United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Part 650
Engineering Field Handbook

Chapter 7 Grassed Waterways

Issued December 2007

Cover: Grassed waterway in Fayette County, Iowa

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(210–VI–EFH, December 2007)

Acknowledgements

Acknowledgments

This chapter was prepared under the general direction of **Daniel Meyer**, national agricultural engineer, Natural Resources Conservation Service (NRCS), Washington, DC, with assistance from **Kelsi S. Bracmort**, Ph.D., agricultural engineer, NRCS, Washington, DC. **D.M. Temple**, research hydraulic engineer (retired), Agricultural Research Service (ARS), Stillwater, Oklahoma, provided guidance and leadership on developing the science for grassed waterways and provided coordination on drafting of the handbook with Oklahoma State University. **Ellen Stevens**, Ph.D., P.E., an instructor and researcher at Oklahoma State University, is the principal author of this manuscript.

Editorial and layout assistance was provided by **Lynn Owens**, Editor, NRCS, Fort Worth, Texas; **Wendy Pierce**, illustrator, NRCS, Fort Worth, Texas; and **Suzi Self**, editorial assistant, NRCS, Fort Worth, Texas.

Extensive comments and edits were supplied by **J. Chris Stoner**, agricultural engineer, NRCS, Stillwater, Oklahoma; **Arthur M. Brate**, state conservation engineer, NRCS, Columbus, Ohio; **Jesse Wilson**, state conservation engineer, NRCS, Gainesville, Florida; **Jade Nield**, agricultural engineer, NRCS, Gainesville, Florida; **Nga Watts**, agricultural engineer, NRCS, Gainesville, Florida; and **Jason Strenth**, agricultural engineer, NRCS, Gainesville, Florida.

Robert E. Romocki, area engineer, Rochester, Minnesota, provided the filter fabric material and diagrams.

Other staff members at the NRCS State Offices also contributed by reviewing the chapter and providing comments.

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Chapter 7 Grassed Waterways

650.0700 Introduction

Grassed waterways are natural or constructed channels shaped to required dimensions and lined with suitable vegetation for stable conveyance of runoff.

Grass-lined water conveyance channels are widely used to convey excess runoff water where flows are of a sufficiently short duration to allow the grass to withstand the inundation period and operation is sufficiently infrequent to allow healthy grass cover to be maintained. This type of channel may be used for diversions, spillways, and floodways, as well as for waterways to convey local runoff.

Research conducted during the 1930s and 1940s documented the benefit of grass as a water conveyance channel liner and provided the basis for engineering design of a stable section based on permissible velocity. This approach was documented in Soil Conservation Service (SCS) Technical Paper (TP)–61 published in 1947, revised in 1954 (SCS 1954), and was used for the design of grassed waterways throughout the remainder of the 20th century. Since the development of the permissible velocity approach and procedure, additional research has led to a more in-depth understanding of the interaction of the flow with the vegetated boundary of a grass-lined channel and the digital computer has allowed more extensive calculations to be easily carried out when needed. These advances led to the documentation of an effective stress approach to grass-lined channel design documented in USDA Agriculture Handbook #667 (Temple et al. 1987). This approach, which also incorporates more general stable channel design concepts and data, has been successfully integrated into the Waterway Design Tool (WDT) software used by the Natural Resources Conservation Service (NRCS) for design of vegetated earth spillways and is being used for design of other grass-lined channels. Incorporation of the allowable effective stress approach into the NRCS Engineering Field Handbook (EFH) allows additional design flexibility through separation of the effects of soil and vegetal parameters and makes the procedures used for waterway and diversion design consistent with those used for other grass-lined and unlined channels.

650.0701 Assessment of suitability

(a) General considerations

A constructed waterway is designed to carry the estimated flow without damage to the waterway or its lining. Waterways should be planned and designed to fit the conditions of a particular site, and the following factors dealing with construction and management should be determined before designing the waterway:

- slope of the proposed waterway (note that this may need to be modified to get a satisfactory design)
- vegetation suitable for site conditions
- expected height at which vegetative cover will be maintained, both in growing and dormant seasons
- allowance for area of field occupied by the waterway
- allowance for freeboard, if required by local standards and specifications

Design of a satisfactory vegetated waterway requires assessment of several site-specific factors: soil properties, management requirements of the vegetation, and climate. The soil properties define the allowable effective stress and are also a factor in the site hydrology and determination of the design discharge. Proper management of the vegetation is critical to its ability to provide the expected level of protection for the channel. The level of management at the site that is feasible, economical, and logistical should be determined and vegetation that will thrive under that degree of management selected. Since height of vegetation is an important factor in flow resistance, realistic estimates of the frequency of mowing and maximum height to be achieved between mowings should be made. In addition to its impact on site hydrology and design discharge, climate is an important factor in vegetation selection and the intensity of management required. In selecting the vegetation and maintenance program for a site, the goal should be to maximize the quality and uniformity of the resulting cover.

A successful grassed waterway also depends on good conservation treatment of the contributing watershed and a regular maintenance program. The better the erosion control in the watershed, the less silting there will be in the waterway. Good conservation practices also reduce the peak rate of runoff and volume of water to be carried by the waterway. When good conservation treatment of the drainage area is not obtained, greater maintenance is usually required.

Waterways subject to constant or prolonged flows require special supplemental treatment, such as stone centers or subsurface drains capable of carrying a portion of such flows. Typically, a grass lining is not suitable if continuous flows for more than 72 hours are expected. A grassed waterway is susceptible to considerable erosion damage until permanent vegetative cover is established. Flows experienced by the waterway during the establishment period may result in maintenance or repair being required.

If an existing natural waterway is to be used, it may need to be selectively cleared, shaped, or enlarged to accommodate the design flow. It also must be checked to ensure stability. Natural waterways that are providing important woody wildlife cover and are not seriously eroding should not normally be disturbed.

Avoid placing waterways where there are sharp, unnatural changes in flow direction. Land management systems should be planned to conform to natural land features. The location of the alignment should not pose a threat to important landscape elements such as unique trees, geologic formations, or scenic features. The slope of the waterway should not interfere with adjacent land uses. Shallower and broader designs usually blend in better and are less disruptive.

(b) Legal/regulatory considerations

If buried utilities cross the proposed alignment, contact the utility companies to determine the exact location of underground services, and analyze compatibility.

The use of public road ditches for the disposal of water should be in conformance with the policy of the local transportation authority and the NRCS. Where a road crosses a waterway, consideration should be given to providing a culvert, bridge, or lining to protect the waterway from resulting damage.

Any other applicable state laws and local ordinances and regulations must be observed in locating waterways and outlets.

650.0702 Planning and preliminary design considerations

(a) Location

If possible, consider more than one location, and select the most practical and economical alternative, considering aesthetics and the nature of local land use. Consider outlet conditions, topography, vegetation, land values, cultural activities, visual quality, soil type, length of slope, and natural features. Waterways should be located such that they will not experience vehicle traffic or other activity sufficient to damage the vegetal cover.

The location of waterways is important to a good program of erosion and sediment control. Wherever possible, the natural drainage system should be preserved and used. Waterways should generally be located in natural drainageways where water can drain in from all sides. Moisture conditions and soil fertility are usually best in such areas for establishment of vegetation. Other advantages of natural waterways include:

- flattest grade in the immediate area
- most stable waterway conditions
- adequate capacity
- sufficient depth for outletting diversions, terraces, and rows with minimum earthwork

Waterways can also be located along development boundaries, road rights-of-way, property lines, or along storm sewer center lines. Special precautions should be taken when waterways start or end near property lines. Care must be taken to prevent sediment from damaging lower or downstream properties. If the upper or upstream end is near a property line, the transition must be stable to prevent erosion or degradation of neighboring land.

In lieu of a constructed or natural channel, an adjoining pasture or meadow strip may be used. The surface of such areas should be checked, however, to ensure that uniform surface and adequate width are available to spread the flow and that the type and density of vegetation are adequate to protect the soil from erosion.

An area of land parallel to a field boundary should be used for the waterway, if suitable. One advantage of this location is that the waterway is less likely to be damaged by farm equipment. Such a location often requires the construction of a channel to:

- provide an outlet for terraces or diversions that cannot be extended to a natural draw
- provide an outlet away from buildings or other critical areas
- avoid the use of a gullied natural draw that would be impractical to stabilize, especially those with large watersheds

(b) Slope

The design bed slope will generally reflect the slope along the chosen channel alignment. If the slope at the site changes significantly and the bed slope will need to change, the channel can be broken up into reaches for analysis. While it is generally most convenient to follow the lay of the land in selecting a slope, there are occasions where modifications to the slope may be necessary such as:

- If it is not possible to find an appropriately sized stable section, it may be necessary to build the channel on a flatter bed slope.
- If it is not possible to obtain adequate capacity under a depth and/or width limitation, then a steeper bed slope is needed.

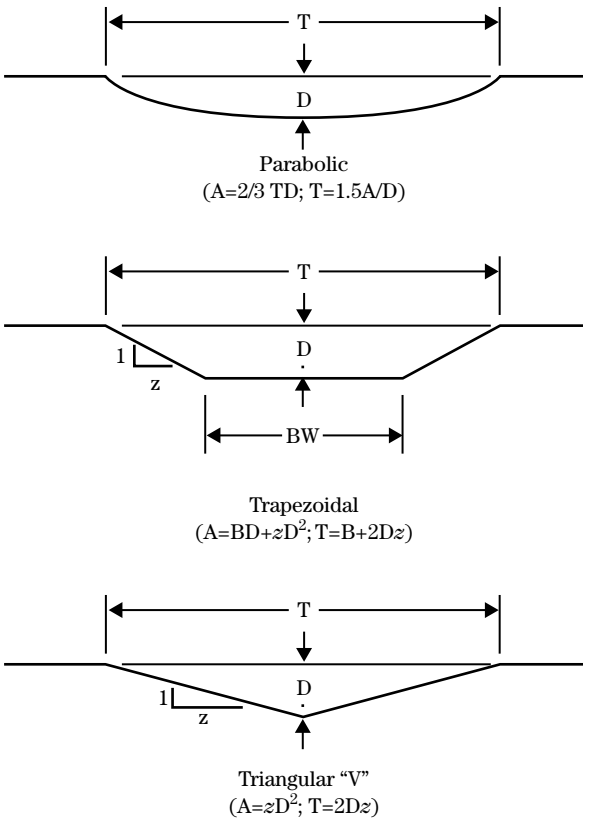
Final grades should be selected to meet capacity and stability requirements. When permanently vegetated waterways are used in residential or commercial developments to manage or convey storm water, the grade of the channel should be such as to minimize standing water or wetness problems. The slope should be steep enough to minimize sediment deposition in the waterway and flat enough to minimize erosion during large flow events.

(c) Cross section shape

The channel section is chosen to accommodate site conditions, limitations imposed by availability of excavating equipment, and allow for maintenance, grazing, or traffic.

Vegetated waterways may be built in a parabolic, trapezoidal, or V shape. Parabolic waterways are the most common and generally are the most satisfactory. This shape is ordinarily found in nature. Small flows are less likely to meander. Waterways constructed with a trapezoidal section often tend to revert to a parabolic cross section. A modified trapezoidal cross section with the bottom center constructed 0.3 to 0.5 feet lower than the edges is sometimes used on wide waterways. The cross section should be designed to permit easy crossing by equipment where necessary. Typical waterway cross sections are shown in figure 7–1.

Figure 7–1 Typical waterway cross sections



Where: A=cross section
D=design depth
T=design top width
B=design bottom width
z=side slope ratio

(d) Vegetation

Consider the possible future conditions of the vegetative lining based upon natural succession and maintenance. In some cases, the expected stand of vegetation may not be attained or will deteriorate under normal maintenance. Therefore, it is necessary to check the waterway design for stability under any eventual conditions of deterioration that may be anticipated. Select vegetation that will provide long-term uniform cover with the anticipated level of maintenance.

(e) Outlets

All waterways shall have stable outlets with adequate capacity for the design flow. The outlet may be another grassed waterway, earth ditch, structure, or other suitable outlet. In all cases, the outlet must discharge in a manner that prevents erosion. Outlets should be constructed and stabilized before the waterway is used.

(f) Sediment control

Permanent waterway channels should be protected from sediment. If sediment is not controlled before it reaches the waterway, several methods may be used:

- install a vegetated filter strip on each side of the waterway where surface water enters
- increase the channel depth to store trapped sediment and/or design areas of increased width or decreased slope to trap and store sediment
- provide for cleaning out the channel when its design capacity deteriorates

(g) Data collection

(1) Engineering surveys

A preliminary site investigation is recommended to determine the feasibility of using a natural watercourse or constructing a waterway. Such a survey includes a study of resource information such as soil maps, aerial photography, and contour maps; visual examination of potential alignment; topographic surveys; and estimating required capacity. A preliminary investigation should provide enough information to select a final alignment.

Surveys for waterways normally consist of field notes for waterway design, layout, and construction as shown by the example in Technical Release (TR)–62 (USDA 1979). These notes are satisfactory when drainage areas are small, topography is relatively uniform, and elevations with respect to other structures are not significant. Standard forms or data sheets approved for field offices may be used to record field notes. A profile and cross section of the original ground surface should be exhibited in enough detail to permit dividing the waterway into reaches of approximately uniform slope and shape.

Design information should include documentation of outlet conditions, topography, vegetation, land use and cultural patterns, soil type, length of slope, and other built or natural features. Typical design conditions will require general identification of the relative erodibility of the soil. Projects with larger drainage areas and more extensive design requirements may require more detailed information such as the unified classification of the soils that will be encountered along the alignment of the waterway, along with the plasticity index (I_w) and void ratio (e), or, for noncohesive soils, the representative particle diameter, d_{75}.

(2) Hydrologic investigations

Information on the watershed area, design storm frequency and duration, and runoff estimates are important in correctly sizing the waterway. The drainage area divides can be determined by field inspection or from topographic mapping. Drainage areas determined from mapping should be field-checked.

Determine the watershed area at the outlet of the waterway and at other points where it may be desirable to change the grade or cross section. Calculate the runoff in cubic feet per second at each design point for the frequency and duration of storm selected. Refer to EFH 650.02 (SCS 1989) or reference methods in National Engineering Handbook (NEH), Part 630 for the procedure.

650.0703 Design process

(a) Steps in the design of a waterway

Step 1 Plan the optimum location of the waterway centerline.

Step 2 Select design points along the waterway where grades, drainage areas, and/or type of lining change significantly.

Step 3 Determine the watershed area for the points in step 2 and for the outlet.

Step 4 Compute the peak runoff produced by the design storm.

Step 5 Determine the slope of each reach of the channel from the topographic map, profiles, or cross sections.

Step 6 Select the appropriate channel cross section and the type of channel lining(s) to be used.

Step 7 Design the channel for stability, typically based on the sparsest and shortest vegetation expected.

Step 8 Adjust the depth to obtain adequate capacity based on the densest and longest vegetation expected.

Step 9 Add appurtenant structures as needed to allow for prolonged flows.

(b) Initial design parameters: slope, discharge, section, and lining

If there are significant changes in slope or discharge along the waterway, it may be necessary to design the waterway in reaches. A reach (or segment) is generally a portion of the waterway having a near-uniform slope, discharge, soil type, and vegetal cover. A point of significant break in slope is a point of division between two reaches. The point of entrance of a diversion or other tributary where the discharge is significantly increased may also be a point of division between two reaches. Large changes in soil properties may also require cross section modification. Where there is a significant difference in cross section or slope between adjoining reaches, it may be necessary to install a transition section between them.

When the limits of two or more reaches have been determined, each reach is designed separately by procedures given in subsequent paragraphs.

Waterways are constructed to discharge the peak flow expected from at least a 10-year frequency, 24-hour duration storm. Out-of-bank flow may be permitted on land slopes parallel to the channel where the slope is not greater than one percent and where it is evident that no erosion or property damage will result. In every case, it is necessary to provide adequate capacity and limit velocities so there will be no danger to humans or animals, in accordance with site conditions.

The shape selected should be compatible with surrounding landform and landscape characteristics. Side slopes may be varied to better balance cut and fill and to improve aesthetics.

On sites where it is impossible to establish suitable permanent vegetation or it is desired to determine the stability of the channel in an as-constructed condition, the design can be based on bare ground conditions. Site conditions may warrant designing the waterway with a rigid or paved lining.

Perforated concrete blocks are a common form of structural lining in residential, commercial, or recreation areas where aesthetics, safety, maintenance, and rodent populations are primary design factors. First introduced as cellular concrete blocks by SCS in the 1950s, the improved versions are now referred to generally as grid pavers. Designed to carry heavy loads and allow turf to grow within the cells, their use is becoming more widespread as an alternative to conventional pavement surfaces or rock riprap (fig. 7–2).

The dimensions computed for waterway discharge capacity are the minimal measurements required to carry the actual flow and do not include a factor for extra depth required for space occupied by sedimentation or freeboard. Where local standards require such factors, they should be added to the computed dimensions. It is important that the depth be adequate to permit unimpeded discharge from terraces, diversions, and crop rows.

If the waterway must be crossed by farm equipment and other forms of traffic, consideration should be given to the need for increased width (fig. 7–3). Large combines, pickers, sprayers, and similar equipment may require a significant increase in width over that needed for hydraulic capacity and freeboard. This scenario deserves consideration so that the proper modifications are made in waterway width and side slopes to meet the needs of equipment common to the locality. Vegetated crossing areas that are not otherwise reinforced may require additional maintenance and/or repair following flow events. Where paved channels are to be crossed, the lining must be designed to carry the expected loads. Culverts or bridges with adequate capacity may also be used.

(c) Conditions for stability

The purpose of the grass lining is to prevent damage to the channel by protecting the soil from eroding. To accomplish this requires limiting the stress on the soil and vegetation such that soil particles will not be detached and the vegetation will not be damaged. For most soils that will be encountered in practice, soil particles will be detached before damage to the vegetation occurs. In this case the effective stress on the soil controls channel stability. With highly erosion-resistant soils, however, the vegetation can become damaged before soil detachment occurs. The consequences of either mode of failure are similar.

Once vegetation becomes weak or damaged in a local area, there is a strong potential for rapid unraveling of the channel lining. This fact, along with high variability within the vegetative cover, makes it advisable for design criteria to be conservative. A very dense and uniform cover may be able to withstand larger stresses than those recommended here for stability design. Increasing the allowable stress is not recommended, however, unless the designer can be certain that the quality of the vegetative cover will *always* be maintained. In addition, the design should be adjusted to account for instances where highly variable cover conditions or low levels of maintenance are expected.

Design based on the erosionally effective stress considers the drag forces that can move individual soil particles, along with the influence of the vegetation on the distribution of stress. The approach is based on separating the stresses on the channel into components. Erosionally effective stress (τ_e) hereafter referred to as effective stress, is computed as:

$$\tau_e = \gamma DS\left(1 - C_F\right)\left(\frac{n_s}{n}\right)^2 \qquad \text{(eq. 7–1)}$$

where:

γ = unit weight of water, 62.4 lb/ft^3
D = maximum flow depth in the cross section
C_F = a vegetal cover factor
n_s = roughness associated with soil grain size
n = Manning's roughness coefficient
S = channel bed slope, ft/ft

The vegetal cover factor was developed based on experimental data and accounts for the cover density and uniformity (Temple 1980). It takes on values between 0 and 1, with 0 indicating no vegetal protection and 1 indicating the channel is completely protected from stress. The vegetal cover factor is a function of vegetation type and condition.

Figure 7–2 Cross section showing perforated grid pavers

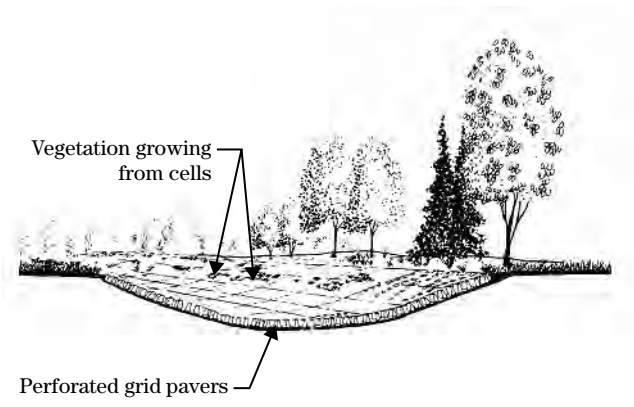
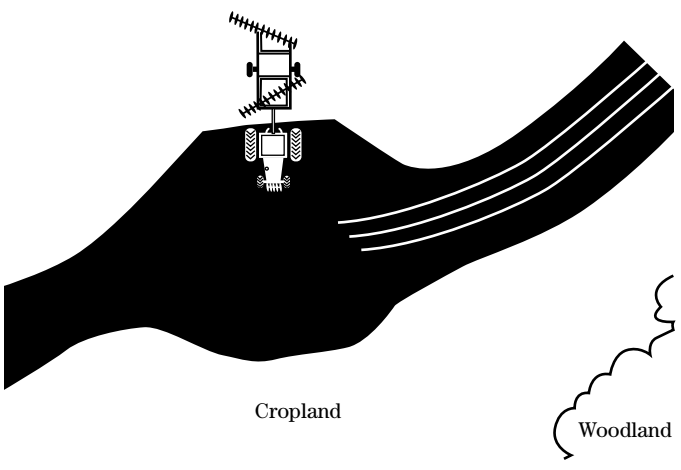


Figure 7–3 Provision for vehicle crossing



Flow depth rather than hydraulic radius is used in this calculation because it is the maximum stress in the cross section that governs the stability. The interaction of the vegetation and flow distorts the stress distribution in the cross section, and the vegetative lining tends to unravel rapidly once damage occurs.

Grain size roughness (n_s) for noncohesive soils is determined as:

$$n_s = \frac{d_{75}^{\frac{1}{6}}}{39} \qquad \text{(eq. 7–2)}$$

where the value of d_{75} is in inches. For fine-grained, cohesive soils, the value of n_s is taken as 0.0156. Figure 7–4 can be used to determine n_s based on d_{75}.

Steps in waterway design are as follows:

Step 1 Determine allowable effective stress based on an evaluation of the soil material.

Step 2 Determine the flow retardance and the allowable stress on the vegetation based on the sparsest and shortest vegetation expected (typically winter vegetation) and the flow retardance offered by the densest and longest vegetation (typically summer vegetation).

Step 3 Determine the vegetal cover factor associated with sparsest vegetation expected.

Step 4 Determine the bed slope.

Step 5 Choose a cross section shape.

Step 6 Use design aids or equations to size channel for sparsest and shortest vegetation.

Step 7 Use design aids or equations to determine depth required to contain the flow for densest and longest vegetation.

Step 8 Add freeboard as appropriate.

(1) Determination of allowable effective stress

The erodibility of the soil may be estimated to fall into one of these categories:

- easily eroded (sand textural soil classification)
- erodible (silt textural soil classification)
- erosion resistant (clay textural soil classification)
- very erosion resistant (based on local information or experience) (gravel textural soil classification)

Allowable effective stress is implied from this classification as indicated in table 7–1. Soil allowable effective stress may also be determined directly from soil properties. The allowable effective stress is the maximum hydraulic stress that may be applied directly to the soil without the occurrence of unacceptable erosion.

Figure 7–4 Calculation for grain roughness for noncohesive soils

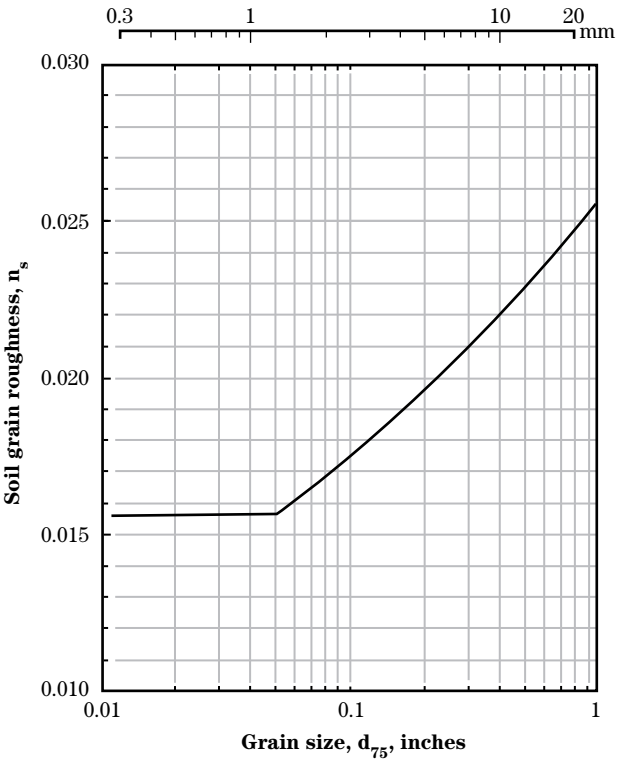


Table 7–1 Allowable effective stress for categories of soil erodibility

Category	Allowable stress, τ_a, lb/ft^2
Easily eroded	0.02
Erodible	0.03
Erosion resistant	0.05
Very erosion resistant	0.07

The first step in defining allowable stress from soil properties is to determine the unified soil classification of the soil from which the channel is to be constructed. This information may be available from the county soil survey (NCSS Web Soil Survey: *http://websoilsurvey.nrcs.usda.gov*). Soils classified as GW, GP, SW, and SP are considered noncohesive soils. The remainder of the soils—GM, SC, GC, SM, CH, CL, MH, ML, OH, and OL—are considered cohesive soils.

For noncohesive soils, the grain size d_{75} in inches is needed to determine the allowable effective stress, τ_a. The grain size may be estimated from data, found in the soil survey. Once the d_{75} is found, the allowable effective stress can be determined from figure 7–5 or from the equations in appendix B.

For cohesive soils, the plasticity and void ratio are needed. The plasticity index describes the range of water content over which a soil is in a plastic state, described as soft butter to stiff putty; deforms but will not crack (Sowers 1979). More specifically, it is the difference between the liquid limit and the plastic limit, where the liquid limit is the maximum water content at which the soil will hold a specific shape when vibrated and the plastic limit is the minimum water content at which the soil will not break and crumble. In general, an estimate of the plasticity index can be obtained from the county soil survey. Laboratory procedures for determination of liquid limit, plastic limit, and plasticity index are in ASTM D–4318–00 (ASTM 2000).

The void ratio is the ratio of the volume of voids (water and air) to the volume of solid particles. It is expressed as a decimal and may exceed 1. Void ratios may be estimated based on soil type as shown in table 7–2 (Das 1994) or by using standard laboratory procedures.

Determination of allowable stress for a cohesive soil is a two-step process. The first step is to use the plasticity index to determine the basic allowable stress, τ_{ab}. This can be estimated from figure 7–6 or by using the equations in appendix A.

