The document includes information and directions of water/wastewater, gas, and electric company's underground facilities located within the project area. The utility locations, elevations, sizes, and other details of any such utilities may not be accurate and the information shall not be relied upon without field verification. Owners must employ appropriate best practices when approaching gas, electric, and utilities and comply with all applicable federal, state, and local laws. Owners shall not be liable to the user(s) of this plan or the owners. Additionally, the recipient expressly acknowledges and agrees that it is not relying on the accuracy of this plan.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

HOWARD COUNTY
M A R Y L A N D

MARYLAND AVENUE BYPASS CULVERT CAPITAL PROJECT DC-0337
HOWARD COUNTY
HSCDEP #20-018

SITE PLAN

SCALE 1" = 20'
WITH STYROFOAM AREA TO BE FILLED

BARS TO BE #5's SPACED AS SHOWN.

ALL LONGITUDINAL REINFORCING STEEL

NOTE:

SECTION A-A

SCALE: 1"=1'

#7'S @ 6" C/C (TYP.)
#5 @ 12" C/C (TYP.)
EXISTING 36" DIA. S.M.
EXISTING 36" DIA. S.M.
EXISTING 3'-6" RC P SEWER
36" SEWER MAIN
CULVERT OUTFALL
A
A
EXISTING 3'-6" RC P SEWER

WITH FOAM ANNULAR SPACE FILLED PROTECTION FOR EXISTING SEWER LINES*

TRENCH DRAIN DETAIL

* DETAIL TO BE UPDATED FOLLOWING 65% DESIGN PHASE

PROTECTION FOR EXISTING SEWER LINES*

* SEE ZURN 288 TRENCH NO. 800 ABOVE OR APPROVED EQUAL.
1. TEMPORARY SOE SHALL BE PROVIDED.

2. SHALL BE DESIGNED AND MAINTAINED BY THE CONTRACTOR IN COMPLIANCE WITH THE REQUIREMENTS OUTLINED IN THE PLANS AND SPECIFICATIONS PRIOR TO TUNNEL EXCAVATION.

3. CONTRACTOR SHALL ENSURE SLOPE AND ROADWAY STABILITY THROUGHOUT CONSTRUCTION.

4. CONSTRUCTION STEEL SHALL BE PLACED OF LEAST SIZE, STRENGTH, AND DURATION AS SHOWN ON SHEET 12.

5. CONTRACTOR MAY CONSTRUCT THE NEW CULVERT USING CONVENTIONAL MINING OR JACKED CULVERT.

6. CONTRACTOR SHALL ENSURE THAT ALL TEMPORARY SOE IS TWICE THE THICKNESS OF THE EXISTING STONE WALLS NOT IDENTIFIED ON THE PROJECT SITE THAT ARE NOT IN V Standard Aashto.
NOTES

1. FOR GENERAL PLAN SEE SHEET 6.
2. FOR CULVERT PLAN AND LONGITUDINAL SECTION, SEE SHEET 7.
3. ARCHITECTURAL SURFACE TREATMENT OF CONCRETE WINGWALLS AND HEADWALL SHALL BE ARCHITECTURAL SURFACE TREATMENT OF CONCRETE APRON.

1. WALL MATERIAL TO THE EXTENT POSSIBLE.
Portions of the wall utilizing salvaged natural stone surround on all visible concrete wingwalls and headwall shall be architectural surface treatment of concrete apron.
NOTES:
1. SEE SHEET 6 FOR GENERAL NOTES.
2. JACKING SYSTEM TO BE DESIGNED BY CONTRACTOR.
3. THRUST SLAB TO BE DESIGNED BY CONTRACTOR (PLATES OR CONCRETE SLAB). PIT OUTLINE SHOWN IS THE MAXIMUM ALLOWED TAKING (WITH BUMP OUT FOR SECTION 2 CONTRACTOR'S OPTION).
4. STAGE 1 SEQUENCE:
   · INSTALL SUPPORT OF EXCAVATION (CONTRACTOR DESIGN)
   · EXCAVATE TO BOE
   · INSTALL THRUST SLAB
   · CAST SECTION 1
   · PREPARE HEADWALL FOR TUNNELING
   · BEGIN EXCAVATION / JACKING
   · STOP JACKING PRIOR TO CSX TRACKS (BULKHEAD IF REQ'D)
   · CAST (OR JACK PREV. CAST) SECTION 2 INTO POSITION
5. SHIELD LENGTH RESTRICTION IS DEFINED TO LIMIT CLEAR DISTANCE TO TRACKS PRIOR TO JACKING SECTION 2. IF REVISED SECTION LENGTHS ARE USED, A LONGER SHIELD MAY BE USED.

