Project Location Plan
January, 2021

Table of Contents

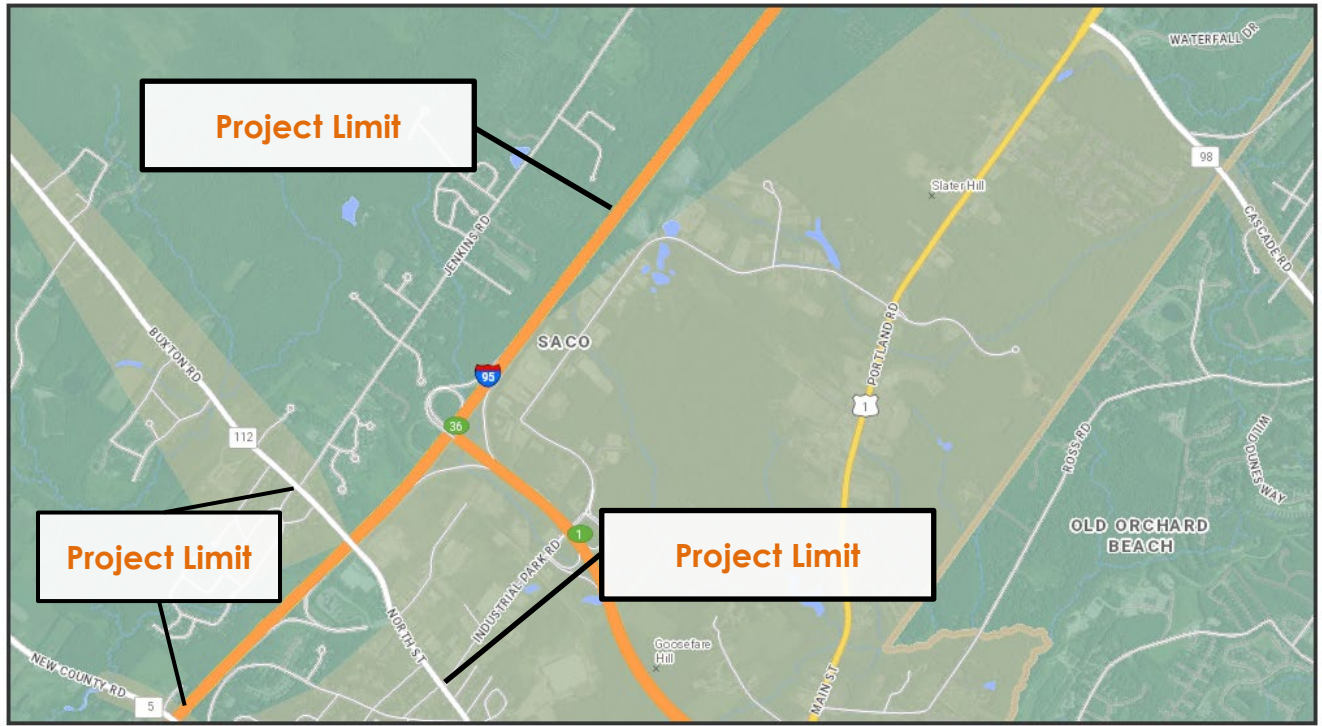
1.0	PROJECT LOCATION PLAN	2
2.0	MTA PROJECT RECOMMENDATION FORM.....	3
3.0	SUMMARY OF EXPECTED IMPACTS	12
4.0	SUMMARY OF HIGHWAY ENGINEERING	13
4.1	PROJECT BACKGROUND	13
4.2	PROJECT DESCRIPTION.....	14
4.3	HORIZONTAL/VERTICAL ALIGNMENT	14
4.4	TYPICAL SECTION.....	20
4.5	HYDROLOGY, HYDRAULIC AND SCOUR EVALUATION.....	20
4.6	STRUCTURAL	22
4.7	GEOTECHNICAL.....	24
4.8	RIGHT-OF-WAY (ROW).....	26
4.9	UTILITIES.....	26
4.10	ENVIRONMENTAL	27
4.11	AVOIDANCE AND MINIMIZATION	29
4.12	TRAFFIC	29
4.13	LIGHTING	32
4.14	CONSTRUCTION AND MAINTENANCE OF TRAFFIC	33
4.15	CONSTRUCTION SCHEDULE.....	35
4.16	PRELIMINARY ENGINEER’S ESTIMATE.....	35
APPENDIX A	PRELIMINARY PLANS	
APPENDIX B	PRELIMINARY ENGINEER’S ESTIMATE	
APPENDIX C	DRAFT WETLAND DELINEATION REPORT	
APPENDIX D	CONSTRUCTION SCHEDULE & GRAPHIC	
APPENDIX E	PRELIMINARY GEOTECHNICAL REPORT	
APPENDIX F	ROUTE 112 TURNING MOVEMENTS	
APPENDIX G	ADVANCED SIGNING GRAPHICS	
APPENDIX H	NB PLAZA ACCESS OPTIONS GRAPHIC	
APPENDIX I	TRAFFIC VOLUME DIAGRAMS AND TABLES	

PRELIMINARY DESIGN REPORT

Project Location Plan
January, 2021

1.0 PROJECT LOCATION PLAN

EXIT 35 & 36 INTERCHANGE IMPROVEMENTS



The Maine Department of Transportation provides this publication for information only. Reliance upon this information is at user risk. It is subject to revision and may be incomplete depending upon changing conditions. The Department assumes no liability if injuries or damages result from this information. This map is not intended to support emergency dispatch.

0.75 Miles
1 inch = 0.55 miles

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PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

2.0 MTA PROJECT RECOMMENDATION FORM

City/Town: Saco **Route:** I-95, State Route 112 **MTA Contract No.:** 2022.XX

Consultant Project Leader: Lauren Meek, PE

MTA Project Manager: Ralph Norwood, IV, PE, PTOE

Consultant: Stantec Consulting Services **Project Length:** 2.0 miles **Date:** June 5, 2020

Project Limits/Description: The project begins on the southern end of the Maine Turnpike Southbound (I-95) by the Maine State Route 5 overpass (Station 1685+75) and continues 10,625 feet/2.01 miles north (Station 1792+16). On the Maine Turnpike Northbound side, the project begins on the southern end near the Southbound limit of work (Station 1689+25) and continues 8,275 feet/1.56 miles north to the end of the Exit 36 Northbound On Ramp (Station 1772+00). The work on Maine State Route 112 begins west of the Turnpike at the Route 112 and Jenkins Road intersection and continues east for roughly 2,745 feet/0.52 miles to the Route 112 and Industrial Park Road intersection.

Purpose & Need: The Transportation Study for the Saco Route 112/Exit 36 Area was released in July 2019. The study was a joint initiative between the City of Saco, Maine Turnpike and the MaineDOT that produced a series of recommendations to address regional transportation issues by improving connections to and from the Turnpike. With much input from stakeholders and the public, the report analyzed several versions of modifying the Exit 36 Interchange area to have a direct connection with Route 112 which is proposed as Exit 35 an additional interchange (Exit 35) on both the north- and southbound. Stantec has developed the program for the Exit 36 Interchange area with a layout for opening year of 2025 and modifications needed when the mainline is widened with a fourth lane in each direction in 2040.

1. **Traffic Data:**

	Functional Class	AADT (2016)
Maine Turnpike I-95	Principle Arterial Turnpike	35,000 (NB) 35,000 (SB)
ME-112	Principle Arterial Turnpike	12,300

Posted Speed: Mainline – 70 mph
Plaza Approach/Departure – 10 mph
Exit 35/36 On/Off Ramps – 35 mph
Route 112 - 35 mph

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

2. Highway Recommendations:

Disposition of Existing Highway: The Maine Turnpike is a limited access highway and currently has three travel lanes northbound and three travel lanes southbound. Maine State Route 112 has one eastbound lane and one westbound lane.

Proposed Recommendations: The proposed work is as follows:

- construction of two new side toll plazas each with an administration building, parking lot, two cash and one E-ZPass entry lanes, one exit lane, toll booths, canopies, structural roadway slab, toll equipment, utility services and employee access road;
- construction of Collector-Distributor (C-D) Roadway along southbound I-95 for the Exit 36 SB on ramp and Exit 35 SB off ramp;
- construction of Exit 35 NB and SB on and off ramps;
- reconfiguration of the Exit 36 NB on ramp to provide a parallel acceleration lane;
- installation of concrete barrier to separate the southbound traffic and the C-D Roadway traffic;
- installation of lighting for the ramps, plaza area, intersections and parking areas;
- construction of closed and open drainage systems;
- installation of advance guide signing on the Turnpike and Route 112;
- replace the existing Route 112 Park and Ride Lot with a 58-space lot at a location next to the new Exit 35 SB on ramp;
- installation of a signalized intersection on Route 112 with Exit 35 SB on and off ramps;
- installation of a signalized intersection on Route 112 intersection with Exit 35 NB on and off ramps and Lund Road;
- construction of a new driveway for Route 112 access for both the Ramada Inn and XL Sports World complex; and
- reconstruction of sidewalk due to roadway widening along the eastbound side of Route 112 and add sidewalk between the Shell gas station and the Madden Beverage business on the westbound side.

