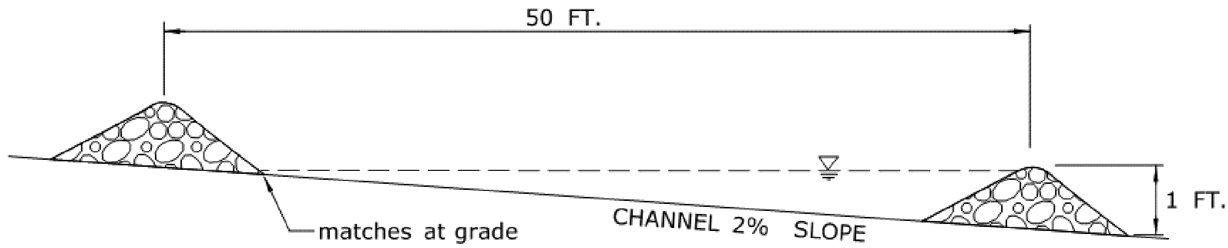
MS4 Project – Alternative 1B – grass channel with stone check dams added

Examining the effect of putting stone check dams in the grass channel:

Note: To utilize stone check dams in a channel in order to increase infiltration (retention):

- Soils must be suitable for infiltration
- Channel must have freeboard at design flow w/stone dikes (functioning as weirs)
- Maximum 18" tall stone dikes
- The height of the stone check dams and their spacing will be related to the channel slope to provide the best chance for a retaining and infiltrating the WQV to the extent practicable.

For this example, assume the stone check dams are 12" high and 50' apart for a length of 150'.



Using the Stage/Discharge Table provided on the "Trap. Channel" tab of the MS4 Water Quality Worksheet, [..\MS4 Water_Quality_Volume__Water_Quality_Flow_Worksheet.xlsx]

for the 4' bottom trapezoidal channel with a water depth of 12", the cross sectional area of the channel at the downstream dike is 7.0 s.f.
At 2% slope, (for this example,) the depth of water is 0 ft. at the previous stone check dam 50' away. (Note: a depth of zero at the previous check dam is not required.)

Therefore by Average End Area, the volume ponded by each dike will be:
(0sf + 7sf)/2 x 50ft = 175 c.f.

For three stone check dams the total ponded area is: 175 c.f. x 3 = 525 c.f. = 0.012 ac-ft

Enter WQV Retained (infiltrated) by Stone Check Dams in Section 4 of the worksheet.

Section 4: Stormwater BMP Selection Summary			
Design Phase ☐30% ☐60% ☐90% ☐FDP	WQV Retained (ac-ft)	WQV Treated (ac-ft)	Site Constraints
Disconnection			
No curb / natural dispersion	0.012	0.012	Insufficient Right-of-Way
Vegetative filter strip			Choose an Item.
Other			Choose an Item.
Conveyance & Disconnection			
Grass channel		0.01	Choose an Item.
Water quality swale (dry)			Choose an Item.
Other			Choose an Item.
Infiltration / Retention			
Infiltration basin			Choose an Item.
Infiltration trench			Choose an Item.
Underground infiltration system			Choose an Item.
Dry well			Choose an Item.
Other Stone Check Dams	0.012		Choose an Item.
Treatment			
Wet basin / wetland system			Choose an Item.
Extended dry detention basin			Choose an Item.
Hydrodynamic-oil/grit sys.			Choose an Item.
Bioretention with underdrain			Choose an Item.
Other			Choose an Item.
TOTAL	0.024	0.022	

Notes: Three stone check dams added: 1 foot high, 50 feet apart. Total ponded area = 525 c.f. = 0.012 ac-ft (see attached calculations.)

Enter the new total WQV Retained and WQV Treated into DC2 and DC3 in Section 3 of the worksheet to obtain a new Total WQV that now includes disconnection, the grass channel and stone check dams.

The change in DCIA associated with the installation of stone check dams will be based on the percentage % of the contributing drainage area WQV retained by the stone check dams.

Section 3: Designed Conditions						
Water Quality Calculations		30% Design		60% Design	90% Design	FDP
DC1	WQV retention design goal ☑ Full ☐ 1/2"-WQV	ac-ft	☑ TBD	0.079 ac-ft	ac-ft	ac-ft
DC2	WQV goal ***retained*** (refer to page 2)	ac-ft		0.024 ac-ft	ac-ft	ac-ft
DC3	WQV goal ***treated*** (refer to page 2)	ac-ft		.022 ac-ft	ac-ft	ac-ft
DC4	Total WQV *retained and treated*	0 **ac-ft**		0.046 **ac-ft**	0 **ac-ft**	0 **ac-ft**
DC5	Post-construction DCIA(acres)	ac.	☑ TBD	0.42 ac.	ac.	ac.
DC6	Pre-construction DCIA (refer to EC2 above)	ac.		0.62 ac.	ac.	ac.
DC7	Change in DCIA from pre- to post-construction *Can be positive (DCIA gained) or negative (DCIA lost)*	0 **ac.**	☑ **TBD**	-0.2 **ac.**	0 **ac.**	0 **ac.**

It was determined that the stone check dams retained 0.012 ac-ft. The WQV for the drainage area to the Grass Channel was previously calculated to be 0.067

0.012/0.067 = 17.9% of the WQV Goal

Referring back to the drainage area to the grass channel: of the total 3.37 acre drainage area, 0.7 acres was impervious.

17.9% x 0.7 ac = 0.13 acres (This area is now considered to be also disconnected.)

Revising Post-Construction DCIA (DC5):

Previous DCIA to this point was 0.55 ac (Example 1A)

0.55 – 0.13 = 0.42 acres (entered into DC5)

DC7: The change in DCIA automatically self-calculates. There is a 0.2 acre reduction in Directly Connected Impervious Area. The three stone check dams help to provide a DCIA reduction for the project.