Wattle Application on Linear Projects

Barney Blackburn, PE, CPESC, CPSWQ
NCDOT – Roadside Environmental Unit
Soil & Water Engineering Section Supervisor
What is a Wattle?

► Anatomical definition* – a fleshy growth hanging from the head or neck of certain animals.

► Construction definition* – woven strips of wood forming panels used for fencing or for walling.

* – definitions from Wikipedia
NCDOT Wattle Definition

- NCDOT definition – tubular product consisting of excelsior or coir (coconut) fibers encased in synthetic netting.
Types of Wattles

- **Straw** – NCDOT does not use
- **Excelsior**
- **Coir/Coconut Fiber**
- **Compost** – New to NCDOT
- **Synthetic** – No NCDOT experience
**Excelsior vs. Coir Fiber**

**Excelsior**
- Inner Material: Curled Wood
- Diameter: 12 in. – 18 in.
- Length: 10 ft.

**Coir Fiber**
- Inner Material: Coconut Fibers
- Diameter: 12 in. – 18 in.
- Length: 10 ft.
Excelsior vs. Coir Fiber

**Excelsior**

- **Density:** 2.5 lb./ft.³
- **Design Life:** 1 year
- **Average Cost:** $5.00 per ft.  
  (Includes material, labor and equipment costs – 2013 NCDOT bid)

**Coir Fiber**

- **Density:** 3.5 lb./ft.³
- **Design Life:** >2 years
- **Average Cost:** $6.00 per ft.  
  (Includes material, labor and equipment costs – 2013 NCDOT bid)
Linear Project Wattle Applications

- Ditches for Polyacrylamide (PAM) Incorporation
- Drainage Breaks in Silt Fence
- Perimeter Barriers in lieu of Silt Fence
- Slope Breaks and Runoff Diversions
- Inlet Protection
Wattles on Erosion Control Plans

- **Ditchline Wattle**
  - Without PAM
  - With PAM

- **Excelsior Wattle Break and Barrier**
  - EW

- **Coir Fiber Wattle Break and Barrier**
  - CFW
Ditch Wattle Design Info

► Wattles Primarily Used for PAM(powder) Incorporation

► Wattles not designed for:
  ▪ Sediment Storage
  ▪ Velocity Control
  ▪ Vegetation Establishment

► Used in Ditch Grades <2.5%

► Placed in Temporary and Permanent Ditches
Wattles in Ditchlines on EC Plans
Ditch Installation

1. Place Matting

2. Install Wattle and Staples on Matting

3. Install 2 Upslope Stakes and 4 Downslope Stakes

4. Apply 1 oz. of PAM Downstream and Upstream and 2 oz. on Wattle (Total of 4 oz.)
WATTLE WITH POLYACRYLAMIDE (PAM) DETAIL

NOTES:

USE MINIMUM 12 IN. DIAMETER EXCELSIOR WATTLE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. MINIMAL CROSS SECTION.

ONLY INSTALL WATTLE TO A HEIGHT IN EATER so FLOW WILL NOT WASH AROUND WATTLE AND SOUR DITCH SLURRY AND AS DIRECTED.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE AT BOTTOM OF EATER.

PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

INSTALL MATING IN ACCORDANCE WITH SECTION 1001 OF THE STANDARD SPECIFICATIONS.

PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OPPOSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOODGONANT TO BE APPLIED TO EACH WATTLE.

INITIALLY APPLY 2 OUNCES OF ANCECRO OR NEUTRALIZED CHARGED PAM DUTCH WATTLE WHERE WATER WILL FLOW AND 1 OUNCE OF PAM OR MATING ON EACH SIDE OF WATTLE. REAPPLY PAM AFTER EVERY HARDFALL EVENT THAT IS EQUAL TO OR EXCEEDS 0.50 IN.

FLOW
Excelsior Wattle

- Can be used with or without PAM
- When utilized, place wattles every 50 ft. in temporary and/or permanent ditches
- Use Excelsior Wattles on short term projects (one year project duration or less)
Excelsior Wattle
Excelsior Wattle
Excelsior Wattle in Median
Coir Fiber Wattle

- Can be used with or without PAM

- When utilized, place coir wattles every 50 ft. in temporary and/or permanent ditches

- Use Coir Fiber Wattles on long term projects (project duration of more than a year)
Coir Fiber Wattle
Coir Fiber Wattle
Coir Fiber Wattles in Temporary Diversion
Silt Fence Wattle Breaks

Design - Utilized on Clearing & Grubbing and Final Grade Phases of Erosion Control Plans

Placement – Between Silt Fence Segments

Function – Wattle provides a drainage break for Silt Fence Sections in Low Areas
Wattle Break Design

- Design for Wattle of 10 ft. in length
- Can be used in wetlands, easy to remove (or not!)
- Maximum Spacing of 200 ft.
- Use Coir Fiber Wattles (CFW) for projects > 1 year
Wattle Breaks in Silt Fence on Plans
SILT FENCE WATTLE BREAK DETAIL

NOTES:

USE MINIMUM 12 IN. DIAMETER EXCELSIOR WATTLE AND LENGTH OF 10 FT.