A correction is then applied based on the void ratio. The correction, C_e, is determined from figure 7–7 or from the equations in appendix A. For the organic soils OH and OL, C_e is equal to 1.0. If the void ratio is not known, then the maximum value of C_e from figure 7–7 for the soil type can be used. This will result in a conservative design. The final allowable effective stress (τ_a) is then computed as

$$\tau_a = \tau_{ab} C_e^2 \qquad \text{(eq. 7–3)}$$

Figure 7–5 Allowable stress for noncohesive soils

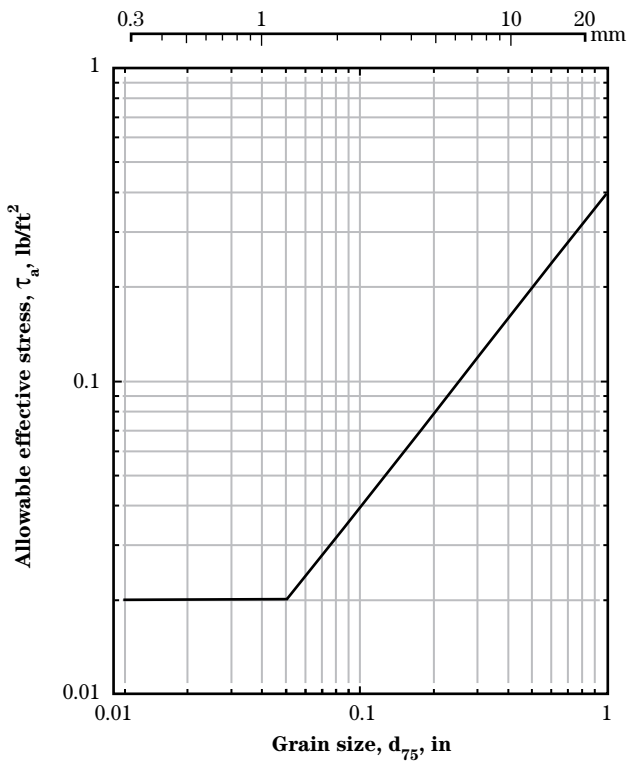


Table 7–2 Void ratios for selected soils

Soil Type	Void ratio, e
Loose angular-grained silty sand	0.65
Dense angular-grained slty sand	0.4
Stiff clay	0.6
Soft clay	0.9–1.4
Loess	0.9
Soft organic clay	2.5–3.2
Glacial till	0.3

Figure 7–6 Basic allowable stress for cohesive soils

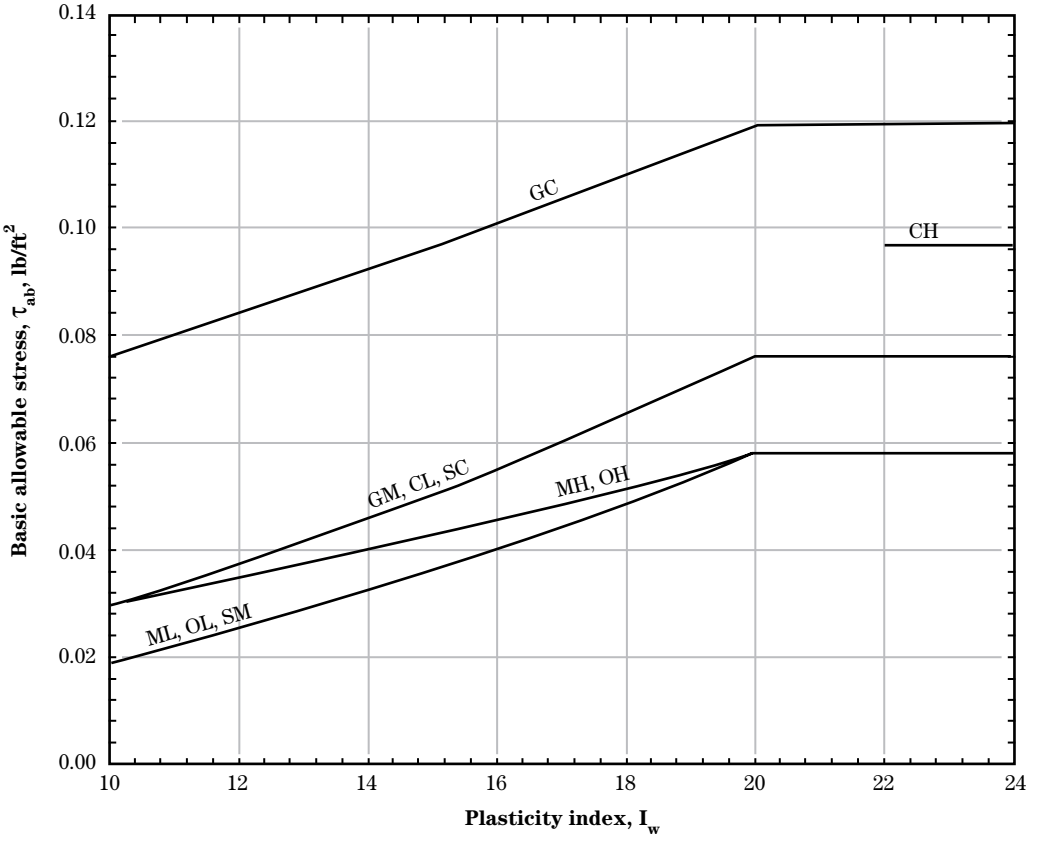
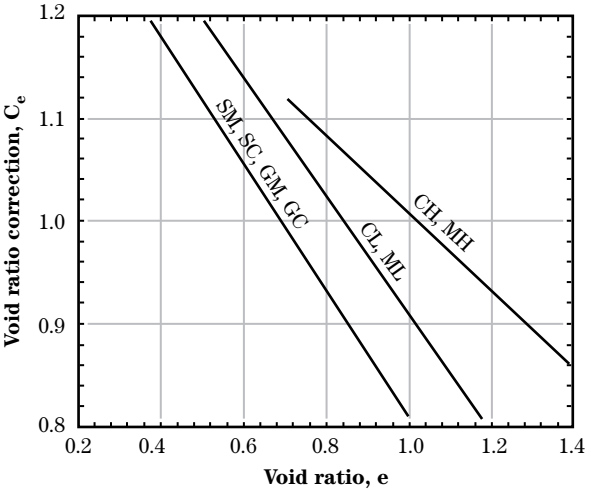


Figure 7–7 Correction for void ratio



Soil Erodibility Categories

One of the important variables used in the design of grassed waterways is the soil erodibility category. The following soil properties were used to determine the appropriate soil erosion category for nearly all soil types in Iowa:

- Unified Soil Classification
- Void Ratio
- Plasticity Index

The following table, Exhibit IA7-1, lists the soil type with its corresponding soil erosion category. This erosion category is used to determine the allowable effective soil stress whether designing a waterway using the charts in this chapter or using the Waterway Design Tool. Table 7-1 in this chapter gives the allowable effective stress for each of the four categories of soil erodibility.

EROSION CATEGORY FOR IOWA SOILS

Soil Type	Erosion Category		Soil Type	Erosion Category
Ackmore	Erodible		Blencoe	Very Erosion Resistant
Adair	Erosion Resistant		Blend	Very Erosion Resistant
Afton	Erosion Resistant		Blue Earth	Erodible
Ainsworth	Erodible		Bode	Very Erosion Resistant
Albaton	Very Erosion Resistant		Bolan	Erodible
Allamakee	Erodible		Bolan Variant	Erodible
Allendorf	Erosion Resistant		Brady	Easily Eroded
Amana	Erosion Resistant		Bremer	Very Erosion Resistant
Ambraw	Erosion Resistant		Brownton	Very Erosion Resistant
Ames	Erodible		Bucklick	Erosion Resistant
Angus	Erosion Resistant		Bucknell	Very Erosion Resistant
Ankeny	Erodible		Buckney	Erodible
Annieville	Erosion Resistant		Burcham	Erodible
Ansgar	Erodible		Burchard	Very Erosion Resistant
Anthon	Erosion Resistant		Burkhardt	Easily Eroded
Appanoose	Easily Eroded		Calamine	Erosion Resistant
Arbor	Erosion Resistant		Calco	Very Erosion Resistant
Aredale	Erodible		Calcousta	Very Erosion Resistant
Arenzville	Erosion Resistant		Caleb	Erosion Resistant
Arispe	Very Erosion Resistant		Camden	Erodible
Armstrong	Erosion Resistant		Caneek	Erodible
Arthur	Erosion Resistant		Caneek Variant	Easily Eroded
Ashdale	Erodible		Canisteo	Erosion Resistant
Ashgrove	Very Erosion Resistant		Canoe	Erodible
Atkinson	Erosion Resistant		Canoe Variant	Erodible
Atterberry	Erodible		Cantril	Erosion Resistant
Aureola	Easily Eroded		Carlow	Very Erosion Resistant
Backbone	Erodible		Carr	Erodible
Bassett	Erodible		Castana	Erosion Resistant
Bauer	Erosion Resistant		Cerlin	Erodible
Bearpen	Erodible		Chaseburg	Erodible
Beckwith	Erodible		Chelsea	Easily Eroded
Belinda	Easily Eroded		Chequest	Very Erosion Resistant
Belmann	Very Erosion Resistant		Churchtown	Erosion Resistant
Belview	Erosion Resistant		Chute	Easily Eroded
Benclare	Very Erosion Resistant		Clanton	Erodible
Bentonsport	Erodible		Clarinda	Very Erosion Resistant
Bertram	Erodible		Clarion	Erodible
Bertrand	Erodible		Clearfield	Very Erosion Resistant
Billett	Easily Eroded		Clinton	Erodible
Biscay	Erosion Resistant		Clyde	Erosion Resistant
Bixby	Erodible		Coggon	Erodible
Blake	Very Erosion Resistant		Cokato	Erodible

EROSION CATEGORY FOR IOWA SOILS

Soil Type	Erosion Category		Soil Type	Erosion Category
Coland	Very Erosion Resistant		Donnan Variant	Erodible
Collinwood	Erosion Resistant		Dorchester	Erodible
Collinwood Variant	Erosion Resistant		Doreton	Erodible
Colo	Very Erosion Resistant		Douds	Erodible
Coloma	Easily Eroded		Dow	Erodible
Cooper	Very Erosion Resistant		Downs	Erodible
Copaston	Very Erosion Resistant		Downs Variant	Erodible
Coppock	Erosion Resistant		Du Page	Erosion Resistant
Cordova	Erosion Resistant		Dubuque	Erodible
Corley	Very Erosion Resistant		Dunbarton	Erodible
Cornell	Erosion Resistant		Dunbarton Variant	Erosion Resistant
Corvuso	Erosion Resistant		Dundas	Erodible
Corwith	Erodible		Dunkerton	Erodible
Cosmos	Erosion Resistant		Edina	Erosion Resistant
Cott	Erosion Resistant		Egan	Erosion Resistant
Coyne	Erodible		Eitzen	Erodible
Creal	Easily Eroded		Eleroy	Erodible
Cresco	Erosion Resistant		Eleva	Easily Eroded
Cresken	Erosion Resistant		Ella	Erosion Resistant
Crippin	Erosion Resistant		Elon	Erosion Resistant
Crofton	Erosion Resistant		Elrick	Erodible
Curran	Erodible		Elrin	Erodible
Cylinder	Erosion Resistant		Elvers	Erodible
Cylinder Variant	Erosion Resistant		Elvira	Very Erosion Resistant
Danbury	Erodible		Ely	Erosion Resistant
Darfur	Erodible		Emeline	Erosion Resistant
Darwin	Very Erosion Resistant		Estherville	Erodible
Darwin Variant	Very Erosion Resistant		Everly	Erosion Resistant
Davis	Erosion Resistant		Exette	Erodible
Delft	Erosion Resistant		Exira	Very Erosion Resistant
Deloit	Erosion Resistant		Fairhaven	Erodible
Dells	Erosion Resistant		Farrar	Erodible
Dempster	Erosion Resistant		Faxon	Very Erosion Resistant
Denrock Variant	Erosion Resistant		Fayette	Erodible
Derinda	Erosion Resistant		Festina	Erodible
Dickinson	Erodible		Fieldon	Erodible
Dickman	Easily Eroded		Flagler	Erodible
Dinsdale	Erodible		Floyd	Erodible
Dinsmore	Erosion Resistant		Forney	Very Erosion Resistant
Dockery	Erodible		Fort Dodge	Erosion Resistant
Dodgeville	Erosion Resistant		Fostoria	Erosion Resistant
Dolbee	Very Erosion Resistant		Franklin	Erodible
Donatus	Erodible		Frankville	Erodible
Donnan	Easily Eroded		Fruitfield	Easily Eroded

EROSION CATEGORY FOR IOWA SOILS

Soil Type	Erosion Category		Soil Type	Erosion Category
Gale	Erosion Resistant		Jackson	Erodible
Galland	Erosion Resistant		Jacwin	Erosion Resistant
Galva	Erosion Resistant		Jameston	Erosion Resistant
Gara	Erosion Resistant		Joliet	Erodible
Garmore	Erodible		Judson	Erosion Resistant
Garwin	Very Erosion Resistant		Kalona	Erosion Resistant
Gasconade	Very Erosion Resistant		Kamrar	Very Erosion Resistant
Gilford	Erodible		Kandiyohi	Erosion Resistant
Gillett Grove	Erosion Resistant		Kasson	Erosion Resistant
Givin	Easily Eroded		Keg	Erodible
Gorin	Erodible		Kenmoor	Easily Eroded
Gosport	Erosion Resistant		Kennebec	Erosion Resistant
Goss	Erosion Resistant		Kensett	Erodible
Grable	Erodible		Kenyon	Erosion Resistant
Graceville	Erodible		Keomah	Erodible
Granby	Easily Eroded		Keosauqua	Erodible
Grantcenter	Erosion Resistant		Keswick	Erodible
Grundy	Very Erosion Resistant		Kilkenny	Very Erosion Resistant
Guckeen	Very Erosion Resistant		Killduff	Very Erosion Resistant
Haig	Very Erosion Resistant		Kingston	Erosion Resistant
Hamburg	Easily Eroded		Klinger	Very Erosion Resistant
Hanlon	Erodible		Klingmore	Very Erosion Resistant
Hanska	Erodible		Klum	Easily Eroded
Harcot	Erosion Resistant		Kniffin	Erosion Resistant
Harps	Erosion Resistant		Knoke	Very Erosion Resistant
Harpster	Very Erosion Resistant		Knox	Erodible
Havana	Easily Eroded		Kossuth	Very Erosion Resistant
Havelock	Very Erosion Resistant		Koszta	Erosion Resistant
Hawick	Easily Eroded		Lacrescent	Very Erosion Resistant
Hayden	Erosion Resistant		Ladoga	Erodible
Hayfield	Erosion Resistant		Lagonda	Erodible
Haynie	Erodible		Lakeport	Very Erosion Resistant
Hedrick	Erodible		Lamoni	Very Erosion Resistant
Hesch	Easily Eroded		Lamont	Erodible
Hixton	Erodible		Landes	Erodible
Holly Springs	Very Erosion Resistant		Lanyon	Erosion Resistant
Hoopeston	Erodible		Larpenteur	Erodible
Hoopeston Variant	Erodible		Lawler	Erodible
Hornick	Very Erosion Resistant		Lawson	Erodible
Humeston	Erodible		Lemond	Erodible
Huntsville	Erosion Resistant		Lerdal	Erosion Resistant
Ida	Easily Eroded		Lester	Easily Eroded
Inton	Erodible		Le Sueur	Erosion Resistant
Ion	Erodible		Letri	Very Erosion Resistant

EROSION CATEGORY FOR IOWA SOILS

Soil Type	Erosion Category		Soil Type	Erosion Category
Lilah	Easily Eroded		Morconick	Erodible
Limecreek	Erosion Resistant		Mottland	Erodible
Linder	Easily Eroded		Moville	Erodible
Lindley	Erodible		Mt. Carroll	Erodible
Lineville	Erodible		Mt. Sterling	Erodible
Lineville Variant	Erosion Resistant		Mula	Erodible
Liscomb	Erosion Resistant		Munterville	Erosion Resistant
Liston	Very Erosion Resistant		Muscatine	Very Erosion Resistant
Lossing	Very Erosion Resistant		Mystic	Erosion Resistant
Lourdes	Erodible		Napa	Erosion Resistant
Luana	Erodible		Napier	Erosion Resistant
Luther	Erodible		Nasset	Erodible
Luton	Very Erosion Resistant		Nevin	Erodible
Lycurgus	Erosion Resistant		NewGlarus	Erosion Resistant
Macksburg	Very Erosion Resistant		Newvienna	Erodible
Madelia	Erodible		Nicollet	Erosion Resistant
Mahaska	Very Erosion Resistant		Niota	Erosion Resistant
Malvern	Very Erosion Resistant		Niota Variant	Erosion Resistant
Marcus	Very Erosion Resistant		Nira	Erosion Resistant
Marlean	Erosion Resistant		Nishna	Erosion Resistant
Marna	Erosion Resistant		Nodaway	Erodible
Marquis	Erosion Resistant		Nordness	Erosion Resistant
Marshall	Very Erosion Resistant		Northboro	Very Erosion Resistant
Marshan	Erosion Resistant		Norville	Very Erosion Resistant
Martinsburg	Erodible		Oakton	Easily Eroded
Massbach	Erosion Resistant		Ocheda	Erosion Resistant
Maxfield	Very Erosion Resistant		Ocheyedan	Erodible
Maxmore	Very Erosion Resistant		Okaw	Erodible
May City	Easily Eroded		Okoboji	Very Erosion Resistant
Mayberry	Very Erosion Resistant		Olin	Erodible
Mayer	Erosion Resistant		Olmitz	Erosion Resistant
McCreath	Erosion Resistant		Omadi	Erodible
McPaul	Erodible		Omsrud	Erodible
Medary	Erosion Resistant		Onawa	Very Erosion Resistant
Medary Variant	Erosion Resistant		Oran	Erodible
Millington	Easily Eroded		Orion	Erosion Resistant
Minden	Very Erosion Resistant		Orwood	Erodible
Minnetonka	Erodible		Ossian	Erosion Resistant
Modale	Erodible		Ostrander	Erodible
Moingona	Erodible		Otley	Very Erosion Resistant
Moneta	Erosion Resistant		Otter	Erosion Resistant
Monona	Erosion Resistant		Ottosen	Very Erosion Resistant
Montieth	Easily Eroded		Owego	Very Erosion Resistant
Moody	Very Erosion Resistant		Paintcreek	Erodible

EROSION CATEGORY FOR IOWA SOILS

Soil Type	Erosion Category		Soil Type	Erosion Category
Percival	Very Erosion Resistant		Sarpy	Easily Eroded
Perks	Easily Eroded		Sattre	Erodible
Pershing	Erosion Resistant		Saude	Erodible
Pillot	Erosion Resistant		Sawmill	Very Erosion Resistant
Pinicon	Erodible		Schapville	Erodible
Plano	Very Erosion Resistant		Schley	Erodible
Port Byron	Erodible		Scroll	Very Erosion Resistant
Primghar	Erosion Resistant		Seaton	Erodible
Protivin	Erosion Resistant		Seymour	Very Erosion Resistant
Quiver	Very Erosion Resistant		Shaffton	Erosion Resistant
Racine	Erosion Resistant		Shandep	Erosion Resistant
Racoon	Erosion Resistant		Sharpsburg	Very Erosion Resistant
Raddle	Erosion Resistant		Shelby	Very Erosion Resistant
Radford	Easily Eroded		Shellwood	Erodible
Ransom	Erosion Resistant		Shorewood	Erosion Resistant
Rathbun	Erodible		Shullsburg	Erodible
Rawles	Erodible		Sigglekov	Erodible
Readlyn	Very Erosion Resistant		Smithland	Very Erosion Resistant
Reedscreek	Erodible		Snider	Easily Eroded
Renova	Erodible		Sogn	Erosion Resistant
Revere	Erosion Resistant		Solomon	Very Erosion Resistant
Riceville	Erosion Resistant		Sparta	Easily Eroded
Richwood	Erodible		Sperry	Erosion Resistant
Ridgeport	Erodible		Spicer	Erosion Resistant
Ridgeton	Erodible		Spillco	Erosion Resistant
Rinda	Very Erosion Resistant		Spillville	Erosion Resistant
Ripon	Erodible		Steinauer	Very Erosion Resistant
Rocksan	Very Erosion Resistant		Storden	Easily Eroded
Rockton	Erodible		Strahan	Erodible
Rodney	Very Erosion Resistant		Stronghurst	Erodible
Roine	Erodible		Sunburg	Erodible
Rolfe	Easily Eroded		Taintor	Very Erosion Resistant
Rollingstone	Erodible		Talcot	Very Erosion Resistant
Roseville	Erodible		Tallula	Easily Eroded
Rossfield	Erosion Resistant		Tama	Erodible
Rowley	Erodible		Tell	Erosion Resistant
Rozetta	Erodible		Terril	Erosion Resistant
Rubio	Erodible		Thebes	Erosion Resistant
Rushmore	Very Erosion Resistant		Thorp	Erosion Resistant
Rushville	Erodible		Ticonic	Easily Eroded
Russell	Erodible		Tieville	Very Erosion Resistant
Sac	Erosion Resistant		Tilfer	Erosion Resistant
Salida	Easily Eroded		Timula	Erodible
Salix	Very Erosion Resistant		Titus	Very Erosion Resistant

EROSION CATEGORY FOR IOWA SOILS

Soil Type	Erosion Category		Soil Type	Erosion Category
Toolesboro	Erosion Resistant		Zook	Very Erosion Resistant
Traer	Erodible		Zwingle	Erodible
Trent	Very Erosion Resistant		Zwingle Variant	Very Erosion Resistant
Tripoli	Very Erosion Resistant			
Truman	Erodible			
Turlin	Easily Eroded			
Tuskeego	Erodible			
Udolpho	Erosion Resistant			
Uturin	Erodible			
Vanmeter	Erodible			
Vesser	Erosion Resistant			
Village	Erodible			
Vinje	Erosion Resistant			
Volney	Erosion Resistant			
Vore	Very Erosion Resistant			
Wabash	Very Erosion Resistant			
Waucousta	Erosion Resistant			
Wacousta Variant	Very Erosion Resistant			
Wadena	Erodible			
Waldorf	Very Erosion Resistant			
Walford	Erodible			
Wapsie	Erodible			
Watkins	Erodible			
Watseka	Easily Eroded			
Waubeek	Erodible			
Waubonsie	Very Erosion Resistant			
Waucoma	Erodible			
Waukee	Erosion Resistant			
Waukegan	Erodible			
Webster	Very Erosion Resistant			
Weller	Erosion Resistant			
Wentworth	Very Erosion Resistant			
Whalan	Erodible			
Whittier	Erodible			
Wilmonton	Very Erosion Resistant			
Wilsey	Erodible			
Winneshiek	Erodible			
Winneshiek Variant	Erosion Resistant			
Winterset	Very Erosion Resistant			
Wiota	Erosion Resistant			
Woodbury	Very Erosion Resistant			
Worthen	Erosion Resistant			
Yellowriver	Erosion Resistant			
Zenor	Erodible			

(2) Determination of allowable vegetal stress

The allowable vegetal stress is the maximum total shear stress that may be withstood by the vegetal cover without unacceptable damage. It is directly related to the drag experienced by the stems and therefore to the level of flow retardance offered by the vegetal cover. The allowable vegetal stress (τ_{va}) is related to the retardance curve index as:

$$\tau_{va} = 0.75C_I \qquad \text{(eq. 7–4)}$$

Retardance curve index (C_I) is in turn related to the stem length and density of the cover as:

$$C_I = 2.5\left(h\sqrt{M}\right)^{\frac{1}{3}} \qquad \text{(eq. 7–5)}$$

where:

h = the representative height of the vegetation in feet

M = the stem density in stems per square foot

Table 7–3 lists stem density for several grasses. Since the density and height of vegetation is likely to be seasonal, upper and lower boundary values of C_I are typically established. The lower boundary value is used in determining if stability requirements are met (steps 5 and 6), and the upper boundary value is used to determine the additional capacity needed for summer vegetation, which generally provides more resistance to flow (step 7).

The value of C_I can also be determined using the retardance classes. The retardance class for various example ground covers is given in table 7–4, and the relation of retardance curve index to retardance class is shown in table 7–5.

(3) Determination of vegetal cover factor

The vegetal cover factor describes the ability of the vegetal cover to reduce the maximum hydraulic stress on the soil. It is related to the type and quality of the vegetal cover. Table 7–3 lists typical values of the vegetal cover factor. The value of the cover factor may be estimated by comparison of the sparsest expected cover with the covers described in the table.

(4) Determination of effective and vegetal stress

Design of a stable waterway requires that the hydraulic stress applied to the soil and vegetation by the flowing water be less than or equal to the computed allowable values. The design tables provided in this chapter were developed to provide a minimum cross sectional area satisfying this requirement. Otherwise, effective stress must be computed using equation 7–1 and compared with the allowable stress.

Calculation of effective stress will require the additional parameter of soil grain roughness and calculation of flow resistance in the form of Manning's *n* and of flow depth. For fine grained materials, including cohesive soils, the soil grain roughness n_s is equal to 0.0156. For coarse grained soils, n_s is a function of d_{75} and can be determined from figure 7–4 or equation 7–2. These computations may be carried out using the additional equations provided in appendix B. Because of the interaction of the flow with the vegetal cover, iterative solution of the equations is required and the computations are normally carried out using computer software.

The final step in designing a channel section is to compare the stress on the vegetation with the allowable vegetal stress, τ_{va}. When the allowable stress on the vegetation is the governing parameter, the stress on the soil will be only a small part of the total stress. Therefore, the computed allowable stress is compared to the total hydraulic stress, τ, where

$$\tau = \gamma DS \qquad \text{(eq. 7–6)}$$

Table 7–3 Properties of grass channel linings; values apply to good uniform stands of each cover[1/]

Cover factor, C_F	Covers tested	Reference stem density (stem/ft^2)
0.90	Bermudagrass	500
	Centipedegrass	500
0.87	Buffalograss	400
	Kentucky bluegrass	350
	Blue grama	350
0.75	Grass mixture	200
0.5	Weeping lovegrass	350
	Yellow bluestem	250
	Alfalfa[2/]	500
	Lespedeza sericea[2/]	300
	Common lespedeza	150
	Sudangrass	50

1/ Multiply the stem densities given by l/3, 2/3,1, 4/3, and 5/3, for poor, fair, good, very good, and excellent covers, respectively. The equivalent adjustment to C_F remains a matter of engineering judgment until more data are obtained or a more analytic model is developed. A reasonable, but arbitrary, approach is to reduce the cover factor by 20 percent for fair stands and 50 percent for poor stands. C_F values for untested covers may be estimated by recognizing that the cover factor is dominated by density and uniformity of cover near the soil surface. Thus, the sod-forming grasses near the top of the table exhibit higher C_F values than the bunch grasses and annuals near the bottom.

2/ For the legumes tested, the effective stem count for resistance (given) is approximately five times the actual stem count very close to the bed. Similar adjustment may be needed for other unusually large-stemmed, branching, and/ or woody vegetation.

Vegetal Cover Factors

The terms cover factor and vegetal cover factor are used interchangeably throughout this chapter and the Waterway Design Tool in the Engineering Field Tools.

The cover factor used for grassed waterway design is an important variable in the design process. Table 7-3 in the EFH provides cover factors and stem densities for a few common grasses used throughout the United States. However, it does not include brome grass. Brome grass is the most common type of grass used to stabilize waterways throughout Iowa.

After a review of research completed by the Agricultural Research Service in the development of grassed waterway design procedures and discussions with ARS personnel, the decision was made to assign a cover factor of 0.87 for brome grass and brome grass mixtures. Likewise, if tall fescue is used as the selected vegetation, it would also have a cover factor of 0.87.

The vegetation retardance factors used in designing grassed waterways should reflect the expected condition of the vegetation after the grass is established. Generally, for stability design, a “D” retardance value is selected. This reflects a condition in which the grass has just been mowed and is the worst case or most erodible condition that is expected after grass establishment. For capacity design, the designer must consider how the waterway will be managed. If the producer plans to mow the waterway several times a year, it is reasonable to use a “C” retardance value. If the waterway will not be mowed, or possibly only mowed once in the spring and once in the fall after harvest, a “B” retardance value should be used. In all cases, the selection of the retardance values to use in design is a site specific critical decision which the designer must make.

