THE STATE OF DELAWARE

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

STANDARDS
**PLAN**

**PLAN**

**FRONT VIEW WITH LAWN STRIP**

**FRONT VIEW WITHOUT LAWN STRIP**

**DRIVEWAY PROFILES — SHOWING TYPICAL CONSTRUCTION**

**NOTES:**

- SEE CURRENT DEPARTMENT "POLICY & STANDARDS FOR ENTRANCES TO HIGHWAYS" FOR ADDITIONAL INFORMATION.
GENERAL NOTES:

PAYMENT FOR RAMPS AND DECREASED CURB SHALL BE UNDER THE APPLICABLE SECTION FOR THE ITEM AND THE SECTIONS PARTIALLY TO THE ALMOND CURVE RESPECTIVELY.

CURB RAMP SHALL BE CONSTRUCTED IN EACH QUADRANT OF THE INTERSECTION ISLANDS OR CROSSWALKS AS SHOWN ON THE PLAN OR AS DIRECTED BY THE ENGINEER.

CURB RAMP PLAN TO BE BRUSHED WITH STREET BROOM IN THE DIRECTION SHOWN BY ARROWS TO CLEAN A SIDE WALK SURFACE ON ALL RAMPS.

CURB RAMP PLAN TO CLEAN A SIDEWALK SURFACE ON ALL RAMPS.

NOTE: WHERE WASHING HARDWARE SHALL BE DEVELOPED WITH THE CURB RAMP PLAN TO CLEAN A SIDEWALK SURFACE ON ALL RAMPS.

TRAFFIC ISLANDS SHALL BE FULLY COVERED OR RAMPS AT CROSSWALK LOCATIONS AS SHOWN. ISLANDS OF PRIOR WIDTH TO ACCOMODATE UP AND DOWN RAMPS AND A 2' LEVEL PLATFROM.

SMALL HAVE A 6' WIDE CROSSWALK PLUS THE PLATFROMS WASHING.

THE BOUNDED SURFACE SHALL EXTEND ONE FOOT BEYOND THE WASHED SECTION.

TYPICAL CROSS SECTIONS

FOR ALL RAMPS

MEDIAN OPENINGS

PROFILE - RAMP, TYPE 1

RAEP, TYPE 2
NOTE: THE CONTACTING SURFACES ON ALL MANHOLE FRAMES AND COVERS USED IN ROADWAY OR SHOULDER AREAS ARE TO BE MACHINE FINISHED.

MATERIAL: CAST IRON
ASTM A-65, CLASS 30

FRAME AND COVER FOR STANDARD MANHOLES

STANDARD CATCH BASIN FRAME & 36" GRADE

SIDEWALK FRAME AND COVER

MONUMENT BOX DETAILS

WEIGHT 450 LBS MIN., 495 LBS MAX.
GENERAL NOTES:
1. TOP OF THE CATCH BASIN TO BE OF P.C. MASONRY.
2. COST OF P.C. MASONRY AND P.W-B.D.-2 GRAVING TO BE INCLUDED IN THE UNIT PRICE AS FOR CATCH BASIN.
3. P.W-B.D.-2 MODIFIED CATCH BASINS ARE TO BE USED ONLY BY THE CIVILIAN DEPARTMENT.
4. STEPS ARE TO BE PLACED IN ALL CATCH BASINS AND MANHOLE SIZES OVER 4' DEEP. SEE STANDARD SHEET D-2. COST TO BE INCLUDED IN COST OF CATCH BASIN.
5. PAVING BRICK ON BLOCK MASONARY WITH 2" OF PORTLAND CEMENT MIXTURE.
6. CATCH BASINS MAY BE ANCEST. CONTRACTOR SHALL SUBMIT DETAILS, LAYOUT, AND OTHER PERTINENT INFORMATION FOR APPROVAL.
ENLARGED SECTIONS

SECTION A-A
NOTE: GRATE TO BE GALVANIZED

PLAN
M-1 MEDIAN GRATE
TABLE OF REINFORCEMENT

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<tr>
<td>G-1 BAR</td>
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<tr>
<td>G-2 BAR</td>
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<td>F-BARS</td>
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</table>

SAFETY END STRUCTURE

NOTE:

SAFETY END STRUCTURES TO BE USED AT EACH END OF CROSSOVER DRAINS.

END STRUCTURE SHALL BE PAID FOR AT A UNIT PRICE BID EACH IN PLACE, INCLUDING M-I GRATES AND REINFORCING STEEL.