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form

January 1, 2021

Design Criteria:

	Maine Turnpike (I-95)	I-95 SB C-D Roadway	Exit 35 Ramps	Exit 36 Ramps	Route 112	NB/SB Access Rds & Park & Ride Lot
Travelway Width	12'	12'; 14' ramp proper	12' accel/decel lanes; 14' ramp proper	12' accel/decel lanes; 14' ramp proper	11'-12'	12'
Shoulder Width Right	12' (For Future Lane)	8'; 10' w/ GR; 4' at wall	8'+	8'+	3'-5'	1' gravel
Shoulder Width Left	9-10' w/ Barrier; 4' w/o GR/Barrier; 6' w/ med. GR	4'	4'	4'	2'	NA
Pavement Depth	10"	7.5"	6"	7.5"	6"	4"
Subbase Depth	4" ABC-C 8" ASC-G 19" Gran. Bor.	4" ABC-C 18" ASC-G	4" ABC-C 20" ASC-G	4" ABC-C 18" ASC-G	4" ABC-C 20" ASC-G	3" ABC-C 18" ASC-G
Front Slope	6:1	6:1	4:1	4:1	3:1	3:1
Guardrail Slope	2:1	2:1	2:1	2:1	2:1	2:1
Back Slope	3:1	3:1	2:1	2:1	2:1	2:1
Design Speed	70 mph	60 mph	35 mph Ent./Exit; 10 mph Plaza	35 mph Ent./Exit	35mph	25mph
Clear Zone	30'	30'	12'	12'	12'	10'

Applicable Standards and References:

1. MaineDOT Design and Construction Policies
(<https://www.maine.gov/mdot/engineering/highway/>)
2. State of the Practice and Traffic Control at Toll Plazas: Best Practices: FHWA
http://www.mutcd.fhwa.dot.gov/rpt/tcstoll/pdf/best_practices.pdf
3. A Policy on Geometric Design of Highways and Streets, AASHTO 7th Edition, 2018

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

3. ADA Compliance

Pedestrian facilities shall be upgraded to comply with the [MaineDOT ADA Compliance Policy for Construction and Maintenance](#) and the [Minimum ADA Requirements for Pedestrian Facilities Design Guidance](#).

Select all that apply:

- No pedestrian facilities exist on the project and none will be installed.**
- Existing pedestrian facilities will not be upgraded to ADA compliance based on project scope.**
- New pedestrian ADA compliant facilities will be installed where none previously existed.**
- Existing pedestrian facilities will be upgraded to ADA compliance unless technically infeasible.**
- Pedestrian signals will be installed or upgraded if required.**

Summarize:

Currently there is a sidewalk along the eastbound lane of State Route 112 for the extent of the project. The existing sidewalk does not have ADA compliant pedestrian facilities nor is there a connection between the stretch of sidewalk along the westbound side of Route 112 and the sidewalk abutting the Shell station. The proposed design will reconstruct the sidewalk within the limits of the Route 112 work. There will be a five-foot esplanade from the Access Road to the Ramada Inn, XL Sports and NB Plaza to the eastern limit of work.

Crosswalks are provided at the Exit 35 SB and Exit 35 NB intersections and the major entrances to the Park & Ride Lot and Access Road to the Ramada Inn, XL Sports, and NB Plaza. A right turn channelization island for eastbound Route 112 traffic entering the Exit 35 SB Plaza provides a crossing refuge and minimizes the crosswalk length across the SB Plaza entrance while also accommodating right turning trucks. A pedestrian activated flashing sign assembly is proposed at the crosswalk at the right turn slip lane. These flashing signs are located to maximize the sightlines of a vehicle entering the right turn lane.

- No technical infeasibility forms are required to be completed at this time.**
- Technical infeasibility forms have been submitted as indicated in the table below.**

Curb Ramp ID/Location	Reason Full Compliance Infeasible	Date Approved
None Currently Identified		

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

Exceptions to Controlling Standards:

Controlling Element	Required Standard	Proposed Design	Date Approved
Right Shoulder Width for C-D Roadway	6-8'	4' at Bridge Abutment	
ADA Exceptions (Yes or No): None Anticipated			
Driveway Exceptions (Yes or No): Exceptions anticipated at Sta. 161+20 & 161+73			

4. Structural Recommendations:

Clearances:	Proposed
Vertical (I-95 SB @ I-195 Bridge)	16.0' FT
Vertical (I-95 SB @ Rte 112/North St Bridge)	16.0' FT
Vertical (I-95 NB @ I-195 Bridge)	16.0' FT
Vertical (I-95 NB @ Rte 112/North St Bridge)	16.0' FT

Proposed Recommendations:

- Soil Nail Wall at the I-195 SB abutment
- Culvert Extension with Retaining Wall for Goosefare Brook (~Sta. 2750+30, LT.)
- Retaining Barrier at the Route 112 SB abutment
- Replace membrane/wearing surface, upgrade endposts and minor substructure repairs on the Route 112 bridge

Design Criteria:

Design Loading:

Structural Slab and Foundation Vehicle Loading - HL-93

Toll Canopy Roof Live Load - 53 psf

Wind Load - 110 MPH

Specification:

AASHTO LRFD bridge Design Specifications, 8th Edition with 2016 Interims

ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and other Structures

ASCE 7-16 Minimum Design Loads for and Associated Criteria for Buildings and other Structures

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

Snow Load-Ground Snow Load (Pg) - 60 psf ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and other Structures

Pavement Depth: See Highway Design Criteria.

Design Life: 75-years for new structural components.

5. Available Soils Information:

This site is located in York County, Maine, approximately 11 miles south of Portland, Maine. A conceptual level evaluation of the subsurface conditions and the potential effect on the proposed construction has been performed. As part of this evaluation the following information was reviewed:

- Surficial Geology, Old Orchard Beach Quadrangle, Maine, Open-File No. 99-94, dated 1999.
- Test boring logs and plans from the construction of Route I-195 over the Maine Turnpike, dated 1981.
- Test boring logs and plans from the North Street bridge replacement project, dated December 2001
- Geotechnical Engineering Report, Contract 2015.06, EZ Pass Lane Addition, Exit 36 Toll Plaza, Saco, Maine, prepared by Stantec and dated December 18, 2014.

The surficial geology map indicates that a sand deposit is present across the entire project area. This sand was deposited in marine water during the regression of the ocean from coastal area after the end of the last glacial period. The sand is commonly underlain by a fine-grained cohesive silty clay formation deposited in deeper and calm marine water during the marine submergence of the coastal zone. The silty clay deposit is commonly known as the Presumpscot Formation and typically consists of a relatively thin stiff crust layer underlain by a thick soft layer.

Based on the boring logs from past transportation projects in the area, the geology is consistent with the geologic map and the coastal area of Maine. The general subsurface conditions encountered in the test borings are summarized in the table below. The table does not include the thickness of existing roadway embankment fills which are present near the existing bridge structures. The embankment fills are generally 15 to 20 feet in height.

6. Project Schedule:

Construction Timeline: Approximate 30-month construction duration

Advertisement: Anticipated by 2023

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

7. **Maintenance of Traffic:**

The construction of the new toll plazas at both north- and southbound Exit 35 will be open and operational before the work on north- and southbound Exit 36 occurs.

Phase 1A will be construction of the Route 112 Access Road for the Ramada Inn as well as beginning construction of the Exit 35 SB ramps and plaza area. Phase 1B will be construction of the Exit 35 Southbound Ramps as well as all the Southbound Plaza work including construction and testing.

Phase 1B will also consist of all the Route 112 roadway and intersection improvements. The first part of the Collector-Distributor Road by Exit 35 will be constructed during Phase 1B. All the Exit 35 Northbound Ramp construction and testing will take place during Phase 1B.

Phase 2 will focus on construction of the Exit 36 ramps and completion of the C-D Roadway.

Phase 3 will consist primarily of final paving and project clean up.

8. **Right of Way Impacts:**

Right of way impacts were avoided and minimized during the 2019 Saco Route 112/Exit 36 Area Transportation study for this project. The number of interchange alternatives were narrowed down to two key viable configurations. An alternative to extend I-195 westerly to Route 112 along with a complete reconfiguration of Exit 36 was found to provide several positive improvements, including reducing traffic congestion on Route 112. However, the property impacts, including the need for full acquisitions, were substantial. The current Exit 35-36 configuration was selected due to its ability to improve Turnpike access with relatively minor property impacts and no full acquisitions. In addition, property impacts were reduced further during preliminary design. In particular, the Route 112/Exit 35 NB ramps intersection analysis was reevaluated in an effort to reduce the width of improvements and impacts along Route 112. Through collaboration with the study team, minor adjustments were made to the traffic model to better reflect actual conditions. The adjustments led to reducing the westbound double left turn lane to a single left turn lane, resulting in reduced property impacts to several properties.

9. **Public Process:**

The following public meetings at Saco City Hall were held as part of the 2019 Saco Route 112/Exit 36 Area Transportation Study:

- June 14, 2018 “blank page” meeting to hear the public’s concerns
- September 27, 2018 potential solutions presentation and feedback
- February 13, 2019 presentation of final array of alternatives. The Study Team received positive feedback on the current Exit 35-36 alternative.

