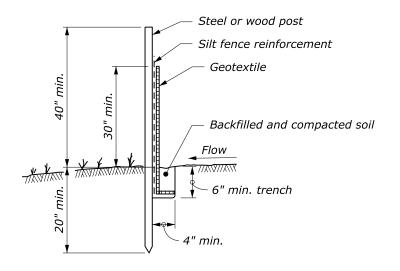
PROJECT SHEET NUMBER

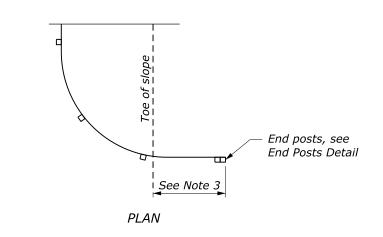


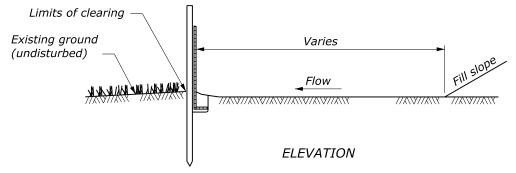
Varies Varies Flow Flow PLAN

NOTE:

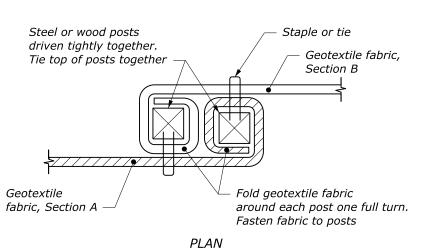
- 1. Alternate preassembled silt fence options will be allowed as long as specified dimensions are satisfied. Follow manufacturer's recommendations for installation procedures. All types must ensure silt fence remains attached to, and does not slide down, supporting posts.
- 2. Install silt fence to follow the ground contours as closely as possible.
- 3. Curve ends of silt fence upgrade to prevent water from running around the ends.
- 4. 10-foot maximum spacing with silt fence reinforcement. 6-foot maximum spacing without silt fence reinforcement.

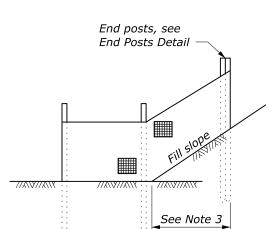
POST AND GEOTEXTILE INSTALLATION DETAIL





SILT FENCE INSTALLATION AT TOE OF FILL

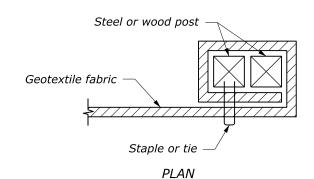




ELEVATION

END DETAIL

POSTS AT JOINTS



END POSTS DETAIL

U.S. DEPARTMENT OF TRANSPORTATION, FHWA
OFFICE OF FEDERAL LANDS HIGHWAY

WFL STANDARD
W157-1

SPECIFICATION
FP-24, FP-14

APPROVED FOR USE
10/2016

March 2025 9:46 AM

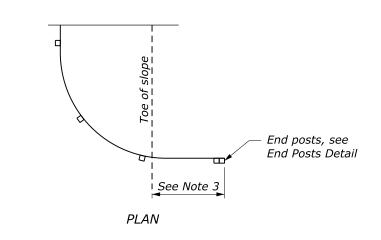
Steel or wood post Silt fence reinforcement Geotextile Backfilled and compacted soil Flow 152 min. trench

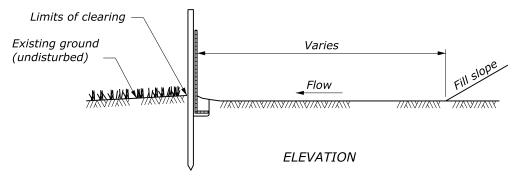
See Note 4 For spacing Flow Flow Flow PLAN

NOTE:

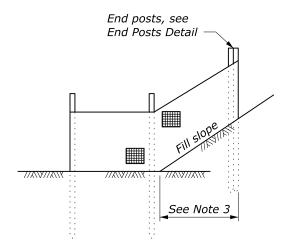
- 1. Alternate preassembled silt fence options will be allowed as long as specified dimensions are satisfied. Follow manufacturer's recommendations for installation procedures. All types must ensure silt fence remains attached to, and does not slide down, supporting posts.
- 2. Install silt fence to follow the ground contours as closely as possible.
- 3. Curve ends of silt fence upgrade to prevent water from running around the ends.
- 4. 3-meters maximum spacing with silt fence reinforcement. 1.8-meters maximum spacing without silt fence reinforcement.

POST AND GEOTEXTILE INSTALLATION DETAIL



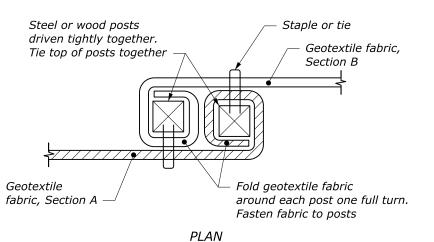


SILT FENCE INSTALLATION AT TOE OF FILL

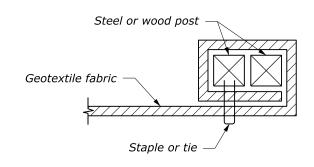




END DETAIL



POSTS AT JOINTS



PLAN **END POSTS DETAIL**

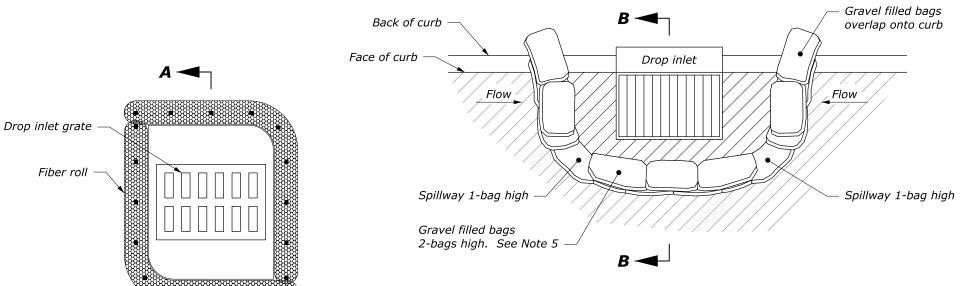
This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