THROUGH 105'-0" ± 91'-2" ± 50'-0" ±

EL. 111

TIBER ALLEY

PATAPSCO RIVER

CHANNEL

MARYLAND AVENUE

EXISTING GRADE

CHANNEL / CULVERT

SUBTERRANEAN BOX CULVERT

ELEVATION

SUBTERRANEAN BOX CULVERT (CONSTRUCTED AFTER JACKING OPERATION)

PROPOSED HEADWALL END OF TUNNEL

EXISTING WALL / FOOTERS

WITH ASSUMED GEOMETRY

COMPRESSION GRouting AS REQ'D

CONDENSATION GRouting AS REQ'D

CHANNEL / CULVERT

SUPPORT OF EXCAVATION SYSTEM (DELEGATED DESIGN)

THRUST FRAME WALL / SUPPORT OF EXCAVATION (DELEGATED DESIGN)

TEMPORARY THRUST BLOCK (DELEGATED DESIGN)

TEMPORARY LAUNCHING SLAB TO BE REMOVED AFTER JACKING OPERATIONS HAVE CONCLUDED (DELEGATED DESIGN)

PROPOSED HEADWALL CONSTRUCTED AFTER JACKING OPERATION

PROPOSED JACKING PATH

SCALE: 1" = 10'-0" (HORIZ.) 1"=5'-0" (VERT.)

SCALE: 1" = 5'-0"

SCALE: 1" = 10'-0"

THROUGH 105'-0" ± 91'-2" ± 50'-0" ±

EL.111

TIBER ALLEY

PATAPSCO RIVER

CHANNEL

MARYLAND AVENUE

EXISTING GRADE

CHANNEL / CULVERT

SUBTERRANEAN BOX CULVERT

ELEVATION

SUBTERRANEAN BOX CULVERT (CONSTRUCTED AFTER JACKING OPERATION)

PROPOSED HEADWALL END OF TUNNEL

EXISTING WALL / FOOTERS

WITH ASSUMED GEOMETRY

COMPRESSION GRouting AS REQ'D

CONDENSATION GRouting AS REQ'D

CHANNEL / CULVERT

SUPPORT OF EXCAVATION SYSTEM (DELEGATED DESIGN)

THRUST FRAME WALL / SUPPORT OF EXCAVATION (DELEGATED DESIGN)

TEMPORARY THRUST BLOCK (DELEGATED DESIGN)

TEMPORARY LAUNCHING SLAB TO BE REMOVED AFTER JACKING OPERATIONS HAVE CONCLUDED (DELEGATED DESIGN)

PROPOSED HEADWALL CONSTRUCTED AFTER JACKING OPERATION

PROPOSED JACKING PATH

SCALE: 1" = 10'-0" (HORIZ.) 1"=5'-0" (VERT.)

SCALE: 1" = 5'-0"

SCALE: 1" = 10'-0"
NOTES:

1. CONCRETE SHALL HAVE A MINIMUM 28-DAY COMpressive STRENGTH OF 5,000 PSI.

2. REINFORCEMENT SHOWN IS A MINIMUM REQUIRED, ASSUMING A MAXIMUM CONCENTRIC THRUST OF 4,000 TONS WHEN JACKING AT THE BASE SLAB ONLY AND 7,000 TONS WHEN JACKING ALONG THE PERIMETER.

3. CUSHIONING MATERIAL SHALL COVER AT LEAST 50% OF THE CONCRETE SURFACE AREA. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL ITS PROPOSED JOINT CONFIGURATION AND METHOD TO ENSURE A RIGID CONNECTION BETWEEN BOX SECTIONS DURING AND AFTER INSTALLATION.

4. CONSTRUCTION JOINTS AND GROUT HOLES ARE NOT SHOWN FOR CLARITY. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL ITS PROPOSED JOINT SEQUENCE AND DETAILS AS WELL AS CONFIGURATION AND METHOD TO FILL THE ANNULUS BETWEEN THE CONCRETE BOX AND THE EXCAVATED MATERIAL.

