RipRap Infalls and Flumes Proper Construction Techniques

Waukesha County Stormwater Conference

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LEADING THE WAY

Why RIPRAP?

- PERMANENT EROSION CONTROL DEVICE
- EROSION RESISTANT – WORKS WELL IN CONCENTRATED RUNOFF AREAS
- VARYING SIZES (nominal size)
  - LIGHT (4-9 inches)
  - MEDIUM (5-11 inches)
  - HEAVY (7-14 inches)
  - EXTRA-HEAVY (8-18 inches)
- PROTECTS SLOPES, BANKS, CHANNELS
- SLOWS VELOCITY OF RUNOFF/EROSION POTENTIAL
- STABILIZES SLOPES DUE TO SEEPAGE

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WHY RIPRAP?

PROS	CONS
• READILY AVAILABLE • EASY TO INSTALL • EASY TO MAINTAIN • DECREASES VELOCITY AND POTENTIAL FOR EROSION • USED WHERE VEGETATION CANNOT THRIVE	• EXPENSIVE COMPARED TO SEED • SCOUR POTENTIAL • DOES NOT INCREASE HABITAT AREAS LIKE GRASSY AREAS

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INSTALLING RIPRAP

- WELL GRADED DENSE RIPRAP

AVERAGE DIMENSION RANGES FOR EACH RIPRAP GRADE				FRACTION OF GROSS
LIGHT RIPRAP inches	MEDIUM RIPRAP inches	HEAVY RIPRAP inches	EXTRA-HEAVY RIPRAP inches	IN-PLACE RIPRAP VOLUME OCCUPIED BY STONES
>16	>20	>25	>30	0%
11 - 13	14 - 16	18 - 20	22 - 25	10% - 14%
9 - 11	11 - 14	14 - 18	18 - 22	15% - 21%
4 - 9	5 - 11	6.5 - 14	8 - 18	20% - 28%
<4	<5	<6.5	<8	5% - 7%
<1	<1	<1	<1	2% or less

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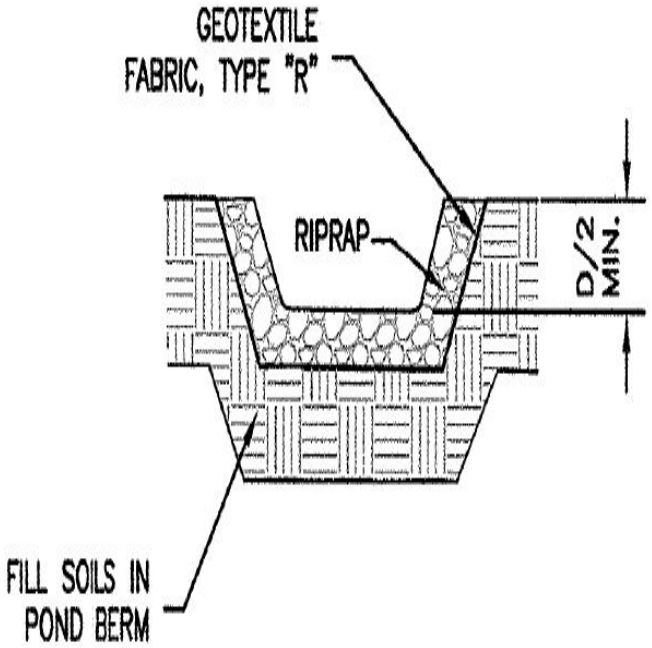
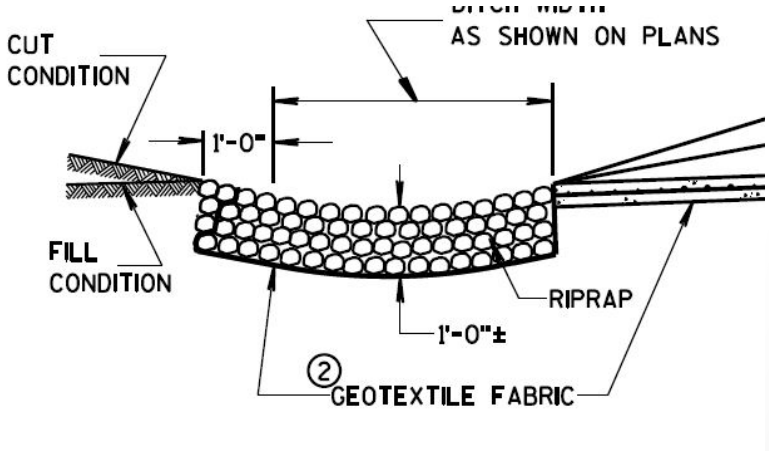
INSTALLING RIPRAP