Table 7–4 Classification of vegetation cover as to degree of retardance

Retardance	Cover	Condition
A	Weeping lovegrass	Excellent stand, tall (average 30 in)
	Reed canarygrass or Yellow bluestem ischaemum	Excellent stand, tall (average 36 in)
B	Smooth bromegrass	Good stand, mowed (average 12 to 15 in)
	Bermudagrass	Good stand, tall (average 12 in)
	Native grass mixture (little bluestem, blue grama, and other long and short midwest grasses	Good stand, unmowed
	Tall fescue	Good stand, unmowed (average 18 in)
	Sericea lespedeza	Good stand, not woody, tall (average 19 in)
	Grass-legume mixture—Timothy, smooth bromegrass, or orchardgrass	Good stand, uncut (average 20 in)
	Reed canarygrass	Good stand, uncut (average 12 to 15 in)
	Tall fescue, with birdsfoot trefoil or ladino clover	Good stand, uncut (average 18 in)
	Blue grama	Good stand, uncut (average 13 in)
C	Bahiagrass	Good stand, uncut (6 to 8 in)
	Bermudagrass	Good stand, mowed (average 6 in)
	Redtop	Good stand, headed (15 to 20 in)
	Grass-legume mixture—summer (orchardgrass, redtop, Italian ryegrass, and common lespedeza)	Good stand, uncut (6 to 8 in)
	Centipedegrass	Very dense cover (average 6 in)
	Kentucky bluegrass	Good stand, headed (6 to 12 in)
D	Bermudagrass	Good stand, cut to 2.5-in height
	Red fescue	Good stand, headed (12 to 18 in)
	Buffalograss	Good stand, uncut (3 to 6 in)
	Grass-legume mixture—fall, spring (orchardgrass, redtop, Italian ryegrass, and common lespedeza)	Good stand, uncut (4 to 5 in)
	Sericea lespedeza or Kentucky bluegrass	Good stand, cut to 2-in height. Very good stand before cutting
E	Bermudagrass	Good stand, cut to 1.5-in height
	Bermudagrass	Burned stubble

Table 7–5 Retardance curve index by retardance class

SCS retardance class	Retardance curve index C_I
A	10.0
B	7.64
C	5.60
D	4.44
E	2.88

650.0704 Sizing channel sections

The channel cross section is normally sized for the minimum cross-sectional area satisfying the stability and capacity requirements for the geometry selected. The channel geometry is selected and the controlling parameters are computed to satisfy stability and capacity design requirements. Table 7–6 shows the typical parameters for design. The parameters specified as optional in table 7–6 influence the design only when the stability requirements would result in an unsuitably narrow cross section. The complete governing equations are given in appendix A, and all notation used throughout this and other sections of this chapter is described in appendix B.

(a) Techniques presented

Design tables are provided covering typical conditions for trapezoidal and parabolic cross sections. For other section shapes, and for use in checking calculations, the full equations are given in appendix A.

For conditions outside the range of parameters covered by the tables and when conditions warrant refinement of the design to better reflect details of the soil and/or vegetal conditions, the equations of appendix A may be solved directly. Because design generally requires iterative solution of the equation set, a programmed solution is generally appropriate. Waterway Design Tool (WDT) software has been developed to provide these solutions.

Finally, a set of examples demonstrating use of the techniques and also including examples of determining allowable effective stress, curve index, and vegetal stress is provided.

The design tables are intended for use with parabolic or trapezoidal channels and include a range of slopes, discharges, and dimensions and should not be used for situations outside the ranges given. They were developed for curve index numbers corresponding to the traditionally used retardance classes, as shown in table 7–4, and for allowable effective stress values representing a typical range of conditions. At times, it may be advantageous to use the tables to obtain preliminary dimensions and then refine the design using the equations. When using the equations for design, it will be necessary to verify that allowable effective stress is the appropriate design parameter by considering the optional limiting parameters of table 7–6 and the maximum total stress on the vegetation as described in previous sections.

Table 7–6 Cross section properties

Section shape	Required design criteria	Optional criteria	Parameters in design table	Parameters computed from tabular data
Trapezoid	Side slope	Minimum bottom width	Bottom width Depth	Top width
Parabolic	None	Steepest side slope at water's edge	Top width Depth	Parabolic coefficient, a_p Side slope at water's edge
Triangular	None	Minimum side slope	Not available	Use equations to design

(b) Use of the design tables for parabolic and trapezoidal channels

In the absence of precise field data regarding the height and stem density vegetation, it is still considered acceptable to design based on retardance classes. In this case, retardance class D is generally used for stability (shortest and sparsest cover) and B or C are used for capacity (longest and densest cover). Tables for B/D (capacity/stability) and C/D design are presented in appendices C and D.

Use of the tables requires the design discharge, bed slope, type of cover (vegetal cover factor), and soil erodibility (allowable effective stress) to be identified. The numbers in the table are for fine-grained cohesive soils. For other conditions, the design should be checked using the equations.

The table is then selected based on capacity retardance (B or C), soil erodibility, cover factor, and side slope (trapezoidal) and is entered using the bed slope and discharge. The trapezoidal channel design table gives the bottom width and depth (B and D), and the parabolic design table gives the top width and depth (T and D).

For a trapezoid, the top width is computed as:

$$T = B + 2zD \qquad \text{(eq. 7–7)}$$

For a parabolic channel, the parabolic channel coefficient (a_p) is computed as:

$$a_p = \frac{4D}{T^2} \qquad \text{(eq. 7–8)}$$

and side slope at the water's edge, that is, point where the water surface meets the channel bank, is computed as:

$$z = \frac{1}{a_p T} \qquad \text{(eq. 7–9)}$$

If this side slope is steeper than 4:1, modification to the design may be needed, depending on mowing and maintenance requirements.

If the exact slope is not included in the table, there are two approaches possible. The design for the slopes bracketing the exact slope can be computed and the final results found by interpolation. Alternatively, the next higher slope can be used to determine the minimum width (specific value of a_p) which will ensure stability criteria are met. To ensure adequate capacity, the depth should be increased to that associated with the next flatter slope or determined using the equations in appendix A and the curve index number for capacity. The final top width will increase accordingly. This computation is illustrated for a trapezoidal section in example 3.

If the exact discharge is not found in the table, the next higher discharge should be used. This will result in a slightly over designed channel, but stability and capacity criteria will be met.

(c) Design examples

Example 1

This example illustrates design of a trapezoidal channel and finding the soil effective stress. Find the channel depth, bottom width, and top width for the following design data. Check that the vegetal stress is within the allowable.

Channel parameters:	Trapezoidal section 6:1 side slopes bed slope = 0.75% Q = 300 ft³/s
Soil parameters:	Easily eroded soil (SM with plasticity index of 12 and void ratio of 0.7)
Vegetation parameters:	Bermudagrass (C_F = 0.9) B retardance (maximum length approximately 14 in) D retardance (minimum length approximately 4 in)

Solution: The tables may be entered directly with the information given. A portion of the table for B/D design of a channel with bermudagrass or equivalent cover (C_F=0.9) over an easily eroded soil (τ_a=0.02 lb/ft²) is shown in figure 7–8. A slope of 0.75 percent and a discharge of 300 cubic feet per second yields a bed width of 24 feet and a flow depth of 2.4 feet as shown in figure 7–8. The top width for the channel is computed as:

$$\begin{aligned} T &= B + 2zD \\ &= 24 + 2(6)(2.4) \qquad \text{(eq. 7–7)} \\ &= 53 \text{ ft} \end{aligned}$$

Using the more detailed information given, the design may be refined if considered warranted. To do this, first, find allowable effective stress and the void ratio correction using figures 7–6 and 7–7. Using $\tau_{ab} = 0.025$ and $C_e = 0.99$, the allowable effective stress is:

$$\begin{aligned}\tau_a &= \tau_{ab} C_e^2 \\ &= 0.025(0.99) \\ &= 0.025 \text{ lb/ft}^2\end{aligned} \qquad \text{(eq. 7–3)}$$

Using the reference stem density for bermudagrass from table 7–3 of 500 stems per square foot with the stem lengths given yield retardance curve index values of 7.48 and 4.87, respectively, from equation 7–5. Solving the governing equations for stability and capacity with these values results in a channel section with a bed width of 10 feet and a flow depth of 3 feet with the difference dependent primarily on the larger value of τ_a used in the refined calculations.

$$\begin{aligned}C_I &= 2.5\left(h\sqrt{M}\right)^{\frac{1}{3}} \\ &= 2.5\left(14 \text{ in } \sqrt{500}\right)^{\frac{1}{3}} \\ &= 2.5\left(1.2 \text{ ft } \sqrt{500}\right)^{\frac{1}{3}} \\ &= 7.48\end{aligned} \qquad \text{(eq. 7–5)}$$

or

$$\begin{aligned}C_I &= 2.5\left(h\sqrt{M}\right)^{\frac{1}{3}} \\ &= 2.5\left(4 \text{ in } \sqrt{500}\right)^{\frac{1}{3}} \\ &= 2.5\left(0.33 \text{ ft } \sqrt{500}\right)^{\frac{1}{3}} \\ &= 4.87\end{aligned}$$

Finally, for the refined computations, the vegetal stress should be checked. The allowable vegetal stress is computed as:

$$\begin{aligned}\tau_{va} &= 0.75 C_{I\,(4 \text{ in length})} \\ &= 0.75(4.87) \\ &= 3.65 \text{ lb/ft}^2\end{aligned} \qquad \text{(eq. 7–4)}$$

Using the quick check for shear stress:

$$\begin{aligned}\tau &= \gamma DS \\ &= 1.12 \text{ lb/ft}^2\end{aligned} \qquad \text{(eq. 7–6)}$$

Since the total average shear stress is less than the allowable stress on the vegetation, this section can be used for the final design. This check will normally have been programmed into design software and will not require separate checking.

Figure 7–8 Design table for example 1

Input parameters:
Channel type=trapezoidal
Cover factor=0.9
Allowable soil stress=0.02
B-D design
Side slope=6

Q	S=0.1%		S=0.25%		S=0.5%		S=0.75%		S=1%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10										
20										
30										
40										
50										
60										
70										
80										
90										
100										
110										
120										
130									2.2	10
140									2.1	11
150									2.1	13
160									2.1	15
170									2.0	16
180									2.0	18
190							2.6	11	2.0	19
200							2.5	12	2.0	21
210							2.5	14	2.0	22
220							2.5	15	2.0	24
230							2.5	16	2.0	25
240							2.4	17	2.0	26
250							2.4	19	1.9	28
260							2.4	20	1.9	29
270							2.4	21	1.9	31
280							2.4	22	1.9	32
290							2.4	23	1.9	33
300					3.4	10	2.4	24	1.9	35
310					3.4	11	2.4	26	1.9	36
320					3.3	12	2.3	27	1.9	38

Example 2

This example illustrates design of a parabolic channel and the addition of 0.5 feet of freeboard. Find the channel depth and top width for the following design data.

Channel parameters:	Q = 100 ft³/s Bed slope S = 2 percent
Soil parameters:	Erosion resistant soil (τ_a=0.05 lb/ft²)
Vegetation:	C retardance for capacity (C_I=5.60) D retardance for stability (C_I=4.44) Grass mixture (C_F = 0.75)

Solution: Using the appropriate C/D table (fig. 7–9) and entering the table with Q = 100 ft³/s and S = 2%, the design depth and top width are D = 1.2 ft and T = 37 ft. The channel parabolic coefficient (which is needed for finding the new top width once the 0.5 ft of freeboard are added) is found using equation 7–8:

$$a_p = \frac{4D}{T^2} = \frac{4(1.2)}{(37)^2} = 0.0035 \qquad \text{(eq. 7–8)}$$

The side slope at the water's edge can now be found using equation 7–9:

$$Z = \frac{1}{a_p T} = \frac{1}{(0.0035)(37)} = 7.7 \qquad \text{(eq. 7–9)}$$

With the 0.5 feet of freeboard, the total section depth, D_T, will be equal to 1.7 feet. The final top width of the excavated section is computed as:

$$D_T = 1.2 + 0.5 = 1.7 \text{ ft}$$

$$T = \sqrt{\frac{4D_T}{a_p}} = \sqrt{\frac{4(1.7)}{0.0035}} = 44.1 \text{ ft} \qquad \text{(eq. 7–8)}$$

A final check of the side slope is computed using T = 44.1 feet.

$$z_f = \frac{1}{a_p T_f} = \frac{1}{(0.0035)(44.1)} = 6.5$$

Figure 7–9 Design table for example 2

Input parameters:
Channel type=parabolic
Cover factor=0.75
Allowable soil stress=0.05
C-D design

Q	S=0.1%		S=0.25%		S=0.5%		S=0.75%		S=1%		S=1.25%		S=1.5%		S=1.75%		S=2%		S=3%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10	1.1	95	1.6	10	1.5	8														
20	1.5	110	2	11													1.2	7	1	10
30	1.6	116	2.3	12									1.4	9	1.3	10	1.2	11	1	15
40	1.6	121	2.5	13							1.6	11	1.4	12	1.3	13	1.2	15	0.9	19
50	1.7	124							1.8	11	1.6	13	1.4	15	1.3	17	1.2	18	0.9	24
60	1.7	128							1.8	13	1.6	16	1.4	18	1.3	20	1.2	22	0.9	29
70	1.8	125					2.2	13	1.8	16	1.6	18	1.4	21	1.3	23	1.2	26	0.9	34
80	1.9	127					2.2	14	1.8	18	1.6	21	1.4	24	1.3	17	1.2	29	0.9	39
90	1.9	130					2.2	16	1.8	20	1.6	24	1.4	27	1.3	30	1.2	33	0.9	44
100	1.9	132					2.2	18	1.8	22	1.6	26	1.4	30	1.3	34	1.2	37	0.9	49
110	2	134					2.2	20	1.8	24	1.6	29	1.4	33	1.3	37	1.2	41	0.9	54
120	3.3	33			2.9	16	2.2	21	1.8	27	1.6	32	1.4	36	1.3	40	1.2	44	0.9	58

Example 3

This example illustrates using the tables to do stability and capacity design for a slope that is not listed. A similar approach may be used to interpolate for other parameters as appropriate.

Channel parameters:	Trapezoidal channel 4:1 side slopes Bed slope = 0.85 percent Q = 160 ft³/s
Soil parameters:	Erodible soil (τ_a = 0.03 lb/ft²)
Vegetal parameters:	C retardance for capacity (C_I=5.60) D retardance for stability (C_I=4.44) Grass mixture (C_F = 0.75)

Solution: To get the bottom width, the C/D table is entered using S = 1 percent. Figure 7–10 shows that the bottom width B should be 35 feet. Also from figure 7–10, for a slope equal to 0.75 percent, we get a trial capacity depth of 1.5 feet.

To find a more accurate capacity depth, start with the trial depth D = 1.5, B = 35, and S = 0.0085 ft/ft, and compute area (A), hydraulic radius (R), trial velocity (V_T), and n. Then use Manning's formula to check velocity. If the velocity computed with Manning's (V_M)is higher, deduct 0.1 foot from the depth and repeat. Keep deducting 0.1 foot until the Manning's velocity is less than the trial velocity. The exact depth will be between the values obtained in the last two steps, and the higher value should be used in the design. The computations are:

$$A = BD + zD^2$$
$$= 35(1.5) + 4(1.5)^2 \qquad \text{(table 7B–3)}$$
$$= 61.5 \text{ ft}^2$$

$$R = \frac{A}{B + 2D\sqrt{z^2+1}}$$
$$= \frac{61.5}{35 + 2(1.5)\sqrt{4^2+1}}$$
$$= 1.298$$

$$V_T = \frac{Q}{A}$$
$$= \frac{160}{61.5}$$
$$= 2.60 \text{ ft/s}$$

$$n = \exp\left\{C_I\left(0.0133\left[\ln(VR)\right]^2 - 0.0954\left[\ln(VR)\right] + 0.297\right) - 4.16\right\}$$
$$= 0.0479 \qquad \text{(table 7B–2)}$$

where:
C_I = 5.60
V = 2.60 ft/s
R = 1.298

$$V_m = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$$
$$= \frac{1.49}{0.0479}(1.298)^{\frac{2}{3}}(0.0085)^{\frac{1}{2}} \qquad \text{(table 7B–2)}$$
$$= 3.40$$

Table 7–7 lists the results of the remainder of the computations.

Since the difference changes from positive to negative between D=1.3 and D=1.2 feet, a depth of 1.3 feet should be used in the final design. As a final step, vegetal stress is checked, and the stress, τ, is found to be less than the allowable vegetal stress, τ_{va}.

$$\tau_{va} = 0.75C_I$$
$$= 0.75(5.60) \qquad \text{(eq. 7–4)}$$
$$= 4.2$$

$$\tau = \gamma DS$$
$$= 62.4(1.3)(0.0085) \qquad \text{(eq. 7–6)}$$
$$= 0.69$$

Figure 7–10 Design table for example 3

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																					0.6	10	0.5	12						
30																			0.7	13	0.6	16	0.5	19						
40															0.9	11	0.9	13	0.7	18	0.6	23								
50											1.2	10	1	13	0.9	15	0.8	17	0.7	23	0.6	29								
60									1.3	10	1.1	13	1	16	0.9	18	0.8	21	0.6	28	0.6	35								
70									1.3	13	1.1	16	1	19	0.9	22	0.8	25	0.6	33	0.6	41								
80							1.6	10	1.3	15	1.1	19	1	22	0.9	26	0.8	29	0.6	38	0.5	47								
90							1.6	12	1.3	18	1.1	22	1	26	0.9	29	0.8	32	0.6	43	0.5	53								
100							1.5	14	1.2	20	1.1	25	1	29	0.9	33	0.8	36	0.6	48	0.5	59								
110							1.5	17	1.2	22	1.1	28	0.9	32	0.9	36	0.8	40	0.6	53	0.5	65								
120					2.1	10	1.5	19	1.2	25	1.1	30	0.9	35	0.9	40	0.8	44	0.6	59	0.5	71								
130					2.1	12	1.5	21	1.2	27	1.1	33	0.9	38	0.9	43	0.8	48	0.6	64	0.5	77								
140					2	13	1.5	23	1.2	30	1.1	36	0.9	42	0.9	47	0.8	52	0.6	69	0.5	83								
150					2	15	1.5	24	1.2	32	1	39	0.9	45	0.9	50	0.8	56	0.6	74	0.5	89								
160					2	16	1.5	26	1.2	35	1	42	0.9	48	0.9	54	0.8	59	0.6	79	0.5	95								
170					2	18	1.5	28	1.2	37	1	44	0.9	51	0.9	57	0.8	63	0.6	84										
180					2	19	1.5	30	1.2	39	1	47	0.9	54	0.9	61	0.8	67	0.6	89										
190					2	21	1.4	32	1.2	42	1	50	0.9	57	0.9	64	0.8	71	0.6	94										
200					1.9	22	1.4	34	1.2	44	1	53	0.9	61	0.9	68	0.8	75	0.6	99										
210					1.9	24	1.4	36	1.2	46	1	55	0.9	64	0.8	71	0.8	79												
220					1.9	25	1.4	38	1.2	49	1	58	0.9	67	0.8	75	0.8	82												
230					1.9	27	1.4	40	1.2	51	1	61	0.9	70	0.8	78	0.8	86												
240					1.9	28	1.4	42	1.2	54	1	64	0.9	73	0.8	82	0.8	90												
250					1.9	30	1.4	44	1.2	56	1	67	0.9	76	0.8	85	0.8	94												
260			3.5	10	1.9	31	1.4	46	1.2	58	1	69	0.9	79	0.8	89	0.8	98												
270			3.4	11	1.9	33	1.4	48	1.2	61	1	72	0.9	83	0.8	92														
280			3.4	11	1.9	34	1.4	50	1.2	63	1	75	0.9	86	0.8	96														
290			3.4	12	1.9	35	1.4	52	1.2	65	1	78	0.9	89	0.8	99														
300			3.4	13	1.9	37	1.4	54	1.2	68	1	80	0.9	92																
310			3.3	14	1.9	38	1.4	55	1.2	70	1	83	0.9	95																
320			3.3	15	1.9	40	1.4	57	1.2	72	1	86	0.9	99																
330			3.3	16	1.9	41	1.4	59	1.2	75	1	89																		
340			3.3	17	1.9	42	1.4	61	1.2	77	1	91																		
350			3.3	18	1.9	44	1.4	63	1.2	80	1	94																		
360			3.3	19	1.9	45	1.4	65	1.2	82	1	97																		
370			3.2	20	1.9	47	1.4	67	1.2	84	1	100																		
380			3.2	20	1.9	48	1.4	69	1.2	87																				
390			3.2	21	1.9	49	1.4	71	1.2	89																				
400			3.2	22	1.9	51	1.4	73	1.2	91																				
410			3.2	23	1.9	52	1.4	75	1.2	94																				
420			3.2	24	1.8	54	1.4	77	1.2	96																				
430			3.2	25	1.8	55	1.4	78	1.2	98																				
440			3.2	26	1.8	56	1.4	80																						
450			3.2	26	1.8	58	1.4	82																						
460			3.2	27	1.8	59	1.4	84																						
470			3.2	28	1.8	61	1.4	86																						
480			3.1	29	1.8	62	1.4	88																						
490			3.1	30	1.8	63	1.4	90																						
500			3.1	31	1.8	65	1.4	92																						

Table 7–7 Trial and error solution for example 3

Discharge, Q	160	160	160	160
Slope, S	0.0085	0.0085	0.0085	0.0085
Depth, D	1.5	1.4	1.3	1.2
Bottom width, B	35	35	35	35
Side slope, *z*	4	4	4	4
Area, A	61.5	56.84	52.26	47.76
Hydraulic radius, R	1.298	1.221	1.143	1.064
V_T, Q/A	2.602	2.815	3.062	3.350
C_I	5.6	5.6	5.6	5.6
n	0.048	0.048	0.047	0.047
V_M, Manning's	3.401	2.286	3.166	3.038
Difference: $V_M - V_T$	0.799	0.471	0.104	–0.312

Grassed Waterway Design Charts
for
Drainage Areas from 0 to 30 Acres

A large number of waterways are constructed throughout Iowa which have drainage areas ranging from 0 to 30 acres. The charts with this amendment provide a standard design for these size waterways. The charts are only applicable if a parabolic waterway cross section is selected.

These charts should not be used if any of the following conditions exist:

1. The drainage area and/or slope exceeds the limits of the chart.
2. The chart shows "na" for the specific condition.
3. There are complex geologic, hydrologic, or topographic features at the site.

For these cases, site specific designs should be completed. A more detailed design procedure may be used in any situation when a site specific design is desired.

Following are some assumptions that went into the development of the charts:

1. The hydrology used for design was based on:
    a. A typical watershed shape was used where the watershed length was equal to 1.5 times the width.
    b. A typical watershed slope was selected for each drainage area and waterway slope.
    c. Runoff curve numbers were based on contoured row crops with a RCN = 75 for hydrologic soil group "B" and a RCN = 82 for hydrologic soil group "C".
    d. The state was divided into two regions based on rainfall. Counties with 10yr.-24hr. rainfalls of 4.2 to 4.5 inches were placed in the North Region and counties with rainfalls of 4.6 to 4.9 inches were placed in the South Region.
2. The vegetative factor used was 0.87. This is valid for brome grass and brome grass mixtures.
3. Designs for grassed waterways with drainage areas from 0 to 10 acres were based on B-C retardance values for capacity and stability design respectively. Designs for waterways with drainage areas from 11 to 30 acres were based on B-D retardance values for capacity and stability design respectively.
4. The minimum waterway depth used is 1.0 ft.
5. Minimum top widths varied depending on the side slope (z) ratio. For a "z" value of 6, the minimum top width is 30 ft. For a "z" value of 8, the minimum top width is 32 ft.

Waterway designs using the charts may be completed by utilizing the following procedure:

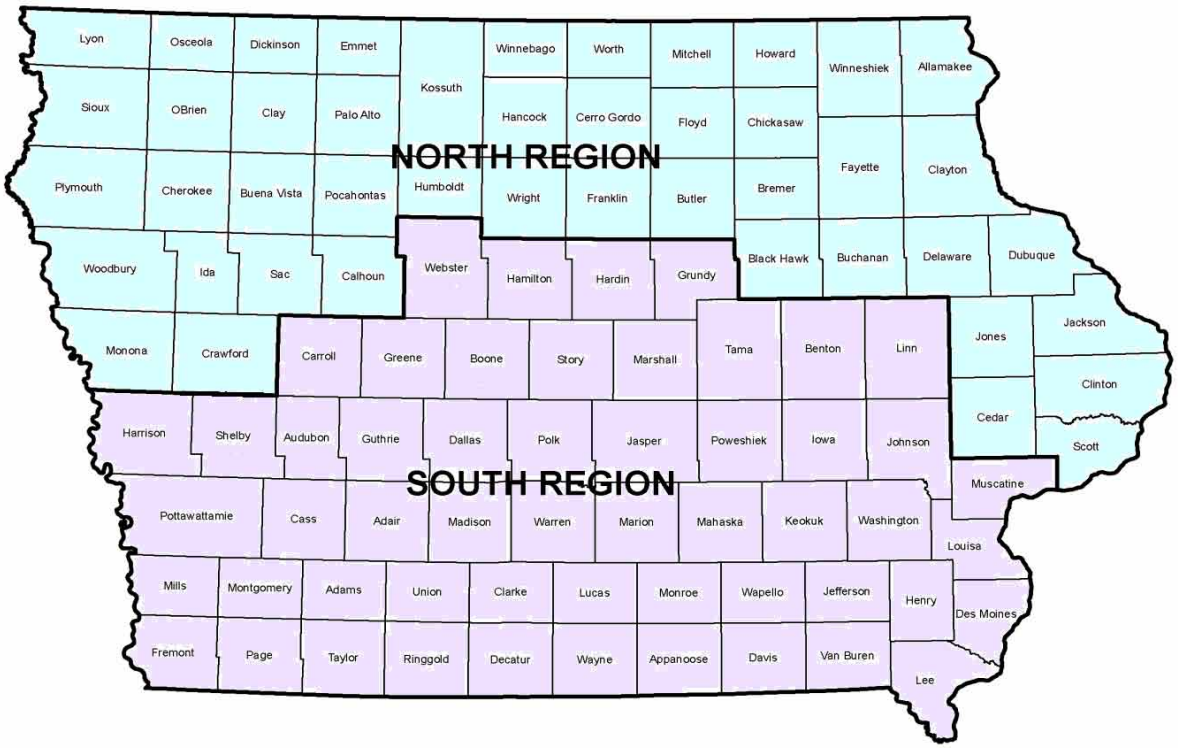
1. Determine if the county where the waterway is located is in the North or South Region of the state from Exhibit IA7-2.
2. Determine if the maximum side slope "z" at the outer edges of the waterway will be 6:1 or 8:1.
3. Determine the drainage area of the waterway.
4. Determine the slope of the waterway.
5. Determine if the average runoff curve number of the drainage area is approximately 75 or 82.
6. Using the type of soil in the planned waterway, determine the soil erodibility category from Exhibit IA7-1.
7. Using the information from steps 1 through 6, enter the appropriate design chart in Exhibit IA7-3 and select the waterway dimensions.

Waterway dimensions taken from the design charts may be used with standard drawings, job sheets, etc. to meet minimum documentation requirements as shown in the Field Office Technical Guide Statement of Work for Grassed Waterways.

Note: The Design Tables for Parabolic Channels presented in Appendix D of this chapter are based on a side slope ratio of 1:1 at the outer edges of the waterway. These tables may be used for design; however, the designer should be aware that the cross section will generally not be crossable with any type of farm equipment.

