

## 5.4 GRASS LINED CHANNELS

**1. DESCRIPTION** - A channel with vegetation and possibly temporary or permanent erosion control matting that is constructed to a design cross section and grade for the conveyance of stormwater runoff during long-term or different phases of construction.

**2. PURPOSE** -To convey concentrated stormwater runoff without erosion, sediment deposition, or flooding.

**3. APPLICATIONS** - This practice can be applied where:

- Concentrated stormwater runoff must be conveyed on a site.
- A vegetative lining can provide sufficient stability for the channel and flow conditions.
- Channel grades are generally less than 5%.
- Space is available for a relatively large cross section.

**4. LIMITATIONS** - The use of this practice is normally limited to:

- Areas where a channel slope of from 1% to 5% can be attained.
- Areas where the natural drainage patterns can be maintained by use of the open channels.
- Design flow velocities that will be less than 6 feet per second.
- Areas graded through existing ground conditions (i.e. not in fill material).

**5. DESIGN CRITERIA** -

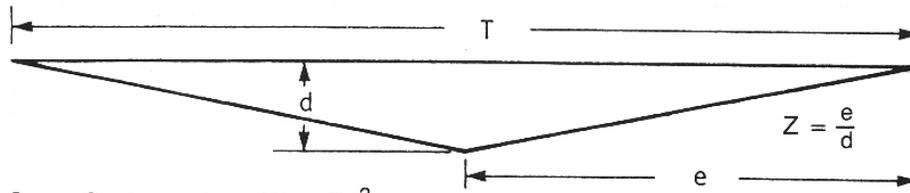
- A. Capacity - shall convey the runoff from a 100-year storm.
- B. Shape - Trapezoidal, parabolic or V bottom at the discretion of the designer.
- C. Velocity - Less than 6 feet per second at design flow. Erosion control matting may be required to stabilize when design velocity  $\geq$  6 fps.
- D. Side Slopes - 3H:1V or flatter.
- E. Freeboard - One foot between design flow depth and top of bank.

**6. MATERIAL SPECIFICATIONS** -

- A. Seeding - Temporary; TxDOT Specification Item 164.  
Permanent; NCTCOG Specification 3.10 as modified by the City of Plano Special Provisions
- B. Sodding - NCTCOG Specification 3.9.
- C. Erosion Control Matting - TxDOT approved Specification Item 169, Class 2.

**7. MAINTENANCE REQUIREMENTS** - During the vegetation establishment period inspect channels after every rain event. Check for erosion and sediment buildup and repair as needed. After establishment of vegetation periodically check channel for damage. Particular attention must be given to side slopes, embankments at pipe inlets and outlets, and condition of the vegetative stabilization. Vegetated channels require maintenance for weed control, possible mowing, sediment removal, and rill development.

### V-Shape

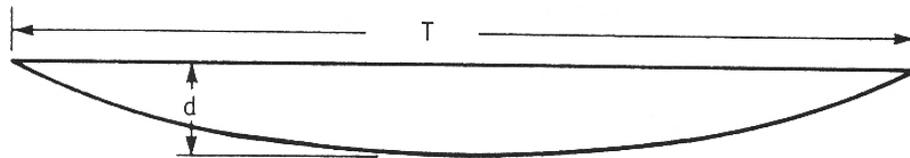


$$\text{Cross-Sectional Area (A)} = Zd^2$$

$$\text{Top Width (T)} = 2dZ$$

$$\text{Hydraulic Radius (R)} = \frac{Zd}{2\sqrt{Z^2 + 1}}$$

### Parabolic Shape

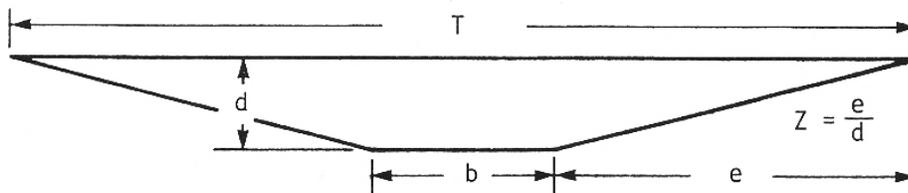


$$\text{Cross-Sectional Area (A)} = \frac{2}{3} Td$$

$$\text{Top Width (T)} = \frac{1.5A}{d}$$

$$\text{Hydraulic Radius} = \frac{T^2d}{1.5T^2 + 4d^2}$$

### Trapezoidal Shape



$$\text{Cross-Sectional Area (A)} = bd + Zd^2$$

$$\text{Top Width (T)} = b + 2dZ$$

$$\text{Hydraulic Radius} = \frac{bd + Zd^2}{b + 2d\sqrt{Z^2 + 1}}$$

[NEXT PAGE >](#)