EXCAVATE A 1 TO 2 INCH TRENCH FOR WATTLE TO BE PLACED,

DO NOT PLACE WATTLE ON TOE OF SLOPE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO GROUND.

PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORGED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

WATTLE INSTALLATION CAN BE ON OUTSIDE OF THE SILT FENCE AS DIRECTED.

INSTALL TEMPORARY SILT FENCE IN ACCORDANCE WITH SECTION 16S5 OF THE STANDARD SPECIFICATIONS.

INSET A

FILL SLOPE

12" WATTLE

SILT FENCE POST

UPPSLOPE STAKE

SEE INSET A

STAPLE

DOWNSLOPE STAKE

SIDE VIEW
Silt Fence Break Installation

1. Leave 8 ft. gap in Silt Fence

2. Excavate 1” to 2” trench to the inside of Silt Fence

3. Place Wattle and Staples in trench

4. Install 2 Upslope Stakes and 4 Downslope Stakes
Wattle Break in Silt Fence
Wattle Break in Silt Fence
Wattle Barrier

Design - Utilized on Clearing & Grubbing and Final Grade Phases of Erosion Control Plans

Placement - At the toe of bridge approach fill slopes

Function - Wattle Barrier temporarily traps sheet flow from disturbed slopes allowing sediment to settle on the flow side
Wattle Barrier Design

► Utilize where Silt Fence can’t be installed (<4 ft.)

► Can be used in wetlands, easy to remove (or not!)

► Maximum Spacing of 20 ft. for breaks on slopes

► Use Coir Fiber Wattles (CFW) for projects > 1 year

► Design for 18 in. diameter Wattle
Wattle Barrier on EC Plans
WATTLE BARRIER DETAIL

NOTES:

USE MINIMUM 18 IN. NOMINAL DIAMETER EXCELSIOR WATTLE AND LENGTH OF 10 FT.

EXCAVATE A 2 TO 3 INCH TRENCH FOR WATTLE TO BE PLACED.

DO NOT PLACE WATTLE ON TOE OF SLOPE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO GROUND.

PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

FOR BREAKS ALONG LARGE SLOPES, USE MAXIMUM SPACING OF 20 FT.

ISOMETRIC VIEW

FILL MATERIAL

TOE OF FILL

ROAD GRADE

FILL SLOPE

INSET A

2"-3" TRENCH

FRONT VIEW

2" WOODEN STAKE

4 FT.

6" WATTLE

SEE INSET A

TOP VIEW

TOE OF FILL

UPSLOPE STAKE

18" WATTLE

DOWNSLOPE STAKE
Wattle Barrier Installation

1. Excavate 2” to 3” trenches in alternating pattern

2. Place Wattles and Staples in trenches

3. Make sure Wattles overlap at least 1 ft.

4. Install 2 Upslope Stakes and 4 Downslope Stakes
Perimeter Wattle Barrier

4 ft.
Wattle Barrier
Wattles as Slope Break
Wattle w/ PAM at Slope Drains
Wattle as Pipe Inlet Protection
Wattle Inlet Protection
Wattle Inlet Protection
Wattle Locations for PAM

► Upstream locations that drain to:
  ▪ Silt Fence
  ▪ Sediment Basin or Trap
  ▪ Rock Dam or Inlet Protection

► Inlet to Sediment Basins

► Inlets to Slope Drains
Wattle Locations **NOT** for PAM

- **Jurisdictional Areas**
  - Streams
  - Wetlands
  - Ponds

- **Perimeter Measure**

- **Outlets of Ditches**

- **Drainage Inlets Carrying Flow Directly Offsite**
Scour Underneath Wattle
Scour Underneath Wattle
Wattle not Stapled Adequately
Wattle Overkill!

Only Wattle needed here!
Stacked Wattles
Wattle Application Summary

- Use Wattles for PAM Incorporation (upstream only!)

- Wattles can be used at Perimeter (No PAM!)

- Can provide Velocity Control & Sediment Storage

- Easier Removal and Disposal than Stone
Wattle Web Resources

► Wattle Construction Specifications:
  http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/soil_water/special_provisions/

► Wattle Construction Details:
  http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/soil_water/details/

► NCDOT Erosion Control Pocket Field Guide
Questions?

Barney Blackburn, PE, CPESC, CPSWQ
1 S. Wilmington St.
Raleigh, NC 27601

Phone: 919-707-2942
Email: bblackburn@ncdot.gov
Web: http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/soil_water/