Grassed Waterway Design

Rainfall Regions Map



GRASSED WATERWAY DESIGN CHARTS									
South Region RCN = 75 z=6									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	34	1.4	34	1.4	34	1.4	34	1.4
	2	30	1.2	30	1.2	30	1.2	30	1.2
*	3	30	1.1	30	1.1	30	1.1	30	1.1
*	4	30	1.0	30	1.0	30	1.0	30	1.0
*	6	30	1.0	30	1.0	30	1.0	30	1.0
*	8	30	1.0	30	1.0	30	1.0	30	1.0
*	10	30	1.0	30	1.0	30	1.0	30	1.0
*	12	30	1.0	30	1.0	30	1.0	30	1.0
7-10	0-1	34	1.4	34	1.4	34	1.4	34	1.4
	2	30	1.2	30	1.2	30	1.2	30	1.2
	3	30	1.1	30	1.1	30	1.1	30	1.1
	4	30	1.0	30	1.0	30	1.0	30	1.0
	6	30	1.0	30	1.0	30	1.0	30	1.0
	8	30	1.0	30	1.0	30	1.0	30	1.0
	10	34	1.0	30	1.0	30	1.0	30	1.0
	12	36	1.0	30	1.0	30	1.0	30	1.0
Design Based on B - D Retardance									
11-20	0-1	38	1.5	38	1.5	38	1.5	38	1.5
	2	32	1.3	32	1.3	32	1.3	32	1.3
	3	42	1.2	30	1.2	30	1.2	30	1.2
	4	50	1.0	34	1.1	30	1.2	30	1.2
	6	70	1.0	48	1.0	30	1.0	30	1.1
	8	na	na	58	1.0	36	1.0	30	1.0
	10	na	na	68	1.0	42	1.0	40	1.0
21-30	0-1	40	1.6	40	1.6	40	1.6	40	1.6
	2	36	1.4	34	1.4	34	1.4	34	1.4
	3	48	1.2	32	1.3	32	1.3	32	1.3
	4	70	1.0	46	1.1	30	1.2	30	1.2
	6	na	na	62	1.0	38	1.0	30	1.1
	8	na	na	80	1.0	50	1.0	36	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS									
South Region RCN = 82 z=6									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	34	1.4	34	1.4	34	1.4	34	1.4
	2	30	1.2	30	1.2	30	1.2	30	1.2
*	3	30	1.1	30	1.1	30	1.1	30	1.1
*	4	30	1.0	30	1.0	30	1.0	30	1.0
*	6	30	1.0	30	1.0	30	1.0	30	1.0
*	8	30	1.0	30	1.0	30	1.0	30	1.0
*	10	30	1.0	30	1.0	30	1.0	30	1.0
*	12	30	1.0	30	1.0	30	1.0	30	1.0
7-10	0-1	36	1.5	36	1.5	36	1.5	36	1.5
	2	32	1.3	32	1.3	32	1.3	32	1.3
	3	30	1.2	30	1.2	30	1.2	30	1.2
	4	30	1.1	30	1.1	30	1.1	30	1.1
	6	32	1.0	30	1.0	30	1.0	30	1.0
	8	40	1.0	30	1.0	30	1.0	30	1.0
	10	44	1.0	32	1.0	30	1.0	30	1.0
	12	50	1.0	36	1.0	36	1.0	30	1.0
Design Based on B - D Retardance									
11-20	0-1	40	1.6	40	1.6	40	1.6	40	1.6
	2	38	1.4	34	1.4	34	1.4	34	1.4
	3	54	1.2	36	1.3	32	1.3	32	1.3
	4	70	1.0	46	1.1	30	1.2	30	1.2
	6	na	na	62	1.0	38	1.0	30	1.1
	8	na	na	80	1.0	50	1.0	36	1.0
	10	na	na	na	na	58	1.0	56	1.0
21-30	0-1	42	1.7	42	1.7	42	1.7	42	1.7
	2	52	1.4	38	1.5	38	1.5	38	1.5
	3	72	1.2	48	1.3	34	1.4	34	1.4
	4	na	na	66	1.1	38	1.3	32	1.3
	6	na	na	na	na	54	1.0	38	1.1
	8	na	na	na	na	70	1.0	52	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS									
North Region RCN = 75 z=6									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	34	1.4	34	1.4	34	1.4	34	1.4
	2	30	1.1	30	1.1	30	1.1	30	1.1
*	3	30	1.0	30	1.0	30	1.0	30	1.0
*	4	30	1.0	30	1.0	30	1.0	30	1.0
*	6	30	1.0	30	1.0	30	1.0	30	1.0
*	8	30	1.0	30	1.0	30	1.0	30	1.0
*	10	30	1.0	30	1.0	30	1.0	30	1.0
*	12	30	1.0	30	1.0	30	1.0	30	1.0
7-10	0-1	34	1.4	34	1.4	34	1.4	34	1.4
	2	30	1.2	30	1.2	30	1.2	30	1.2
	3	30	1.1	30	1.1	30	1.1	30	1.1
	4	30	1.0	30	1.0	30	1.0	30	1.0
	6	30	1.0	30	1.0	30	1.0	30	1.0
	8	30	1.0	30	1.0	30	1.0	30	1.0
	10	30	1.0	30	1.0	30	1.0	30	1.0
	12	32	1.0	30	1.0	30	1.0	30	1.0
Design Based on B - D Retardance									
11-20	0-1	36	1.5	36	1.5	36	1.5	36	1.5
	2	32	1.3	32	1.3	32	1.3	32	1.3
	3	36	1.2	30	1.2	30	1.2	30	1.2
	4	44	1.0	30	1.1	30	1.1	30	1.1
	6	62	1.0	42	1.0	30	1.0	30	1.0
	8	74	1.0	50	1.0	30	1.0	30	1.0
	10	na	na	58	1.0	36	1.0	36	1.0
21-30	0-1	40	1.6	40	1.6	40	1.6	40	1.6
	2	36	1.4	34	1.4	34	1.4	34	1.4
	3	48	1.2	32	1.3	32	1.3	32	1.3
	4	62	1.0	42	1.1	30	1.2	30	1.2
	6	na	na	56	1.0	34	1.0	30	1.1
	8	na	na	70	1.0	42	1.0	32	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS									
North Region RCN = 82 z=6									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	34	1.4	34	1.4	34	1.4	34	1.4
	2	30	1.2	30	1.2	30	1.2	30	1.2
*	3	30	1.1	30	1.1	30	1.1	30	1.1
*	4	30	1.0	30	1.0	30	1.0	30	1.0
*	6	30	1.0	30	1.0	30	1.0	30	1.0
*	8	30	1.0	30	1.0	30	1.0	30	1.0
*	10	30	1.0	30	1.0	30	1.0	30	1.0
*	12	30	1.0	30	1.0	30	1.0	30	1.0
7-10	0-1	36	1.5	36	1.5	36	1.5	36	1.5
	2	30	1.3	30	1.3	30	1.3	30	1.3
	3	30	1.1	30	1.1	30	1.1	30	1.1
	4	30	1.1	30	1.1	30	1.1	30	1.1
	6	30	1.0	30	1.0	30	1.0	30	1.0
	8	36	1.0	30	1.0	30	1.0	30	1.0
	10	40	1.0	30	1.0	30	1.0	30	1.0
	12	44	1.0	32	1.0	32	1.0	30	1.0
Design Based on B - D Retardance									
11-20	0-1	38	1.6	38	1.6	38	1.6	38	1.6
	2	34	1.4	34	1.4	34	1.4	34	1.4
	3	48	1.2	32	1.3	32	1.3	32	1.3
	4	62	1.0	42	1.1	30	1.2	30	1.2
	6	na	na	58	1.0	36	1.0	30	1.1
	8	na	na	72	1.0	44	1.0	32	1.0
	10	na	na	na	na	50	1.0	50	1.0
21-30	0-1	42	1.8	42	1.8	42	1.8	42	1.8
	2	46	1.4	36	1.5	36	1.5	36	1.5
	3	66	1.2	44	1.3	34	1.4	34	1.4
	4	na	na	58	1.1	34	1.3	32	1.3
	6	na	na	78	1.0	48	1.0	34	1.2
	8	na	na	na	na	62	1.0	46	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS									
South Region RCN = 75 z=8									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	44	1.4	44	1.4	44	1.4	44	1.4
	2	36	1.1	36	1.1	36	1.1	36	1.1
*	3	34	1.0	34	1.0	34	1.0	34	1.0
*	4	32	1.0	32	1.0	32	1.0	32	1.0
*	6	32	1.0	32	1.0	32	1.0	32	1.0
*	8	32	1.0	32	1.0	32	1.0	32	1.0
*	10	32	1.0	32	1.0	32	1.0	32	1.0
*	12	32	1.0	32	1.0	32	1.0	32	1.0
7-10	0-1	46	1.4	46	1.4	46	1.4	46	1.4
	2	38	1.2	38	1.2	38	1.2	38	1.2
	3	34	1.1	34	1.1	34	1.1	34	1.1
	4	32	1.0	32	1.0	32	1.0	32	1.0
	6	32	1.0	32	1.0	32	1.0	32	1.0
	8	32	1.0	32	1.0	32	1.0	32	1.0
	10	34	1.0	32	1.0	32	1.0	32	1.0
	12	36	1.0	32	1.0	32	1.0	32	1.0
Design Based on B - D Retardance									
11-20	0-1	48	1.5	48	1.5	48	1.5	48	1.5
	2	42	1.3	40	1.3	40	1.3	40	1.3
	3	42	1.2	38	1.2	38	1.2	38	1.2
	4	50	1.0	36	1.1	36	1.1	36	1.1
	6	70	1.0	48	1.0	32	1.0	32	1.0
	8	na	na	58	1.0	36	1.0	32	1.0
	10	na	na	68	1.0	42	1.0	40	1.0
21-30	0-1	50	1.5	50	1.5	50	1.5	50	1.5
	2	44	1.3	44	1.3	44	1.3	44	1.3
	3	48	1.2	40	1.2	40	1.2	40	1.2
	4	70	1.0	46	1.1	38	1.2	38	1.2
	6	na	na	62	1.0	38	1.0	34	1.1
	8	na	na	80	1.0	50	1.0	36	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS									
South Region RCN = 82 z=8									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	44	1.4	44	1.4	44	1.4	44	1.4
	2	38	1.2	38	1.2	38	1.2	38	1.2
*	3	34	1.1	34	1.1	34	1.1	34	1.1
*	4	32	1.0	32	1.0	32	1.0	32	1.0
*	6	32	1.0	32	1.0	32	1.0	32	1.0
*	8	32	1.0	32	1.0	32	1.0	32	1.0
*	10	32	1.0	32	1.0	32	1.0	32	1.0
*	12	32	1.0	32	1.0	32	1.0	32	1.0
7-10	0-1	46	1.4	46	1.4	46	1.4	46	1.4
	2	40	1.2	40	1.2	40	1.2	40	1.2
	3	36	1.1	36	1.1	36	1.1	36	1.1
	4	34	1.0	34	1.0	34	1.0	34	1.0
	6	32	1.0	32	1.0	32	1.0	32	1.0
	8	40	1.0	32	1.0	32	1.0	32	1.0
	10	44	1.0	32	1.0	32	1.0	32	1.0
	12	50	1.0	36	1.0	36	1.0	32	1.0
Design Based on B - D Retardance									
11-20	0-1	50	1.6	50	1.6	50	1.6	50	1.6
	2	44	1.4	44	1.4	44	1.4	44	1.4
	3	54	1.2	40	1.2	40	1.2	40	1.2
	4	70	1.0	46	1.1	38	1.2	38	1.2
	6	na	na	62	1.0	38	1.0	34	1.1
	8	na	na	80	1.0	50	1.0	36	1.0
	10	na	na	na	na	58	1.0	56	1.0
21-30	0-1	52	1.6	52	1.6	52	1.6	52	1.6
	2	52	1.4	46	1.4	46	1.4	46	1.4
	3	72	1.2	48	1.3	42	1.3	42	1.3
	4	na	na	66	1.1	40	1.3	40	1.3
	6	na	na	na	na	54	1.0	38	1.1
	8	na	na	na	na	70	1.0	52	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS									
North Region RCN = 75 z=8									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	42	1.3	42	1.3	42	1.3	42	1.3
	2	36	1.1	36	1.1	36	1.1	36	1.1
*	3	32	1.0	32	1.0	32	1.0	32	1.0
*	4	32	1.0	32	1.0	32	1.0	32	1.0
*	6	32	1.0	32	1.0	32	1.0	32	1.0
*	8	32	1.0	32	1.0	32	1.0	32	1.0
*	10	32	1.0	32	1.0	32	1.0	32	1.0
*	12	32	1.0	32	1.0	32	1.0	32	1.0
7-10	0-1	44	1.4	44	1.4	44	1.4	44	1.4
	2	38	1.2	38	1.2	38	1.2	38	1.2
	3	34	1.1	34	1.1	34	1.1	34	1.1
	4	32	1.0	32	1.0	32	1.0	32	1.0
	6	32	1.0	32	1.0	32	1.0	32	1.0
	8	32	1.0	32	1.0	32	1.0	32	1.0
	10	32	1.0	32	1.0	32	1.0	32	1.0
	12	32	1.0	32	1.0	32	1.0	32	1.0
Design Based on B - D Retardance									
11-20	0-1	48	1.5	48	1.5	48	1.5	48	1.5
	2	42	1.3	40	1.3	40	1.3	40	1.3
	3	38	1.2	38	1.2	38	1.2	38	1.2
	4	44	1.0	34	1.1	34	1.1	34	1.1
	6	62	1.0	42	1.0	32	1.0	32	1.0
	8	74	1.0	50	1.0	32	1.0	32	1.0
	10	na	na	58	1.0	36	1.0	36	1.0
21-30	0-1	50	1.6	50	1.6	50	1.6	50	1.6
	2	44	1.3	42	1.3	42	1.3	42	1.3
	3	48	1.2	40	1.2	40	1.2	40	1.2
	4	62	1.0	42	1.1	38	1.1	38	1.1
	6	na	na	56	1.0	34	1.0	34	1.0
	8	na	na	70	1.0	42	1.0	32	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS									
North Region RCN = 82 z=8									
DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion	
		Top Width	Depth	Top Width	Depth	Top Width	Depth	Top Width	Depth
Design Based on B - C Retardance									
0-6	0-1	44	1.4	44	1.4	44	1.4	44	1.4
	2	38	1.2	38	1.2	38	1.2	38	1.2
*	3	34	1.0	34	1.0	34	1.0	34	1.0
*	4	32	1.0	32	1.0	32	1.0	32	1.0
*	6	32	1.0	32	1.0	32	1.0	32	1.0
*	8	32	1.0	32	1.0	32	1.0	32	1.0
*	10	32	1.0	32	1.0	32	1.0	32	1.0
*	12	32	1.0	32	1.0	32	1.0	32	1.0
7-10	0-1	46	1.4	46	1.4	46	1.4	46	1.4
	2	40	1.2	40	1.2	40	1.2	40	1.2
	3	36	1.1	36	1.1	36	1.1	36	1.1
	4	34	1.0	34	1.0	34	1.0	34	1.0
	6	32	1.0	32	1.0	32	1.0	32	1.0
	8	36	1.0	32	1.0	32	1.0	32	1.0
	10	40	1.0	32	1.0	32	1.0	32	1.0
	12	44	1.0	32	1.0	32	1.0	32	1.0
Design Based on B - D Retardance									
11-20	0-1	48	1.5	48	1.5	48	1.5	48	1.5
	2	42	1.3	42	1.3	42	1.3	42	1.3
	3	48	1.2	40	1.2	40	1.2	40	1.2
	4	62	1.0	42	1.1	38	1.1	36	1.1
	6	na	na	58	1.0	36	1.0	34	1.1
	8	na	na	72	1.0	44	1.0	32	1.0
	10	na	na	na	na	50	1.0	50	1.0
21-30	0-1	54	1.7	54	1.7	54	1.7	54	1.7
	2	46	1.4	46	1.4	46	1.4	46	1.4
	3	66	1.2	44	1.3	42	1.3	42	1.3
	4	na	na	58	1.1	40	1.2	40	1.2
	6	na	na	78	1.0	48	1.0	36	1.1
	8	na	na	na	na	62	1.0	46	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

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Additional Grassed Waterway Design Charts
For
Drainage Areas from 0 to 30 Acres

Engineering Field Handbook Amendment IA55 dated April 2011 included grassed waterway design charts for many typical field situations. Since then, many hydrologic soil groups (HSG) were revised to reflect the use of updated analytical procedures and new technology. This resulted in the HSG classification for many soils throughout the state being changed from A to B, B to C, or C to D. This increased the runoff curve number and consequently the design peak flows also increased.

It was determined that additional grassed waterway design charts for the south region of the state should be developed for runoff curve numbers of 85 and 90.

This Amendment includes design charts for the following conditions for grassed waterways with drainage areas from 0 to 30 acres.

RCN	z
85	6
90	6
85	8
90	8

Refer to pages IA7-20(1-2) for instructions on the use of the charts and discussion on assumptions used to develop the charts.

GRASSED WATERWAY DESIGN CHARTS

South Region RCN = 85 z = 6

DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion Resistant	
Design Based on B - C Retardance									
0-6	0-1	36	1.5	36	1.5	36	1.5	36	1.5
	2	30	1.2	30	1.2	30	1.2	30	1.2
*	3	30	1.1	30	1.1	30	1.1	30	1.1
*	4	30	1.0	30	1.0	30	1.0	30	1.0
*	6	30	1.0	30	1.0	30	1.0	30	1.0
*	8	30	1.0	30	1.0	30	1.0	30	1.0
*	10	30	1.0	30	1.0	30	1.0	30	1.0
*	12	30	1.0	30	1.0	30	1.0	30	1.0
7-10	0-1	38	1.6	38	1.6	38	1.6	38	1.6
	2	32	1.3	32	1.3	32	1.3	32	1.3
	3	30	1.2	30	1.2	30	1.2	30	1.2
	4	30	1.1	30	1.1	30	1.1	30	1.1
	6	36	1.0	30	1.0	30	1.0	30	1.0
	8	42	1.0	30	1.0	30	1.0	30	1.0
	10	50	1.0	36	1.0	30	1.0	30	1.0
	12	56	1.0	40	1.0	40	1.0	30	1.0
Design Based on B - D Retardance									
11-20	0-1	42	1.7	42	1.7	42	1.7	42	1.7
	2	44	1.4	36	1.5	36	1.5	36	1.5
	3	58	1.2	38	1.3	32	1.3	32	1.3
	4	80	1.0	54	1.1	32	1.3	32	1.3
	6	na	na	72	1.0	42	1.0	30	1.2
	8	na	na	86	1.0	52	1.0	40	1.0
	10	na	na	na	na	64	1.0	62	1.0
21-30	0-1	44	1.9	46	1.9	46	1.9	46	1.9
	2	60	1.4	40	1.6	38	1.6	38	1.6
	3	80	1.2	54	1.3	36	1.4	34	1.4
	4	na	na	74	1.1	44	1.3	34	1.4
	6	na	na	98	1.0	58	1.0	42	1.1
	8	na	na	na	na	72	1.0	54	1.0
	10	na	na	na	na	92	1.0	90	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS

South Region RCN = 90 z = 6

DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion Resistant	
Design Based on B - C Retardance									
0-6	0-1	36	1.5	36	1.5	36	1.5	36	1.5
	2	30	1.3	30	1.3	30	1.3	30	1.3
*	3	30	1.1	30	1.1	30	1.1	30	1.1
*	4	30	1.1	30	1.1	30	1.1	30	1.1
*	6	30	1.0	30	1.0	30	1.0	30	1.0
*	8	30	1.0	30	1.0	30	1.0	30	1.0
*	10	34	1.0	30	1.0	30	1.0	30	1.0
*	12	38	1.0	30	1.0	30	1.0	30	1.0
7-10	0-1	40	1.6	40	1.6	40	1.6	40	1.6
	2	34	1.4	34	1.4	34	1.4	34	1.4
	3	30	1.2	30	1.2	30	1.2	30	1.2
	4	34	1.1	30	1.2	30	1.2	30	1.2
	6	44	1.0	30	1.0	30	1.1	30	1.1
	8	52	1.0	36	1.0	30	1.0	30	1.0
	10	58	1.0	42	1.0	30	1.0	30	1.0
	12	64	1.0	46	1.0	46	1.0	46	1.0
Design Based on B - D Retardance									
11-20	0-1	44	1.8	44	1.8	44	1.8	44	1.8
	2	54	1.4	38	1.5	38	1.5	38	1.5
	3	70	1.2	48	1.3	34	1.4	34	1.4
	4	96	1.0	66	1.1	38	1.3	32	1.3
	6	na	na	86	1.0	52	1.0	36	1.1
	8	na	na	na	na	64	1.0	48	1.0
	10	na	na	na	na	80	1.0	78	1.0
21-30	0-1	48	1.9	48	1.9	48	1.9	48	1.9
	2	74	1.4	50	1.6	40	1.7	40	1.7
	3	98	1.2	66	1.3	38	1.5	36	1.5
	4	na	na	92	1.1	54	1.3	38	1.4
	6	na	na	na	na	74	1.0	52	1.1
	8	na	na	na	na	90	1.0	68	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS

South Region RCN = 85 z = 8

DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion Resistant	
Design Based on B - C Retardance									
0-6	0-1	46	1.4	46	1.4	46	1.4	46	1.4
	2	38	1.2	38	1.2	38	1.2	38	1.2
*	3	34	1.1	34	1.1	34	1.1	34	1.1
*	4	32	1.0	32	1.0	32	1.0	32	1.0
*	6	32	1.0	32	1.0	32	1.0	32	1.0
*	8	32	1.0	32	1.0	32	1.0	32	1.0
*	10	32	1.0	32	1.0	32	1.0	32	1.0
*	12	34	1.0	32	1.0	32	1.0	32	1.0
7-10	0-1	48	1.5	48	1.5	48	1.5	48	1.5
	2	40	1.3	40	1.3	40	1.3	40	1.3
	3	36	1.1	36	1.1	36	1.1	36	1.1
	4	34	1.1	34	1.1	34	1.1	34	1.1
	6	36	1.0	32	1.0	32	1.0	32	1.0
	8	42	1.0	32	1.0	32	1.0	32	1.0
	10	50	1.0	36	1.0	32	1.0	32	1.0
	12	56	1.0	40	1.0	40	1.0	32	1.0
Design Based on B - D Retardance									
11-20	0-1	52	1.6	52	1.6	52	1.6	52	1.6
	2	44	1.4	44	1.4	44	1.4	44	1.4
	3	58	1.2	40	1.3	40	1.3	40	1.3
	4	80	1.0	54	1.1	40	1.2	38	1.2
	6	na	na	72	1.0	42	1.0	36	1.1
	8	na	na	86	1.0	52	1.0	40	1.0
	10	na	na	na	na	64	1.0	62	1.0
21-30	0-1	56	1.7	56	1.7	56	1.7	56	1.7
	2	60	1.4	48	1.5	48	1.5	48	1.5
	3	80	1.2	54	1.3	44	1.3	44	1.3
	4	na	na	74	1.1	44	1.3	42	1.3
	6	na	na	98	1.0	58	1.0	42	1.1
	8	na	na	na	na	72	1.0	54	1.0
	10	na	na	na	na	92	1.0	90	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

GRASSED WATERWAY DESIGN CHARTS

South Region RCN = 90 z = 8

DA	WW Slope	Allowable Stress							
Acres	Per Cent	Easily Eroded		Erodible		Erosion Resistant		Very Erosion Resistant	
Design Based on B - C Retardance									
0-6	0-1	46	1.5	46	1.5	46	1.5	46	1.5
	2	40	1.2	40	1.2	40	1.2	40	1.2
	3	36	1.1	36	1.1	36	1.1	36	1.1
	4	34	1.0	34	1.0	34	1.0	34	1.0
	6	32	1.0	32	1.0	32	1.0	32	1.0
	8	32	1.0	32	1.0	32	1.0	32	1.0
	10	34	1.0	32	1.0	32	1.0	32	1.0
	12	38	1.0	32	1.0	32	1.0	32	1.0
7-10	0-1	50	1.5	50	1.5	50	1.5	50	1.5
	2	42	1.3	42	1.3	42	1.3	42	1.3
	3	38	1.2	38	1.2	38	1.2	38	1.2
	4	36	1.1	36	1.1	36	1.1	36	1.1
	6	44	1.0	32	1.0	32	1.0	32	1.0
	8	52	1.0	36	1.0	32	1.0	32	1.0
	10	58	1.0	42	1.0	32	1.0	32	1.0
	12	64	1.0	46	1.0	46	1.0	32	1.0
Design Based on B - D Retardance									
11-20	0-1	56	1.7	56	1.7	56	1.7	56	1.7
	2	54	1.4	46	1.4	46	1.4	46	1.4
	3	70	1.2	48	1.3	42	1.3	42	1.3
	4	96	1.0	66	1.1	40	1.3	40	1.3
	6	na	na	86	1.0	52	1.0	38	1.1
	8	na	na	na	na	64	1.0	48	1.0
	10	na	na	na	na	80	1.0	78	1.0
21-30	0-1	60	1.8	58	1.8	58	1.8	60	1.8
	2	74	1.4	50	1.6	50	1.5	50	1.6
	3	98	1.2	66	1.3	46	1.4	46	1.4
	4	na	na	92	1.1	54	1.3	44	1.4
	6	na	na	na	na	74	1.0	52	1.1
	8	na	na	na	na	90	1.0	68	1.0

* The dimensions for waterways in this line may be changed to T=20 ft. and d=0.75 ft. if the criteria for Special Treatment Areas in the 412 Standard is met.

Waterway Design for Flat Waterways with Out-of-Bank Flow

For waterways with slopes of less than 1 percent, out-of-bank flow will be permitted if the flow will not cause erosion. The minimum capacity of the vegetated portion of the waterway shall be the expected runoff from a 2-year - 24-hour storm. The velocity of the flow outside of the vegetated waterway, based on the runoff expected from a 10-year - 24-hour storm, will not exceed 1.5 fps for easily eroded and erodible soils or 2.0 fps for erosion resistant and very erosion resistant soils, as defined on pages IA7 - 10(1-7). Following are the minimum steps which must be documented in the design for these waterways:

1. The waterway design grade must be less than 1 percent.
2. Document the soil type and determine its soil erodibility category.
3. Determine the allowable out-of-bank flow depth from Table 1 on page IA7-20(15).

4 A. For Trapezoidal Waterways

a. Design the waterway for the Q_2 storm using the Waterway Design Tool (WDT).
b. Determine the dimensions for a Q_{10} waterway. In the WDT, set the minimum bottom width to the design bottom width for the Q_2 waterway. (step a.)
c. Add D_2 (depth of the Q_2 waterway) to the $d_{allowable}$ from Table 1. (step 3.)
d. If the value obtained in step c. is equal to or greater than D_{10}, then the design is ok.
e. If D_{10} is greater than the value from step c., then the design is not adequate. Go back to step a. and increase the flow for the "Q_2" design. Then go through steps a. through d. again. Repeat the process until the condition in step d. is met.

4 B. For Parabolic Waterways

a. Design the waterway for the Q_2 storm using the WDT. Record the top width, depth, and parabolic channel coefficient.
b. Determine the dimensions for a Q_{10} waterway using the WDT. Record the top width, depth, and parabolic channel coefficient.
c. Using the WDT, do a trial and error process to determine the dimensions of a waterway to carry the Q_{10} which has the same parabolic channel coefficient as the Q_2 waterway. To do this, keep the inputs the same as step b. Then go to the channel properties screen and input a flow width that is less than the Q_{10} waterway width. For a first guess, try a width that is 10 ft less than the Q_{10} width. Do a simulation. Compare the parabolic channel coefficient to the Q_2 coefficient from step a. If the numbers are not the same, change the top width and do another simulation. When the coefficients are approximately the same, record the "revised" Q_{10} waterway dimensions.
d. Add D_2 from step a. and $d_{allowable}$ from step 3.

e. Compare this value to D_{10}. If the value obtained in step d. is greater than or equal to $D_{10,}$ the design is ok.
f. If D_{10} is greater than the value from step d., then the design is not adequate. Go back to step a. and increase the flow for the "Q_2" design. Then go through steps a. through e. again. Repeat the process until the condition in step e. is met.

For example designs see pages IA7-20(16-25).

Sometimes it is difficult to design waterways with reasonable dimensions that also meet the requirements of the standard. In those cases it is acceptable to design waterways based on a capacity which is equal to or larger than Q_2 but less than Q_{10}. The following table gives the maximum depth for out of bank flow that results in non-erosive velocities.

TABLE 1. Maximum depths in feet for non-erosive flows ($d_{allowable}$).

Rows parallel to waterway (n = 0.035)		
S	V_{max} = 1.5 fps*	V_{max} = 2.0 fps**
0.1 %	1.18	1.82
0.2 %	0.70	1.08
0.3 %	0.52	0.80
0.4 %	0.42	0.64
0.5 %	0.35	0.54
0.6 %	0.31	0.47
0.7 %	0.27	0.42
0.8 %	0.25	0.38
0.9 %	0.23	0.35
1.0 %	0.21	0.32

Rows perpendicular to waterway (n = 0.040)		
S	V_{max} = 1.5 fps*	V_{max} = 2.0 fps**
0.1 %	1.44	2.22
0.2 %	0.86	1.32
0.3 %	0.63	0.97
0.4 %	0.51	0.79
0.5 %	0.43	0.66
0.6 %	0.38	0.58
0.7 %	0.34	0.52
0.8 %	0.30	0.47
0.9 %	0.28	0.43
1.0 %	0.26	0.40

***** For soils with an erosion category of “easily eroded” or “erodible”

****** For soils with an erosion category of “erosion resistant” or “very erosion resistant”

EXAMPLE 1.