DESIGN

TRAPAZOIDAL



PARABOLIC



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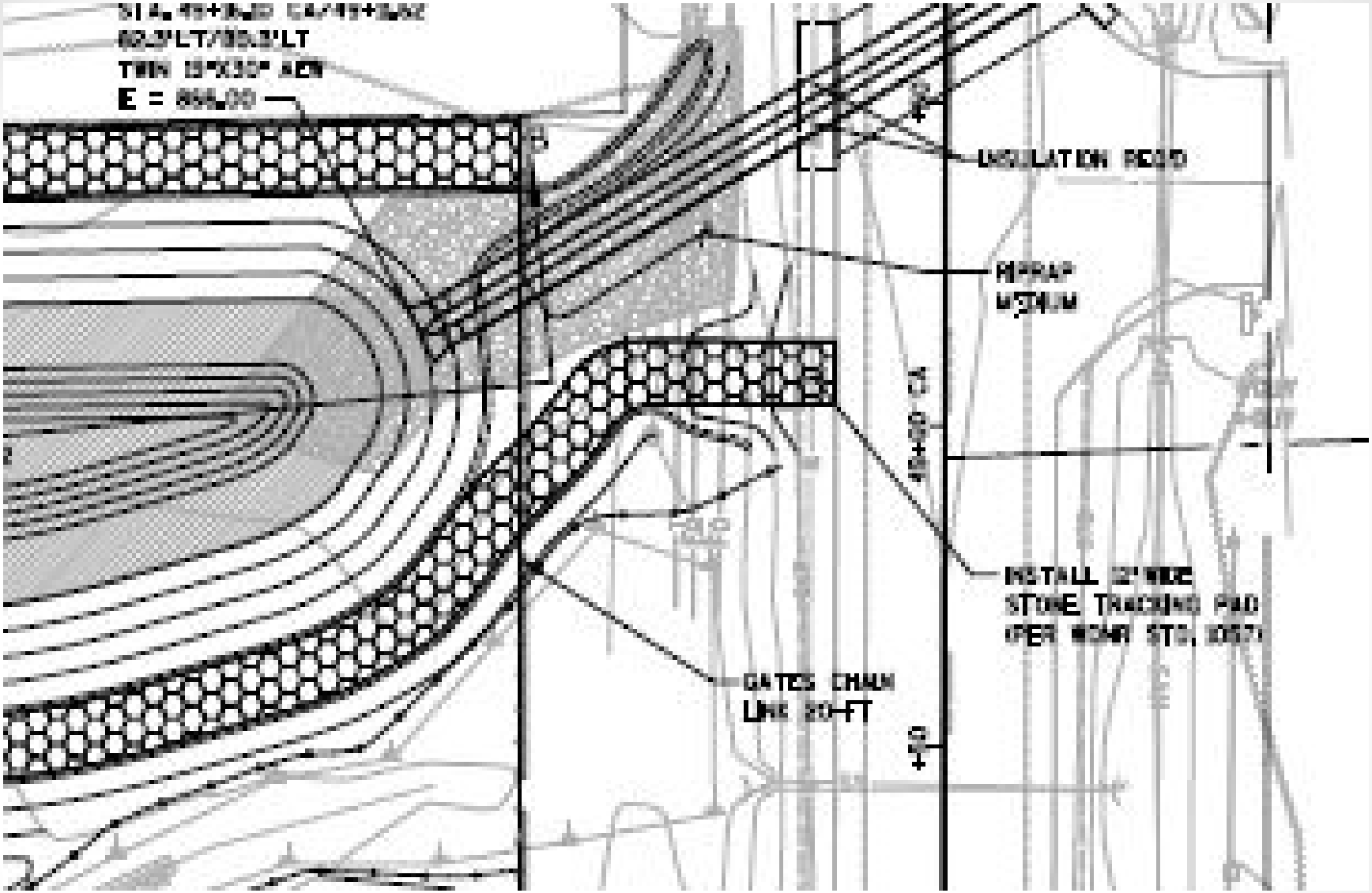
INSTALLING RIPRAP

- USE CORRECT GEOTEXTILE FABRIC BASED ON SIZE :
  - R, MR, HR
- PROPER DEPTH – IS IT DEEP ENOUGH?
- IS IT THE CORRECT SHAPE?
- INSTALL BY HAND OR BY MACHINE IN ONE LIFT
- FILL VOIDS WITH HANDPLACED SMALLER STONE
- PLACE AS SOON AFTER PIPES ARE PLACED



PLAN CTH D & Calhoun Rd

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RIP RAP FLUME

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Rip Rap Flumes

BEFORE

AFTER

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WHAT ARE THE PROBLEMS?

- EXCAVATION IS NOT DEEP ENOUGH – MOST COMMON ISSUE
- POOR GRADATION
- POOR COMPACTION OF FOUNDATION CAUSING STONE DISPLACEMENT
- TOE AND SLOPES NOT PROPERLY GRADED
- VEGETATION NOT REMOVED
- NO SWALE – TOO FLAT
- SLOPES ARE TOO STEEP
- TALK WITH DESIGNER – WHAT IS THE INTENT?
- TALK WITH THE CONTRACTOR – ALTERNATIVE METHOD TO FIT CONDITIONS?

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QUESTIONS?

Thank you!

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