THE MINIMUM SLOPE FOR PIPE UNDER CROSSOVERS SHALL BE 0.003.

SEE STANDARD SHEET D-4 FOR M-I GRATE.

*REINFORCING BAR LIST GIVEN FOR ESTIMATING PURPOSES ONLY. COST TO BE INCLUDED IN UNIT PRICE BID FOR STRUCTURE.
GENERAL NOTES:

1. PLACE BRICK OR BLOCK MASONRY WITH 1/2" OF PORTLAND CEMENT MORTAR.

2. CATCH BASIN MAY BE PLACED. CONTRACTOR SHALL SUMMIT OR GROOVE A 18" DRAINAGE SECTION AT JUNCTION OF DIFFERENT MATERIALS.

3. STEPS ARE TO BE PLACED IN ALL CATCH BASIN AND MANHOLE OVS + DEPT. SEE STANDARD SHEET 5-A. COST OF STEPS TO BE INCLUDED IN COST OF CATCH BASIN (THIS ALSO APPLIES TO JUNCTION BOXES)

4. A CATCH BASIN FRAME AND MAY BE DEPRESSED U/S BELOW POSITION SHOWN, WHEN DIRECTED

5. USE STANDARDS CATCH BASIN FRAME B GAGE SEE STANDARD SHEET 5-A.

6. REINFORCING STEEL G TO BE INCLUDED IN UNIT PRICE (G-FOR A CATCH BASIN)

CONSTRUCT FLOW CHANNEL OF BRICK OR CONCRETE.

SECTION B-B

SECTION A-A

SECTION B-B

A CATCH BASIN

B CATCH BASIN (as shown)

OR

B JUNCTION BOX*

* The cover shown on page D-1 is substituted for the grate. This is the only difference.
1. PAVEMENT BRICK OR BLOCK MORTAR WITH 1/2" OF PORTLAND CEMENT MORTAR.
2. "OFF" OF STRUCTURE TO BE OF P.C. MORTAR.
3.catch basin drain (See Section). Contractor shall furnish detailed plans showing sections, joints, reinforcement and other pertinent information for approval.
4. Stakes are to be placed in all catch basins and manholes by the City. See standard sheet 0-1.

**BILL OF MATERIALS**

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<tr>
<td>B</td>
<td>Straight Bar</td>
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<tr>
<td>C</td>
<td>Bent Bar</td>
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</table>

**CONSTRUCTION DETAILS**

- Limits of Construction:
  - 12" deep

**SECTION A-A**

- A-A CATCH BASIN

**SECTION B-B**

- Lawn Catch Basin

**FRAME AND GRATE**

Approx. Wt. 1: Frame & Grate 160 lbs.
SD-1 CATCH BASIN

SECTION A-A

SECTION B-B

SECTION C-C

PLAN

SECTION D-D

SECTION B-B

SD-2A CATCH BASIN

NOTE:
- SEE STANDARD SHEET D-I FOR FRAME AND GRATE. APPLIES TO BOTH CATCH BASINS.
- CATCH BASIN FRAMES AND GRATES MAY BE DEPRESSED FOR USE IN OTHER FRAMES.
- COST OF GRATE TO BE INCLUDED IN COST OF CATCH BASIN.
- PLACE 46 TONS WHERE CATCH BASIN SUTTER IS 12" IN Structures TO BE OF PRECAST CONCRETE.
- NAVFAC 145 BETWEEN NORMAL CURBS
- TABLE FOR REINFORCEMENT

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10 BE GEMLEASE AFTER VELDING

SD-2A CATCH BASIN

TABLE FOR REINFORCEMENT

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</table>

WIRE MESH:
- X 6\x4 60#
CLASS A BEDDING

CLASS B BEDDING

LIMIT OF EXCAVATION FOR PIPE TRENCHES

LIMIT OF EXCAVATION FOR PIPE TRENCHES

CONCRETE 2000 PSLING

COMPACTED SOIL

NORMAL TRENCH INSTALLATION (CLASS C BEDDING)

CLASS B & C BEDDING IN ROCK

LIMIT OF EXCAVATION FOR PIPE TRENCHES

LIMIT OF EXCAVATION FOR PIPE TRENCHES

FINISHED GRADE

12" MIN. TAMP H.D. 1.5

Erosion Protection

Erosion Protection

CASE I

CASE II

CASE III

CASE IV

NOTE: USE CLASS "C" BEDDING UNLESS OTHERWISE INDICATED.