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

A more detail description of the meetings and public process is included in the study.

On October 6, 2020, the City of Saco presented the draft preliminary plans of Route 112 to the Traffic Safety Committee.

Environmental Permitting Public Notice of Intent

Due to the likely levels of State and Federal permitting there will be a requirement for additional public notice of intent to file the permit applications. This includes notice to abutters, public notification in a local newspaper, a public hearing, and the permit applications to be available at the municipal office(s), MDEP and USACE local offices.

10. Anticipated Permit Level

Maine Department of Environmental Protection: Individual Permit

***US Army Corps of Engineers:** Individual Permit

NPDES: MPDES-GP

NOI: Yes

*Due to proposed alteration of protected natural resources and alteration of areas adjacent to protected natural resource, permit approval will be required by Maine Department of Environmental Protection (MeDEP) and US Army Corps of Engineers (ACOE). Project plans are not fully designed so currently the amount and types of resource alteration are not fully assessed. Therefore local, State, and Federal permitting requirements are not finalized. Confirmation of proposed permitting thresholds will be determined by the final design alterations and through a discussion with MeDEP and Corps at the pre-application meeting. Construction methods will likely be required where working in or close to resources to demonstrate avoidance of unnecessary and non-permitted alteration of regulated resources. Proposed disturbance area does not currently exceed thresholds triggering the Site Location of Development Law.

The proposed disturbance and construction activity are one acre or more of disturbed area and will require coverage under the Construction General Permit (CGP) requirements; therefore, a Notice of Intent (NOI) will be required.

This project will comply with the current Memorandum of Agreement (MOA) between MeDEP and MTA (June 2017). Section 3 of the MOA states that all projects shall comply with the requirements of MeDEP Chapters 500 and 502. Specific Provisions:

- A. **Basic Standards:** This project will meet the Basic Standards described in Section 4(B) of Chapter 500, through the implementation of the MeDEP Best Management Practices for Erosion and Sediment Control.
- B. **General Standards:** This project is located within the Goosefare Brook watershed, which is listed in Maine's Stormwater Law (Title 38 M.R.S.A. §420-D), Chapter 502 as an Urban Impaired Stream, and will meet the General Standards to the extent practicable.

PRELIMINARY DESIGN REPORT

MTA Project Recommendation Form
January 1, 2021

- C. Phosphorus Standard: This project is not within the watershed of a lake and therefore does not trigger the Phosphorus Standard
- D. Urban Impaired Stream Standard: This project is located within the Goosefare Brook watershed, which is listed in Maine’s Stormwater Law (Title 38 M.R.S.A. §420-D), Chapter 502 as an Urban Impaired Stream, and the trigger threshold for meeting the general standards of the Stormwater Law (Chapter 500) will be reduced from 1 acre to 20,000 square feet or more of “new” impervious area, or 5 acres or more of “developed area”. This project meets this threshold. Based on the current Memorandum of Agreement (MOA) between Mainedep and MTA, this project is exempt from filing a permit. The MOA does not require linear projects associated with existing travel corridors to meet the requirements of the General Standards of the Stormwater Management Law unless the project is located in the direct watershed of an urban impaired stream. This project will be considered as a “Linear Project” located in the direct watershed of an urban impaired stream and must meet the General Standards to the extent practicable {MOA 3.B.(1)}.
- E. Flooding Standards: This project will result in greater than 3 acres or more of net new impervious area and therefore will meet the Flooding Standards per 4(F) of Chapter 500.

Anticipated NEPA Requirement:

Although the Project will require a federal permit consultation with the Environmental Protection Agency (EPA) regarding NEPA will not be required. However, the USACE will perform an Environmental Assessment as part of Federal permitting process.

11. Estimate of Project Cost:

\$35,500,000

Approved for Final Design

Date

1/15/21

Approved By

Stephen R. Tartre

Stephen R. Tartre, P.E.
Director of Engineering

Tolls Systems Approved for Final Design

Date

16 JAN 21

Approved By

William H. Yates III

William H. Yates, III
Director of Information Services and
Communications

PRELIMINARY DESIGN REPORT

Summary of Expected Impacts
January 1, 2021

3.0 SUMMARY OF EXPECTED IMPACTS

RIGHT OF WAY –

Number of: Property Owners = 14
Buildings To Be Taken = 0

Type of Acquisitions: Fee Simple Easement
 Grading Temporary Road

HISTORICAL/ARCHEOLOGICAL – Outreach to the Maine Historic Preservation Commission (MHPC) and State Tribes has not been initiated.

COAST GUARD PERMIT? No **FAA PERMIT?** No

ENVIRONMENTAL –

Instream Work Window? Yes From July 15 To September 30

Wetlands: The preliminary combined permanent and temporary wetland impact total is approximately 191,831 SF (4.40 Ac.)

Freshwater Area = 0 SF Coastal Area = 0 SF

Mitigation Required: Yes

Dredged Spoils Testing Required: No

Stream Diversion: Yes; 150 feet each bank

Expected Permit and NEPA Level:

MDEP: Individual NRPA Permit ACOE: Individual Permit LUPC: No
NPDES: CGP (Construction General Permit) NEPA: No

Summary of Avoidance and Minimization: Project plans were modified in several ways to avoid wetland and stream alterations. Where avoidance of these natural resources was not possible the plans were further modified to minimize resource alterations to achieve the least environmentally damaging practicable alternative (LEDPA) for the project design. To minimize wetland impacts in areas of high fill, steep 2H:1V slopes with guardrail are proposed rather than the standard 6H:1V slopes. The Exit 35 SB Park & Ride lot is sited so access to the plaza admin building is provided but minimizes the impacts to wetlands to the west. The relocated access road for the hotel’s Route 112 entrance aligns closely to the parking lot of the gym to minimize the embankment footprint through the wetlands.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

4.0 SUMMARY OF HIGHWAY ENGINEERING

4.1 PROJECT BACKGROUND

A transportation study for the Saco Route 112/Exit 36 Area was released in July 2019. The study was a joint initiative between the City of Saco, Maine Turnpike and the MaineDOT that produced a series of recommendations to address regional transportation issues by improving connections to and from the Turnpike. The predominant recommendation involved expanding Exit 36 to include Turnpike access to Route 112. Specifically, the improvements consist of providing Turnpike access to Route 112 via a Collector-Distributor (C-D) roadway on the southbound Turnpike mainline and an auxiliary lane between Exit 36 and Route 112 on the northbound Turnpike mainline. The improvements to the northbound Turnpike will increase the weave length between the Route 112 on ramp (the old Exit 5 on ramp) and the offramp to I-195 from an existing 870' to an acceptable length of 2,150 feet. Access to the Turnpike will be provided at Lund Road (with signals) and at a new signalized intersection west of the Turnpike.

The project also includes building a toll plaza at Exit 35 NB on and off ramp with three entry lanes (two cash and one E-ZPass) and one exit lane. A toll plaza will be constructed at the Exit 35 SB on ramp with three entry lanes (two cash and one E-ZPass). Both toll plaza will have an admin building, associated parking and an access road. For Exit 35 SB off ramp, a toll exit gantry will be constructed. A park and ride lot is proposed to replace the existing lot at the Ramada Inn entrance that needs to be closed for the new Turnpike northbound ramps. The proposed location of the 58-space lot is next to the Exit 35 SB admin building with access from Route 112.

The following changes were made in collaboration with the MTA after the 10% design submission:

- The Route 112 westbound double left turn lane to the northbound on ramp was reduced to a single left turn lane.
- A westbound left turn lane to Hillview Avenue is proposed. The layout for this addition will be provided at a later date after survey is completed.
- The 10% option for replacing the existing park and ride lot on Ramada Inn property was dropped in favor of the current location next to the Exit 35 SB on ramp. The current location is owned by the MTA and the topography is more favorable for the design. Design will incorporate a landscaped berm and fencing along the abutter's property line.
- Improvements to the Exit 36 NB on ramp to provide a parallel acceleration lane.
- The design was modified to reduce the limits of work and associated impacts for the Exit 36 SB off ramp construction.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

4.2 PROJECT DESCRIPTION

The proposed construction scope includes the construction of:

- construction of two new side toll plazas each with an administration building, parking lot, two cash and one E-ZPass entry lanes, one exit lane, toll booths, canopies, structural roadway slab, toll equipment, utility services and employee access road;
- construction of Collector-Distributor (C-D) Roadway along southbound I-95 for the Exit 36 SB on ramp and Exit 35 SB off ramp;
- construction of Exit 35 NB and SB on and off ramps;
- reconfiguration of the Exit 36 NB on ramp to provide a parallel acceleration lane;
- installation of concrete barrier to separate the southbound traffic and the C-D Roadway traffic;
- installation of lighting for the ramps, plaza area, intersections and parking areas;
- construction of closed and open drainage systems;
- installation of advance guide signing on the Turnpike and Route 112;
- replace the existing Route 112 Park and Ride Lot with a 58-space lot at a location next to the new Exit 35 SB on ramp;
- installation of a signalized intersection on Route 112 with Exit 35 SB on and off ramps;
- installation of a signalized intersection on Route 112 intersection with Exit 35 NB on and off ramps and Lund Road;
- construction of a new driveway for Route 112 access for both the Ramada Inn and XL Sports World complex; and
- reconstruction of sidewalk due to roadway widening along the eastbound side of Route 112 and add sidewalk between the Shell gas station and the Madden Beverage business on the westbound side.