Design a waterway for a field in Story County, Iowa. The drainage area of the waterway is measured to be 88 acres and the runoff curve number is calculated to be 78. The survey shows that the waterway slope is 0.9 percent. The hydraulic length of the watershed is 2,450 feet and the average watershed slope is 2.6 percent. The producer has indicated that the rows will run perpendicular to the waterway and that he will not normally mow the waterway. Use a trapezoidal waterway with 8:1 side slopes.

Step 1. The waterway is 0.9 percent. It is allowable to use this procedure.

Step 2. The peak discharges from EFH 2 are: (See page IA7-20(17))

Q_2 = 67 cfs

Q_{10} = 145 cfs

Step 3. The soil type is a Webster. The erosion category is "very erosion resistant."

(See page IA7-10(7))

Step 4. The allowable flow depth for out-of bank flow is 0.43 feet ($d_{allowable}$).

(See Table 1)

Step 5. Dimensions for a Q_2 waterway. (See page IA7-20(18))

b_2 = 10 ft D_2 = 1.82 ft

Step 6. Dimensions for a Q_{10} waterway. (See page IA7-20(19))

b_{10} = 10 ft D_{10} = 2.21 ft

Step 7. Add $d_{allowable}$ from Table 1 to D_2

0.43 + 1.82 = 2.25 ft

Step 8. Compare this to D_{10}:

2.25 ft > 2.21 ft The design is ok.

Construct a trapezoidal waterway with a 10 foot bottom width, 8:1 side slopes, and 1.8 feet deep.

Client: Example 1
County: STORY State: IA
Practice: Grassed Waterway
Calculated By: MJJ Date: 4/13/2011
Checked By: _____ Date: _____

Drainage Area:	88	Acres (user entered value)
Curve Number:	78	(user entered value)
Watershed Length:	2450	Feet
Watershed Slope:	2.6	Percent
Time of Concentration:	0.72	Hours (calculated value)
Rainfall Type:	II	

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	2	5	10	25	50	100	
24-Hr rainfall (in)	3.10	4.00	4.70	5.40	6.00	6.60	
Ia/P Ratio	0.18	0.14	0.12	0.10	0.09	0.09	0.00
Used	0.18	0.14	0.12	0.10	0.10	0.10	0.00
Runoff (in)	1.20	1.89	2.46	3.05	3.58	4.11	
(ac-ft)	8.80	13.86	18.04	22.37	26.25	30.14	0.00
Unit Peak Discharge (cfs/acre/in)	0.631	0.656	0.669	0.678	0.681	0.681	0.000
Peak Discharge (cfs)	67	109	145	182	214	247	

Story County Example 1: Starting Station 0+00, Ending Station 16+50.0

Input

Channel Data

Bank Slopes, z1,z2: 8.0, 8.0 **Bed Slope:** 0.903% **Freeboard:** NA **Min Bed Width:** 10.00 ft

Flow Depth: NA **Flow Width:** NA **Discharge:** 67.0 cfs

Soil Data

Grain Roughness: 0.0156

Allowable Stress: Very Erosion Resistant - 0.070 lb/sq.ft

Vegetal Data

	Stem Length	Density	Ret Curve Index	Vegetal Cover Factor
Stability			4.44 (D)	Turf grasses (Buffalo grass, 0.87)
Capacity			7.64 (B)	

Outputs

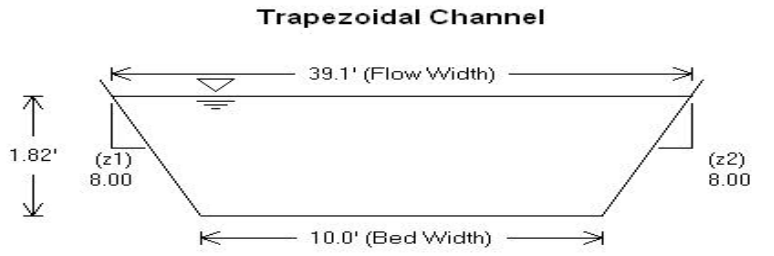
Bed Width determined by specified minimum value for Stability Conditions (Stress not the limiting factor)

Flow Conditions with Minimum cover (Stability)

Manning's n	Average Velocity	Flow Depth	Effect. Soil Stress	Flow Width
0.0408	2.95 ft/sec	1.17 ft	0.013 lb/sq.ft	28.7 ft
X-sect. Area	**Hydraulic Radius**		**Bed Width**	**Flow Width w/Fb**
22.7 sq.ft	0.79 ft		10.0 ft	NA

Capacity Flow Conditions

Manning's n	Average Velocity	Flow Depth		Flow Width
0.1026	1.50 ft/sec	1.82 ft		39.1 ft
X-sect. Area	**Hydraulic Radius**		**Bed Width**	**Flow Width w/Fb**
44.6 sq.ft	1.13 ft		10.0 ft	NA



Note: picture is not to scale and does not include freeboard

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Reach Simulation
EFH Amendment Examples

		Date
Designed		
Drawn		
Checked		
Approved		

EFT Version 2.1.0.2

File Name *Examples.xml*

Drawing Name

04/27/2011

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Story County Example 1 - Q10: Starting Station 0+00, Ending Station 16+50.0

Input

Channel Data

Bank Slopes, z1,z2: 8.0, 8.0	**Bed Slope:** 0.903%	**Freeboard:** NA	**Min Bed Width:** 10.00 ft
Flow Depth: NA	**Flow Width:** NA	**Discharge:** 145.0 cfs	

Soil Data

Grain Roughness: 0.0156

Allowable Stress: Very Erosion Resistant - 0.070 lb/sq.ft

Vegetal Data

	Stem Length	Density	Ret Curve Index	Vegetal Cover Factor
Stability			4.44 (D)	Turf grasses (Buffalo grass, 0.87)
Capacity			7.64 (B)	

Outputs

Bed Width determined by specified minimum value for Stability Conditions (Stress not the limiting factor)

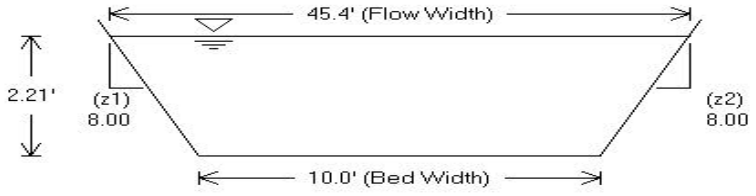
Flow Conditions with Minimum cover (Stability)

Manning's n	Average Velocity	Flow Depth	Effect. Soil Stress	Flow Width
0.0351	4.06 ft/sec	1.58 ft	0.023 lb/sq.ft	35.3 ft
X-sect. Area	**Hydraulic Radius**		**Bed Width**	**Flow Width w/Fb**
35.7 sq.ft	1.01 ft		10.0 ft	NA

Capacity Flow Conditions

Manning's n	Average Velocity	Flow Depth		Flow Width
0.0727	2.37 ft/sec	2.21 ft		45.4 ft
X-sect. Area	**Hydraulic Radius**		**Bed Width**	**Flow Width w/Fb**
61.2 sq.ft	1.34 ft		10.0 ft	NA

Trapezoidal Channel



Note: picture is not to scale and does not include freeboard

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Reach Simulation
EFH Amendment Examples

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04/27/2011

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EXAMPLE 2.

Design a reach of a parabolic waterway for a field in Grundy County, Iowa. The drainage area of the waterway is measured to be 477 acres and the runoff curve number is calculated to be 78. The survey indicates that the waterway slope is 0.3 percent. The hydraulic length of the watershed is 8,800 feet and the average watershed slope is 2.4 percent. The producer has indicated that the rows will run parallel to the waterway and that he will normally mow the waterway.

Step 1. The waterway is 0.3 percent, which is less than 1 percent; therefore, it is allowable to use this procedure.

Step 2. The peak discharges from EFH 2 are: (See page IA7-20(21))
Q_2 = 182 cfs
Q_{10} = 382 cfs

Step 3. The soil type is a Clyde silty clay loam. The erosion category for a Clyde soil is "erosion resistant." (See page IA7-10(2))

Step 4. The allowable flow depth ($d_{allowable}$) for out-of bank flow is 0.80 ft. (See Table 1)

Step 5. Dimensions for a Q_2 waterway from the WDT. (See page IA7-20(22))
Top width = 66.6 ft D_2 = 2.09 ft Parabolic Channel Coefficient = 0.00189

Step 6. Dimensions of a Q_{10} waterway from the WDT. (See page IA7-20(23))
Top width = 85.6 ft D_{10} = 2.53 ft Parabolic Channel Coefficient = 0.00138

Step 7. Use a trial and error procedure with the waterway design tool to find the dimensions of a Q_{10} waterway with the same Parabolic Channel Coefficient as the Q_2 waterway.

Q_{10}		T	D	P Channel Coeff	See Page
382		85.6	2.53	0.00138 < 0.00189	
	Try	80	2.61	0.00163 < 0.00189	IA7-20(24)
	Try	75	2.68	0.00191 ~ 0.00189	IA7-20(25)

0.00191 ~ 0.00189 Therefore, the D_{10} depth is 2.68 ft.

Step 8. $D_2 + d_{allowable}$ = 2.09 + 0.80 = 2.89 ft
2.89 ft > D_{10} = 2.68 ft Therefore, the design is good.

Construct a parabolic waterway with T = 68 ft and depth = 2.1 ft.

Client: Example 2
County: GRUNDY State: IA
Practice: Grassed Waterway
Calculated By: MJJ Date: 4/13/2011
Checked By: _____ Date: _____

Drainage Area:	477	Acres (user entered value)
Curve Number:	78	(user entered value)
Watershed Length:	8800	Feet
Watershed Slope:	2.4	Percent
Time of Concentration:	2.07	Hours (calculated value)
Rainfall Type:	II	

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	2	5	10	25	50	100	
24-Hr rainfall (in)	3.10	4.00	4.60	5.30	5.80	6.50	
Ia/P Ratio	0.18	0.14	0.12	0.11	0.10	0.09	0.00
Used	0.18	0.14	0.12	0.11	0.10	0.10	0.00
Runoff (in)	1.20	1.89	2.38	2.97	3.40	4.02	
(ac-ft)	47.70	75.13	94.61	118.06	135.15	159.80	0.00
Unit Peak Discharge (cfs/acre/in)	0.319	0.331	0.337	0.342	0.344	0.344	0.000
Peak Discharge (cfs)	182	298	382	484	558	660	

Grundy Q2: Starting Station 6+00, Ending Station 15+00

Input

Channel Data

Limiting BS, z:1: 8.0	**Bed Slope:** 0.300%	**Freeboard:** NA	:
Flow Depth: NA	**Flow Width:** NA	**Discharge:** 182.0 cfs	
	Offsets 1,2,3: 0.00, 0.00, 0.00		

Soil Data

Grain Roughness: 0.0156

Allowable Stress: Erosion Resistant - 0.050 lb/sq.ft

Vegetal Data

	Stem Length	Density	Ret Curve Index	Vegetal Cover Factor
Stability			4.44 (D)	Turf grasses (Buffalo grass, 0.87)
Capacity			5.60 (C)	

Outputs

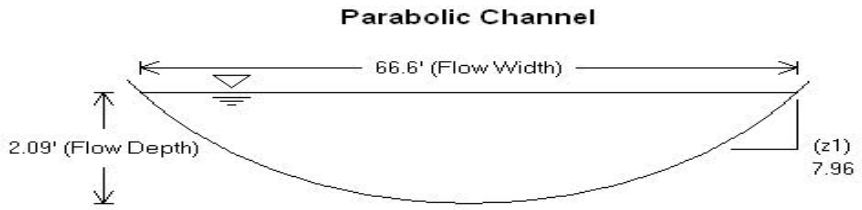
Parabolic Channel Coefficient determined by specified bank slope limit for Capacity Conditions (Stress not the limiting factor)

Flow Conditions with Minimum cover (Stability)

Manning's n	Average Velocity	Flow Depth	Effect. Soil Stress	Flow Width
0.0397	2.36 ft/sec	1.85 ft	0.007 lb/sq.ft	62.6 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
77.2 sq.ft	1.23 ft	8.45	0.00189	NA

Capacity Flow Conditions

Manning's n	Average Velocity	Flow Depth		Flow Width
0.0519	1.96 ft/sec	2.09 ft		66.6 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
92.9 sq.ft	1.39 ft	7.96	0.00189	NA



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Sheet of

Grundy Q10: Starting Station 6+00, Ending Station 15+00

Input

Channel Data

Limiting BS, z:1: 8.0	**Bed Slope:** 0.300%	**Freeboard:** NA	:
Flow Depth: NA	**Flow Width:** NA	**Discharge:** 382.0 cfs	
	Offsets 1,2,3: 0.00, 0.00, 0.00		

Soil Data

Grain Roughness: 0.0156

Allowable Stress: Erosion Resistant - 0.050 lb/sq.ft

Vegetal Data

	Stem Length	Density	Ret Curve Index	Vegetal Cover Factor
Stability			4.44 (D)	Turf grasses (Buffalo grass, 0.87)
Capacity			5.60 (C)	

Outputs

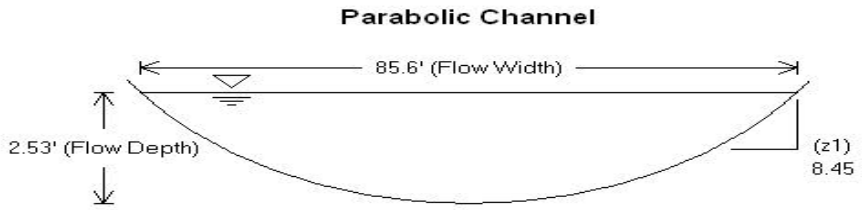
Parabolic Channel Coefficient determined by specified bank slope limit for Capacity Conditions (Stress not the limiting factor)

Flow Conditions with Minimum cover (Stability)

Manning's n	Average Velocity	Flow Depth	Effect. Soil Stress	Flow Width
0.0349	3.09 ft/sec	2.28 ft	0.011 lb/sq.ft	81.3 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
123.6 sq.ft	1.52 ft	8.88	0.00138	NA

Capacity Flow Conditions

Manning's n	Average Velocity	Flow Depth		Flow Width
0.0438	2.64 ft/sec	2.53 ft		85.6 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
144.7 sq.ft	1.69 ft	8.45	0.00138	NA



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Sheet of

Grundy Q10 80: Starting Station 6+00, Ending Station 15+00

Input

Channel Data

Limiting BS, z:1: 8.0	**Bed Slope:** 0.300%	**Freeboard:** NA	:
Flow Depth: NA	**Flow Width:** 80.0	**Discharge:** 382.0 cfs	
	Offsets 1,2,3: 0.00, 0.00, 0.00		

Soil Data

Grain Roughness: 0.0156

Allowable Stress: Erosion Resistant - 0.050 lb/sq.ft

Vegetal Data

	Stem Length	Density	Ret Curve Index	Vegetal Cover Factor
Stability			4.44 (D)	Turf grasses (Buffalo grass, 0.87)
Capacity			5.60 (C)	

Outputs

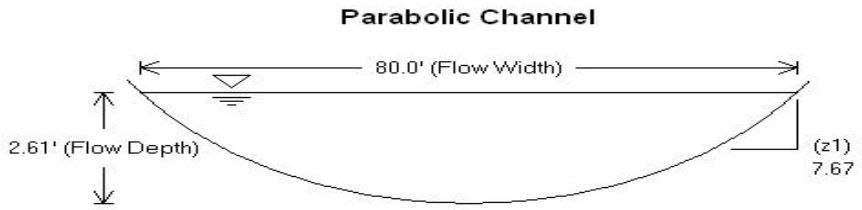
Parabolic Channel Coefficient determined by total stress on vegetal cover

Flow Conditions with Minimum cover (Stability)

Manning's n	Average Velocity	Flow Depth	Effect. Soil Stress	Flow Width
0.0344	3.20 ft/sec	2.35 ft	0.012 lb/sq.ft	76.0 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
119.3 sq.ft	1.57 ft	8.07	0.00163	NA

Capacity Flow Conditions

Manning's n	Average Velocity	Flow Depth		Flow Width
0.0429	2.75 ft/sec	2.61 ft		80.0 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
139.1 sq.ft	1.73 ft	7.67	0.00163	NA



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Sheet of

Grundy Q10 75: Starting Station 6+00, Ending Station 15+00

Input

Channel Data

Limiting BS, z:1: 8.0	**Bed Slope:** 0.300%	**Freeboard:** NA	:
Flow Depth: NA	**Flow Width:** 75.0	**Discharge:** 382.0 cfs	
	Offsets 1,2,3: 0.00, 0.00, 0.00		

Soil Data

Grain Roughness: 0.0156

Allowable Stress: Erosion Resistant - 0.050 lb/sq.ft

Vegetal Data

	Stem Length	Density	Ret Curve Index	Vegetal Cover Factor
Stability			4.44 (D)	Turf grasses (Buffalo grass, 0.87)
Capacity			5.60 (C)	

Outputs

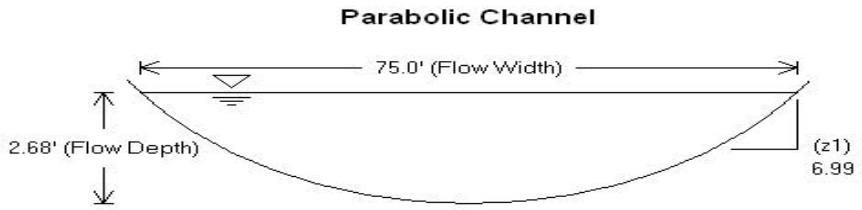
Parabolic Channel Coefficient determined by total stress on vegetal cover

Flow Conditions with Minimum cover (Stability)

Manning's n	Average Velocity	Flow Depth	Effect. Soil Stress	Flow Width
0.0339	3.31 ft/sec	2.43 ft	0.013 lb/sq.ft	71.3 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
115.3 sq.ft	1.61 ft	7.35	0.00191	NA

Capacity Flow Conditions

Manning's n	Average Velocity	Flow Depth		Flow Width
0.0421	2.85 ft/sec	2.68 ft		75.0 ft
X-sect. Area	**Hydraulic Radius**	**Bank Slope, z:1**	**P-Channel Coeff**	**Flow Width w/Fb**
134.1 sq.ft	1.78 ft	6.99	0.00191	NA



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650.0705 Layout and construction

(a) Layout

The layout of the waterway should begin at a key point. Usually, this is the outlet, but it may be a point determined by a building, property boundary, gully, or other landscape feature.

(b) Adjustment and marking

After the centerline has been staked, check and move some stakes, if necessary, to avoid landscape features or to improve alignment. The waterway should then be staked for construction. Mark all existing vegetation (trees, shrubs) and other landscape features to be protected during construction.

(c) Site preparation

A good time to build waterways is when the site has a good cover so that runoff and sedimentation will be at a minimum. All debris and vegetation not marked for retention should be removed from the site and disposed of in such a manner that does not adversely affect the environment or proper function of the waterway. For typical design and construction survey notes, see EFH 650.01. Soil may also be used as berms along the sides of the waterway.

(d) Excavation

The soil removed from the waterway should be deposited where it will not interfere with the flow of water into the waterway. Normally, the soil can be shaped and graded to fill low spots in the nearby fields or mounded to create visual interest and screening or to reduce noise and control wind.

The topsoil may be saved and spread in the constructed waterway if necessary for obtaining a good vegetative cover. Where this is done, the waterway should be overexcavated to allow for replacement of the topsoil without encroaching on the design cross section.

(e) Equipment

Many kinds of farming and construction equipment are adapted to the construction of waterways. However, it may be necessary to use equipment that will load and transport the excavated material to locations where it is needed, such as low spots in the surrounding field or washes in the waterway. Although scrapers that can be pulled by farm tractors are satisfactory for waterway construction, large self-propelled scrapers, bulldozers, and motor graders are the preferred equipment.

(f) Appurtenant structures

Effective vegetated waterways are not subjected to low flows of long duration nor kept wet for long periods. Subsurface drains, underground outlets, stone center drains, or other means of providing drainage and protecting the center of the waterway should be considered where low flows or wet conditions are prolonged.

(1) Subsurface drains

Subsurface drains should parallel the center of the vegetated waterway but be offset from the centerline at least a fourth of the top width of the waterway. Two drains may be required in some cases, one on each side of the center. The principles outlined in EFH 650.14 should be followed in designing and installing the subsurface drains. The subsurface drains may be outletted through a drop structure at the end of the waterway or through a standard pipe outlet.

(2) Underground outlets

Underground outlets can be used to carry prolonged low flows. Buried conduits with surface inlets are frequently used downstream of highway culverts or other locations where low flows are concentrated. Blind inlets are sometimes used, but they frequently become a maintenance problem.

(3) Stone center drains

In areas where field stones or other sources of rock are plentiful, a stone center drain may be the best solution to problems of prolonged flow and wetness, A gravel bedding or filter fabric (nonwoven geotextile) is commonly used under the rock to prevent erosion of the underlying soil. These drains are installed as shown in figure 7–11. An alternate cross section would have a stone center that could carry the flow from a

1-year, 24-hour event. Required stone size can be computed using techniques for sizing riprap found in EFH 650.16 or Hydraulic Engineering Circular 11 (FHWA 1989).

(4) Filter fabric barriers

The stability of grassed waterways is based on the establishment of vegetation within the constructed channel's boundaries. Until grass can be established, the waterway is subject to failure from rainfall events significantly less than the design storm. Installing filter fabric in the waterway immediately after the waterway has been constructed is one approach used to minimize the erosive damage caused by untimely rainfall events before the vegetation is established. The barriers are a light weight nonwoven filter fabric (geotextile) plowed into the waterway perpendicular to the direction of flow at intervals ranging from 50 to 100 feet (fig. 7–12).

(g) Postconstruction protection of channel lining

If vegetation is to be used for erosion protection, it should be established as soon after construction as weather conditions permit. (Check Field Office Technical Guide for local planting dates.) Prepare a seedbed and seed with a mixture of grasses and legumes adapted to soil conditions and local climate. Most excavated areas will require fertilizers to establish good cover. If weather conditions are not favorable for permanent seeding, it may be necessary to use a temporary seeding, mulch, or lining. Irrigation may be needed to assure adequate germination and growth initially. If an immediate turf cover is desired or if it is difficult to establish turf from seed, it may be necessary to use sod. Sodding by sprigging or broadcasting root stalks and stolons gives good results with bermudagrass and other grasses in favorable climates. In other areas, direct planting of sod in strips is practical. Woody plantings may be appropriate on channel back slopes to improve screening, wildlife habitat, space definition, and climate control (fig. 7–13). Check Field Office Technical Guides for tree planting dates.

Mulching materials such as straw, hay, jute, paper, or plastic mesh should be used to protect new seeding. At least the center-third portion of the cross section should be anchored. If temporary seedings or nurse crops are used, they should be mowed to reduce competition to permanent seeding. All seeding, planting, sodding, and mulching should conform to standards as given in the local Field Office Technical Guide.

Figure 7–11 Installation of stone center drain

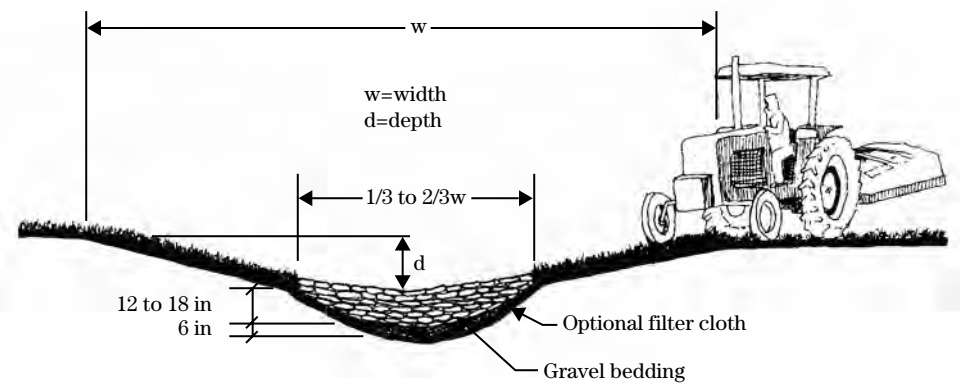
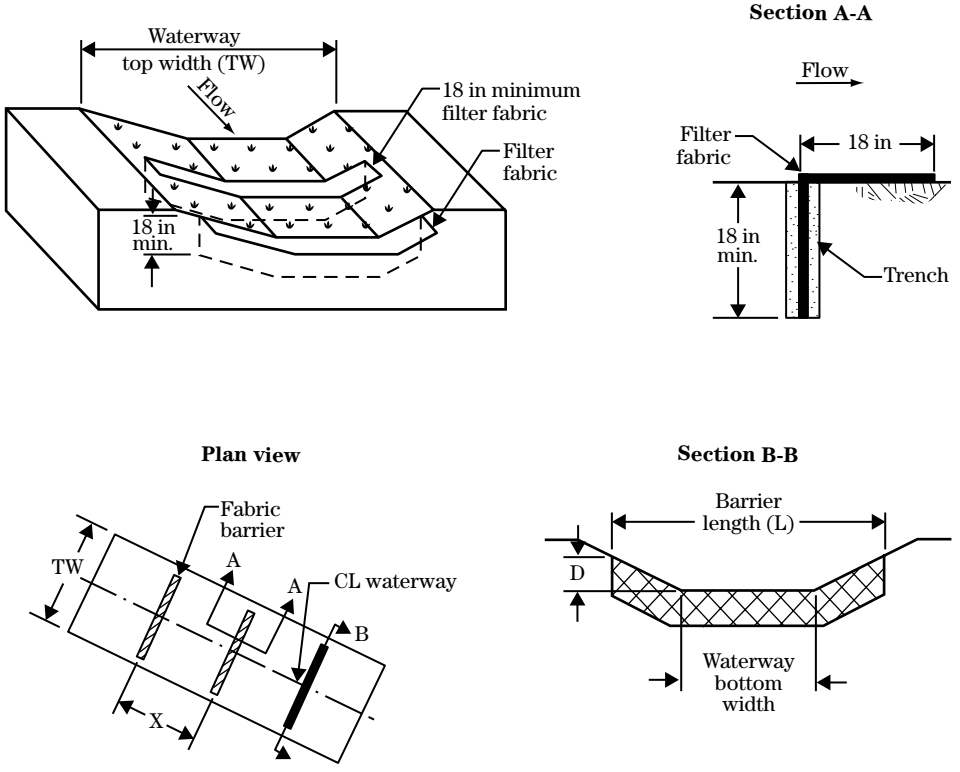


Figure 7–12 Fabric barrier



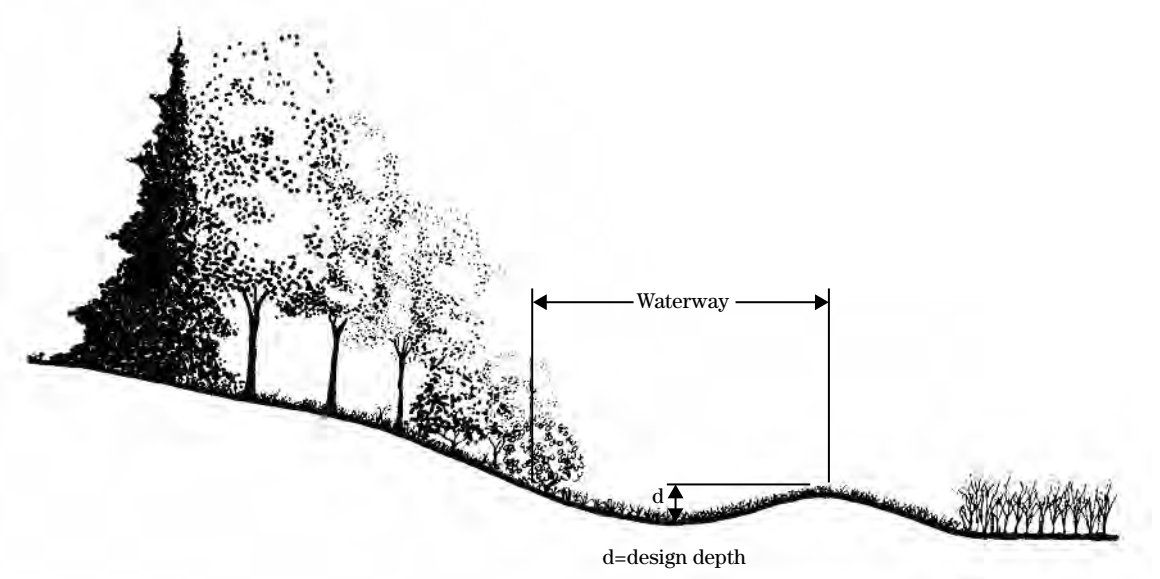
Barrier depth (D)
Barrier spacing (X)
Barrier length (L)

Notes
Fabric barriers are 36 inches wide with 18 inches of the fabric buried and anchored with compacted soil; lay the remaining 18 inches of fabric down the watercourse in the direction of the waterflow. After installation, compact the trench with rear tractor tire; the geotextile shall meet the requirements of NRCS Material Specification 592—Geotextile (ms592), class III nonwoven geotextile. Barriers need to be completed within 14 days after construction check-out. It is recommended that installation be done after seeding.

