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### APPROXIMATE OUTLET PROTECTOR QUANTITIES

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<tr>
<th>TYPE</th>
<th>CONCRETE, CLASS A (cys)</th>
<th>REINFORCING BARS (lb)</th>
<th>SODDING (sys)</th>
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<tr>
<td>1</td>
<td>0.8</td>
<td>29</td>
<td>4.9</td>
</tr>
<tr>
<td>2</td>
<td>0.6</td>
<td>25</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>0.3</td>
<td>22</td>
<td>3.2</td>
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NOTE:

1. If the underdrain pipe and the outlet pipe are of different sizes an increaser of the same material as the outlet pipe shall be installed 2 ft from the transition pipe and the 45° elbow.

INFORMATION: "INDIANA DEPARTMENT OF TRANSPORTATION"

UNDERDRAIN DETAILS

SEPTEMBER 2017

STANDARD DRAWING NO. E 718-UNDR-02

DESIGN STANDARDS ENGINEER DATE

CHIEF ENGINEER DATE
Structure Backfill Limits
Material Backfill

Limits of Suitable Material Backfill

Shoulder Break

Suitable Material Cap
(Match HMA Shoulder Depth)

6" Underdrain Outlet Pipe

Rodent Screen

Refer to Ditch Outlet Detail

OUTSIDE SHOULDER INSTALLATION

DITCH OUTLET DETAIL

NOTE:

1. If underdrain outlet pipe elevations are not shown on Underdrain Table, the minimum outlet pipe slope shall be 0.3%. The minimum freeboard between the outlet pipe outfall and the ditch line shall be 1'-0" for median ditches and 2'-0" for side ditches.

MEDIAN SHOULDER INSTALLATION

HMA for Underdrains
(Match Existing Shoulder Depth)

New HMA Shoulder, Refer to Typical Cross Section

Existing HMA Shoulder

Structure Backfill

6" Underdrain Outlet Pipe or Pipes

Drainage Structure Outlet Pipe

PVC Connection

INFORMATION STRUCTURE OUTLET DETAIL

RETROFIT UNDERDRAIN OUTLET DETAIL (UNDER PAVED SHOULDER)

NEW HMA SHOULDER, REFER TO

TYPICAL CROSS SECTION

Existing HMA Shoulder

Structure Backfill

6" Underdrain Outlet Pipe or Pipes

Rodent Screen

Outlet Protector

6" Outlet Pipe

Type 4 Pipe or PVC Connection

Inlet, Catch Basin or Similar Structure Wall

Drainage Structure Outlet Pipe

PVC Connection

NOTE:

1. If underdrain outlet pipe elevations are not shown on Underdrain Table, the minimum outlet pipe slope shall be 0.3%. The minimum freeboard between the outlet pipe outfall and the ditch line shall be 1'-0" for median ditches and 2'-0" for side ditches.

INDIANA DEPARTMENT OF TRANSPORTATION

UNDERDRAIN DETAILS

SEPTEMBER 2017

STANDARD DRAWING NO. E 718-UNDR-03

/s/ Elizabeth W. Phillips 08/26/16
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/19/16
CHIEF ENGINEER DATE
NOTE:

1. The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipe or pipes.
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1. The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipe or pipes.
NOTE:

1. The #4 transverse bars in the upslope lug may be field cut to accommodate the outlet pipe or pipes. The 404 bars in the upslope lug may be moved to accommodate the outlet pipe or pipes.
Mesh Size = 3 Openings per 1"
Wire Ø = 0.072"

Pipe Ø = 0.072"
Mesh Size = 3 Openings per 1"