5. ANTI-DRAW DETAILS NOT SHOWN. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL ITS PROPOSED METHOD TO MANAGE RESISTANCE TO THE CONCRETE BOX.
1. All geotechnical instrumentation shown on this sheet are mandatory requirements. The locations shown for these instruments are approximate. Contractor to determine the actual locations based on field conditions and access restrictions. All locations are subject to approval of facility owner.

2. For response criteria and reading frequencies refer to GT-004.

3. For typical instrumentation details refer to GT-005.

4. For additional instrumentation requirements, see specification section 31 09 13.

5. DMP Type 3 instruments are for monitoring the support of excavation (SOE) system and are not shown for clarity. DMP Type 3 shall be spaced at Maryland 25 foot intervals along each side wall. For additional information see specification section 31 09 13.

INSTRUMENTATION SUMMARY

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>INSTRUMENT TYPE</th>
<th>MIN./MAX. QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>STRUCTURE MONITORING POINT (SMP)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>DEFORMATION MONITORING POINT (DMP TYPE 1)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>DEFORMATION MONITORING POINT (DMP TYPE 2)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>DEFORMATION MONITORING POINT (DMP TYPE 3)</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>INCLINOMETER (INC)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>TRACK MONITORING POINT (TMP)</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>UTILITY MONITORING POINT (UMP)</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>SEISMOGRAPH (SMG)</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

- For typical instrumentation details refer to GT-005.
- For additional instrumentation requirements, see specification section 31 09 13.
- DMP Type 3 instruments are for monitoring the support of excavation (SOE) system and are not shown for clarity. DMP Type 3 shall be spaced at Maryland 25 foot intervals along each side wall. For additional information see specification section 31 09 13.
### GEOTECHNICAL INSTRUMENTATION

#### INSTRUMENT RESPONSE LEVELS

<table>
<thead>
<tr>
<th>INSTRUMENT TYPE</th>
<th>INSTRUMENT VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>REVIEW (INCH)</td>
</tr>
<tr>
<td>STRUCTURE MONITORING POINT</td>
<td>TBD</td>
</tr>
<tr>
<td>DEFORMATION MONITORING POINT (DMP TYPE 1)</td>
<td>TBD</td>
</tr>
<tr>
<td>DEFORMATION MONITORING POINT (DMP TYPE 2)</td>
<td>TBD</td>
</tr>
<tr>
<td>DEFORMATION MONITORING POINT (DMP TYPE 3)</td>
<td>TBD</td>
</tr>
<tr>
<td>INCLINOMETER</td>
<td>TBD</td>
</tr>
<tr>
<td>TRACK MONITORING POINT</td>
<td>TBD</td>
</tr>
<tr>
<td>UTILITY MONITORING POINT</td>
<td>TBD</td>
</tr>
<tr>
<td>SEISMOGRAPH</td>
<td>TBD</td>
</tr>
</tbody>
</table>

**NOTES:**

1. ALL UNITS ARE IN INCHES UNLESS OTHERWISE NOTED ON TABLE.
2. PPV MEANS PEAK PARTICLE VELOCITY.
3. IPS MEANS INCHES PER SECOND.

#### INSTRUMENT TYPE

<table>
<thead>
<tr>
<th>INSTRUMENT TYPE</th>
<th>READING FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X ≤ 50'</td>
</tr>
<tr>
<td>STRUCTURE MONITORING POINT</td>
<td>TBD</td>
</tr>
<tr>
<td>DEFORMATION MONITORING POINT (DMP TYPE 1)</td>
<td>TBD</td>
</tr>
<tr>
<td>DEFORMATION MONITORING POINT (DMP TYPE 2)</td>
<td>TBD</td>
</tr>
<tr>
<td>DEFORMATION MONITORING POINT (DMP TYPE 3)</td>
<td>TBD</td>
</tr>
<tr>
<td>INCLINOMETER</td>
<td>TBD</td>
</tr>
<tr>
<td>TRACK MONITORING POINT</td>
<td>TBD</td>
</tr>
<tr>
<td>UTILITY MONITORING POINT</td>
<td>TBD</td>
</tr>
<tr>
<td>SEISMOGRAPH</td>
<td>TBD</td>
</tr>
</tbody>
</table>

**NOTE:**

1. X IS THE DISTANCE ALONG THE CULVERT CENTERLINE.