Careful consideration has been made to avoid and minimize direct and indirect impacts to the wetlands.

4.3 HORIZONTAL/VERTICAL ALIGNMENT

Northbound Exit 35 Off Ramp

Existing

The existing off ramp is a tapered exit ramp with a 285' painted gore and includes a relatively tight 400' radius curve where it turns away from the Turnpike. Currently the ramp is connected to the Ramada Inn parking lot and does not provide direct access to Route 112.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

Proposed

The project replaces the existing tapered exit with a parallel exit lane. The proposed alignment turns away from the Turnpike through a 1,500'/750' compound curve. The compound curves are followed by a 219' tangent that connects to a 750' radius curve that turns the alignment toward Route 112. Although the proposed alignment does completely avoid the wetlands that the current alignment does, the proposed horizontal alignment provides a much more gradual transition to the toll plaza area.

Northbound Exit 35 On Ramp

Existing

The existing on ramp is a tapered entrance ramp with a 500' painted gore that ties into the auxiliary lane leading to the Exit 36 off ramp. The auxiliary lane provides approximately 870' for weaving maneuvers between entering and exiting traffic. Currently, the ramp is connected to the Ramada Inn parking lot and does not provide direct access to the Turnpike from Route 112.

Proposed

The proposed horizontal alignment follows the existing horizontal alignment for most of the ramp except where it matches into mainline auxiliary lane through a flatter 680' radius curve. The result is a parallel single lane entrance with a 195' painted gore that has been moved roughly 825 feet to the south. Combined with revision to the northbound Exit 36 off ramp revision described below, the length of the auxiliary lane is increased by 1280'. The proposed auxiliary lane is 2,150' long, exceeding the 2000' minimum length recommended by AASHTO.

The project also modifies the ramp to accommodate a three-lane side plaza located approximately 550' from its intersection with Route 112. Similar to the southbound plaza, the departure tapers from 51' to 14' wide in 901' (24:1 taper).

The vertical alignment was developed to provide a high point at the the proposed northbound toll plaza and to mimic the existing ramp grade as much as possible. The last 400' of the profile lowers the existing ramp by 2' to 3' in order to tie into the mainline further south than existing.

Northbound Exit 36 Off Ramp

Existing

The existing Exit 36 off ramp is a tapered exit ramp with a 565' painted gore.

Proposed

The project will replace the tapered exit with a parallel exit ramp that ties into the Turnpike auxiliary lane through an 1800' radius curve. The revised alignment moves the painted

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

gore approximately 455' to the north. Combined with the northbound Exit 35 on ramp revision described below, the length of the auxiliary lane is increased by 1280'.

There is no change to the vertical alignment.

Northbound Exit 36 On Ramp

Existing

The existing Exit 36 on ramp is a direct connection to the Turnpike with a tapered single lane entrance ramp.

Proposed

The project will replace the tapered entrance with a parallel single lane entrance ramp that has a 1300' acceleration lane and a 300' taper that matches into the Turnpike. The 975' radius is much flatter than the existing curvature thus creates a much smoother transition into the Turnpike. The design speed is 35 MPH.

There is no change to the vertical alignment.

Southbound Collector-Distributor Roadway

Existing

None

Proposed

The Collector-Distributor (C-D) Roadway baseline runs parallel to the Main Turnpike and serves the Exit 36 SB off and on ramps and the Exit 35 SB off ramp. The baseline is offset a distance of 77' to allow for a future fourth southbound lane with an adjacent 10' shoulder. Until the fourth lane is warranted, a 22' wide shoulder will be striped as the outside shoulder for the existing three-lane section. The adjacent 10' shoulder will be unused until the fourth mainline travel lane is needed.

As recommended by AASHTO, the design speed for the C-D Roadway was set at 60 MPH, 10 MPH under the mainline design speed. The lower speed roadway with its 1,950' (1,650' required) auxiliary lane will provide for safer weaving maneuvers between entering traffic from the I-195 on ramp and exiting off ramp traffic to Route 112.

The C-D Roadway is transitioned back into the mainline by a gradual reverse curve (5000' and 8100' respectively) which leads to a parallel on ramp that provides a 500' gap acceptance length and a 300' tie-in taper.

The C-D Roadway vertical alignment is a spline profile developed from the mainline elevations and cross slopes to accommodate the two roadways' opposing cross slopes. The

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering

January 1, 2021

spline angle points were developed to not exceed an algebraic difference of grade 0.6% and are generally less than 0.2%.

Southbound Exit 36 Off Ramp

Existing

The existing Exit 36 off ramp is a semidirect connection to I-195 with a tapered single lane exit from the Turnpike. This ramp has been identified as a near High Crash Location (HCL) with a Critical Rate Factor of 0.96. The data does not point to a particular reason for the crashes, but it is surmised that the relatively short tapered exit lane is a contributing factor.

Proposed

The proposed horizontal geometry for the southbound Exit 36 off ramp has a flat radius allowing for a smooth transition from the CD roadway speed to the ramp speed. The proposed parallel single lane exit ramp with a 1500' auxiliary lane and a 300' taper will improve safety. The ramp design speed is 35 MPH.

The proposed vertical alignment is a spline profile developed from the mainline cross slopes and ties into the existing ramp in approximately 225'.

Southbound Exit 36 On Ramp

Existing

The existing southbound Exit 36 on ramp is a 30 MPH cloverleaf loop ramp with a parallel single lane entrance. This loop ramp does not meet current design criteria for design speed in relation to the mainline design speed of 70 MPH.

Proposed

The existing ramp entrance geometry will be modified to connect to the proposed C-D Roadway. The point of compound curvature was shifted slightly to provide a 231' entrance radius. However, the entrance to the slower C-D Roadway will be improved and meet the design criteria for the ramp's design speed in relation to the C-D Roadway design speed.

The proposed vertical alignment matches the existing alignment with minor adjustments to tie into the new C-D Roadway.

Southbound Exit 35 Off Ramp

Existing

None Existing

Proposed

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

The exit geometry for proposed Exit 35 off ramp from the CD roadway consists of a 750' radii reverse curve and 200' perpendicular approach to Route 112. The approach provides a 400' right turn lane with the last 70' being channelized. The ramp design speed is 35 MPH.

The southbound Exit 35 off ramp profile rises at 5% from a 300' sag vertical curve at the CD roadway. The profile is terminated at Route 112 by a 105' vertical curve that provides an approximate 2.7%, 50' long approach.

Southbound Exit 35 On Ramp

Existing

None Existing

Proposed

The proposed southbound Exit 35 on ramp layout was developed to accommodate a new three lane side plaza and provide 1500' from the plaza to the end of the painted gore with the mainline. The ramp was designed as a parallel single lane entrance that has a 1300' acceleration lane and a 300' taper that matches into the Turnpike. There is a 1051'/4500' radii reverse curve directly after the plaza that ties into the parallel acceleration lane. After the plaza there is an 878' departure taper (approximately 22:1) to transition the 51' wide plaza area to a 12' lane. The design speed is 35 MPH.

The vertical alignment was developed to provide a high point at the proposed southbound toll plaza and to minimize slopes (2% max) approaching the plaza. The profile was also developed in conjunction with the design of the adjacent proposed 58 space park and ride lot. A 5.0% downgrade brings the ramp to the mainline elevation.

Southbound Admin Building and Park and Ride Lot Access Road

Existing

None Existing

Proposed

The southbound administration building and park and ride lot access road will be all new construction that ties into Route 112. The alignment forms a new unsignalized intersection with Route 112 at the westerly extent of the Maine Turnpike property. The intersection is located 250' from the signalized on ramp intersection. The access road follows a 75'/100' radii reverse curve to place the parking lot adjacent to the southbound on ramp. The alignment accommodates a Zoom Turnpike Express bus.

Northbound Admin Building and Ramada Inn/XL Sports World Access Road

Existing

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

None Existing

Proposed

The new road will provide Route 112 access to the Toll Plaza administration building and replace the existing access for the Ramada Inn and the XL Sports World complex. The road creates a new unsignalized intersection approximately 650' from the signalized northbound ramps intersection and beyond its anticipated queue length.

The new road connects directly to the Ramada Inn's front access road and intersects its back access road as well as the new plaza admin building access. The alignment includes two driveways for the XL Sports Complex. The Ramada Inn will no longer have direct access to the northbound ramps.

The new Ramada Inn access road alignment consists of a 300'/750' radii reverse curve and 400' radius curve separated by a 212' tangent. Its approach to Route 112 ends in a left lane with an adjacent a 75' right turn lane. The administration building access road is 280' long and consists of a 325'/40' radii compound curve. The 40' curve can accommodate an SU design vehicle.