METHODS OF PLACING EROSION PROTECTION

GENERAL NOTES:

1.) THESE ILLUSTRATIONS ARE GENERAL CASES ONLY, HOWEVER THE BASIC PRINCIPLES SHOWN ARE TO BE APPLIED TO SPECIFIC CASES.

2.) EROSION PROTECTION SHALL BE CONSTRUCTED OF EITHER GRouted RP-MAP OR 4" PORTLAND CEMENT CONCRETE BUTTER (SEE SPECIAL PROVISIONS).

SHEET NUMBER:

DRAWN:

CHECKED:

APPROVED:
### Bill of Materials

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<tr>
<td>4</td>
<td>4-8</td>
<td>6-7</td>
<td>TBD</td>
</tr>
</tbody>
</table>

### Bending Diagram

**Variable with Type of Brick:**
- Flow channel, either brick or concrete
- Pipe sizes: TBD

**Standard Manhole Frame & Cover:**
See standard sheet D-1

**Varied with Type of Brick:**
- Flow channel, either brick or concrete

**Hot Mix:**
- Design for 30° pipe

---

**Section A-A**

- Flow channel, either brick or concrete
- Pipe sizes: TBD

---

**W 30 Manhole**

- Shallow depth only

---

**W 30 Manhole**

- Shallow depth only

---

**Director of Operations Date:**

**Deputy Director-Chief Engineer Date:**

---

*Note: This sheet requires the use of Portland cement mortar.*
NOTES:

REINFORCING STEEL IS TO BE INCLUDED IN UNIT PRICE BID FOR DOUBLE A CATCH BASIN.

W BEAM AND ANGLE IRON ARE TO BE INCLUDED IN UNIT PRICE BID FOR DOUBLE A CATCH BASIN.

USE STANDARD CATCH BASIN FRAMES & GRATES. SEE STANDARD SHEET D-12.

COST OF 5'-0" CURB IS TO BE INCLUDED IN UNIT PRICE BID FOR DOUBLE A CATCH BASIN.

CATCH BASIN FRAMES AND GRATES MAY BE SUPPLIED BY BE-2.:

BELOW POSITION SHOWN, WHEN DIRECTIONAL STEPS ARE TO BE PLACED IN ALL CATCH BASINS AND MICHIGANS:

BE-14. SEE STANDARD SHEET D-12. COST OF STEPS TO BE INCLUDED IN COST OF CURB.

CATCH BASINS MAY BE RECAST- CONTRACTOR SHALL SUBMIT PERMIT TO RECAST A RIB TO BE COATED WITH TITANUM. CONTRACTOR SHALL PROVIDE 

GALVANIZED BUR DRAIN PAVING MASONRY WITH 5% OF FORTLAND CEMENT MORTAR.

DOUBLE A CATCH BASIN

FOR USE WITH P.C.C. CURB TYPE 1

FOR USE WITH P.C.C. CURB TYPE 2

W BEAM SUPPORT FOR STANDARD CATCH BASIN FRAMES AND GRATES
DOUBLE J CATCH BASIN FOR INTEGRAL CURB AND GUTTER ONLY

PLAN

SECTION A-A

TO BE GALVANIZED AFTER WELDING

W BEAM SUPPORT FOR STANDARD CATCH BASIN FRAMES AND GRATES

SECTION C-C

NOTE:
CATCH BASIN MAY BE PRECAST. CONTRACTOR SHALL SUBMIT DETAILED PLANS SHOWING SECTIONS, DETAILS, REINFORCEMENT AND OTHER REQUIREMENTS FOR APPROVAL. TIE-UPS ARE TO BE PLACED ACROSS CATCH BASES AND MANHOLES OVER COST OF CATCH BASIN.

NOTE:
REINFORCING STEEL IS TO BE INCLUDED IN UNIT PRICE BID FOR DOUBLE J CATCH BASIN.
W BEAM AND ANGLE IRON ARE TO BE INCLUDED IN UNIT PRICE BID FOR DOUBLE J CATCH BASIN.
USE STANDARD CATCH BASIN FRAMES AND GRATES.
SEE STANDARD SHEET D-19-8.
COST OF 3'-0" OF INTEGRAL CURB & GUTTER IS TO BE INCLUDED IN UNIT PRICE BID FOR DOUBLE J CATCH BASIN.
PAINT BASE OR BLOCK MASONRY WITH 1/4" OF PORTLAND CEMENT MORTAR.
UPPER 1/2" OF STRUCTURE TO BE OF P.O.C. MASONRY.
FRAME AND GRATE MAY BE DEPRESSED 1/8" BELOW POSITION SHOWN, WHEN SHOWN.