U.S. DEPARTMENT OF TRANSPORTATION, FHWA
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WM157-1

SPECIFICATION
FP-24, FP-14

APPROVED FOR USE
10/2016



PLAN

SECTION A-A

FIBER ROLL

DROP INLET PROTECTION (TYPE A)

 $1" \times 1" \times 1" \emptyset$ wood stake. See Note 2.

9" Ø (min.) fiber roll

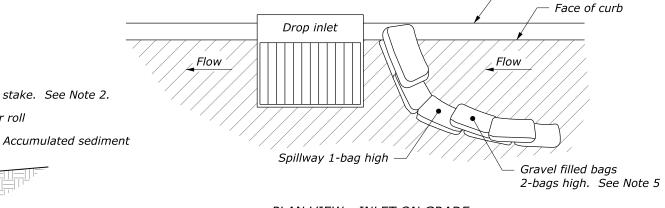
Drop inlet grate

Fiber roll in

full contact

with the ground

PLAN VIEW - INLET AT SAG



Back of curb

PLAN VIEW - INLET ON GRADE

Gravel filled bags (stacked tightly) Spillway (beyond) Accumulated sediment Drop inlet grate Flow

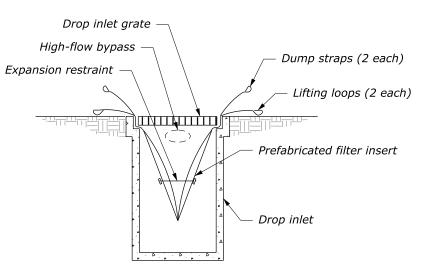
SECTION B-B

Catch basin

GRAVEL BAG BERM **DROP INLET PROTECTION (TYPE B)**

NOTE:

- 1. Select the inlet protection device to fit field conditions as approved.
- 2. Install fiber rolls with stakes spaced no more than 24-inches on center. Drive stakes 12-inches (min.) in undisturbed soil.
- 3. Approximate finished dimension of gravel bags is 12-inches x 18-inches.
- 4. Maximum top of gravel bag spillway elevation = Top of curve minus 1-inch.
- 5. Pack gravel filled bags tightly together end to end to ensure no sediment flows between or underneath the bags. Where tight fit is unachievable, install geotextile filter, class 2, type C along the upstream face of the bags. Place fabric over the top of the bags to the spillway elevation. Anchor the fabric by placing the next layer of bags on top of it. Extend the geotextile fabric a minimum of 18-inches upstream of the bags. Cover geotextile fabric to the top of the fabric with clean, silt-free coarse aggregate between 2 and 3-inches in diameter.
- 6. Size the prefabricated filter insert (Type C) to fit the drop inlet and allow collected material removal without spillage. Include a high-flow bypass in the insert.



PREFABRICATED FILTER INSERT DROP INLET PROTECTION (TYPE C)

See Note 6

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

TEMPORARY INLET PROTECTION

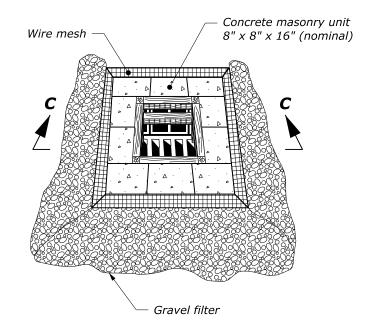
Sheet 1 of 2

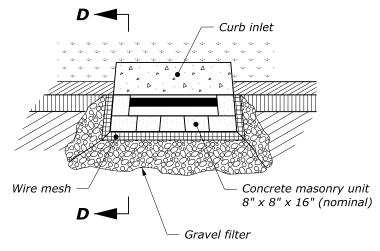
WFL STANDARD W157-2 SPECIFICATION FP-24, FP-14 APPROVED FOR USE

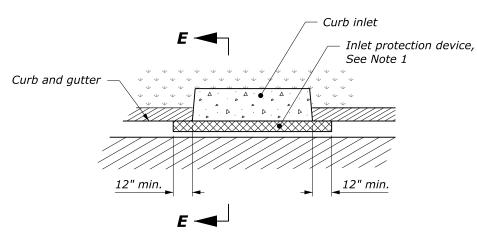
7/2016

PROJECT	SHEET NUMBER	

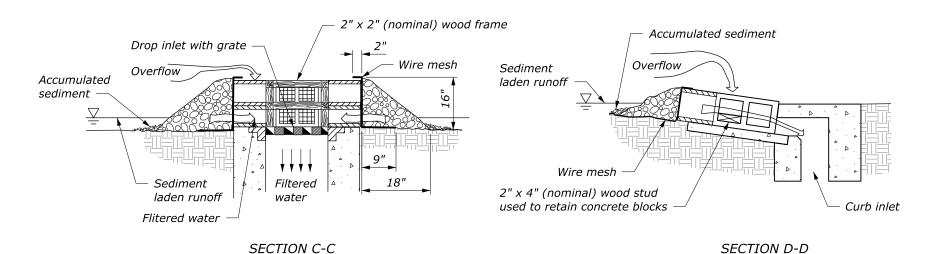
- 1. Inlet protection device (type E) may consist of continuous filter tubing filled with gravel or other prefabricated filter material. Install device according to manufacturer's recommendations.
- 2. Vary dimensions to fit field conditions.