An alternative layout is provided in Appendix H. This maintains the same alignment for the Ramada Inn. The plaza parking follows the existing roadway for the hotel's Turnpike access.

Route 112

The Route 112 widening improvements are designed for 35 MPH and occur in two locations. The westerly location begins at the Hillview Ave. Extension intersection and will match into existing conditions or improvements from the City of Saco's Jenkins Drive Intersection project depending on the timing of the project. The MTA project extends from Hillview Ave. Extension 200' east of the Route 112 bridge over the Maine Turnpike. The easterly location begins at the former Saco Public Works facility and extends 780' west of the Industrial Park Road Intersection. The baseline for both of these locations follows the existing roadway centerline with the westerly location entirely on tangent and the easterly location consisting of two 1,100' radius curves separated by a 242' tangent.

Route 112 is widened at both locations to develop right and left turn lanes at the various intersections. The widenings for the development of the right turn lanes to the Turnpike NB and SB On Ramps are developed with approximate 9:1 tapers (100 feet). The left turn lane to Hillview Ave. develops out of the approaching two-way center turn that begins at the park and ride lot entrance. The development of the left turn lanes into the Park & Ride Lot Entrance and NB On Ramp also have approximate 9:1 tapers (100 feet). The development of the left turn lanes for the SB On Ramp and Hotel/Gym Access Road are developed after the thru lane has completed the shift outward and a 50' length is provided as allowed by AASHTO Section 9.7.2.3. This maximizes the left turn lane queue storage.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

The proposed vertical alignment matches the existing grade to provide for a variable depth mill and overlay.

4.4 TYPICAL SECTION

The proposed typical sections are shown in the preliminary plans in Appendix A. Travel lanes on the Turnpike mainline are 12' in width and ramp travel lanes are 14' in width with both mainline and ramps having 4' wide left shoulders. The mainline right shoulders are 12' in width and ramp right shoulders are 8' in width. A Collector-Distributor roadway is proposed for the southbound mainline which is physically separated by concrete median barrier. This roadway will have two 12' lanes, a 4' wide left shoulder and an 8' wide right shoulder, with the exception of the right shoulder between the Exit 36 SB On Ramp and the I-195 bridge underpass which has a width of 4'. This Collector-Distributor roadway barrier is proposed to be located for the future mainline fourth lane and therefore the right shoulder for the mainline adjacent to the barrier will have an additional 12' in width. Through and turning lanes on Route 112 are proposed to be 11' in width with 3.5' to 5' wide shoulders. The Route 112 sidewalk is 5.5' wide.

The toll plazas for both NB and SB On-ramps are proposed to have two cash lanes and one E-ZPass only lane, similar to the configuration at the new Exit 63 SB On-ramp. The two lanes that are bordered by booth islands will be 12' wide. The right most lanes will be 11' wide with an adjacent 8' shoulder.

The Design Criteria for the project is presented in Section 1. The existing Route 112 Turnpike underpass bridge has a curb-to-curb width of 40'. With three 11-foot lanes, the right shoulder width on Route 112 is proposed to be 3.5' wide. This section of Route 112 is designated as a bike route by the City of Saco and as such would need a 5' shoulder to accommodate a bike lane; however, MaineDOT standards note that for a Highway Corridor Priority 2 roadway such as Route 112, the shoulder width should be 3' to 5'. MaineDOT has reviewed and determined that a design exception is not needed for this location. It is noted that the shoulders east of Lund Road are also less than 5' wide.

4.5 HYDROLOGY, HYDRAULIC AND SCOUR EVALUATION

There are ten (10) existing cross culverts under the Turnpike mainline. The first three located south of Route 112 flow to the east to the Saco River. The other seven flow to the west to the Goosefare Brook. A preliminary hydrologic analysis of the drainage areas was performed to determine if the culverts are adequately sized for the existing and proposed conditions. For a 50-year storm event, eight of ten were found to be adequate. Overflow drainage from the culvert at Sta. 1694+65 will go to the wetlands along the Exit 35 NB Off Ramp. Overflow drainage from the culvert at Sta. 1757+18 continues directly to the Goosefare Brook before it goes under the Exit 36 SB Off Ramp.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

Culvert Number	Diameter (in)	Type	Station	50-Year Storm Event Drainage Evaluation					
				Existing			Proposed		
				Adequate Size?	Percent of Mannings Capacity	Required Dia.	Adequate Size?	Percent of Mannings Capacity	Required Dia.
1	18	RCP	1694+65	Yes			Yes		
2	48	RCP	1699+45	Yes			Yes		
3	36	RCP	1712+07	Yes			Yes		
4	36	RCP	1731+70	Yes			Yes		
5	54	RCP	1739+50	Yes			Yes		
6	18	RCP	1757+18	No*	254%	48	No*	322%	60
7	18	RCP	1764+92	Yes			Yes		
8	36	RCP	1770+46	Yes			Yes		
9	48	RCP	1778+06	Yes			Yes		
10	48	RCP	1783+18	Yes			Yes		

* Overflow can bypass directly to Goosefare Brook

The roadway drainage swales along this section of the Turnpike are fairly flat and some are located within wetlands. The design of the open drainage systems will have to recognize the existing drainage patterns of the wetlands and the need to have positive drainage in swales and drainage the roadway subgrade.

The design includes three locations for closed drainage systems:

1. A proposed closed drainage system associated with the 3,640 feet of median barrier along the C-D Roadway has been designed for a 10-year storm event. The layout has six RCP outlets to the western open roadside swales.
2. A closed drainage system is along the curbed Route 112 roadway west of the Turnpike. The drainage system has proposed and existing underdrain and catch basins from the Hillview Ave Extension to the Route 112 bridge. The system utilizes the existing outlet pipe located at Sta. 144+20, right that is in an existing drainage easement.
3. The third location for a closed drainage system is along the curbed Route 112 roadway east of the Turnpike and installs underdrain and catch basins for the roadway widening. The drainage system between Sta. 157+30 and the NB Exit 35 intersection connects to the existing outlet at Sta. 156+50, left. The proposed drainage from the NB Exit 35 intersection east to the limit of work connects to the drainage system that outlets to the north at Sta. 170+00.

The project includes extending an 84" RCP carrying the Goosefare Brook by 23 feet. This will require the relocation of the stream for approximately 125 feet. Final design will include a peak-flow hydraulic analysis and modeling to evaluate the base flood elevation for the FEMA flood plain.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

4.6 STRUCTURAL

The construction will include one new toll plaza with entry lanes for the Exit 35 SB On Ramp, one new toll plaza with entry and exit lanes for the Exit 35 NB On and Off Ramp, one new toll gantry for the Exit 35 SB Off ramp exit lane, and one administration building for each of the toll plazas. The cash lanes will include new toll booths, utility pits, concrete islands, and a structural steel canopy. The layout constraints, foundations, plaza details, and phasing considerations are outlined for each plaza component below. In addition to the toll plaza construction, an extended 84" RCP will require a prefabricated concrete modular gravity retaining wall, a soil nail wall will be constructed in front of the I-195 western abutment, and a retaining barrier will be constructed at the bottom of the Route 112 western abutment slope protection.

4.6.1 Exit 35 Northbound Entry and Exit Plaza

The Northbound (NB) administration building is located south of the existing Park and Ride lot, directly adjacent to the Exit 35 NB Ramps. The NB and SB cash lanes have the same lane geometry, toll booth geometry, and entry/approach slab widths. The concrete island geometry (bumpers, nose, etc.) are the same.

4.6.2 Exit 35 Southbound Entry Plaza

The Southbound (SB) administration building is located directly adjacent to the Exit 35 SB On Ramp. The NB and SB cash lanes have the same lane geometry, toll booth geometry, and entry/approach slab widths. The concrete island geometry (bumpers, nose, etc.) are the same.

4.6.3 Exit 35 Southbound Exit Gantry

The Exit 35 Southbound off ramp requires a gantry for tolling operations. This monotube structure and the concrete roadway slab underneath will be founded on piles. Due to the sensitive nature of tolling equipment, settlement will be minimized. Approach slabs will be constructed before and after the roadway slab.

4.6.4 Goosefare Brook Culvert Extension

The Goosefare Brook culvert extension is located on the SB collector at STA 2750+29.00 LT. The extension is an 84" reinforced concrete pipe (RCP) attached to the existing 84" RCP with a reinforced concrete collar. To minimize the impacts to Goosefare Brook, a 65'-0" long prefabricated concrete modular gravity (PCMG) retaining wall is located along the headwall of the culvert extension. Reinforcing in the concrete collar and PCMG wall are epoxy-coated. There will be regrading of the sideslopes along the ramp and the inlet of the Goosefare Brook in the immediate culvert extension area as the brook flow is skewed to the existing culvert. Special fill will be used in the regrading area at the inlet of the culvert extension. The use of a cofferdam is anticipated to complete the culvert extension work.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

4.6.5 I-195 Soil Nail Wall

The location of the proposed southbound collector-distributor roadway encroaches upon the existing west abutment slope protection below the I-195 bridge spanning over the Turnpike. Due to limited overhead clearance the construction of a soil nail wall between SB collector STA 2743+25 to STA 2745+95 is proposed to provide the necessary grade separation for the roadway. The existing west stub abutment of the I-195 bridge is founded on spread footings and may require supplemental tie-backs for stability purposes, depending on the final design of the soil nail retaining wall. A cast-in-place single-slope roadway barrier is to be positively attached to the roadway face of the soil nail wall.