The waterway may be protected by using a combination of the following steps that best fits the needs of the site:

- Reduce the required capacity by dividing the runoff between two or more waterways.
- Construct and vegetate the waterway before any other channels or structures are allowed to discharge into it.
- Carry prolonged low flows in a subsurface drainage system or in a surface-protected section such as a stone center.
- When possible, divert major flows from the waterway during establishment period.
- Maintain vegetative cover by mowing, spraying, fertilizing, and performing other maintenance as needed.

Figure 7–13 Use of woody plantings



Geotextile Reinforced Vegetated Outlet (GVO)
Criteria and Design Procedure

Geotextile Reinforced Vegetated Outlets (GVO) provide an economical outlet for small watersheds. The Grassed Waterway Standard (412), Engineering Field Handbook Chapter 7, and the Waterway Design Tool were used as the basis for developing this procedure.

The use of this type of outlet is limited to watersheds with peak flows up to 100 cfs from a 10 year – 24 hour storm. It is also limited to soils which have an erosion category of erodible, erosion resistant, or very erosion resistant.

The cross section shape of the outlet shall be trapezoidal. Side slopes shall not be steeper than 3 horizontal to 1 vertical (3:1). Bottom widths shall be no more than 30 feet. The maximum amount of drop through a GVO shall be 10 feet.

Either the following chart or the Waterway Design Tool may be used to size the GVO. The chart is based on an allowable effective stress of 0.090. Vegetative retardance values used were "D" for stability and "B" for capacity.

Outlet Slope		Maximum Flow	Chute Depth Including 0.5 ft. Freeboard	Minimum Inlet Depth
%	H:V	cfs/ft.	Ft.	Ft.
8	12.5:1	5.4	1.4	1.4
10	10:1	4.6	1.3	1.3
12.5	8:1	3.9	1.2	1.3
16.7	6:1	3.2	1.1	1.3
20	5:1	2.8	1.1	1.3
25	4:1	2.5	1.0	1.2
33	3:1	2.1	1.0	1.2

The minimum GVO bottom width is determined by dividing the peak flow for the 10 year – 24 hour storm by the maximum flow per foot from the table for the desired outlet slope.

The inlet depth must be the larger of the value from the above table or the depth of the upstream waterway. The upstream waterway shall be designed with a slope of 4% or less for at least 100 feet. The waterway may be used for a transition section to change the bottom width and/or side slope to those that match the GVO inlet dimensions. The inlet shall be a minimum of 10 feet long and shall be of the same width as the chute section of the GVO.

It is intended that this design procedure be used with Iowa Standard Drawing IA-1402A, Geotextile Reinforced Vegetated Outlet - Geotextile with an Erosion Control Blanket, or Iowa Standard Drawing IA-1402B, Geotextile Reinforced Vegetated Outlet - Turf Reinforcement Mat.

The drawings show a riprap section at the downstream toe of the chute. If wet conditions exist higher than the flow line of the outlet, additional riprap may be needed up the slope of the GVO to ensure that the outlet is stable.

Depending on the outlet slope and design flow, the designer may choose one of two options for the type(s) of material to use for the GVO. Standard Drawing IA-1402A shows the option for using a geotextile with either an erosion control blanket or mulch with an erosion control netting. Standard Drawing IA-1402B shows the option for using either a turf reinforcement mat or an erosion control blanket.

650.0706 Maintenance

(a) General

Timely maintenance is important for keeping a waterway in good working condition. Recommended maintenance generally includes mowing of waterways and removing vegetation so as not to retard water flow and cause excessive sedimentation in the channel. Timely mowing is critical for wildlife. The cool-season grasses typically should be fertilized for hay production, while the native grasses may not need fertilizer. Very often herbicides in field runoff can kill introduced grass species, while native grasses may not be affected as much by this problem. Grazing, if permitted, should be rigidly controlled. Livestock should be excluded during wet periods. Vehicular traffic should be excluded except at designated crossings.

(b) Removal of sediment

The waterway channel may require maintenance to remove small sediment deposits. However, if the deposit extends over long reaches or for the full length of the waterway, the channel should be reconstructed by use of appropriate construction equipment. Sediment should be used onsite or disposed of properly.

(c) Repair work

Eroded areas or damage to lining materials should be repaired promptly. This will prevent or reduce further degradation of the waterway system.

The transition section of waterway outlets is the most susceptible to erosion damage. Repairs should be made promptly to prevent gullying from advancing up the waterway channel. If vegetation proves inadequate in the transition section, it may be necessary to line this section of channel or construct a grade stabilization structure.

Where underground outlets are used, it is important to keep the outlet free of trash that may plug it and cause failure.

650.0707 References

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Appendix A Notations

Table 7A–1 Description of symbols

Symbol	Description
A	Cross section area, ft^2
a_p	Parabolic coefficient (determines shape of parabola)
B	Bottom width of trapezoidal channel, ft
C_e	Correction for void ratio
C_F	Vegetal cover factor
C_I	Retardance curve index
D	Maximum depth of flow in cross section, ft
d_{75}	75th percentile particle diameter, in
D_T	Section depth after addition of freeboard, ft
e	Void ratio
h	Representative height of vegetation, ft
I_w	Plasticity index
M	Stem density, stems/ft^2
n	Manning's roughness coefficient
n_s	Roughness associated with soil grain size
Q	Discharge in channel, ft^3/s (cfs)
R	Hydraulic radius, ft
S	Channel bed slope, ft/ft
T	Top width of trapezoidal or parabolic channel, ft
V_M	Velocity computed with Manning's equation
V_T	Average section velocity, Q/A (trial value in iterative solution)
z	Side slope
γ	Unit weight of water, 62.4 lb/ft^3
τ	Maximum hydraulic stress, lb/ft^2
τ_a	Allowable effective stress on soil, lb/ft^2
τ_{ab}	Basic allowable stress on soil, before correction for void ratio, lb/ft^2
τ_e	Erosionally effective stress on soil, lb/ft^2
τ_{va}	Allowable stress on vegetation, lb/ft^2

Blank

Appendix B Equations

Table 7B–1 Equations for deternining allowable effective stress

Soil classification	Applicable range	Equation
Noncohesive soils	$I_w < 10$	
GW, GP, SW, SP	$d_{75} < 0.05$	$n_s = 0.0156$ $\tau_a = 0.02$
	$d_{75} \geq 0.05$	$n_s = 0.0256 d_{75}^{\frac{1}{6}}$ $\tau_a = 0.4 d_{75}$
Cohesive soils	$I_w > 10$	$n_s = 0.0156$ $\tau_a = \tau_{ab} C_e^2$
GM, SC	$10 < I_w < 20$ $I_w > 20$	$C_e = 1.42 - 0.61e$ $\tau_{ab} = \left(1.07 I_w^2 + 14.3 I_w + 47.7\right) \times 10^{-4}$ $\tau_{ab} = 0.076$
GC	$10 < I_w < 20$ $I_w > 20$	$C_e = 1.42 - 0.61e$ $\tau_{ab} = \left(1.0477 I_w^2 + 2.86 I_w + 42.9\right) \times 10^{-3}$ $\tau_{ab} = 0.119$
SM	$10 < I_w < 20$ $I_w > 20$	$C_e = 1.42 - 0.61e$ $\tau_{ab} = \left(1.07 I_w^2 + 7.15 I_w + 11.9\right) \times 10^{-4}$ $\tau_{ab} = 0.058$
CH		$C_e = 1.38 - 0.373e$ $\tau_{ab} = 0.0966$

Table 7B–1 Equations for deternining allowable effective stress—Continued

Soil classification	Applicable range	Equation
CL		$C_e = 1.48 - 0.57e$
	$10 < I_w < 20$	$\tau_{ab} = \left(1.07I_w^2 + 14.3I_w + 47.7\right) \times 10^{-4}$
	$I_w > 20$	$\tau_{ab} = 0.076$
MH		$C_e = 1.38 - 0.373e$
	$10 < I_w < 20$	$\tau_{ab} = \left(1.0477I_w^2 + 1.43I_w + 10.7\right) \times 10^{-3}$
	$I_w > 20$	$\tau_{ab} = 0.058$
ML		$C_e = 1.48 - 0.57e$
	$10 < I_w < 20$	$\tau_{ab} = \left(1.07I_w^2 + 7.15I_w + 11.9\right) \times 10^{-4}$
	$I_w > 20$	$\tau_{ab} = 0.058$
OH		$C_e = 1.0$
	$10 < I_w < 20$	$\tau_{ab} = \left(1.0477I_w^2 + 1.43I_w + 10.7\right) \times 10^{-3}$
	$I_w > 20$	$\tau_{ab} = 0.058$
OL		$C_e = 1.0$
	$10 < I_w < 20$	$\tau_{ab} = \left(1.07I_w^2 + 7.15I_w + 11.9\right) \times 10^{-4}$
	$I_w > 20$	$\tau_{ab} = 0.058$

Table 7B–2 Governing hydraulic equations

Basic hydraulic equations	
Manning's *n*	$n = \exp\left\{C_I\left(0.0133\left[\ln(VR)\right]^2 - 0.0954\left[\ln(VR)\right] + 0.297\right) - 4.16\right\}$
Velocity (Manning's formula)	$V = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$
Unit discharge, or discharge per unit width	$q = \frac{Q}{T} = VD$

Stable unit discharge equations

Condition(s)	**Equation**	**Parameters**
$0.0025C_I^{2.5} \le q \le 36$ and $\gamma DS \le \tau_{va} + \tau_e$	$q = \exp\left\{\frac{-b - \sqrt{b^2 - 4ac}}{2a}\right.$	$a = 0.0133C_I$ $b = -\left(0.0954C_I + 0.429\right)$ $c = 0.297C_I - 0.5\ln(S) + 0.714\ln\left\{\frac{\tau_a}{\left(1 - C_F\right)n_s^{\,2}}\right\} - 6.94$
$q < 0.0025C_I^{2.5}$ or $q > 36$ and $\gamma DS \le \tau_{va} + \tau_e$	$q = \frac{0.0015\tau_a^{\frac{5}{3}} n^{\frac{7}{3}}}{\left(1 - C_F\right)^{\frac{5}{3}} n_s^{\frac{10}{3}} S^{\frac{7}{6}}}$	n computed with eq.: for $q < 0.0025C_I^{\,2.5}$ then $VR = 0.0025C_I^{\,2.5}$; for $q > 36$ then $VR = 36$
$0.0025C_I^{2.5} \le q \le 36$ and $\gamma DS \ge \tau_{va} + \tau_e$ (stess on vegetation controls)	$q = \exp\left\{\frac{-b - \sqrt{b^2 - 4ac}}{2a}\right.$	$a = 0.0133C_I$ $b = -\left(0.0954C_I + 0.429\right)$ $c = 0.297C_I - 1.67\ln\left(\tau_{va}\right) + 1.17\ln(S) + 2.33$
neither $0.0025C_I^{2.5} \le q \le 36$ or $\gamma DS \le \tau_{va} + \tau_e$ is satisfied	$q = \frac{0.0015\tau_{va}^{\frac{5}{3}}}{nS^{\frac{7}{6}}}$	$n = \exp\left(0.126C_I - 4.16\right)$

Table 7B–3 Cross section geometry equations

Area—trapezoidal channel	$A = BD + zD^2$
Area—parabolic channel	$A = \frac{D^{\frac{3}{2}}}{.75\sqrt{a_p}}$
Depth— trapezoidal channel	$D = \frac{-B\sqrt{B^2 + 4Az}}{2z}$
Depth—parabolic channel	$D = \left(0.75A\sqrt{a_p}\right)^{\frac{2}{3}}$
Hydraulic radius—trapezoidal channel	$R = \frac{A}{B + 2D\sqrt{z^2 + 1}}$
Hydraulic radius—parabolic channel	$R = \frac{A}{\sqrt{4D^2 + \frac{D}{a_p}} + \frac{1}{2a_p}\ln\left(\sqrt{4a_pD} + \sqrt{4a_pD + 1}\right)}$