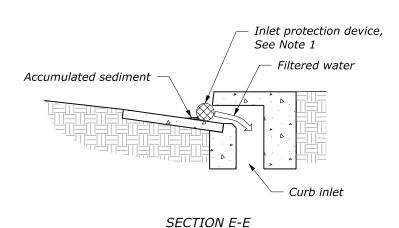


PLAN



BLOCK AND GRAVEL DROP INLET PROTECTION (TYPE D1)

BLOCK AND GRAVEL CURB INLET PROTECTION (TYPE D2)



INLET PROTECTION DEVICE CURB INLET PROTECTION (TYPE E)

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

TEMPORARY INLET PROTECTION

Sheet 2 of 2

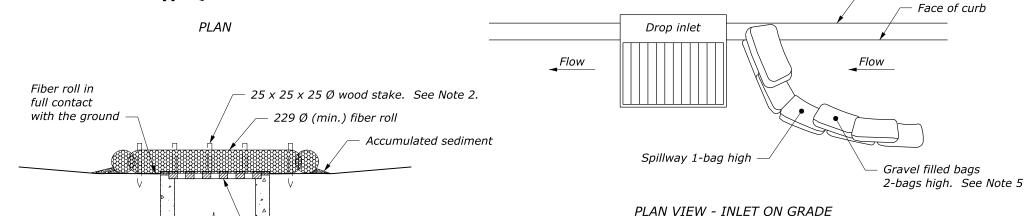
SPECIFICATION FP-24, FP-14 APPROVED FOR USE 7/2016

WFL STANDARD W157-2

Back of curb Face of curb Flow Spillway 1-bag high Gravel filled bags overlap onto curb Flow Spillway 1-bag high

PLAN VIEW - INLET AT SAG

Back of curb



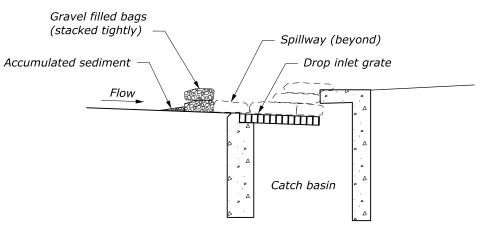
Drop inlet grate

Gravel filled bags

2-bags high. See Note 5

FIBER ROLL DROP INLET PROTECTION (TYPE A)

SECTION A-A



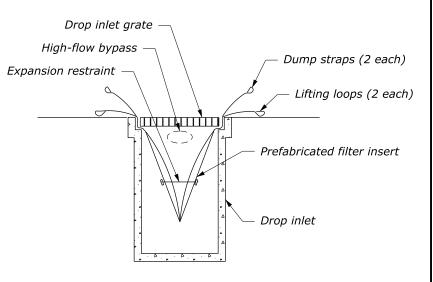
SECTION B-B

GRAVEL BAG BERM
DROP INLET PROTECTION (TYPE B)

NOTE:

- 1. Select the inlet protection device to fit field conditions as approved.
- 2. Install fiber rolls with stakes spaced no more than 610 mm on center. Drive stakes 305 mm (min.) in undisturbed soil.
- 3. Approximate finished dimension of gravel bags is 305 mm x 457 mm.
- 4. Maximum top of gravel bag spillway elevation = Top of curve minus 25 mm.
- 5. Pack gravel filled bags tightly together end to end to ensure no sediment flows between or underneath the bags. Where tight fit is unachievable, install geotextile filter, class 2, type C along the upstream face of the bags. Place fabric over the top of the bags to the spillway elevation. Anchor the fabric by placing the next layer of bags on top of it. Extend the geotextile fabric a minimum of 457 mm upstream of the bags. Cover geotextile fabric to the top of the fabric with clean, silt-free coarse aggregate between 51 and 76 mm in diameter.
- 6. Size the prefabricated filter insert (Type C) to fit the drop inlet and allow collected material removal without spillage.

 Include a high-flow bypass in the insert.



PREFABRICATED FILTER INSERT DROP INLET PROTECTION (TYPE C)

See Note 6

This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

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WFL STANDARD WM157-2

TEMPORARY INLET PROTECTION
Sheet 1 of 2

SPECIFICATION FP-24, FP-14 APPROVED FOR USE 7/2016

NO SCALE

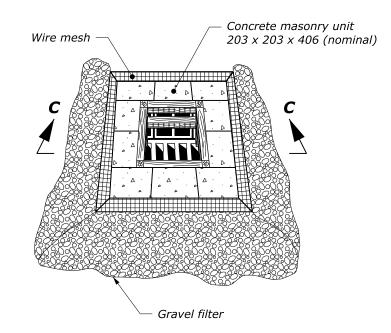
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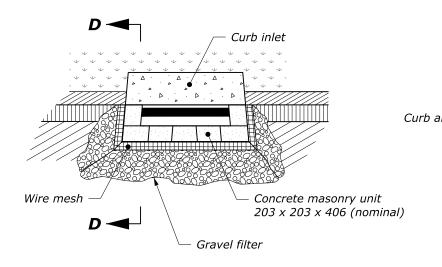
Drop inlet grate