4.6.6 Route 112 Barrier

The existing concrete slope paving at the Route 112 bridge is impacted by the SB Collector. To prevent sloughing of the concrete slope paving and undermining the abutment slope, an Earth Retaining Barrier is proposed. The Earth Retaining Barrier will have epoxy coated reinforcing and transition to guardrail with a modified reinforced concrete transition barrier. The slope paving is removed to an existing joint to accommodate the widened roadway and allow for a new reinforced concrete drainage swale behind the Earth Retaining Barrier.

4.6.7 Route 112 Bridge

The 2020 annual inspection report rated the Route 112 bridge as “Satisfactory” for the wearing surface and “Good” for the underside of the deck and barrier. However, the MTA would like to take the opportunity to address maintenance issues to take advantage of the MOT that will be in place for the Route 112 work and given the growing traffic volumes. This will prolong the life of the deck.

Design will replace membrane/wearing surface and provide a deck repair contingency, upgrade the guardrail transition and endposts, and address minor repairs such as concrete spalls on the barrier and wing, re-rub the pier columns, repair mortar in granite curbing and repair/replace barrier paraffin joints. The deck joint scope is still to be finalized. Cleaning out/repairing berm erosion at NE asphalt curb cut/riprap downspout and curb termination area will also be included.

The existing bridge has two 12’ travel lanes with 8’ shoulders and a sidewalk on the southern side. Three 11’ travel lanes with 3.5’ shoulders are proposed which will leave the crown in the center of the left turn lane. Shifting the crown would involve reworking the bridge joint and have challenges with maintaining appropriate curb reveals on the sidewalk and barrier and cross slopes. This additional work was considered not to be prudent to the project.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

4.7 GEOTECHNICAL

As part of the geotechnical evaluation, 7 test borings have been drilled at the sites of both proposed toll facilities and along the Exit 36 SB Ramps. A conceptual level evaluation of the subsurface conditions and the potential effect on the proposed construction has been performed. As part of this evaluation the following information was reviewed:

- Surficial Geology, Old Orchard Beach Quadrangle, Maine, Open-File No. 99-94, dated 1999.
- Test boring logs and plans from the construction of Route I-195 over the Maine Turnpike, dated 1981.
- Test boring logs and plans from the North Street bridge replacement project, dated December 2001
- Geotechnical Engineering Report, Contract 2015.06, EZ Pass Lane Addition, Exit 36 Toll Plaza, Saco, Maine, prepared by Stantec and dated December 18, 2014.

The surficial geology map indicates that a sand deposit is present across the entire project area. This sand was deposited in marine water during the regression of the ocean from coastal area after the end of the last glacial period. The sand is commonly underlain by a fine-grained cohesive silty clay formation deposited in deeper and calm marine water during the marine submergence of the coastal zone. The silty clay deposit is commonly known as the Presumpscot Formation and typically consists of a relatively thin stiff crust layer underlain by a thick soft layer.

Based on the boring logs from past transportation projects in the area, the geology is consistent with the geologic map and the coastal area of Maine. The general subsurface conditions encountered in the test borings are summarized in the table below. The table does not include the thickness of existing roadway embankment fills which are present near the existing bridge structures. The embankment fills are generally 15 to 20 feet in height.

Area	General Subsurface Conditions	Strength of Clay (psf)
I-195 Bridge	<ul style="list-style-type: none">• 25 feet of medium silty sand• 120 to 135 feet of medium stiff to stiff, gray, silty clay• 10 to 25 feet of medium dense silty sand• Bedrock is 172 to 184 feet below the mainline turnpike grade	Undrained shear strength ranged from 800 to 1600 psf increasing with depth. No identifiable crust layer.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering

January 1, 2021

North Street Bridge	<ul style="list-style-type: none">• 10 to 15 feet of hard to soft, brown to gray, silty clay• 5 to 10 feet of dense glacial till• Bedrock is 15 to 25 feet below the mainline turnpike grade	Clay is very thin and predominately medium stiff to hard. Shear strength test not available.
Exit 36 Toll Plaza	<ul style="list-style-type: none">• 5 to 10 feet of medium dense sand• 56 to 139 feet soft to very soft, gray, silty clay• 0 to 10 feet of dense glacial till• Bedrock is 56 to greater than 176 feet below the I-195 grade	Crust was present in two of the three borings and was less than 10 feet thick. Undrained shear strength of the soft clay ranged from 300 to 500 psf.

Based upon a review of the available subsurface information, the conditions are highly variable across the project area. Conceptual level comments for the various portions of the project are provided below.

- **I-195 Ramp Area**

This area is underlain by a significant thickness of clay. The strength of the clay is expected to range from very soft to stiff. Large embankment fills constructed on virgin ground are expected to produce significant settlement due to consolidation of the clay. Embankment construction will likely require preloading to allow the settlement to occur prior to constructing the final pavement section. If the duration of the preloading is more than the project schedule will allow, then wick drains may be required to shorten the preload duration. Lightweight fill may also be an option for embankment construction. Large embankment fills over the thick clay may also have slope stability issues which may require the use of geosynthetics to reinforce the embankment slopes. Embankment widening with only minor grade change may not require preloading or other special construction techniques.

- **North Street Bridge Area**

In the area of North Street bridge, the clay is relatively thin and stiff and the bedrock is relatively shallow. Proposed embankment fills in this area may not need special construction techniques such as over excavation, lightweight fill, preloading and wick drains. However, the proposed ramps are expected to extend several hundred feet beyond the location of the historic bridge borings and the subsurface conditions may change significantly with distance.

- **Lund Road Ramp Area**

Surface information for the area was not available. Based on the surficial geology map this area will have a sand deposit underlain by a clay deposit. Given the highly variable soil conditions between the I-195 Ramp and North Street area it is difficult to anticipate the subsurface conditions in this area. Small embankment fills and small lightweight tolling structures may not induce large settlements in this area. It may be possible to found lightweight

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

structures on conventional spread footings. Consideration will need to be given to tolling equipment which is sensitive to settlement.

- **Mainline Widening**

The subsurface conditions will vary significantly along the mainline. The proposed widening along the east and west sides of the mainline may cause excessive settlement if the embankment fills exceed more than approximately 5 feet and extend into areas significantly beyond the current roadway embankment. Small grade raises that are close to the existing roadway embankment will likely induce relatively minor settlement that will be tolerable. Stability of the embankment side slopes are not expected to be an issue along the mainline provided the slopes are less than 3 Horizontal to 1 vertical.

4.8 RIGHT-OF-WAY (ROW)

The project abuts 24 properties in the City of Saco. The abutters are a mix between commercial and residential properties. Temporary grading rights, slope easements and minor strip acquisitions are anticipated for 14 parcels along the Route 112 improvements and 1 parcel along the I-95 mainline improvements. No relocations are anticipated. Final Right-of-Way impacts will be confirmed during final design and coordinated with stakeholders.

4.9 UTILITIES

Utilities associated with the project area are below. Note that the utility locations are approximate and subject to change due to further coordination and survey.

Overhead

- Central Maine Power – Electric
- Consolidated Communications - Telephone
- Spectrum - Cable

Underground

- City of Saco – Sewer
- Maine Water – Water
- Until – Gas
- Consolidated Communications - Telephone

Overhead utilities consisting of communications/electric aerial lines are on both sides on Route 112. Six utility poles located along the westbound side of Route 112 will have to be relocated further from the roadway to accommodate a new eastbound right-turn lane and sidewalk. Electrical and communications service will be provided underground to the toll plazas. Final design assumes that CMP will provide the design from Route 112 to the transformer.

The waterline is located in the Route 112 roadway and crosses the Turnpike north of the bridge. Three hydrants within the work limits of the Exit 35 NB Route 112 intersection will need to be

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

relocated. Two hydrants are along the Turnpike mainline. The hydrant located on the northbound side is not impacted; however, the hydrant located on the southbound side will need to be relocated.

Water, gas, sewer, underground electric and communications service connections to the new toll plazas will be provided from Route 112. These lines are proposed to parallel each other with appropriate horizontal spacing from Route 112 to the admin building. This utility corridor for the NB plaza parallels the plaza approach roadway and for the SB plaza follows the access roadway. Connection to the sewer assumes gravity line for both plazas.

Current design leaves the existing water, sewer and gas services to the Ramada Inn within the proposed NB Plaza approach roadway. The Authority may want to coordinate further with the Ramada Inn to move their services from the plaza approach area to the new access road in order to avoid any potential responsibility over private services or complications with accessing the lines.

The southbound ramp plaza will require water and sewer services connected to the existing mains located along the westbound side of Route 112. The relative elevations between plaza administration building and the gravity sewer main on Route 112 will allow for a gravity service connection.