SECTION B-B

SECTION C-C

FOR 6' CURB

SECTION C-C

FOR 8' CURB

SECTION C-C

FOR REINFORCING STEEL

SECTION C-C

NOTE:
CATCH BASIN MODIFIED FOR INTEGRAL CURB & GUTTER ONLY

DRAWN, CHECKED:

CITY DIRECTOR-CIVIL ENGINEER

APPROVED:

2/27/20
**INTERCEPTING DITCH**

**EARTH SPILLWAY**

**DIKE**

**DIKE WITH PIPE SPILLWAY**

**SEEDMENT BASIN**

**DIKE ON SLOPE**

**LEVEL SPREADER**

---

**NOTES:**
1. LEVEL SPREADERS MUST BE CONSTRUCTED ON UNDISTURBED SOIL.
2. ENTRANCE MUST BE GRADED TO INSURE THE FLOW ENTERS DIRECTLY INTO THE 0.0% GRADED CHANNEL.

**PLAN**

**SECTION A-A**

**CLIFF COUNTRY**

**ENVIRONMENTAL CONTROL**

**DIKE ON SLOPE**

**PORT DIRECTOR-CHIEF ENGINEER**

**APPROVED**

**DATE**

**DIRECTOR OF OPERATIONS**

**DATE**

**REVIEWED**

**DATE**

**DETAILED EXCELSIOR BLANKET ARISIN**

**D.E.**

**DATE**

---

**NOTE:**
1. DIKES MUST BE MACHINE COMPACTED
2. DIKES MUST HAVE A POSITIVE GRADE DRAINING TO A STABILIZED OUTLET.
### Table of Offsets from Taper for Placing Guardrail Taper

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### Diagram

- **Standard Terminal Section**
- **Standard Swage Fitting and Stud**
- **Anchor Plate Details**
- **Limits of Guardrail as indicated on Plans**
- **Plan at Shoulder**

### Notes
1. Material for mound not to be compacted.
2. Mound to be constructed from approved excess material, unless otherwise directed.
3. Sketch shown is typical when proposed grade lines of pavement are identical.
4. Mounds to be constructed only where called for on plans.

---

END ANCHOR DETAILS BLOCKED OUT "W" BEAM
DETAIL TYPICAL RAIL SECTION

SYMMETRICAL ABOUT 12 GAGE U.S. STANDARD STEEL 1/2" WALL

DEVELOPMENT AXIS

1 3/16" HOLE FOR 1/4" ANCHOR BOLTS

STANDARD TERMINAL SECTION MODIFIED ONLY TO BE USED WHEN CONNECTING TO
SPACING STRUCTURE:

NOTE:
- RAIL ELEMENTS INCLUDE THE BASIC RAIL ELEMENTS,
- SLICES, AND SPECIAL RAIL SECTIONS SUCH AS
- TERMINALS FOR "W" BEAM GUARDIAN AND "W" BEAM MEDIAN BARRIER SYSTEMS.
- USE 12 GAGE UNLESS OTHERWISE SPECIFIED.
- STANDARD TERMINAL SECTION MODIFIED TO BE 12 GAGE-
- SEE STANDARD SHEET 0-4 FOR ALTERNATE 6" C STRONG
- POST DETAIL.

END SECTION (FLARED)

END SECTION (ROUNDED)

BUFFER END SECTION

TERMINAL CONNECTOR

BEAM SPlice

BACK-UP PLATE

SLICE BOLT SLOT 3/4" X 1 1/8"
NOTE:
AS SHOWN BELOW.

NOTE:
USE: P.W.-B.D.-1 GRATE ON INTAKE BASIN.

P.C.C. INTAKE APRON

NOTE:
P.C.C. INTAKE APRON TO BE PAID FOR AT UNIT PRICE BID FOR EACH.

CORRUGATED METAL DOWNSPOUTS

PLACE I.C.Y. COARSE CEMENT CONCRETE LOOSE IN VARIOUS VOLUME BID FOR SPLASH APRON.

CORRUGATED METAL DOWNSPOUTS

WITH P.C.C. INTAKE APRON

DOWNSPOUT SPLASH APRON

Construct 3 foot when detailed, to be paid for at unit price bid for each splash apron.
TEMPORARY INSTALLATION ON BRIDGE DECKS

Two channel sections shall be used for each barrier section. The top shelf to be placed on top of barrier, except as required to clear bridge expansion joint.