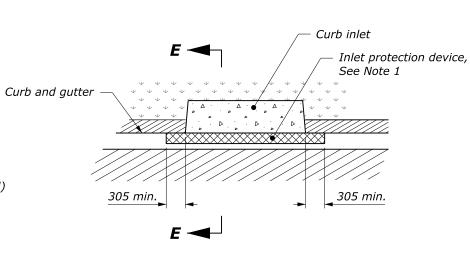
Fiber roll

arch 2025 9:24 AM

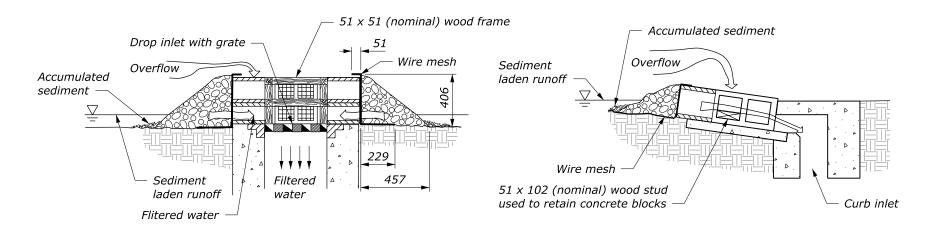
- Inlet protection device (type E) may consist of continuous filter tubing filled with gravel or other prefabricated filter material. Install device according to manufacturer's recommendations.
- 2. Vary dimensions to fit field conditions.







PLAN

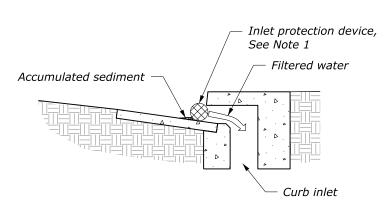


BLOCK AND GRAVEL
DROP INLET PROTECTION (TYPE D1)

SECTION C-C

BLOCK AND GRAVEL
CURB INLET PROTECTION (TYPE D2)

SECTION D-D



SECTION E-E

INLET PROTECTION DEVICE
CURB INLET PROTECTION (TYPE E)

This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

TEMPORARY INLET PROTECTION

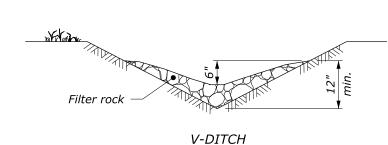
Sheet 2 of 2

WM157-2 SPECIFICATION FP-24, FP-14 APPROVED FOR USE 7/2016

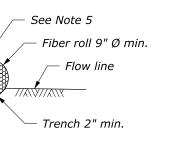
WFL STANDARD

9:26 AM c:\pw-work\d042

- 1. Construct check dams from fiber rolls, filter rock, or gravel bags as approved, to meet the functional requirements of the check dam device.
- 2. Repair all rills or gullies and properly compact prior to installation.
- 3. Install check dams in ditches perpendicular to the flowline.
- 4. Stake fiber rolls in place with $1\frac{1}{8}$ -inch x $1\frac{1}{8}$ -inch wood stakes. Drive stakes at each end of the fiber roll and at 2-foot maximum spacing.
- 5. Drive stakes into undisturbed soil of trench bottom. Expose stakes 2-inches minimum above top of fiber roll.
- 6. Provide sufficient length to prevent water from flowing around the ends of the fiber roll.
- 7. Adjust check dam spacing based on site-specific conditions.







FIBER ROLL CHECK DAM

FIBER ROLL STAKING DETAIL

Trench 2" min.

Place excavated

trench material on

uphill side of fiber roll

FIBER ROLL CHECK DAM SPACING* (See Note 7)		
DITCH GRADE	CHECK DAM SPACING (max.) (FT)	
2%	150	
3%	100	

V-ditch design shown.

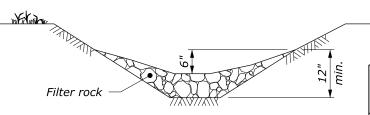
4% 5%

Check dam installation details are similar for flat-bottom ditches

> * Spacing calculated based on 9" Ø minimum fiber roll. Do not use fiber roll check dams on ditch grades steeper than 5%.

80

60

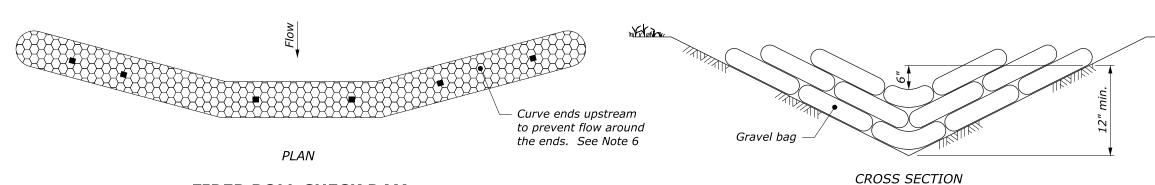


CROSS SECTION

FLAT-BOTTOM DTICH CROSS SECTION

FILTER ROCK CHECK DAM SPACING (See Note 7)		
DITCH GRADE	CHECK DAM SPACING (max.) (FT)	
2%	150	
3%	100	
4%	80	
5%	60	
6%	50	

FILTER ROCK CHECK DAM



4%	80	l
5%	60	
6%	50	
	use gravel bag che n ditch grades stee	

GRAVEL BAG

(See Note 7)

CHECK DAM

SPACING (max.)

(FT)

150

100

CHECK DAM SPACING**

DITCH

GRADE

2%

3%

than 6%.