Currently, there is no gas main on the west side of the turnpike. However, the gas company may have interest in taking advantage of the project's traffic management and administration to extend their service to the west but until that has been considered, gas will be provided to the toll plaza administration building by a liquid propane tank located at the site.

The project will provide MTA communications between the two plazas via a fiber connection. The connection will be made by extending a fiber line up the side of northbound ramps, crossing under the on ramp and directional drilling under the turnpike where it would run down the southbound ramp.

4.10 ENVIRONMENTAL

The Project site is located on land adjacent to the existing I-95, I-195, and Route 112 exchanges, associated ramps, and commercial/residential development in the vicinity of I-95 Exits 35 and 36. The Project site is located within the MTA properties and some adjacent properties. Significant sections of the Project area are currently disturbed as part of development for buildings, parking, roadways and infrastructure including, stormwater control, recontouring, fill, pavement, and periodic vegetation management. Field investigations to identify jurisdictional wetlands, vernal pools, and streams were completed in 2019 and 2020; along with consultation with State and Federal resource agencies. The items listed below describe the findings of those studies. Additional details are included in Appendix C: Interchange Improvements Saco Exits 35 & 36 Wetland/Watercourse Delineation, and Vernal Pool Survey Report).

- The Project site includes jurisdictional wetlands and streams, which were delineated in accordance with state and federal requirements.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering

January 1, 2021

- The Project site does not contain vernal pools.
- The Project does not contain areas mapped by the Maine Department of Inland Fisheries and Wildlife (MDIFW) as Significant Wildlife Habitat (SWH); which includes Inland Wading Bird or Waterfowl Habitat (IWWH) and Deer Wintering Area (DWA).
- Contact with MDIFW regarding known locations of Rare, Endangered, Threatened, Special Concern species within the Project area resulted in the finding that *“of the eight species of bats that occur in Maine, the three Myotis species are protected under Maine’s Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three Myotis species include little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are listed as Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during migration and/or the breeding season. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project”*.
- Contact with the US Fish and Wildlife Service (USFWS) regarding known locations of mapped Critical Habitat or the potential occurrence of Rare, Endangered, Threatened, or Candidate Species resulted in the finding that *“there are no Critical Habitats within your Project area under this office’s jurisdiction”*. However, it did result in the finding that *“there is a total of 1 threatened, endangered, or candidate species on this species list, the Northern Long-eared Bat (Myotis septentrionalis)”*, with a status of Threatened. Additional consultation with USFWS will occur once resource alterations are finalized to determine how this determination may affect the Project.
- The Project site does not include habitat for Atlantic salmon (*Salmo salar*).
- The Project site does not overlay significant groundwater aquifers or public wells.
- Contact with Maine Natural Areas Program (MNAP) regarding known rare botanical features documented within the Project area resulted in the finding that *“according to our current information, there are no rare botanical features that will be disturbed within the project site”*.
- Contact has not been initiated with the Maine Historic Preservation Commission (MHPC) regarding known or eligible sites on the National Register.
- Contact has not been initiated with the Passamaquoddy Tribe, Penobscot Nation, Houlton Band of Maliseets, and Aroostook Band of Micmacs regarding known cultural or historical concerns within the project area.
- As currently designed, the project has proposed direct wetland alteration and proposed stream alteration, however no waterbody alterations.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

4.11 AVOIDANCE AND MINIMIZATION

Environmental:

Project plans were modified in several ways to avoid wetland and stream alterations. Where avoidance of these natural resources was not possible the plans were further modified to minimize resource alterations to achieve the least environmentally damaging practicable alternative (LEDPA) for the project design. To minimize wetland impacts in areas of high fill, steep 2H:1V slopes with guardrail are proposed rather than the standard 6H:1V slopes. The Exit 35 SB Park & Ride lot is sited so access to the plaza admin building is provided but minimizes the impacts to wetlands to the west. The relocated access road for the hotel's Route 112 entrance aligns closely to the parking lot of the gym to minimize the embankment footprint through the wetlands.

Right-of-Way:

Right of way impacts were avoided and minimized during the 2019 Saco Route 112/Exit 36 Area Transportation study for this project. The number of interchange alternatives were narrowed down to two key viable configurations. An alternative to extend I-195 westerly to Route 112 along with a complete reconfiguration of Exit 36 was found to provide several positive improvements, including reducing traffic congestion on Route 112. However, the property impacts, including the need for full acquisitions, were substantial. The current Exit 35-36 configuration was selected due to its ability to improve Turnpike access with relatively minor property impacts and no full acquisitions. In addition, property impacts were reduced further during preliminary design. In particular, the Route 112/Exit 35 NB ramps intersection analysis was reevaluated in an effort to reduce the width of improvements and impacts along Route 112. Through collaboration with the study team, minor adjustments were made to the traffic model to better reflect actual conditions. The adjustments led to reducing the westbound double left turn lane to a single left turn lane, resulting in reduced property impacts to several properties.

4.12 TRAFFIC

During the 10% design phase, a capacity analysis was performed utilizing VISSIM for: 1) Turnpike mainline and ramps, and 2) Route 112 intersections. Existing condition AM and PM peak hour VISSIM models were developed, calibrated and were then utilized to develop the future 2025 (Opening Year), 2030 (Interim Year), and 2040 (Horizon Year) analysis models with and without the proposed collector-distributor (CD) roadways. The mainline was assumed to be widened to four lanes in each direction in the 2040 models. Traffic volume diagrams and the associated Level of Service (LOS) for ramp and intersections are in Appendix I.

Turnpike Mainline and Ramps

Mainline and ramp (merge, diverge, and weaving segments) capacity analyses were conducted to:

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering

January 1, 2021

- Assess the need for/phasing of the proposed fourth lane widening;
- Evaluate the need for the CD roadway given the short distance between the Exit 35 and 36 ramps; and
- Evaluate the need for/phasing of the previously proposed two-lane ramps to/from I-195.

A sensitivity analysis was conducted to determine when the proposed fourth mainline lane would be required to maintain acceptable traffic operations through the interchange area (LOS D or better). The analysis results indicate that the NB merge area with the Interchange 36 on-ramp from I-195 would operate at LOS D in the 2035 AM peak hour and LOS F in the 2040 AM peak hour. This increase in density is due to a combination of the additional volume growth and the shift of volume from Interchange 36 to Interchange 35, which results in additional mainline volume at the Interchange 36 NB merge area. In summary, the fourth lane is required by 2040 because that is when the merge area from Interchange 36 would fail (LOS F). The mainline throughput demand at this point exceeds capacity so a fourth lane is required

The results of the capacity analysis indicate that the northbound ramp merge, diverge, and weave segments would operate at LOS C or better through 2040 without a C-D roadway. However, given the spacing between the Interchange 35 on-ramp and Interchange 36 off-ramp, it is recommended that an auxiliary lane be provided. The distance between the Exit 35 NB on and Exit 36 NB off ramp is 2,150 feet meeting the AASHTO recommended distance of 2,000 feet for a System to Service Interchange. The current design provides for three through lanes plus an auxiliary lane between the ramps. When a fourth lane is added to the turnpike, the currently proposed auxiliary lane will become the fourth lane in this area and a new auxiliary lane will be added. While a NB C-D roadway was not found to be needed through 2040, the need for it should be considered again based on the traffic conditions and the performance of the auxiliary lane at that time.

Current ramp spacing along the SB mainline does not meet the AASHTO recommended distance of 2,000 feet without a CD roadway. Layout of the ramps without a CD roadway provides 1,900 feet and although the results of the VISSIM model indicated that the southbound ramp segments and weave areas would operate at LOS C or better through 2040, a SB CD roadway will provide safer weaving conditions, and provide more storage for queuing vehicles on the Exit 35 SB off-ramp. With a CD roadway, the ramp spacing is 2,025 feet and meets AASHTO's recommendation of 1,600 feet. Density and LOS improves from LOS C to LOS A with the addition of the SB CD roadway. Another design consideration for a CD roadway is the design speed of the existing Exit 36 SB on-ramp which is 30mph adjacent to the 70mph mainline. AASHTO recommends a minimum of 35mph when mainline is 70mph. This recommended minimum ramp speed would be reduced to 30mph with a 60mph CD roadway. Therefore, it was recommended that the SB CD roadway be constructed. This CD roadway can merge with mainline prior to the Exit 35 SB on ramp and meet the AASHTO recommended ramp spacing for consecutive on-ramps of 1,000 feet.

With the addition of new ramps at Interchange 35, vehicular volume is anticipated to shift from Interchange 36 to Interchange 35. Previous studies of Interchange 36 indicated the need to widen the on and off ramps to/from I-195 to two lanes. However, with the volume shift that is anticipated to occur with the construction of Interchange 35, the VISSIM models revealed that the interchange would continue to operate acceptably with single lane on and off-ramps through the year 2040.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

Route 112 Intersections

The VISSIM models were also utilized to conduct a traffic analysis for the Route 112 intersections with the NB and SB ramps to evaluate delay, LOS, and queuing on all approaches, and propose an acceptable lane configuration for the opening and design years.