Note to be filed with non-returning barrier upon removal of expansion joint, when required.

LIFTING DEVICES SHALL BE SWIFT LIFT ANCHORS, 12 TON CAPACITY. AS MANUFACTURED BY SUPERIOR CONCRETE ACCESSORIES, INC. OR APPROVED EQUIVALENT.

PORTLAND CEMENT CONCRETE MANUFACTURED TO SPECIFICATION 622.
PORTLAND CEMENT CONCRETE, CLASS A (42 MP SI STRONG) 600 PSI.
SECOND CHANNEL SECTION CEMENT MANUFACTURED TO COMPLIANCE WITH PRE-CAST TO BE USED AS A PERMANENT BARRIER ON BRIDGES.
RIGHT-OF-WAY FENCE

VEHICULAR GATE FOR RIGHT-OF-WAY FENCE

FLAP GATE DETAIL

NO SCALE
PLAN OF WIRE MESH & JOINTS FOR 45'-0" SLAB

SECTION D-D

DOWELLED LATERAL SHADDON SAW-CUT CONTRACTION JOINT

SECTION E-E

DOWELLED LATERAL SAW-CUT JOINT

SECTION A-A

DOWELLED LATERAL JOINT

SECTION B-B

DETAIL OF HOOK-BOLT DOWEL

SECTION C-C

TRANSVERSE SAW CUT CONTRACTION JOINT

NOTE: 1. ALL WIRE IS IN SIDE FRAMES TO BE 5/8" DIA. ASTM A-52
2. TRANSVERSE CONCRETE JOINTS MUST BE SPACED AS SPECIFIED
3. FIELD ASSEMBLY OF LOAD TRANSFER DEVICE WILL NOT BE PERMITTED.
STANDARD JOINT SPACING

TRANSVERSE CONSTRUCTION JOINT

NOTE: TO BE USED ONLY WHERE SPECIFIED & AT END OF DAYS Poured

DOUBLE THICKNESS OF TAR-TREATED PAPER INSERTED WITH PROPER TOOL.

1 1/2" LONG @ C.C.

# SMOOTH STEEL DOWEL BAR

NOTE: SEE STANDARD SHEET 6-A1 FOR DETAILS OF DOWELLED LONGITUDINAL CONSTRUCTION JOINTS.

STANDARD SHEET P-2
PCC BASE COURSE WITH CRACK CONTROL

APPROVED:

DIRECTOR OF OPERATIONS

DEPUTY DIRECTOR-CHIEF ENGINEER
# SOILS CLASSIFICATION

## GENERAL CLASSIFICATION

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## GRANULAR MATERIALS (35% or less passing a No. 200 sieve)

- **SIEVE ANALYSIS**
  - **PERCENT PASSING**
    - **NO. 10**: 35 MAX, 30 MAX, 25 MAX, 20 MAX, 15 MAX, 10 MAX
    - **NO. 40**: 35 MAX, 35 MAX, 35 MAX
    - **NO. 200**: 35 MAX, 35 MAX, 35 MAX

- **CHARACTERISTICS OF FRACTION PASSING NO. 10**
  - **LIQUID LIMIT**: 6 MAX, 6 MAX
  - **PLASTICITY INDEX**: N.P.
  - **PLOTTING NO. 40**: 40 MAX, 40 MAX
  - **PLOTTING NO. 10**: 41 MIN, 41 MIN
  - **PLOTTING NO. 200**: 40 MAX, 40 MAX

## SILT-CLAY MATERIALS (More than 35% passing a No. 200 sieve)

- **GROUP INDEX**: EXCELLENT, GOOD, FAIR, POOR, VERY POOR, UNSAT.
- **GENERAL SUBGRADE RATING**: WELL GRADED GRAVELS AND SANDS, CLEAN SAND & GRAVELY SAND, POORLY GRADED, SILTY OR CLAYEY SANDS, SILTY SOILS, ELASTIC SILTS, PLASTIC CLAYS, EXPANSIVE PLASTIC CLAYS, MUDDY PEAT

## STRUCTURAL BORING DATA

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<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
</tr>
</thead>
<tbody>
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<td>50</td>
<td>25</td>
<td>10</td>
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<td>0</td>
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</tr>
</tbody>
</table>