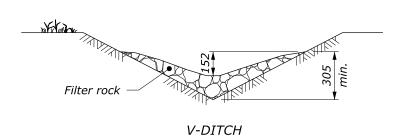
GRAVEL BAG CHECK DAM

CHECK DAM MODERATE GRADES

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

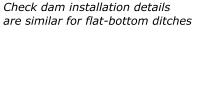
WFL STANDARD W157-15 SPECIFICATION FP-24, FP-14 APPROVED FOR USE 7/2016

- 1. Construct check dams from fiber rolls, filter rock, or gravel bags as approved, to meet the functional requirements of the check dam device.
- 2. Repair all rills or gullies and properly compact prior to installation.
- 3. Install check dams in ditches perpendicular to the flowline.
- 4. Stake fiber rolls in place with 29 mm x 29 mm wood stakes. Drive stakes at each end of the fiber roll and at 610 mm maximum spacing.
- 5. Drive stakes into undisturbed soil of trench bottom. Expose stakes 51 mm minimum above top of fiber roll.
- 6. Provide sufficient length to prevent water from flowing around the ends of the fiber roll.
- 7. Adjust check dam spacing based on site-specific conditions.

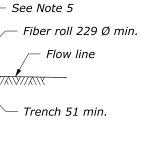


CROSS SECTION

CROSS SECTION



V-ditch design shown.



FIBER ROLL CHECK DAM

FIBER ROLL STAKING DETAIL

Trench 51 min.

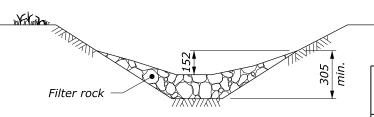
Place excavated

trench material on

uphill side of fiber roll

FIBER ROLL CHECK DAM SPACING* (See Note 7)		
DITCH SPACING (max. (m)		
2%	46	
3%	30	
4% 24		
5%	18	

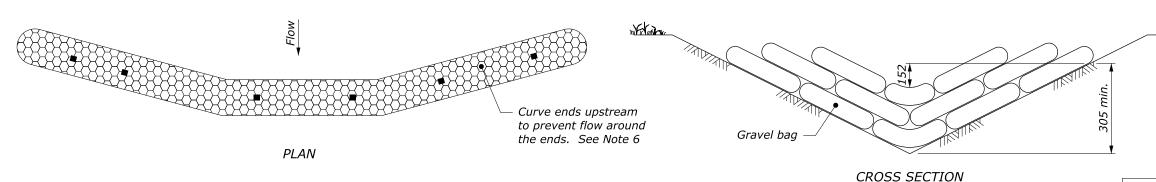
* Spacing calculated based on 229 mm Ø minimum fiber roll. Do not use fiber roll check dams on ditch grades steeper than 5%.



FLAT-BOTTOM DTICH CROSS SECTION

FILTER ROCK CHECK DAM SPACING (See Note 7)		
DITCH GRADE	CHECK DAM SPACING (max.) (m)	
2%	46	
3%	30	
4%	24	
5%	18	
6%	15	

FILTER ROCK CHECK DAM



GRAVEL BAG CHECK DAM

GRAVEL BAG CHECK DAM SPACING** (See Note 7)			
DITCH GRADE	CHECK DAM SPACING (max.) (m)		
2%	46		
3%	30		
4%	24		
5%	18		
6%	15		

** Do not use gravel bag check dams on ditch grades steeper than 6%.

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CHECK DAM
MODERATE GRADES

WM157-15

SPECIFICATION
FP-24, FP-14

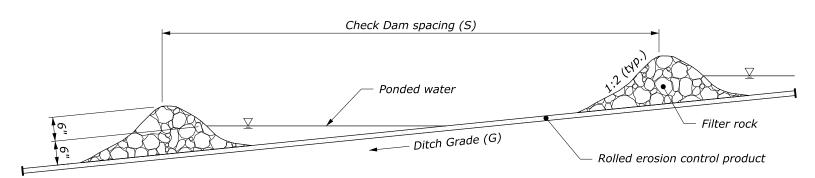
APPROVED FOR USE
7/2016

WFL STANDARD

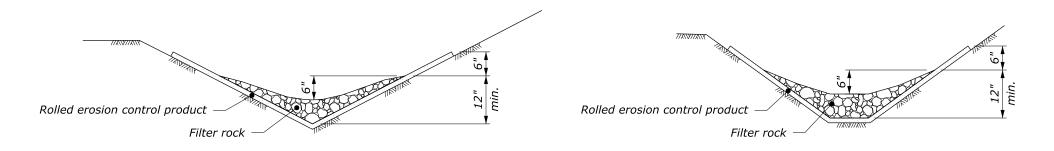
PROJECT SHEET NUMBER

NOTE:

- 1. Repair all rills or gullies and properly compact prior to installation.
- 2. Install check dams in ditches perpendicular to the flowline.
- 3. Adjust check dam spacing based on site-specific conditions.



PROFILE VIEW



CROSS SECTION V-DITCH CROSS SECTION FLAT-BOTTOM DITCH

FILTER ROCK CHECK DAM SPACING (See Note 3)		
DITCH MAX. CHECK DAM		
GRADE SPACING (S)		
(G) (FT)		
7% 40		
8% and 9% 30		
≥10%	20	

FILTER ROCK CHECK DAM WITH ROLLED EROSION CONTROL PRODUCT

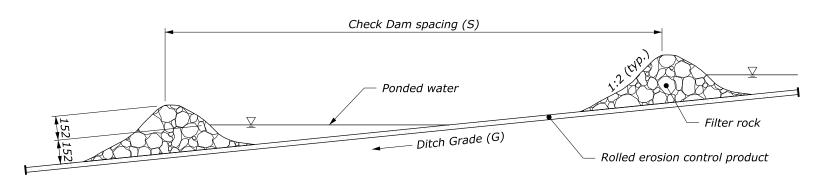
U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

CHECK DAM WITH ROLLED

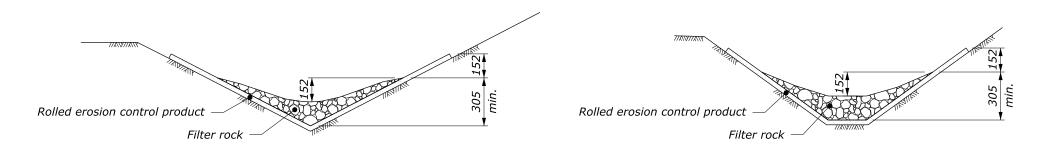
EROSION CONTROL PRODUCT

APPROVED FOR USE 7/2016

- 1. Repair all rills or gullies and properly compact prior to installation.
- 2. Install check dams in ditches perpendicular to the flowline.
- 3. Adjust check dam spacing based on site-specific conditions.