Appendix C Design Tables for Trapezoidal Channels

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																			0.8	11	0.7	14	0.6	16	0.6	18	0.5	21		
20									1.3	11	1.1	13	1	15	0.9	17	0.9	19	0.7	25	0.6	29	0.6	33	0.6	37	0.5	44		
30							1.4	14	1.2	18	1.1	21	1	24	0.9	27	0.8	29	0.7	38	0.6	45	0.6	51	0.6	56				
40					1.7	13	1.3	20	1.2	25	1	29	1	33	0.9	36	0.8	39	0.7	51	0.6	60	0.6	68	0.5	75				
50					1.7	18	1.3	25	1.1	31	1	37	0.9	41	0.9	46	0.8	50	0.7	64	0.6	75	0.6	85	0.5	94				
60					1.6	22	1.3	31	1.1	38	1	44	0.9	50	0.9	55	0.8	60	0.7	77	0.6	90								
70			2.6	13	1.6	27	1.3	37	1.1	45	1	52	0.9	59	0.9	65	0.8	70	0.7	90										
80			2.5	16	1.6	31	1.3	42	1.1	52	1	60	0.9	67	0.9	74	0.8	81												
90			2.5	19	1.6	36	1.3	48	1.1	59	1	68	0.9	76	0.9	84	0.8	91												
100			2.4	21	1.6	40	1.3	54	1.1	65	1	76	0.9	85	0.9	93														
110			2.4	24	1.6	45	1.3	60	1.1	72	1	83	0.9	93																
120			2.3	27	1.6	49	1.3	65	1.1	79	1	91																		
130			2.3	30	1.5	53	1.3	71	1.1	86	1	99																		
140			2.3	33	1.5	58	1.3	77	1.1	93																				
150			2.3	35	1.5	62	1.3	82	1.1	99																				
160			2.3	38	1.5	66	1.3	88																						
170	4.5	11	2.3	41	1.5	71	1.3	93																						
180	4.4	13	2.2	44	1.5	75	1.3	99																						
190	4.4	15	2.2	46	1.5	79																								
200	4.3	16	2.2	49	1.5	84																								
210	4.3	18	2.2	52	1.5	88																								
220	4.2	19	2.2	55	1.5	92																								
230	4.2	21	2.2	57	1.5	97																								
240	4.2	22	2.2	60																										
250	4.1	24	2.2	63																										
260	4.1	25	2.2	65																										
270	4.1	27	2.2	68																										
280	4.1	28	2.2	71																										
290	4	30	2.2	74																										
300	4	31	2.2	76																										
310	4	33	2.2	79																										
320	4	34	2.2	82																										
330	4	35	2.2	84																										
340	4	37	2.2	87																										
350	4	38	2.2	90																										
360	3.9	40	2.2	93																										
370	3.9	41	2.2	95																										
380	3.9	43	2.2	98																										
390	3.9	44																												
400	3.9	45																												
410	3.9	47																												
420	3.9	48																												
430	3.9	50																												
440	3.9	51																												
450	3.9	52																												
460	3.9	54																												
470	3.9	55																												
480	3.8	56																												
490	3.8	58																												
500	3.8	59																												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																			0.8	11	0.7	14	0.6	16	0.6	18	0.5	21		
20											1.1	12	1	14	0.9	16	0.9	18	0.7	24	0.6	29	0.6	33	0.6	37	0.5	43		
30							1.4	12	1.2	17	1.1	20	1	23	0.9	26	0.9	29	0.7	37	0.6	44	0.6	50	0.6	56				
40					1.8	11	1.4	18	1.2	24	1	28	1	32	0.9	36	0.8	39	0.7	50	0.6	60	0.6	68	0.5	75				
50					1.7	16	1.3	24	1.1	30	1	36	0.9	41	0.9	45	0.8	49	0.7	63	0.6	75	0.6	85	0.5	94				
60					1.7	21	1.3	30	1.1	37	1	44	0.9	49	0.9	55	0.8	60	0.7	76	0.6	90								
70					1.6	25	1.3	36	1.1	44	1	52	0.9	58	0.9	64	0.8	70	0.7	89										
80			2.7	12	1.6	30	1.3	41	1.1	51	1	59	0.9	67	0.9	74	0.8	80												
90			2.6	15	1.6	34	1.3	47	1.1	58	1	67	0.9	76	0.9	83	0.8	90												
100			2.5	18	1.6	39	1.3	53	1.1	65	1	75	0.9	84	0.9	93														
110			2.5	22	1.6	43	1.3	59	1.1	71	1	83	0.9	93																
120			2.4	24	1.6	48	1.3	64	1.1	78	1	90																		
130			2.4	27	1.6	52	1.3	70	1.1	85	1	98																		
140			2.3	30	1.5	56	1.3	76	1.1	92																				
150			2.3	33	1.5	61	1.3	81	1.1	99																				
160			2.3	36	1.5	65	1.3	87																						
170			2.3	39	1.5	69	1.3	93																						
180			2.3	42	1.5	74	1.3	98																						
190			2.3	44	1.5	78																								
200			2.3	47	1.5	83																								
210	4.6	10	2.2	50	1.5	87																								
220	4.5	12	2.2	53	1.5	91																								
230	4.5	14	2.2	55	1.5	96																								
240	4.4	16	2.2	58	1.5	100																								
250	4.4	17	2.2	61																										
260	4.3	19	2.2	64																										
270	4.3	21	2.2	66																										
280	4.2	23	2.2	69																										
290	4.2	24	2.2	72																										
300	4.2	26	2.2	75																										
310	4.1	27	2.2	77																										
320	4.1	29	2.2	80																										
330	4.1	31	2.2	83																										
340	4.1	32	2.2	85																										
350	4.1	34	2.2	88																										
360	4	35	2.2	91																										
370	4	37	2.2	94																										
380	4	38	2.2	96																										
390	4	40	2.2	99																										
400	4	41																												
410	4	43																												
420	4	44																												
430	3.9	45																												
440	3.9	47																												
450	3.9	48																												
460	3.9	50																												
470	3.9	51																												
480	3.9	53																												
490	3.9	54																												
500	3.9	55																												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																			0.8	10	0.7	13	0.6	15	0.6	17	0.5	21		
20											1.1	11	1	13	0.9	15	0.9	17	0.7	24	0.6	29	0.6	33	0.6	37	0.5	43		
30							1.5	10	1.2	15	1.1	19	1	22	0.9	25	0.9	28	0.7	37	0.6	44	0.6	50	0.6	56				
40							1.4	17	1.2	22	1	27	1	31	0.9	35	0.8	38	0.7	50	0.6	59	0.6	67	0.5	75				
50					1.8	14	1.3	23	1.2	30	1	35	0.9	40	0.9	45	0.8	49	0.7	63	0.6	74	0.6	85	0.5	94				
60					1.7	19	1.3	29	1.1	36	1	43	0.9	49	0.9	54	0.8	59	0.7	76	0.6	90								
70					1.7	24	1.3	35	1.1	43	1	51	0.9	58	0.9	64	0.8	69	0.7	89										
80					1.6	28	1.3	40	1.1	50	1	59	0.9	66	0.9	73	0.8	80												
90			2.8	10	1.6	33	1.3	46	1.1	57	1	66	0.9	75	0.9	83	0.8	90												
100			2.7	14	1.6	37	1.3	52	1.1	64	1	74	0.9	84	0.9	92	0.8	100												
110			2.6	18	1.6	42	1.3	58	1.1	71	1	82	0.9	92																
120			2.5	21	1.6	46	1.3	63	1.1	77	1	90																		
130			2.5	24	1.6	51	1.3	69	1.1	84	1	98																		
140			2.4	27	1.6	55	1.3	75	1.1	91																				
150			2.4	30	1.5	60	1.3	80	1.1	98																				
160			2.4	33	1.5	64	1.3	86																						
170			2.3	36	1.5	68	1.3	92																						
180			2.3	39	1.5	73	1.3	97																						
190			2.3	42	1.5	77																								
200			2.3	45	1.5	81																								
210			2.3	48	1.5	86																								
220			2.3	51	1.5	90																								
230			2.3	53	1.5	95																								
240			2.2	56	1.5	99																								
250			2.2	59																										
260	4.7	10	2.2	62																										
270	4.6	12	2.2	64																										
280	4.5	14	2.2	67																										
290	4.5	16	2.2	70																										
300	4.4	18	2.2	73																										
310	4.4	20	2.2	75																										
320	4.3	22	2.2	78																										
330	4.3	24	2.2	81																										
340	4.2	26	2.2	84																										
350	4.2	28	2.2	86																										
360	4.2	29	2.2	89																										
370	4.2	31	2.2	92																										
380	4.1	33	2.2	95																										
390	4.1	34	2.2	97																										
400	4.1	36	2.2	100																										
410	4.1	37																												
420	4.1	39																												
430	4	41																												
440	4	42																												
450	4	44																												
460	4	45																												
470	4	47																												
480	4	48																												
490	4	50																												
500	4	51																												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																							0.7	11	0.6	13	0.5	15		
20													1.1	10	1	11	1	12	0.8	17	0.7	21	0.6	24	0.6	27	0.5	32		
30									1.4	11	1.2	14	1.1	16	1	18	0.9	20	0.8	26	0.7	32	0.6	36	0.6	40	0.5	48		
40							1.6	12	1.3	16	1.2	19	1	22	1	25	0.9	27	0.8	36	0.7	43	0.6	49	0.6	54	0.5	64		
50					2.1	10	1.5	16	1.3	21	1.1	25	1	28	1	31	0.9	34	0.8	45	0.7	54	0.6	61	0.6	68	0.5	80		
60					2	13	1.5	20	1.3	25	1.1	30	1	34	1	38	0.9	42	0.7	54	0.7	65	0.6	74	0.6	82	0.5	97		
70					1.9	16	1.5	24	1.3	30	1.1	36	1	40	0.9	45	0.9	49	0.7	64	0.7	76	0.6	86	0.6	96				
80					1.9	19	1.5	28	1.2	35	1.1	41	1	46	0.9	52	0.9	56	0.7	73	0.7	87	0.6	99						
90					1.8	22	1.4	32	1.2	40	1.1	46	1	53	0.9	58	0.9	64	0.7	82	0.7	98								
100			3.1	10	1.8	25	1.4	36	1.2	44	1.1	52	1	59	0.9	65	0.9	71	0.7	91										
110			3	12	1.8	28	1.4	39	1.2	49	1.1	57	1	65	0.9	72	0.9	78												
120			2.9	14	1.8	31	1.4	43	1.2	54	1.1	63	1	71	0.9	78	0.9	85												
130			2.9	16	1.8	34	1.4	47	1.2	58	1.1	68	1	77	0.9	85	0.9	93												
140			2.9	18	1.8	37	1.4	51	1.2	63	1.1	74	1	83	0.9	92	0.9	100												
150			2.8	20	1.8	40	1.4	55	1.2	68	1.1	79	1	89	0.9	98														
160			2.8	22	1.8	43	1.4	59	1.2	72	1.1	84	1	95																
170			2.8	24	1.8	46	1.4	63	1.2	77	1.1	90																		
180			2.8	25	1.7	49	1.4	67	1.2	82	1.1	95																		
190			2.7	27	1.7	52	1.4	71	1.2	86																				
200			2.7	29	1.7	55	1.4	74	1.2	91																				
210			2.7	31	1.7	58	1.4	78	1.2	96																				
220			2.7	33	1.7	61	1.4	82																						
230			2.7	34	1.7	64	1.4	86																						
240			2.7	36	1.7	67	1.4	90																						
250			2.7	38	1.7	69	1.4	94																						
260			2.6	40	1.7	72	1.4	98																						
270			2.6	42	1.7	75																								
280			2.6	44	1.7	78																								
290	5.4	10	2.6	45	1.7	81																								
300	5.4	11	2.6	47	1.7	84																								
310	5.3	12	2.6	49	1.7	87																								
320	5.3	13	2.6	51	1.7	90																								
330	5.3	14	2.6	52	1.7	93																								
340	5.2	15	2.6	54	1.7	96																								
350	5.2	16	2.6	56	1.7	99																								
360	5.2	17	2.6	58																										
370	5.1	18	2.6	60																										
380	5.1	19	2.6	61																										
390	5.1	20	2.6	63																										
400	5.1	21	2.6	65																										
410	5.1	22	2.6	67																										
420	5	23	2.6	68																										
430	5	24	2.6	70																										
440	5	25	2.6	72																										
450	5	26	2.6	74																										
460	5	27	2.5	75																										
470	5	27	2.5	77																										
480	4.9	28	2.5	79																										
490	4.9	29	2.5	81																										
500	4.9	30	2.5	83																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																							0.7	11	0.6	12	0.5	15		
20															1.1	10	1	11	0.8	16	0.7	20	0.6	23	0.6	26	0.5	31		
30											1.2	12	1.1	15	1	17	0.9	19	0.8	26	0.7	31	0.6	36	0.6	40	0.5	48		
40							1.7	10	1.3	14	1.2	18	1.1	21	1	24	0.9	26	0.8	35	0.7	42	0.6	48	0.6	54	0.5	64		
50							1.6	14	1.3	19	1.1	24	1	27	1	31	0.9	34	0.8	44	0.7	53	0.6	61	0.6	68	0.5	80		
60					2.1	10	1.5	18	1.3	24	1.1	29	1	34	1	37	0.9	41	0.7	54	0.7	64	0.6	73	0.6	82	0.5	96		
70					2	14	1.5	22	1.3	29	1.1	35	1	40	0.9	44	0.9	48	0.7	63	0.7	75	0.6	86	0.6	96				
80					1.9	17	1.5	26	1.2	34	1.1	40	1	46	0.9	51	0.9	56	0.7	72	0.7	86	0.6	98						
90					1.9	20	1.5	30	1.2	39	1.1	46	1	52	0.9	58	0.9	63	0.7	82	0.7	97								
100					1.9	23	1.4	34	1.2	43	1.1	51	1	58	0.9	64	0.9	70	0.7	91										
110					1.8	26	1.4	38	1.2	48	1.1	56	1	64	0.9	71	0.9	78	0.7	100										
120					1.8	29	1.4	42	1.2	53	1.1	62	1	70	0.9	78	0.9	85												
130			3.1	11	1.8	32	1.4	46	1.2	57	1.1	67	1	76	0.9	84	0.9	92												
140			3	14	1.8	36	1.4	50	1.2	62	1.1	73	1	82	0.9	91	0.9	99												
150			3	16	1.8	38	1.4	54	1.2	67	1.1	78	1	88	0.9	98														
160			2.9	18	1.8	41	1.4	58	1.2	72	1.1	84	1	94																
170			2.9	20	1.8	44	1.4	62	1.2	76	1.1	89	1	100																
180			2.9	22	1.8	48	1.4	66	1.2	81	1.1	94																		
190			2.8	24	1.8	50	1.4	70	1.2	86	1.1	100																		
200			2.8	26	1.7	53	1.4	73	1.2	90																				
210			2.8	28	1.7	56	1.4	77	1.2	95																				
220			2.8	30	1.7	59	1.4	81	1.2	100																				
230			2.8	32	1.7	62	1.4	85																						
240			2.7	34	1.7	65	1.4	89																						
250			2.7	35	1.7	68	1.4	93																						
260			2.7	37	1.7	71	1.4	97																						
270			2.7	39	1.7	74																								
280			2.7	41	1.7	77																								
290			2.7	43	1.7	80																								
300			2.7	45	1.7	83																								
310			2.6	47	1.7	86																								
320			2.6	48	1.7	89																								
330			2.6	50	1.7	92																								
340			2.6	52	1.7	95																								
350			2.6	54	1.7	98																								
360			2.6	56	1.7	100																								
370			2.6	57																										
380	5.5	10	2.6	59																										
390	5.4	11	2.6	61																										
400	5.4	12	2.6	63																										
410	5.4	13	2.6	64																										
420	5.3	14	2.6	66																										
430	5.3	15	2.6	68																										
440	5.3	17	2.6	70																										
450	5.2	18	2.6	72																										
460	5.2	19	2.6	73																										
470	5.2	20	2.6	75																										
480	5.1	21	2.6	77																										
490	5.1	22	2.6	79																										
500	5.1	23	2.6	80																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																							0.7	10	0.6	12	0.5	15		
20																	1	10	0.8	16	0.7	20	0.6	23	0.6	26	0.5	31		
30											1.3	11	1.1	14	1	16	0.9	18	0.8	25	0.7	31	0.6	36	0.6	40	0.5	47		
40									1.4	13	1.2	17	1.1	20	1	23	0.9	26	0.8	35	0.7	42	0.6	48	0.6	54	0.5	64		
50							1.7	12	1.3	18	1.2	23	1	26	1	30	0.9	33	0.8	44	0.7	53	0.6	61	0.6	68	0.5	80		
60							1.6	16	1.3	23	1.1	28	1	33	1	37	0.9	40	0.7	53	0.7	64	0.6	73	0.6	81	0.5	96		
70					2.2	10	1.5	21	1.3	28	1.1	34	1	39	1	43	0.9	48	0.7	63	0.7	75	0.6	86	0.6	95				
80					2.1	14	1.5	25	1.3	33	1.1	39	1	45	0.9	50	0.9	55	0.7	72	0.7	86	0.6	98						
90					2	18	1.5	29	1.2	37	1.1	45	1	51	0.9	57	0.9	62	0.7	81	0.7	97								
100					1.9	21	1.5	33	1.2	42	1.1	50	1	57	0.9	64	0.9	70	0.7	90										
110					1.9	24	1.4	37	1.2	47	1.1	56	1	63	0.9	70	0.9	77	0.7	100										
120					1.9	27	1.4	41	1.2	52	1.1	61	1	69	0.9	77	0.9	84												
130					1.8	31	1.4	45	1.2	56	1.1	66	1	76	0.9	84	0.9	92												
140					1.8	34	1.4	49	1.2	61	1.1	72	1	82	0.9	90	0.9	99												
150			3.2	10	1.8	37	1.4	53	1.2	66	1.1	77	1	88	0.9	97														
160			3.1	13	1.8	40	1.4	57	1.2	71	1.1	83	1	94																
170			3	15	1.8	43	1.4	61	1.2	75	1.1	88	1	100																
180			3	18	1.8	46	1.4	65	1.2	80	1.1	94																		
190			2.9	20	1.8	49	1.4	68	1.2	85	1.1	99																		
200			2.9	22	1.8	52	1.4	72	1.2	89																				
210			2.9	24	1.8	55	1.4	76	1.2	94																				
220			2.9	26	1.7	58	1.4	80	1.2	99																				
230			2.8	28	1.7	61	1.4	84																						
240			2.8	30	1.7	64	1.4	88																						
250			2.8	32	1.7	67	1.4	92																						
260			2.8	34	1.7	70	1.4	96																						
270			2.8	36	1.7	73	1.4	100																						
280			2.7	38	1.7	76																								
290			2.7	40	1.7	79																								
300			2.7	42	1.7	82																								
310			2.7	44	1.7	85																								
320			2.7	46	1.7	87																								
330			2.7	47	1.7	90																								
340			2.7	49	1.7	93																								
350			2.7	51	1.7	96																								
360			2.6	53	1.7	99																								
370			2.6	55																										
380			2.6	57																										
390			2.6	59																										
400			2.6	60																										
410			2.6	62																										
420			2.6	64																										
430			2.6	66																										
440			2.6	68																										
450			2.6	69																										
460			2.6	71																										
470			2.6	73																										
480	5.5	10	2.6	75																										
490	5.5	12	2.6	77																										
500	5.4	13	2.6	78																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																											0.6	10	0.5	11
20																			0.9	10	0.8	13	0.7	15	0.6	17	0.6	20	0.5	24
30															1.2	10	1.1	11	0.9	16	0.7	20	0.7	23	0.6	26	0.5	31	0.5	36
40											1.4	10	1.3	12	1.1	14	1.1	16	0.8	22	0.7	27	0.7	31	0.6	35	0.5	42		
50									1.6	10	1.4	13	1.2	16	1.1	18	1	21	0.8	28	0.7	34	0.7	39	0.6	44	0.5	53		
60									1.6	13	1.3	17	1.2	20	1.1	23	1	25	0.8	34	0.7	41	0.7	48	0.6	53	0.5	63		
70							1.9	12	1.5	16	1.3	20	1.2	24	1.1	27	1	30	0.8	40	0.7	48	0.7	56	0.6	62	0.5	74		
80							1.8	14	1.5	19	1.3	24	1.2	28	1.1	31	1	34	0.8	46	0.7	55	0.7	64	0.6	71	0.5	85		
90							1.8	17	1.5	22	1.3	27	1.2	32	1.1	35	1	39	0.8	52	0.7	62	0.7	72	0.6	81	0.5	96		
100					2.4	11	1.8	19	1.5	25	1.3	31	1.2	35	1.1	40	1	44	0.8	58	0.7	70	0.7	80	0.6	90				
110					2.4	13	1.8	22	1.5	28	1.3	34	1.2	39	1.1	44	1	48	0.8	64	0.7	77	0.7	88	0.6	99				
120					2.3	15	1.7	24	1.4	31	1.3	37	1.2	43	1.1	48	1	53	0.8	70	0.7	84	0.7	96						
130					2.3	17	1.7	26	1.4	34	1.3	41	1.1	47	1.1	52	1	57	0.8	76	0.7	91								
140					2.3	19	1.7	29	1.4	37	1.3	44	1.1	50	1.1	56	1	62	0.8	81	0.7	98								
150					2.3	20	1.7	31	1.4	40	1.3	47	1.1	54	1.1	61	1	66	0.8	87										
160					2.3	22	1.7	33	1.4	43	1.3	51	1.1	58	1.1	65	1	71	0.8	93										
170					2.2	24	1.7	36	1.4	45	1.3	54	1.1	62	1.1	69	1	76	0.8	99										
180					2.2	26	1.7	38	1.4	48	1.3	57	1.1	65	1	73	1	80												
190					2.2	28	1.7	40	1.4	51	1.2	61	1.1	69	1	77	1	85												
200			3.8	10	2.2	29	1.7	43	1.4	54	1.2	64	1.1	73	1	81	1	89												
210			3.7	11	2.2	31	1.7	45	1.4	57	1.2	67	1.1	77	1	86	1	94												
220			3.7	12	2.2	33	1.7	47	1.4	60	1.2	71	1.1	81	1	90	1	98												
230			3.7	13	2.2	35	1.7	50	1.4	63	1.2	74	1.1	84	1	94														
240			3.6	14	2.2	36	1.7	52	1.4	65	1.2	77	1.1	88	1	98														
250			3.6	16	2.1	38	1.7	54	1.4	68	1.2	81	1.1	92																
260			3.6	17	2.1	40	1.7	57	1.4	71	1.2	84	1.1	96																
270			3.6	18	2.1	42	1.6	59	1.4	74	1.2	87	1.1	100																
280			3.6	19	2.1	43	1.6	61	1.4	77	1.2	91																		
290			3.5	20	2.1	45	1.6	64	1.4	80	1.2	94																		
300			3.5	21	2.1	47	1.6	66	1.4	82	1.2	97																		
310			3.5	22	2.1	48	1.6	68	1.4	85																				
320			3.5	23	2.1	50	1.6	71	1.4	88																				
330			3.5	24	2.1	52	1.6	73	1.4	91																				
340			3.5	25	2.1	54	1.6	75	1.4	94																				
350			3.4	26	2.1	55	1.6	78	1.4	97																				
360			3.4	27	2.1	57	1.6	80	1.4	100																				
370			3.4	28	2.1	59	1.6	82																						
380			3.4	29	2.1	60	1.6	85																						
390			3.4	30	2.1	62	1.6	87																						
400			3.4	31	2.1	64	1.6	89																						
410			3.4	32	2.1	66	1.6	91																						
420			3.4	34	2.1	67	1.6	94																						
430			3.4	35	2.1	69	1.6	96																						
440			3.4	35	2.1	71	1.6	98																						
450			3.4	37	2.1	72																								
460			3.3	38	2.1	74																								
470			3.3	39	2.1	76																								
480			3.3	40	2.1	78																								
490			3.3	41	2.1	79																								
500			3.3	42	2.1	81																								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																													0.5	11
20																					0.8	12	0.7	14	0.6	16	0.6	20	0.5	23
30																	1.1	10	0.9	15	0.7	19	0.7	22	0.6	26	0.5	31	0.5	35
40													1.3	11	1.2	13	1.1	15	0.9	21	0.7	26	0.7	31	0.6	35	0.5	42		
50											1.4	12	1.2	15	1.1	17	1	20	0.8	27	0.7	33	0.7	39	0.6	44	0.5	52		
60									1.6	11	1.4	16	1.2	19	1.1	22	1	24	0.8	33	0.7	41	0.7	47	0.6	53	0.5	63		
70									1.6	15	1.3	19	1.2	23	1.1	26	1	29	0.8	39	0.7	48	0.7	55	0.6	62	0.5	74		
80							2	12	1.5	18	1.3	23	1.2	27	1.1	30	1	34	0.8	45	0.7	55	0.7	63	0.6	71	0.5	85		
90							1.9	14	1.5	21	1.3	26	1.2	30	1.1	35	1	38	0.8	51	0.7	62	0.7	72	0.6	80	0.5	95		
100							1.8	17	1.5	24	1.3	29	1.2	34	1.1	39	1	43	0.8	57	0.7	69	0.7	80	0.6	89				
110							1.8	20	1.5	27	1.3	33	1.2	38	1.1	43	1	47	0.8	63	0.7	76	0.7	88	0.6	98				
120					2.5	11	1.8	22	1.5	30	1.3	36	1.2	42	1.1	47	1	52	0.8	69	0.7	83	0.7	96						
130					2.4	14	1.8	25	1.5	33	1.3	40	1.2	46	1.1	51	1	57	0.8	75	0.7	90								
140					2.4	16	1.7	27	1.4	36	1.3	43	1.1	50	1.1	56	1	61	0.8	81	0.7	97								
150					2.4	18	1.7	29	1.4	39	1.3	46	1.1	53	1.1	60	1	66	0.8	87										
160					2.3	20	1.7	32	1.4	41	1.3	50	1.1	57	1.1	64	1	70	0.8	93										
170					2.3	22	1.7	34	1.4	44	1.3	53	1.1	61	1.1	68	1	75	0.8	99										
180					2.3	23	1.7	37	1.4	47	1.3	56	1.1	65	1.1	72	1	80												
190					2.3	25	1.7	39	1.4	50	1.3	60	1.1	69	1	77	1	84												
200					2.2	27	1.7	41	1.4	53	1.3	63	1.1	72	1	81	1	89												
210					2.2	29	1.7	44	1.4	56	1.2	66	1.1	76	1	85	1	93												
220					2.2	31	1.7	46	1.4	59	1.2	70	1.1	80	1	89	1	98												
230					2.2	33	1.7	48	1.4	61	1.2	73	1.1	84	1	93														
240					2.2	34	1.7	51	1.4	64	1.2	76	1.1	87	1	98														
250					2.2	36	1.7	53	1.4	67	1.2	80	1.1	91																
260			3.8	11	2.2	38	1.7	55	1.4	70	1.2	83	1.1	95																
270			3.8	12	2.2	40	1.7	58	1.4	73	1.2	86	1.1	99																
280			3.7	13	2.2	41	1.7	60	1.4	76	1.2	90																		
290			3.7	15	2.2	43	1.7	62	1.4	79	1.2	93																		
300			3.7	16	2.1	45	1.7	65	1.4	82	1.2	96																		
310			3.6	17	2.1	47	1.6	67	1.4	84	1.2	100																		
320			3.6	18	2.1	48	1.6	69	1.4	87																				
330			3.6	19	2.1	50	1.6	72	1.4	90																				
340			3.6	21	2.1	52	1.6	74	1.4	93																				
350			3.6	22	2.1	54	1.6	76	1.4	96																				
360			3.5	23	2.1	55	1.6	79	1.4	99																				
370			3.5	24	2.1	57	1.6	81																						
380			3.5	25	2.1	59	1.6	83																						
390			3.5	26	2.1	61	1.6	86																						
400			3.5	27	2.1	62	1.6	88																						
410			3.5	29	2.1	64	1.6	90																						
420			3.4	30	2.1	66	1.6	93																						
430			3.4	31	2.1	67	1.6	95																						
440			3.4	32	2.1	69	1.6	97																						
450			3.4	33	2.1	71	1.6	100																						
460			3.4	34	2.1	73																								
470			3.4	35	2.1	74																								
480			3.4	36	2.1	76																								
490			3.4	37	2.1	78																								
500			3.4	38	2.1	80																								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																													0.5	10
20																					0.8	11	0.7	14	0.6	16	0.6	20	0.5	23
30																			0.9	14	0.8	18	0.7	22	0.6	25	0.5	30		
40															1.2	11	1.1	14	0.9	20	0.7	26	0.7	30	0.6	34	0.5	41		
50											1.5	10	1.3	13	1.2	16	1.1	19	0.8	27	0.7	33	0.7	38	0.6	43	0.5	52		
60											1.4	14	1.2	17	1.1	21	1	23	0.8	33	0.7	40	0.7	47	0.6	53	0.5	63		
70									1.7	12	1.4	18	1.2	22	1.1	25	1	28	0.8	39	0.7	47	0.7	55	0.6	62	0.5	74		
80									1.6	16	1.3	21	1.2	26	1.1	29	1	33	0.8	45	0.7	54	0.7	63	0.6	71	0.5	84		
90							2	12	1.6	19	1.3	25	1.2	29	1.1	34	1	37	0.8	51	0.7	61	0.7	71	0.6	80	0.5	95		
100							1.9	14	1.5	22	1.3	28	1.2	33	1.1	38	1	42	0.8	56	0.7	69	0.7	79	0.6	89				
110							1.9	17	1.5	25	1.3	32	1.2	37	1.1	42	1	47	0.8	63	0.7	76	0.7	87	0.6	98				
120							1.8	20	1.5	28	1.3	35	1.2	41	1.1	46	1	51	0.8	68	0.7	83	0.7	96						
130							1.8	23	1.5	31	1.3	39	1.2	45	1.1	51	1	56	0.8	74	0.7	90								
140					2.5	12	1.8	25	1.5	34	1.3	42	1.2	49	1.1	55	1	60	0.8	80	0.7	97								
150					2.5	14	1.8	28	1.5	37	1.3	45	1.1	52	1.1	59	1	65	0.8	86										
160					2.4	16	1.7	30	1.4	40	1.3	49	1.1	56	1.1	63	1	70	0.8	92										
170					2.4	18	1.7	32	1.4	43	1.3	52	1.1	60	1.1	67	1	74	0.8	98										
180					2.4	20	1.7	35	1.4	46	1.3	55	1.1	64	1.1	72	1	79												
190					2.3	22	1.7	37	1.4	49	1.3	59	1.1	68	1.1	76	1	83												
200					2.3	24	1.7	40	1.4	52	1.3	62	1.1	71	1.1	80	1	88												
210					2.3	26	1.7	42	1.4	55	1.3	66	1.1	75	1	84	1	93												
220					2.3	28	1.7	45	1.4	57	1.2	69	1.1	79	1	88	1	97												
230					2.3	30	1.7	47	1.4	60	1.2	72	1.1	83	1	93														
240					2.2	32	1.7	49	1.4	63	1.2	76	1.1	87	1	97														
250					2.2	34	1.7	52	1.4	66	1.2	79	1.1	90																
260					2.2	36	1.7	54	1.4	69	1.2	82	1.1	94																
270					2.2	37	1.7	56	1.4	72	1.2	86	1.1	98																
280					2.2	39	1.7	59	1.4	75	1.2	89																		
290					2.2	41	1.7	61	1.4	78	1.2	92																		
300					2.2	43	1.7	63	1.4	81	1.2	96																		
310			3.9	10	2.2	45	1.7	66	1.4	83	1.2	99																		
320			3.8	11	2.2	46	1.7	68	1.4	86																				
330			3.8	13	2.2	48	1.7	70	1.4	89																				
340			3.8	14	2.2	50	1.6	73	1.4	92																				
350			3.7	16	2.1	52	1.6	75	1.4	95																				
360			3.7	17	2.1	53	1.6	77	1.4	98																				
370			3.7	18	2.1	55	1.6	80																						
380			3.6	20	2.1	57	1.6	82																						
390			3.6	21	2.1	59	1.6	85																						
400			3.6	22	2.1	61	1.6	87																						
410			3.6	23	2.1	62	1.6	89																						
420			3.6	25	2.1	64	1.6	92																						
430			3.5	26	2.1	66	1.6	94																						
440			3.5	27	2.1	67	1.6	96																						
450			3.5	28	2.1	69	1.6	98																						
460			3.5	29	2.1	71																								
470			3.5	31	2.1	73																								
480			3.5	32	2.1	74																								
490			3.5	33	2.1	76																								
500			3.4	34	2.1	78																								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.8	10	0.7	12	0.6	15	0.5	17
30																			1	11	0.8	14	0.7	17	0.7	19	0.6	23	0.5	27
40																	1.2	10	0.9	15	0.8	19	0.7	23	0.7	26	0.6	31	0.5	36
50													1.4	10	1.3	12	1.2	14	0.9	20	0.8	25	0.7	29	0.7	33	0.6	39	0.5	45
60											1.6	10	1.4	13	1.3	15	1.2	17	0.9	24	0.8	30	0.7	35	0.6	39	0.6	47	0.5	54
70									1.9	10	1.6	13	1.4	16	1.2	18	1.1	21	0.9	29	0.8	35	0.7	41	0.6	46	0.6	55	0.5	64
80									1.8	12	1.5	15	1.3	19	1.2	21	1.1	24	0.9	33	0.8	40	0.7	47	0.6	53	0.6	64	0.5	73
90									1.8	14	1.5	18	1.3	21	1.2	24	1.1	27	0.9	37	0.8	46	0.7	53	0.6	60	0.6	72	0.5	82
100							2.2	11	1.7	16	1.5	20	1.3	24	1.2	28	1.1	31	0.9	42	0.8	51	0.7	59	0.6	66	0.6	80	0.5	91
110							2.1	13	1.7	18	1.5	23	1.3	27	1.2	31	1.1	34	0.9	46	0.8	56	0.7	65	0.6	73	0.6	88		
120							2.1	14	1.7	20	1.5	25	1.3	30	1.2	34	1.1	37	0.9	50	0.8	61	0.7	71	0.6	80	0.6	96		
130							2.1	16	1.7	22	1.4	28	1.3	32	1.2	37	1.1	41	0.9	55	0.8	67	0.7	77	0.6	87				
140							2.1	18	1.7	24	1.4	30	1.3	35	1.2	40	1.1	44	0.9	59	0.8	72	0.7	83	0.6	94				
150					2.8	10	2	20	1.7	27	1.4	32	1.3	38	1.2	43	1.1	47	0.9	63	0.8	77	0.7	89	0.6	100				
160					2.8	12	2	21	1.6	29	1.4	35	1.3	40	1.2	46	1.1	51	0.9	68	0.8	82	0.7	95						
170					2.7	13	2	23	1.6	31	1.4	37	1.3	43	1.2	49	1.1	54	0.9	72	0.8	88								
180					2.7	14	2	25	1.6	33	1.4	40	1.3	46	1.2	52	1.1	57	0.9	77	0.8	93								
190					2.7	16	2	26	1.6	35	1.4	42	1.3	49	1.2	55	1.1	61	0.9	81	0.8	98								
200					2.7	17	2	28	1.6	37	1.4	44	1.3	51	1.2	58	1.1	64	0.9	85										
210					2.6	18	2	30	1.6	39	1.4	47	1.3	54	1.2	61	1.1	67	0.9	89										
220					2.6	20	2	31	1.6	41	1.4	49	1.3	57	1.2	64	1.1	70	0.9	94										
230					2.6	21	2	33	1.6	43	1.4	51	1.3	59	1.2	67	1.1	74	0.9	98										
240					2.6	22	1.9	35	1.6	45	1.4	54	1.3	62	1.2	70	1.1	77												
250					2.6	23	1.9	36	1.6	47	1.4	56	1.3	65	1.2	73	1.1	80												
260					2.6	25	1.9	38	1.6	49	1.4	59	1.3	68	1.2	76	1.1	84												
270					2.6	26	1.9	39	1.6	51	1.4	61	1.3	70	1.2	79	1.1	87												
280					2.5	27	1.9	41	1.6	53	1.4	63	1.3	73	1.2	82	1.1	90												
290					2.5	28	1.9	43	1.6	55	1.4	66	1.3	76	1.2	85	1.1	94												
300					2.5	29	1.9	44	1.6	57	1.4	68	1.3	78	1.2	88	1.1	97												
310					2.5	31	1.9	46	1.6	59	1.4	70	1.3	81	1.2	91	1.1	100												
320					2.5	32	1.9	48	1.6	61	1.4	73	1.3	84	1.2	94														
330			4.5	10	2.5	33	1.9	49	1.6	63	1.4	75	1.3	87	1.1	97														
340			4.5	10	2.5	34	1.9	51	1.6	65	1.4	78	1.3	89	1.1	100														
350			4.4	11	2.5	35	1.9	52	1.6	67	1.4	80	1.2	92																
360			4.4	12	2.5	37	1.9	54	1.6	69	1.4	82	1.2	95																
370			4.4	13	2.5	38	1.9	56	1.6	71	1.4	85	1.2	97																
380			4.4	13	2.5	39	1.9	57	1.6	73	1.4	87	1.2	100																
390			4.3	14	2.5	40	1.9	59	1.6	75	1.4	89																		
400			4.3	15	2.5	41	1.9	61	1.6	77	1.4	92																		
410			4.3	16	2.5	43	1.9	62	1.6	79	1.4	94																		
420			4.3	16	2.5	44	1.9	64	1.6	81	1.4	96																		
430			4.3	17	2.5	45	1.9	65	1.6	83	1.4	99																		
440			4.3	18	2.5	46	1.9	67	1.6	85																				
450			4.3	19	2.5	47	1.9	69	1.6	87																				
460			4.2	19	2.5	48	1.9	70	1.6	89																				
470			4.2	20	2.5	49	1.9	72	1.6	91																				
480			4.2	21	2.5	51	1.9	73	1.6	93																				
490			4.2	21	2.5	52	1.9	75	1.6	95																				
500			4.2	22	2.5	53	1.9	77	1.6	97																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.8	10	0.7	11	0.6	14	0.5	17
30																			1	10	0.8	13	0.7	16	0.7	18	0.6	23	0.5	26
40																			1	14	0.8	19	0.7	22	0.7	25	0.6	31	0.5	36
50															1.3	11	1.2	13	0.9	19	0.8	24	0.7	28	0.7	32	0.6	39	0.5	45
60													1.5	11	1.3	14	1.2	16	0.9	23	0.8	29	0.7	34	0.6	39	0.6	47	0.5	54
70											1.6	11	1.4	14	1.3	17	1.2	20	0.9	28	0.8	35	0.7	40	0.6	46	0.6	55	0.5	63
80											1.6	14	1.4	17	1.2	20	1.1	23	0.9	32	0.8	40	0.7	46	0.6	52	0.6	63	0.5	73
90									1.9	12	1.5	16	1.4	20	1.2	23	1.1	26	0.9	37	0.8	45	0.7	53	0.6	59	0.6	71	0.5	82
100									1.8	14	1.5	19	1.3	23	1.2	26	1.1	30	0.9	41	0.8	50	0.7	59	0.6	66	0.6	79	0.5	91
110									1.8	16	1.5	21	1.3	26	1.2	30	1.1	33	0.9	45	0.8	56	0.7	65	0.6	73	0.6	87	0.5	100
120							2.2	11	1.7	18	1.5	24	1.3	28	1.2	33	1.1	36	0.9	50	0.8	61	0.7	71	0.6	80	0.6	95		
130							2.2	13	1.7	21	1.5	26	1.3	31	1.2	36	1.1	40	0.9	54	0.8	66	0.7	77	0.6	86				
140							2.1	15	1.7	23	1.5	29	1.3	34	1.2	39	1.1	43	0.9	58	0.8	71	0.7	83	0.6	93				
150							2.1	17	1.7	25	1.4	31	1.3	37	1.2	42	1.1	47	0.9	63	0.8	77	0.7	89	0.6	100				
160							2.1	19	1.7	27	1.4	34	1.3	39	1.2	45	1.1	50	0.9	67	0.8	82	0.7	95						
170							2.1	21	1.7	29	1.4	36	1.3	42	1.2	48	1.1	53	0.9	72	0.8	87								
180					2.9	10	2	22	1.7	31	1.4	38	1.3	45	1.2	51	1.1	57	0.9	76	0.8	92								
190					2.8	12	2	24	1.6	33	1.4	41	1.3	48	1.2	54	1.1	60	0.9	80	0.8	98								
200					2.8	13	2	26	1.6	35	1.4	43	1.3	50	1.2	57	1.1	63	0.9	85										
210					2.7	15	2	28	1.6	37	1.4	46	1.3	53	1.2	60	1.1	66	0.9	89										
220					2.7	16	2	29	1.6	39	1.4	48	1.3	56	1.2	63	1.1	70	0.9	93										
230					2.7	17	2	31	1.6	41	1.4	50	1.3	59	1.2	66	1.1	73	0.9	98										
240					2.7	19	2	33	1.6	43	1.4	53	1.3	61	1.2	69	1.1	76												
250					2.7	20	2	34	1.6	46	1.4	55	1.3	64	1.2	72	1.1	80												
260					2.6	21	2	36	1.6	48	1.4	58	1.3	67	1.2	75	1.1	83												
270					2.6	23	2	38	1.6	50	1.4	60	1.3	69	1.2	78	1.1	86												
280					2.6	24	1.9	39	1.6	52	1.4	62	1.3	72	1.2	81	1.1	90												
290					2.6	25	1.9	41	1.6	54	1.4	65	1.3	75	1.2	84	1.1	93												
300					2.6	27	1.9	43	1.6	56	1.4	67	1.3	78	1.2	87	1.1	96												
310					2.6	28	1.9	44	1.6	58	1.4	69	1.3	80	1.2	90	1.1	100												
320					2.6	29	1.9	46	1.6	60	1.4	72	1.3	83	1.2	93														
330					2.6	30	1.9	48	1.6	62	1.4	74	1.3	86	1.2	96														
340					2.5	32	1.9	49	1.6	64	1.4	77	1.3	88	1.2	99														
350					2.5	33	1.9	51	1.6	66	1.4	79	1.3	91																
360					2.5	34	1.9	53	1.6	68	1.4	81	1.3	94																
370					2.5	35	1.9	54	1.6	70	1.4	84	1.3	96																
380					2.5	37	1.9	56	1.6	72	1.4	86	1.2	99																
390					2.5	38	1.9	57	1.6	74	1.4	89																		
400					2.5	39	1.9	59	1.6	76	1.4	91																		
410					2.5	40	1.9	61	1.6	78	1.4	93																		
420					2.5	41	1.9	62	1.6	80	1.4	96																		
430			4.5	10	2.5	43	1.9	64	1.6	82	1.4	98																		
440			4.5	11	2.5	44	1.9	66	1.6	84	1.4	100																		
450			4.5	12	2.5	45	1.9	67	1.6	86																				
460			4.4	13	2.5	46	1.9	69	1.6	88																				
470			4.4	13	2.5	47	1.9	70	1.6	90																				
480			4.4	14	2.5	49	1.9	72	1.6	92																				
490			4.4	15	2.5	50	1.9	74	1.6	94																				
500			4.4	16	2.5	51	1.9	75	1.6	96																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																									0.7	11	0.6	14	0.5	17
30																					0.8	12	0.7	15	0.7	18	0.6	22	0.5	26
40																			1	13	0.8	18	0.7	22	0.7	25	0.6	30	0.5	35
50																	1.3	11	0.9	18	0.8	23	0.7	28	0.7	32	0.6	38	0.5	45
60															1.3	12	1.2	15	0.9	23	0.8	29	0.7	34	0.6	38	0.6	47	0.5	54
70													1.5	12	1.3	16	1.2	18	0.9	27	0.8	34	0.7	40	0.6	45	0.6	55	0.5	63
80											1.7	11	1.4	16	1.3	19	1.2	22	0.9	31	0.8	39	0.7	46	0.6	52	0.6	63	0.5	72
90											1.6	14	1.4	19	1.2	22	1.1	25	0.9	36	0.8	45	0.7	52	0.6	59	0.6	71	0.5	81
100									1.9	11	1.6	17	1.4	21	1.2	25	1.1	29	0.9	40	0.8	50	0.7	58	0.6	66	0.6	79	0.5	91
110									1.9	14	1.5	20	1.3	24	1.2	28	1.1	32	0.9	45	0.8	55	0.7	64	0.6	72	0.6	87	0.5	100
120									1.8	16	1.5	22	1.3	27	1.2	32	1.1	36	0.9	49	0.8	60	0.7	70	0.6	79	0.6	95		
130							2.3	10	1.8	18	1.5	25	1.3	30	1.2	35	1.1	39	0.9	53	0.8	66	0.7	76	0.6	86				
140							2.2	12	1.8	21	1.5	27	1.3	33	1.2	38	1.1	42	0.9	58	0.8	71	0.7	82	0.6	93				
150							2.2	14	1.7	23	1.5	30	1.3	36	1.2	41	1.1	46	0.9	62	0.8	76	0.7	88	0.6	100				
160							2.1	16	1.7	25	1.5	32	1.3	38	1.2	44	1.1	49	0.9	66	0.8	81	0.7	95						
170							2.1	18	1.7	27	1.4	35	1.3	41	1.2	47	1.1	52	0.9	71	0.8	87	0.7	100						
180							2.1	20	1.7	29	1.4	37	1.3	44	1.2	50	1.1	56	0.9	75	0.8	92								
190							2.1	22	1.7	32	1.4	40	1.3	47	1.2	53	1.1	59	0.9	80	0.8	97								
200							2.1	24	1.7	34	1.4	42	1.3	49	1.2	56	1.1	62	0.9	84										
210							2.1	25	1.7	36	1.4	44	1.3	52	1.2	59	1.1	66	0.9	88										
220					2.9	11	2	27	1.6	38	1.4	47	1.3	55	1.2	62	1.1	69	0.9	93										
230					2.8	13	2	29	1.6	40	1.4	49	1.3	58	1.2	65	1.1	72	0.9	97										
240					2.8	14	2	31	1.6	42	1.4	52	1.3	60	1.2	68	1.1	76												
250					2.8	16	2	32	1.6	44	1.4	54	1.3	63	1.2	71	1.1	79												
260					2.7	17	2	34	1.6	46	1.4	56	1.3	66	1.2	74	1.1	82												
270					2.7	19	2	36	1.6	48	1.4	59	1.3	69	1.2	77	1.1	85												
280					2.7	20	2	38	1.6	50	1.4	61	1.3	71	1.2	80	1.1	89												
290					2.7	22	2	39	1.6	52	1.4	64	1.3	74	1.2	83	1.1	92												
300					2.7	23	2	41	1.6	54	1.4	66	1.3	77	1.2	86	1.1	95												
310					2.6	25	2	42	1.6	56	1.4	68	1.3	79	1.2	89	1.1	99												
320					2.6	26	1.9	44	1.6	58	1.4	71	1.3	82	1.2	92														
330					2.6	27	1.9	46	1.6	60	1.4	73	1.3	85	1.2	95														
340					2.6	29	1.9	48	1.6	63	1.4	76	1.3	87	1.2	98														
350					2.6	30	1.9	49	1.6	65	1.4	78	1.3	90																
360					2.6	31	1.9	51	1.6	67	1.4	80	1.3	93																
370					2.6	32	1.9	53	1.6	69	1.4	83	1.3	96																
380					2.6	34	1.9	54	1.6	71	1.4	85	1.3	98																
390					2.6	35	1.9	56	1.6	73	1.4	88																		
400					2.5	36	1.9	58	1.6	75	1.4	90																		
410					2.5	38	1.9	59	1.6	77	1.4	92																		
420					2.5	39	1.9	61	1.6	79	1.4	95																		
430					2.5	40	1.9	62	1.6	81	1.4	97																		
440					2.5	41	1.9	64	1.6	83	1.4	99																		
450					2.5	42	1.9	66	1.6	85																				
460					2.5	44	1.9	67	1.6	87																				
470					2.5	45	1.9	69	1.6	89																				
480					2.5	46	1.9	71	1.6	91																				
490					2.5	47	1.9	72	1.6	93																				
500					2.5	49	1.9	74	1.6	95																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																									0.6	10	0.6	12	0.5	14
20																			0.8	13	0.7	16	0.7	18	0.6	21	0.5	25		
30													1.2	11	1.1	13	1	15	0.8	20	0.7	24	0.6	28	0.6	32	0.5	38		
40									1.5	11	1.3	14	1.2	16	1.1	18	1	20	0.8	27	0.7	33	0.6	38	0.6	43	0.5	51		
50							1.8	10	1.4	15	1.3	18	1.1	21	1	24	1	26	0.8	35	0.7	42	0.6	48	0.6	54	0.5	64		
60							1.7	13	1.4	18	1.2	22	1.1	26	1	29	1	32	0.8	42	0.7	50	0.6	58	0.6	65	0.5	76		
70					2.3	10	1.7	17	1.4	22	1.2	26	1.1	30	1	34	1	37	0.8	49	0.7	59	0.6	68	0.6	76	0.5	89		
80					2.2	12	1.6	20	1.4	25	1.2	31	1.1	35	1	39	0.9	43	0.8	56	0.7	68	0.6	77	0.6	86				
90					2.2	15	1.6	23	1.4	29	1.2	35	1.1	40	1	44	0.9	49	0.8	64	0.7	76	0.6	87	0.6	97				
100					2.1	17	1.6	26	1.3	33	1.2	39	1.1	44	1	50	0.9	54	0.8	71	0.7	85	0.6	97						
110					2.1	19	1.6	29	1.3	36	1.2	43	1.1	49	1	55	0.9	60	0.8	78	0.7	93								
120					2.1	21	1.6	32	1.3	40	1.2	47	1.1	54	1	60	0.9	65	0.8	85										
130					2	24	1.6	34	1.3	43	1.2	51	1.1	58	1	65	0.9	71	0.8	93										
140					2	26	1.6	37	1.3	47	1.2	55	1.1	63	1	70	0.9	77	0.8	100										
150			3.4	10	2	28	1.6	40	1.3	51	1.2	60	1.1	68	1	75	0.9	82												
160			3.4	12	2	30	1.5	43	1.3	54	1.2	64	1.1	72	1	80	0.9	88												
170			3.3	13	2	33	1.5	46	1.3	58	1.2	68	1.1	77	1	86	0.9	94												
180			3.3	15	2	35	1.5	49	1.3	61	1.2	72	1.1	82	1	91	0.9	99												
190			3.2	16	2	37	1.5	52	1.3	65	1.2	76	1.1	86	1	96														
200			3.2	18	2	39	1.5	55	1.3	68	1.2	80	1.1	91																
210			3.2	19	2	41	1.5	58	1.3	72	1.2	84	1.1	96																
220			3.2	20	1.9	44	1.5	61	1.3	76	1.2	89	1.1	100																
230			3.1	22	1.9	46	1.5	64	1.3	79	1.2	93																		
240			3.1	23	1.9	48	1.5	67	1.3	83	1.2	97																		
250			3.1	25	1.9	50	1.5	70	1.3	86																				
260			3.1	26	1.9	52	1.5	72	1.3	90																				
270			3.1	27	1.9	55	1.5	75	1.3	93																				
280			3.1	29	1.9	57	1.5	78	1.3	97																				
290			3.1	30	1.9	59	1.5	81																						
300			3.1	31	1.9	61	1.5	84																						
310			3	33	1.9	63	1.5	87																						
320			3	34	1.9	65	1.5	90																						
330			3	35	1.9	68	1.5	93																						
340			3	37	1.9	70	1.5	96																						
350			3	38	1.9	72	1.5	99																						
360			3	39	1.9	74																								
370			3	40	1.9	76																								
380			3	42	1.9	79																								
390			3	43	1.9	81																								
400			3	44	1.9	83																								
410			3	46	1.9	85																								
420			3	47	1.9	87																								
430			3	48	1.9	89																								
440			3	50	1.9	92																								
450	6.3	10	3	51	1.9	94																								
460	6.2	10	3	52	1.9	96																								
470	6.2	11	2.9	53	1.9	98																								
480	6.2	12	2.9	55	1.9	100																								
490	6.2	12	2.9	56																										
500	6.2	13	2.9	57																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																											0.6	11	0.5	13
20																			0.9	12	0.7	15	0.7	18	0.6	20	0.5	25		
30													1.2	10	1.1	12	1	14	0.8	19	0.7	24	0.6	28	0.6	31	0.5	37		
40											1.3	12	1.2	15	1.1	17	1	19	0.8	27	0.7	33	0.6	38	0.6	42	0.5	50		
50									1.5	13	1.3	17	1.1	20	1	23	1	25	0.8	34	0.7	41	0.6	48	0.6	53	0.5	63		
60							1.8	11	1.4	17	1.2	21	1.1	25	1	28	1	31	0.8	41	0.7	50	0.6	57	0.6	64	0.5	76		
70							1.7	15	1.4	20	1.2	25	1.1	29	1	33	1	37	0.8	48	0.7	59	0.6	67	0.6	75	0.5	89		
80							1.7	18	1.4	24	1.2	29	1.1	34	1	38	0.9	42	0.8	56	0.7	67	0.6	77	0.6	86				
90					2.3	11	1.7	21	1.4	28	1.2	34	1.1	39	1	44	0.9	48	0.8	63	0.7	76	0.6	87	0.6	97				
100					2.2	14	1.6	24	1.4	32	1.2	38	1.1	44	1	49	0.9	54	0.8	70	0.7	84	0.6	97						
110					2.2	17	1.6	27	1.3	35	1.2	42	1.1	48	1	54	0.9	59	0.8	77	0.7	93								
120					2.1	19	1.6	30	1.3	39	1.2	46	1.1	53	1	59	0.9	65	0.8	85										
130					2.1	21	1.6	33	1.3	42	1.2	50	1.1	58	1	64	0.9	70	0.8	92										
140					2.1	24	1.6	36	1.3	46	1.2	55	1.1	62	1	69	0.9	76	0.8	99										
150					2.1	26	1.6	39	1.3	50	1.2	59	1.1	67	1	75	0.9	82												
160					2	28	1.6	42	1.3	53	1.2	63	1.1	72	1	80	0.9	87												
170					2	31	1.6	45	1.3	57	1.2	67	1.1	76	1	85	0.9	93												
180					2	33	1.5	48	1.3	60	1.2	71	1.1	81	1	90	0.9	98												
190			3.5	11	2	35	1.5	51	1.3	64	1.2	75	1.1	86	1	95														
200			3.4	13	2	37	1.5	54	1.3	67	1.2	79	1.1	90	1	100														
210			3.4	14	2	40	1.5	57	1.3	71	1.2	84	1.1	95																
220			3.3	16	2	42	1.5	60	1.3	75	1.2	88	1.1	100																
230			3.3	17	2	44	1.5	63	1.3	78	1.2	92																		
240			3.2	19	2	46	1.5	66	1.3	82	1.2	96																		
250			3.2	20	1.9	49	1.5	69	1.3	85	1.2	100																		
260			3.2	22	1.9	51	1.5	71	1.3	89																				
270			3.2	23	1.9	53	1.5	74	1.3	92																				
280			3.2	25	1.9	55	1.5	77	1.3	96																				
290			3.1	26	1.9	57	1.5	80	1.3	100																				
300			3.1	28	1.9	60	1.5	83																						
310			3.1	29	1.9	62	1.5	86																						
320			3.1	31	1.9	64	1.5	89																						
330			3.1	32	1.9	66	1.5	92																						
340			3.1	33	1.9	68	1.5	95																						
350			3.1	35	1.9	71	1.5	98																						
360			3.1	36	1.9	73																								
370			3	37	1.9	75																								
380			3	39	1.9	77																								
390			3	40	1.9	79																								
400			3	41	1.9	82																								
410			3	43	1.9	84																								
420			3	44	1.9	86																								
430			3	46	1.9	88																								
440			3	47	1.9	90																								
450			3	48	1.9	92																								
460			3	49	1.9	95																								
470			3	51	1.9	97																								
480			3	52	1.9	99																								
490			3	53																										
500			3	55																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																											0.6	11	0.5	13
20																			0.9	11	0.7	14	0.7	17	0.6	20	0.5	24		
30															1.1	10	1	13	0.8	19	0.7	23	0.6	27	0.6	31	0.5	37		
40											1.4	10	1.2	14	1.1	16	1	19	0.8	26	0.7	32	0.6	37	0.6	42	0.5	50		
50									1.6	11	1.3	15	1.2	19	1.1	22	1	24	0.8	33	0.7	41	0.6	47	0.6	53	0.5	63		
60									1.5	15	1.3	20	1.1	24	1	27	1	30	0.8	41	0.7	49	0.6	57	0.6	64	0.5	76		
70							1.8	12	1.4	19	1.2	24	1.1	28	1	32	1	36	0.8	48	0.7	58	0.6	67	0.6	75	0.5	89		
80							1.8	16	1.4	23	1.2	28	1.1	33	1	38	1	42	0.8	55	0.7	67	0.6	77	0.6	86				
90							1.7	19	1.4	26	1.2	33	1.1	38	1	43	0.9	47	0.8	62	0.7	75	0.6	87	0.6	97				
100					2.4	10	1.7	22	1.4	30	1.2	37	1.1	43	1	48	0.9	53	0.8	70	0.7	84	0.6	97						
110					2.3	13	1.6	25	1.4	34	1.2	41	1.1	47	1	53	0.9	59	0.8	77	0.7	93								
120					2.3	16	1.6	28	1.3	38	1.2	45	1.1	52	1	58	0.9	64	0.8	84										
130					2.2	19	1.6	32	1.3	41	1.2	49	1.1	57	1	64	0.9	70	0.8	92										
140					2.2	21	1.6	35	1.3	45	1.2	54	1.1	62	1	69	0.9	75	0.8	99										
150					2.1	24	1.6	38	1.3	48	1.2	58	1.1	66	1	74	0.9	81												
160					2.1	26	1.6	41	1.3	52	1.2	62	1.1	71	1	79	0.9	87												
170					2.1	28	1.6	44	1.3	56	1.2	66	1.1	76	1	84	0.9	92												
180					2	31	1.6	47	1.3	59	1.2	70	1.1	80	1	89	0.9	98												
190					2	33	1.6	50	1.3	63	1.2	75	1.1	85	1	95														
200					2	35	1.5	53	1.3	66	1.2	79	1.1	90	1	100														
210					2	38	1.5	55	1.3	70	1.2	83	1.1	94																
220					2	40	1.5	59	1.3	74	1.2	87	1.1	99																
230			3.5	11	2	42	1.5	61	1.3	77	1.2	91																		
240			3.4	13	2	45	1.5	64	1.3	81	1.2	95																		
250			3.4	15	2	47	1.5	67	1.3	84	1.2	99																		
260			3.4	17	2	49	1.5	70	1.3	88																				
270			3.3	18	2	51	1.5	73	1.3	91																				
280			3.3	20	1.9	54	1.5	76	1.3	95																				
290			3.3	22	1.9	56	1.5	79	1.3	99																				
300			3.2	23	1.9	58	1.5	82																						
310			3.2	25	1.9	60	1.5	85																						
320			3.2	26	1.9	62	1.5	88																						
330			3.2	28	1.9	65	1.5	91																						
340			3.1	29	1.9	67	1.5	94																						
350			3.1	31	1.9	69	1.5	97																						
360			3.1	32	1.9	71	1.5	100																						
370			3.1	34	1.9	73																								
380			3.1	35	1.9	76																								
390			3.1	37	1.9	78																								
400			3.1	38	1.9	80																								
410			3.1	39	1.9	82																								
420			3.1	41	1.9	84																								
430			3	42	1.9	87																								
440			3	44	1.9	89																								
450			3	45	1.9	91																								
460			3	46	1.9	93																								
470			3	48	1.9	95																								
480			3	49	1.9	98																								
490			3	50	1.9	100																								
500			3	52																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																					0.8	10	0.7	12	0.7	14	0.6	17	0.5	20
30																			0.9	13	0.8	16	0.7	19	0.6	22	0.6	27	0.5	31
40															1.2	11	1.1	13	0.9	18	0.8	23	0.7	26	0.6	30	0.6	36	0.5	41
50											1.5	10	1.3	13	1.2	15	1.1	17	0.9	23	0.8	29	0.7	33	0.6	38	0.6	45	0.5	52
60									1.7	10	1.5	13	1.3	16	1.2	18	1.1	21	0.9	28	0.8	35	0.7	40	0.6	45	0.6	54	0.5	62
70									1.7	13	1.4	16	1.3	19	1.2	22	1.1	25	0.9	33	0.8	41	0.7	47	0.6	53	0.6	63	0.5	73
80							2.1	10	1.7	15	1.4	19	1.3	22	1.1	26	1.1	29	0.9	38	0.8	47	0.7	54	0.6	61	0.6	73	0.5	83
90							2	12	1.6	18	1.4	22	1.2	26	1.1	29	1.1	32	0.9	43	0.7	53	0.7	61	0.6	69	0.6	82	0.5	94
100							2	14	1.6	20	1.4	25	1.2	29	1.1	33	1.1	36	0.9	48	0.7	59	0.7	68	0.6	76	0.6	91		
110							1.9	17	1.6	22	1.4	28	1.2	32	1.1	36	1	40	0.9	53	0.7	65	0.7	75	0.6	84	0.6	100		
120					2.6	10	1.9	19	1.6	25	1.4	30	1.2	35	1.1	40	1	44	0.9	59	0.7	71	0.7	82	0.6	92				
130					2.6	12	1.9	21	1.6	27	1.4	33	1.2	38	1.1	43	1	48	0.9	64	0.7	77	0.7	89	0.6	100				
140					2.5	13	1.9	23	1.5	30	1.4	36	1.2	42	1.1	47	1	52	0.8	69	0.7	83	0.7	96						
150					2.5	15	1.9	24	1.5	32	1.3	39	1.2	45	1.1	50	1	56	0.8	74	0.7	89								
160					2.5	16	1.9	26	1.5	35	1.3	42	1.2	48	1.1	54	1	59	0.8	79	0.7	95								
170					2.5	18	1.8	28	1.5	37	1.3	44	1.2	51	1.1	57	1	63	0.8	84										
180					2.4	19	1.8	30	1.5	39	1.3	47	1.2	54	1.1	61	1	67	0.8	89										
190					2.4	21	1.8	32	1.5	42	1.3	50	1.2	57	1.1	64	1	71	0.8	94										
200					2.4	22	1.8	34	1.5	44	1.3	53	1.2	61	1.1	68	1	75	0.8	99										
210					2.4	24	1.8	36	1.5	46	1.3	55	1.2	64	1.1	71	1	79												
220					2.4	25	1.8	38	1.5	49	1.3	58	1.2	67	1.1	75	1	82												
230					2.4	27	1.8	40	1.5	51	1.3	61	1.2	70	1.1	78	1	86												
240					2.4	28	1.8	42	1.5	54	1.3	64	1.2	73	1.1	82	1	90												
250					2.4	30	1.8	44	1.5	56	1.3	67	1.2	76	1.1	85	1	94												
260			4.1	10	2.4	31	1.8	46	1.5	58	1.3	69	1.2	79	1.1	89	1	98												
270			4.1	11	2.4	33	1.8	48	1.5	61	1.3	72	1.2	83	1.1	92														
280			4.1	11	2.3	34	1.8	50	1.5	63	1.3	75	1.2	86	1.1	96														
290			4	12	2.3	35	1.8	52	1.5	65	1.3	78	1.2	89	1.1	99														
300			4	13	2.3	37	1.8	54	1.5	68	1.3	80	1.2	92																
310			4	14	2.3	38	1.8	55	1.5	70	1.3	83	1.2	95																
320			4	15	2.3	40	1.8	57	1.5	72	1.3	86	1.2	99																
330			4	16	2.3	41	1.8	59	1.5	75	1.3	89																		
340			3.9	17	2.3	42	1.8	61	1.5	77	1.3	91																		
350			3.9	18	2.3	44	1.8	63	1.5	80	1.3	94																		
360			3.9	19	2.3	45	1.8	65	1.5	82	1.3	97																		
370			3.9	20	2.3	47	1.8	67	1.5	84	1.3	100																		
380			3.9	20	2.3	48	1.8	69	1.5	87																				
390			3.9	21	2.3	49	1.8	71	1.5	89																				
400			3.8	22	2.3	51	1.8	73	1.5	91																				
410			3.8	23	2.3	52	1.8	75	1.5	94																				
420			3.8	24	2.3	54	1.8	77	1.5	96																				
430			3.8	25	2.3	55	1.8	78	1.5	98																				
440			3.8	26	2.3	56	1.8	80																						
450			3.8	26	2.3	58	1.8	82																						
460			3.8	27	2.3	59	1.8	84																						
470			3.8	28	2.3	61	1.7	86																						
480			3.8	29	2.3	62	1.7	88																						
490			3.8	30	2.3	63	1.7	90																						
500			3.8	31	2.3	65	1.7	92																						