- **GROUND ELEV. 60.5**
  - **A-1 1/8 (ALTIV)**
  - **RECOVERY 55%**

- **A-2 1/4**
  - **SAMPLE DEPTH 2.5 FT**
  - **CLASSIFICATION, DESCRIPTION & RECOVERY**
  - **SAMPLE NUMBER 1**
  - **BLOWS ON SAMPLE SPOON 1)**
  - **PENETRATION OF SAMPLE SPOON 2)**
  - **ELEVATIONS**

- **A-3 1/16**
  - **RUN NUMBER 1**
  - **SAMPLE DEPTH 2.5 FT**
  - **CLASSIFICATION & DESCRIPTION**
  - **SAMPLE NUMBER 1**
  - **RECOVERY 55%**
  - **ELEVATION**

## METHOD OF PLACING BORING DATA ON PLAN AND PROFILE SHEETS

- **EXIST. GRADE LINE**
- **GROUP CLASSIFICATION GROUP INDEX**

- **OFFSET LEFT OR RIGHT TO SCALE**
  - **SCALE OF SYMBOLS TO BE USED ON PLAN**
    - **h' OR VERTICAL SCALE - 1"=5'-0"**
    - **o' OR HORIZONTAL SCALE - 1"=50'-0" ON h'+50'-0" SCALE**

- **SURVEY q**
- **DATUM**
  - **444+100**

- **PLACEMENT ON PLAN SHEET**

- **ROCK CLASSIFICATION**
TEMPORARY DIVERSION DIKE (DRAINAGE AREAS LESS THAN 5 ACRES)

A ridge of compacted soil or gravel, to remain for a period of usually less than one year, constructed across disturbed areas of small to moderate size, shall be required to stabilize small areas of disturbed soil by covering the area with a layer of compacted soil.

NOTES:
1. All dikes shall be machine compacted.
2. The slope of the dike shall be such that it does not allow for any drainage to an outlet.
3. The grade of the dike shall be such that it does not allow for any drainage to an outlet.
4. Runoff diverted from a protected or stabilized area shall not enter the dike.
5. Diversion dikes shall be constructed with a minimum of 10' vertical face.
6. Periodic inspection and required maintenance shall be provided.

TEMPORARY INTERCEPTOR DIKE (DRAINAGE AREAS LESS THAN 5 ACRES)

A ridge of compacted soil or gravel, to remain for a period of usually less than one year, constructed across disturbed areas of small to moderate size, shall be required to stabilize small areas of disturbed soil by covering the area with a layer of compacted soil.

NOTES:
1. All dikes shall be machine compacted.
2. The slope of the dike shall be such that it does not allow for any drainage to an outlet.
3. The grade of the dike shall be such that it does not allow for any drainage to an outlet.
4. Runoff diverted from a protected or stabilized area shall not enter the dike.
5. Diversion dikes shall be constructed with a minimum of 10' vertical face.
6. Periodic inspection and required maintenance shall be provided.

TEMPORARY PERIMETER DIKE (DRAINAGE AREAS LESS THAN 5 ACRES)

A ridge of compacted soil or gravel, to remain for a period of usually less than one year, constructed across disturbed areas of small to moderate size, shall be required to stabilize small areas of disturbed soil by covering the area with a layer of compacted soil.

NOTES:
1. All dikes shall be machine compacted.
2. The slope of the dike shall be such that it does not allow for any drainage to an outlet.
3. The grade of the dike shall be such that it does not allow for any drainage to an outlet.
4. Runoff diverted from a protected or stabilized area shall not enter the dike.
5. Diversion dikes shall be constructed with a minimum of 10' vertical face.
6. Periodic inspection and required maintenance shall be provided.

EMBEDDING DETAIL

NOTES:
1. Bales shall be placed in rows with ends tightly authorizing adjacent bales.
2. Each bale shall be embedded in the soil with a minimum of 4'.
3. Bales shall be securely anchored in place by stakes or rebar driven through the bales. The first stake in each bale shall be angled toward previously laid bale to force bales together.
4. Inspection shall be frequent and repair or replacement shall be made promptly as required.
5. Bales shall be removed when they have served their useful purpose in order to prevent the blocking or impeding of stream flow or drainage.
TEMPORARY INTERCEPTOR SWALE (DRAINAGE AREAS LESS THAN 5 ACRES)

A temporary excavated drainage way located along the perimeter of the site or disturbed areas, that is used to prevent offsite runoff from entering and to prevent sediment laden storm runoff from leaving the construction site or disturbed areas. The swale shall remain in place until the disturbed areas are permanently stabilized.