PROFILE VIEW



CROSS SECTION V-DITCH CROSS SECTION FLAT-BOTTOM DITCH

FILTER ROCK CHECK DAM SPACING (See Note 3)		
DITCH MAX. CHECK DAM		
GRADE SPACING (S)		
(G) (m)		
7% 12		
8% and 9% 9		
≥10%	6	

FILTER ROCK CHECK DAM WITH ROLLED EROSION CONTROL PRODUCT

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CHECK DAM WITH ROLLED EROSION CONTROL PRODUCT

SPECIFICATION FP-24, FP-14 APPROVED FOR USE 7/2016

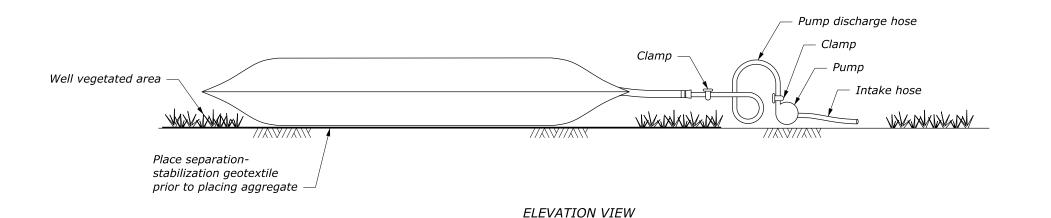
WFL STANDARD WM157-16

Heavy duty lifting straps WELL VEGETATED Use 6" minimum depth clean crushed AREA aggregate only when leveling is required WELL VEGETATED AREA Clamp FLOW Sewn in spout Clamp Pump Intake hose Pump discharge hose Insert hose as specified by manufacturer and securely fasten with metal clamps WELL WELL VEGETATED VEGETATED AREA AREA

PLAN VIEW

NOTE:

- 1. Locate bags in level areas (less than 5% grade). When level areas are not available, place geotextile and coarse aggregate to level the bags.
- 2. Locate bags in approved areas. Discharge onto stable, erosion resistant areas.
- 3. Locate bags in areas accessible by equipment for maintenance and removal.
- 4. Insert a maximum of one hose in each bag at any given time.
- 5. Replace bags when 50% of the sediment capacity has been reached and/or when there is a failure. Have spare bags on site for replacement.
- 6. Do not cut or empty filter bag onsite.
- 7. Do not permit discharge from the bags to drain back into work or access areas of the project.



U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

SEDIMENT FILTER BAG

WFL STANDARD
W157-18
SPECIFICATION
FP-24
APPROVED FOR USE
10/2016

- 1. Locate bags in level areas (less than 5% grade). When level areas are not available, place geotextile and coarse aggregate to level the bags.
- 2. Locate bags in approved areas. Discharge onto stable, erosion resistant areas.
- 3. Locate bags in areas accessible by equipment for maintenance and removal.
- 4. Insert a maximum of one hose in each bag at any given time.
- 5. Replace bags when 50% of the sediment capacity has been reached and/or when there is a failure. Have spare bags on site for replacement.
- 6. Do not cut or empty filter bag onsite.

7. Do not permit discharge from the bags to drain back into work or access areas of the project.

PLAN VIEW

Well vegetated area

Clamp

Pump discharge hose

Clamp

Pump

Intake hose

Place separationstabilization geotextile
prior to placing aggregate

ELEVATION VIEW

This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

WFL STANDARD WM157-18
SPECIFICATION

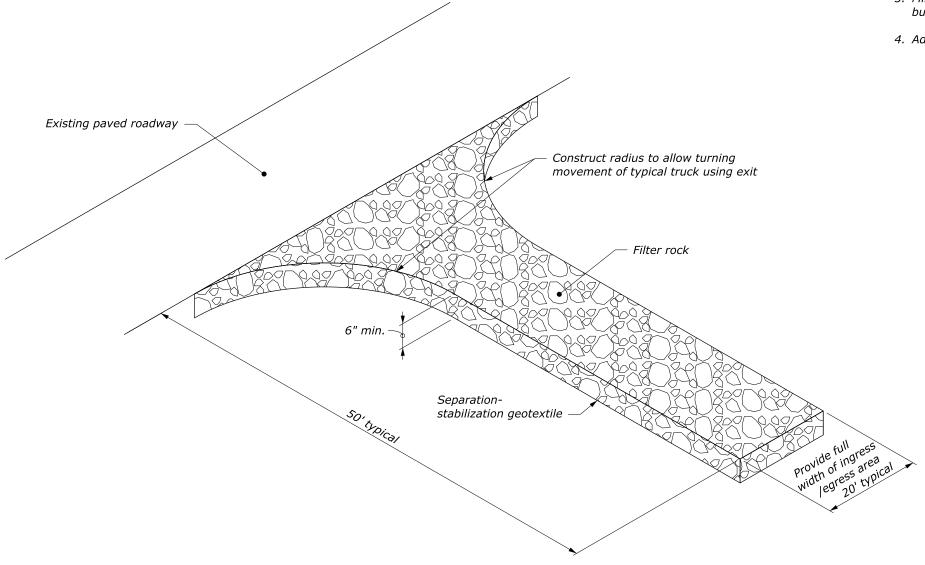
SEDIMENT FILTER BAG

FP-24
APPROVED FOR USE 10/2016

PROJECT SHEET NUMBER

NOTE:

- 1. Use this entrance for construction vehicles only.
- 2. Construct drainage ditches along entrance as directed. Provide temporary drainage culvert where entrance crosses existing drainage ditches.
- 3. Minimize tracking onto paved roadway by removing built up sediment.
- 4. Adjust length to fit field conditions as approved.