The need for two left turn lanes on the WB approach to the intersection of Route 112 and the NB Ramps/Lund Road was reevaluated for the preliminary design. In collaboration with the Saco Route 112/Exit 36 Area Transportation Study team, the traffic model volumes for this intersection were revised. Specifically, the build model showed a questionably high 256 vph AM increase in the total of vehicles turning right onto Industrial Park Road plus vehicles turning left onto the northbound ramp. After consideration of the City's recent change to Garfield Street to prohibit left turns toward the northbound on ramp, the study modeler recommended reducing the AM lefts by 84 vph for long range planning purposes. If left turn restrictions at Garfield do not remain, the left turns out of Garfield would be reduced when traffic queues from the NB Ramp intersection are present given that the existing right turn to access the Turnpike via Industrial Road would remain the more viable choice. This reduction in left turns at the signalized intersection is enough to conclude that a single westbound left turn lane to the northbound on ramp is sufficient. Having the single left turn lane allows for protected-permitted phasing which provides efficient signal operations. The intersection is expected to operate at an overall LOS D in the 2040 AM peak hour and a LOS C in the 2040 PM peak hour.

The intersection of Route 112 and the SB Ramps includes two key features that accommodate the relatively high PM peak hour volumes. A 245' long westbound left turn lane was extended across the bridge to reduce the likelihood of queue spillback into the through lane and a 400' SB off ramp right turn lane was provided. With these features in addition to a 345' eastbound right turn lane and channelized SB off ramp right turn lane, the intersection is anticipated to operate at an overall LOS B in the 2040 AM and PM peak hours.

Route 112 Turning Movements

Design of the Route 112 intersections will afford access to the Maine Turnpike and therefore will accommodate WB-67 vehicles. Access to/from Lund Road maintains the existing design vehicle without encroachment into the oncoming lane and a WB-67 vehicle with encroachment. Below summarizes the vehicle turning movements accommodated for each movement at the intersections. Those WB-67 movements that have encroachment are associated with Lund Road which has a local road functional classification. This road does have industrial and commercial properties. The proposed intersection geometry improves or maintains the existing movements.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

Movement		Existing Layout		Proposed Layout	
		Vehicle	Encroachment	Vehicle	Encroachment
Route 112 / Exit 35 SB Intersection					
SB	RT	-	-	WB-67	No
	LT	-	-	WB-67	No
WB	RT	-	-	-	-
	LT	-	-	WB-67	No
NB	RT	-	-	-	-
	LT	-	-	-	-
EB	RT	-	-	WB-67	No
	LT	-	-	-	-
Route 112 / Exit 35 NB / Lund Road Intersection					
SB	RT	WB-67	Yes*	WB-67	Yes*
		WB-40	No		
	LT	WB-67	No	WB-67	No
WB	RT	WB-67	Yes*	WB-67	Yes*
	LT	WB-67	No	WB-67	No
NB	RT	WB-67	Yes	WB-67	No
	LT	WB-67	No	WB-67	No
EB	RT	WB-67	No	WB-67	No
	LT	WB-67	Yes*	WB-67	Yes*

* To or from Lund Road

4.13 LIGHTING

Exit Lighting is provided in four locations for the project:

1. Entrance and Exit Ramps for the Exits 35 and 36 and the C-D Roadway: Current layout provides five light standards at the 300' lane drop at the end of an acceleration lane and five light standards at the gore of a deceleration lane. Four additional lights are located between the SB C-D Roadway exit gore and the SB Exit 36 exit gore in order to avoid a short segment of unlit roadway which can be problematic for drivers to adapt to the rapidly changing light levels. A minimum of 0.2 foot-candles with a uniformity of 3.5:1 is provided.
2. Exit 35 NB and SB Plaza Areas: Lighting is provided from the Route 112 intersections through the approach and departure zones of the plaza areas. Additional lighting for toll plaza personnel and tolling equipment will be provided under the toll booth canopies. A minimum of 0.2 foot candles with a uniformity of 4:1 is provided.
3. Route 112 intersections: Light standards are located at the proposed two intersections for vehicular and pedestrian safety. The luminaires are on separate poles but could be added to the

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

signal mast arms if preferred by the Authority. A minimum of 0.2 foot-candles with a uniformity of 2:1 is provided for the crosswalk and a uniformity of 3:1 for the intersection.

4. Parking areas for both admin buildings and the Exit 35 Park & Ride lot have illumination. A minimum of 0.2 foot-candles with a uniformity of 4:1 is provided.

Exit 36 has four existing high mast lights. The proposed lighting levels do account for these lights; however, they provide minimal light coverage and are not located at the key locations for acceleration and deceleration lanes. Exit 35 NB entrance and exit ramps do have existing light standards, and these are identified to be removed and reset.

Mainline ramp lighting south of the I-195 bridge is powered from the Exit 35 NB and SB toll plazas. Lighting for the Exit 36 SB off ramp and NB ramp assumes that the existing high mast light system has capacity. This will be reviewed in final design. If there is not capacity and/or the Authority does not want to connect to the existing system, alternative power sources are from the Exit 35 toll plazas with extending the proposed light system or provide new conduit and conductors from the existing Exit 36 toll plaza which is beyond the current project limits.

4.14 CONSTRUCTION AND MAINTENANCE OF TRAFFIC

The conceptual Construction Phasing and Maintenance of Traffic plan was developed to take advantage of the substantial amount of work that is proposed offline of the existing roadway. The Exit 35 SB ramps, large portions of the C-D Roadway and the Exit 35 NB ramps can all be built with minimal interference from traffic. Completion of each of these components incrementally adds capacity and alternative access for areas that need to be constructed adjacent to traffic. The following highlights the phasing sequence and critical milestones. Appendix D contains the graphic for this approach.

Phase 1A: (4 Months)

Begin construction of the Ramada Inn Access Road from Route 112 and make available for operation prior to closing the Exit 35 NB on and off ramps in Phase 1B

- Construct preload embankments for Exit 35 SB Plaza area and SB C-D Roadway widening
- Begin SB Turnpike mainline widening and CD roadway construction from the mainline Sta. 1710+00 to 1738+00
- Maintain normal operation of the Exit 36 NB and SB ramps
- Begin Exit 35 SB on ramp and off ramp construction
- Begin construction of Exit 35 SB Toll Plaza, Admin Building and Park and Ride lot including associated site work and access road
- Begin construction of Route 112 auxiliary lane widening and intersection improvements (includes traffic signals)
- Begin construction of overhead guide Signs

Milestone needed before Phase 1B: Ramada Inn access road complete and operational.

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering

January 1, 2021

Phase 1B: (15 Months)

- Close the NB Ramada Inn off ramp (future Exit 35 NB off ramp). All Inn traffic to use new access road from Route 112 constructed during Phase 1A
- Begin construction of Exit 35 NB & SB ramps
- Begin construction of Exit 35 NB admin building and associated site work
- Begin construction of auxiliary lane between Exit 35 and 36 NB
- Maintain normal operation of Exit 36 NB and SB ramps
- Continue construction of Exit 35 SB on ramp and off ramp
- Continue construction of Exit 35 SB Toll Plaza and admin building
- Continue construction of overhead guide signs
- Continue construction of SB CD roadway
- Construct temporary off-ramp from the SB mainline to the Exit 35 SB off ramp. (To be used during Phase 2 Construction)
- Complete testing of Exit 35 NB & SB Toll Plaza Tolling Equipment

Milestone needed before Phase 2: Exit 35 NB and SB Ramps and Toll Plazas to be complete and fully operational. All overhead guide Signs must be completed. Route 112 and intersection improvements to be complete and fully operational.

Phase 2: (9 Months)

- Construct Exit 36 SB on and off ramps during off peak closures with detours to the new Exit 35 NB and SB ramps. Exit 36 NB Entrance ramp can remain open.
- Begin construction of Exit 36 NB off ramp and Exit 36 SB ramps.
- Continue construction of SB CD roadway from the mainline Sta. 1738+00 to 1792+00.
- Maintain normal operation of Exit 35 NB and SB ramps
- Begin construction of Goosefare Brook Culvert Extension
- Begin construction of Exit 36 SB Underpass soil nail retaining wall that is located adjacent to the CD roadway.

Milestone needed before Phase 3: Exit 35 Ramps to be complete and fully operational. SB CD roadway to be operational but with construction of permanent median barrier continuing.

****Substantial Completion at this milestone***

Phase 3: (2 Months)

- New Exit 35 and 36 Interchanges to be fully operational.
- Complete median barrier
- Complete surface paving of entire project (Exit 35, Exit 36 and CD roadway)

PRELIMINARY DESIGN REPORT

Summary of Highway Engineering
January 1, 2021

4.15 CONSTRUCTION SCHEDULE

The project is currently funded for construction with an anticipated 2023 advertisement date. The project is anticipated to span over 30 months. Any long lead time items will be identified in the final design and be considered for advanced procurement. Appendix D contains the schedule of the phases outlined in the previous section.

4.16 PRELIMINARY ENGINEER'S ESTIMATE

The engineer's estimate to construct this project is \$35,500,000. The estimate includes the cost for the new tolling system items and allows for a 10% contingency. A detailed Preliminary Engineer's estimate is in Appendix B.