SECTION D-2

EROSION PLAN SYMBOL

NOTES:
1. All trees, brush, shrubs, obstructions, and other objectionable material shall be removed and disposed of so not to interfere with the proper function of the swale.
2. The swale shall be excavated or shaped to line, grade, and cross section as required to meet the specified criteria and be free of bank projections or other irregularities which will impede normal flow. Earth removed and not needed in construction shall be spread or disposed of so that it will not interfere with the functioning of the swale. Fills shall be compacted to prevent unequal settlement that will cause damage in the completed swale.
3. Interceptor swales shall have a minimum grade of one percent and the bottom of the swale shall be level.
4. The spacing of the interceptor swales along the graded slope shall be as follows:
   - Minimum slope of area swale 10% to 15% Depth between interceptor swales 100 feet 200 feet
   - Earth erosion may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.
5. Intercepter swales must have an outlet that functions with a minimum of erosion of the swale or storm water trapping device such as a sediment trap or sediment basket.
6. When it is deemed necessary by the periodic inspections, the flow area of the swale shall be stabilized using "Stabilization" which consists of a thick layer of stone or gravel (Delaware Standard Gradation Size No. 10) that is forced into the soil. The filling shall extend above the bottom and on both sides of the swale to a height of at least 3 inches vertically above the bottom.
7. All points where several or more vehicle crossings per day will be made, the side slopes may be made flatter to allow construction traffic to cross. The entire swale area in the vicinity of the crossing shall be stabilized using "Stabilization" consisting of stone that meets Delaware Standard Gradation Size No. 10, that is placed in two separate layers each three inches thick. Each layer is compacted into the soil after placement.
8. Periodic inspection and required maintenance shall be provided.

STONE OUTLET STRUCTURE (DRAINAGE AREAS LESS THAN 5 ACRES)

A temporary crushed stone dike installed in conjunction with and as a part of a diversion dike, interceptor swale, or perimeter swale that is used to provide a protected outlet for the dike. They apply to any point of discharge criteria is a maximum of 10 feet from an oriented orifice to a dike or concentrated flow for the duration of the period of construction. Stone outlet structures also allow the area behind the dike to drain.

NOTES:
1. The stone shall be crushed stone. (Gravel may be used only when crushed stone is not available. The stone shall meet Delaware Standard Gradation Size No. 105.
2. the crest of the stone dike shall be at least six inches lower than the lowest elevation of the lip of the earth dike. The crest shall be level.
3. The stone outlet structure shall be embedded into the soil a minimum compacted to prevent unequal settlement that will cause damage in the completed swale.
4. The minimum length, in feet, at the crest or the stone outlet structure shall be equal to six times the number of acres of the contributing drainage area.
5. The stone outlet structure shall be inspected after each rain, and the stone shall be replaced when the structure fails to function as intended due to accumulation among the stone, in the structure, traffic damage, etc.
6. When the drainage area above the structure is not stabilized, a sediment backwater trap must be used in conjunction with the stone outlet structure.

SECTION F-F

LEVEL SPREADER

NOTES:
1. Level spreaders shall be constructed under the direct supervision of the Engineer.
2. Construct level lip on zero percent grade to ensure uniform spreading of sediment-free runoff (converting channel flow to sheet flow).
3. Level spreader shall be constructed on undisturbed soil (not on fill).
4. The minimum channel flow shall not exceed 0.15 feet per second before entering the spreader.
5. Storm runoff converted to sheet flow shall outlet into stabilized areas. Water shall not be recombined immediately below the point of discharge.
6. Spreader length will be determined by estimating Qd (inflow frequency) using the following equation and multiplying the total length by a multiple:

   Design Qd = Maximum Length
   Up to 10 19
   11 to 20 20
   21 to 50 28
   51 to 60 36
   61 to 70 44

7. Periodic inspection and required maintenance shall be provided.
PIECE OUTLET SEDIMENT TRAPS (DRAINAGE AREA: 5 ACRES OR LESS)

A piece outlet sediment trap consists of a basin formed by an embankment or by excavation and embankment. The outlet for the trap is a perforated riser pipe with an outfall pipe through the embankment. Sediment, as necessary, for storage.