STABILIZED CONSTRUCTION EXIT

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

STABILIZED CONSTRUCTION EXIT

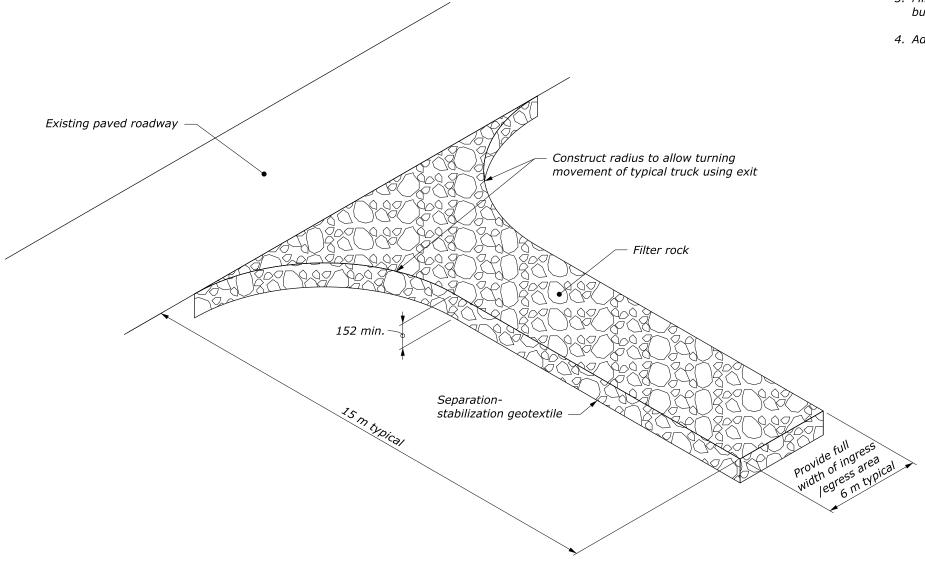
WFL STANDARD
W157-19
SPECIFICATION

FP-24
APPROVED FOR USE 7/2016

PROJECT

NOTE:

- 1. Use this entrance for construction vehicles only.
- 2. Construct drainage ditches along entrance as directed. Provide temporary drainage culvert where entrance crosses existing drainage ditches.
- 3. Minimize tracking onto paved roadway by removing built up sediment.
- 4. Adjust length to fit field conditions as approved.



STABILIZED CONSTRUCTION EXIT

This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

WFL STANDARD WM157-19 SPECIFICATION

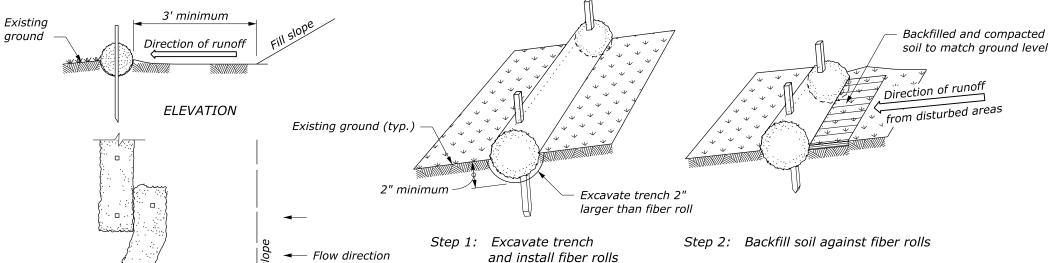
FP-24

7/2016

APPROVED FOR USE

STABILIZED CONSTRUCTION EXIT





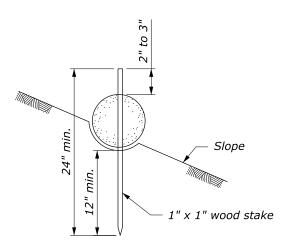
PROPERLY STAKED AND ENTRENCHED FIBER ROLL

FIBER ROLL SPACING Spacing Slope (FT) 1:4 or flatter 40 1:3 30 1:2 20 1:1 10

STAKES REQUIRED		
Fiber roll length Stakes required		
(FT)	for each roll	
25	8	
20	6	
12	4	

NOTE:

- 1. Drive stakes at each end and at 4-foot spacing until fiber roll is secure to slope. Live stakes may be used for permanent installations. Do not crush fiber roll while staking.
- 2. Overlap fiber rolls 12-inch minimum. Drive stakes at 6-inches from fiber roll end angles towards the adjacent fiber roll and space stakes at 4-foot maximum.