NOTES:
1. The area under embankments shall be cleared, grubbed, and stripped of all vegetation and root mat. The pool area shall be cleared.
2. The fill material for embankments shall be free of roots or other woody vegetation, as well as stones, rocks, organic material, or other objectionable material. The embankment shall be compacted by traversing with equipment while it is being placed.
3. The crest of the earth outlet shall be level. The outlet width (feet) shall be equal to 2 times the drainage area (acres). If an embankment is used to form the sediment trap, the outlet width shall be at least one foot below the top of the embankment. The outlet shall be free of any restrictions to flow.
4. All cut and fill slopes used in the construction of sediment traps shall be 3:1 or flatter. The maximum top width of embankments used to form sediment traps shall be 4 feet.
5. Sediment shall be removed and the trap restored to its original dimensions, when the sediment has accumulated to one-half of the design depth of the trap. Removal of sediment shall be disposed of in a suitable area, as approved by the Engineer, and in such a manner that it will not erode.
6. The structure shall be inspected after each rain and repairs shall be made when required.
7. Construction operations shall be carried out in such a manner that erosion and water pollution are minimized.
8. The sediment trap shall be removed and the area shall be stabilized after the drainage area above the trap has been properly stabilized.

STONE OUTLET SEDIMENT TRAPS (DRAINAGE AREA: 5 ACRES OR LESS)

A stone outlet sediment trap consists of a basin formed by an embankment or by excavation and embankment. The outlet for the trap is a perforated riser pipe with an outfall pipe through the embankment. Sediment, as necessary, for storage.

NOTES:
1. The area under embankments shall be cleared, grubbed, and stripped of all vegetation and root mat. The pool area shall be cleared.
2. The fill material for embankments shall be free of roots or other woody vegetation, as well as stones, rocks, organic material, or other objectionable material. The embankment shall be compacted by traversing with equipment while it is being placed.
3. The crest of the stone outlet shall be level and at least one foot below the top of the embankment. The outlet width (feet) shall be equal to 2 times the drainage area (acres). If an embankment is used to form the sediment trap, the outlet shall be 3:1 or flatter. The minimum top width of embankments used to form sediment traps shall be 4 feet.
4. The crushed stone used to form the outlet shall meet Delaware Standard Specification No. 103. Gravel meeting the stone gradation requirement may be used if preferred by the Engineer.
5. The drawings above show size grading being used to form the core. The boubles shall be anchored in accordance with the details for Straw Bale Silt Fence, shown on Standard Number 2856. All other materials (timber, concrete block, etc.) may be used for the core. All core material must be firmly placed in the ground. The core shall be covered by a minimum of six inches of stone.
6. Construction operations shall be carried out in such a manner that erosion and water pollution are minimized.
7. The structure shall be inspected after each rain and repairs shall be made when required.
8. Sediment shall be removed and the trap restored to its original dimensions, when the sediment accumulates to 1/3 of the design depth of the trap. Removel of sediment shall be disposed of in a suitable area, as approved by the Engineer, and in such a manner that it will not erode.
9. The sediment trap shall be removed and the area shall be stabilized after the drainage area above the trap has been properly stabilized.
GRADE STABILIZATION STRUCTURE

RIGID PIPE SLOPE DRAINS
(DRAINAGE AREA: 5 ACRES OR LESS)

A rigid pipe with a prefabricated flared entrance section, temporarily placed to extend from the top to the bottom of the slope, is used to convey surface runoff safely down the slope without causing erosion. Pipe slope drains are to be used whenever concentrated flows of surface runoff are to be conveyed down a cut or fill slope in order to prevent erosion.

GRADE STABILIZATION STRUCTURE

FLEXIBLE PIPE SLOPE DRAINS
(DRAINAGE AREA: 5 ACRES OR LESS)

A flexible tubing with a rigid pipe and prefabricated flared entrance section, temporarily placed to extend from the top to the bottom of the slope, used to convey surface runoff safely down the slope without causing erosion. Pipe slope drains are to be used whenever concentrated flows of surface runoff are to be conveyed down a cut or fill slope in order to prevent erosion.

GRADE STABILIZATION STRUCTURE

PAVED CHUTE OR FLUME
(DRAINAGE AREA: 5 ACRES OR LESS)

A temporary channel lined with bituminous concrete, Portland cement concrete, or other suitable material, extended from the top of a slope to the bottom of the slope, that is used to convey concentrated flows of surface runoff down the slope in a manner that will not cause erosion.

EROSION PLAN SYMBOL

Example: FGQ-1A, Flexible Pipe Slope Drain with 10'CM Pipe.

EROSION PLAN SYMBOL

Example: FGQ-1A, Flexible Pipe Slope Drain with 10'CM Pipe.