FIBER ROLL STAKING DETAIL

INSTALLATION BEYOND TOE OF SLOPE

PLAN

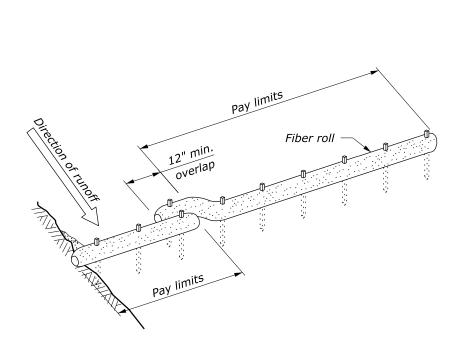
3' minimum or as shown in plans

Runoff from

disturbed areas

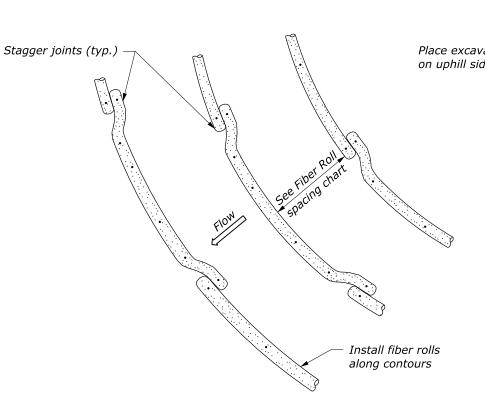
· . . . :

Fiber roll

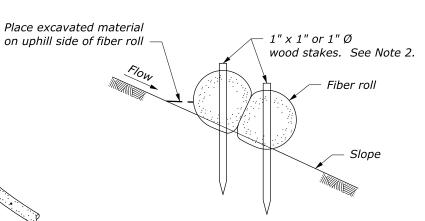


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ALTERNATE FIBER ROLL JOINT DETAIL SLOPE PROTECTION INSTALLATION



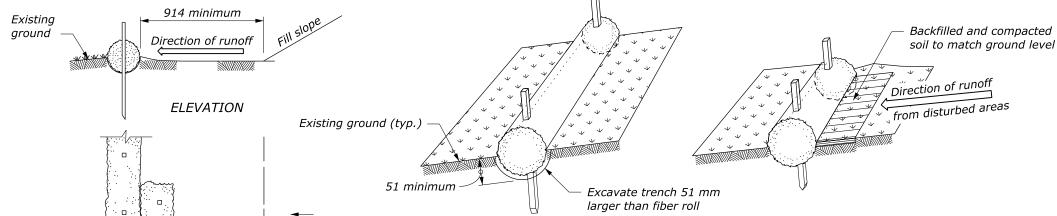
INSTALLATION ALONG SLOPES



FIBER ROLL LAPPING DETAIL

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	WFL STANDARD W157-21
	SPECIFICATION FP-24, FP-14
FIBER ROLL	APPROVED FOR USE 7/2016

PROJECT



→ Flow direction

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Step 1: Excavate trench and install fiber rolls Step 2: Backfill soil against fiber rolls

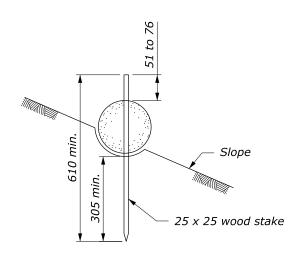
PROPERLY STAKED AND ENTRENCHED FIBER ROLL

FIBER ROLL SPACING	
Slope	Spacing (m)
1:4 or flatter	12
1:3	9
1:2	6
1:1	3

STAKES REQUIRED	
Fiber roll length	Stakes required
(m)	for each roll
7.6	8
6.1	6
3.7	4

NOTE:

- 1. Drive stakes at each end and at 1.2 m spacing until fiber roll is secure to slope. Live stakes may be used for permanent installations. Do not crush fiber roll while staking.
- 2. Overlap fiber rolls 305 mm minimum. Drive stakes at 152 mm from fiber roll end angles towards the adjacent fiber roll and space stakes at 1.2 m maximum.



FIBER ROLL STAKING DETAIL

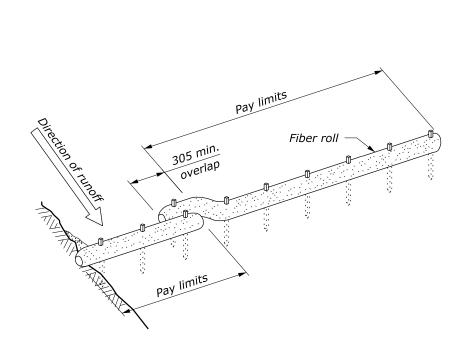
INSTALLATION BEYOND TOE OF SLOPE

PLAN

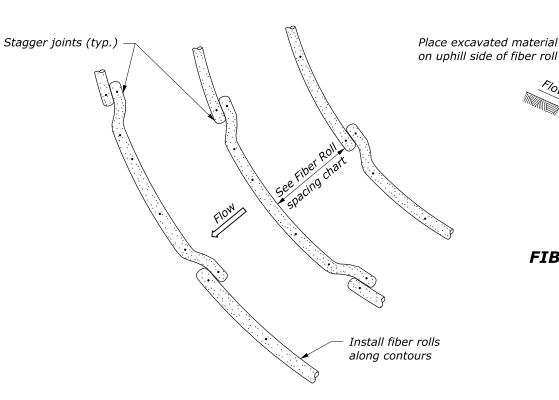
914 minimum or as shown in plans

Runoff from

disturbed areas



ALTERNATE FIBER ROLL JOINT DETAIL SLOPE PROTECTION INSTALLATION



INSTALLATION ALONG SLOPES

25 x 25 or 25 Ø wood stakes. See Note 2. Fiber roll Slope

FIBER ROLL LAPPING DETAIL

This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY WFL STANDARD WM157-21 SPECIFICATION FP-24, FP-14 **FIBER ROLL** APPROVED FOR USE

7/2016

NO SCALE

Fiber roll