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.7	12	0.7	14	0.6	17	0.5	20
30																			0.9	12	0.8	16	0.7	19	0.6	21	0.6	26	0.5	30
40															1.3	10	1.2	12	0.9	17	0.8	22	0.7	26	0.6	29	0.6	35	0.5	41
50													1.4	11	1.2	14	1.1	16	0.9	23	0.8	28	0.7	33	0.6	37	0.6	45	0.5	51
60											1.5	11	1.3	15	1.2	17	1.1	20	0.9	28	0.8	34	0.7	40	0.6	45	0.6	54	0.5	62
70									1.8	10	1.5	15	1.3	18	1.2	21	1.1	24	0.9	33	0.8	40	0.7	47	0.6	53	0.6	63	0.5	72
80									1.7	13	1.4	18	1.3	21	1.2	25	1.1	28	0.9	38	0.8	46	0.7	54	0.6	60	0.6	72	0.5	83
90									1.7	16	1.4	20	1.3	25	1.1	28	1.1	32	0.9	43	0.7	52	0.7	61	0.6	68	0.6	82	0.5	93
100							2.1	12	1.6	18	1.4	23	1.2	28	1.1	32	1.1	35	0.9	48	0.7	58	0.7	68	0.6	76	0.6	91		
110							2	14	1.6	21	1.4	26	1.2	31	1.1	35	1.1	39	0.9	53	0.7	64	0.7	75	0.6	84	0.6	100		
120							2	16	1.6	23	1.4	29	1.2	34	1.1	39	1	43	0.9	58	0.7	70	0.7	81	0.6	92				
130							2	18	1.6	26	1.4	32	1.2	37	1.1	42	1	47	0.9	63	0.7	76	0.7	88	0.6	99				
140							1.9	20	1.6	28	1.4	35	1.2	41	1.1	46	1	51	0.9	68	0.7	83	0.7	95						
150					2.7	11	1.9	23	1.6	31	1.4	38	1.2	44	1.1	50	1	55	0.8	73	0.7	89								
160					2.6	13	1.9	25	1.6	33	1.3	40	1.2	47	1.1	53	1	59	0.8	78	0.7	95								
170					2.6	15	1.9	27	1.5	36	1.3	43	1.2	50	1.1	56	1	62	0.8	83										
180					2.5	16	1.9	29	1.5	38	1.3	46	1.2	53	1.1	60	1	66	0.8	88										
190					2.5	18	1.9	31	1.5	40	1.3	49	1.2	57	1.1	64	1	70	0.8	93										
200					2.5	19	1.8	33	1.5	43	1.3	52	1.2	60	1.1	67	1	74	0.8	98										
210					2.5	21	1.8	35	1.5	45	1.3	54	1.2	63	1.1	71	1	78												
220					2.5	23	1.8	37	1.5	48	1.3	57	1.2	66	1.1	74	1	82												
230					2.4	24	1.8	38	1.5	50	1.3	60	1.2	69	1.1	78	1	86												
240					2.4	26	1.8	40	1.5	52	1.3	63	1.2	72	1.1	81	1	89												
250					2.4	27	1.8	42	1.5	55	1.3	66	1.2	76	1.1	85	1	93												
260					2.4	29	1.8	44	1.5	57	1.3	68	1.2	79	1.1	88	1	97												
270					2.4	30	1.8	46	1.5	60	1.3	71	1.2	82	1.1	92														
280					2.4	32	1.8	48	1.5	62	1.3	74	1.2	85	1.1	95														
290					2.4	33	1.8	50	1.5	64	1.3	77	1.2	88	1.1	99														
300					2.4	34	1.8	52	1.5	67	1.3	80	1.2	91																
310					2.4	36	1.8	54	1.5	69	1.3	82	1.2	94																
320					2.4	37	1.8	56	1.5	71	1.3	85	1.2	98																
330					2.3	39	1.8	58	1.5	74	1.3	88																		
340			4.2	10	2.3	40	1.8	60	1.5	76	1.3	91																		
350			4.1	11	2.3	42	1.8	62	1.5	79	1.3	94																		
360			4.1	12	2.3	43	1.8	64	1.5	81	1.3	96																		
370			4.1	13	2.3	45	1.8	66	1.5	83	1.3	99																		
380			4.1	14	2.3	46	1.8	67	1.5	86																				
390			4	16	2.3	47	1.8	69	1.5	88																				
400			4	16	2.3	49	1.8	71	1.5	90																				
410			4	17	2.3	50	1.8	73	1.5	93																				
420			4	18	2.3	52	1.8	75	1.5	95																				
430			3.9	19	2.3	53	1.8	77	1.5	97																				
440			3.9	20	2.3	55	1.8	79	1.5	100																				
450			3.9	21	2.3	56	1.8	81																						
460			3.9	22	2.3	57	1.8	83																						
470			3.9	23	2.3	59	1.8	85																						
480			3.9	24	2.3	60	1.8	87																						
490			3.9	25	2.3	62	1.8	89																						
500			3.8	26	2.3	63	1.8	91																						

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.7	11	0.7	13	0.6	16	0.5	19
30																			1	11	0.8	15	0.7	18	0.6	21	0.6	26	0.5	30
40																	1.2	10	0.9	16	0.8	21	0.7	25	0.6	29	0.6	35	0.5	40
50															1.3	12	1.1	14	0.9	22	0.8	27	0.7	32	0.6	37	0.6	44	0.5	51
60													1.4	13	1.2	16	1.1	19	0.9	27	0.8	33	0.7	39	0.6	44	0.6	54	0.5	62
70											1.5	13	1.3	16	1.2	20	1.1	23	0.9	32	0.8	40	0.7	46	0.6	52	0.6	63	0.5	72
80									1.8	10	1.5	16	1.3	20	1.2	23	1.1	27	0.9	37	0.8	46	0.7	53	0.6	60	0.6	72	0.5	83
90									1.8	13	1.5	19	1.3	23	1.2	27	1.1	31	0.9	42	0.7	52	0.7	60	0.6	68	0.6	81	0.5	93
100									1.7	16	1.4	22	1.3	27	1.1	31	1.1	34	0.9	47	0.7	58	0.7	67	0.6	76	0.6	90		
110							2.1	11	1.7	19	1.4	25	1.3	30	1.1	34	1.1	38	0.9	52	0.7	64	0.7	74	0.6	83	0.6	100		
120							2.1	13	1.6	22	1.4	28	1.2	33	1.1	38	1.1	42	0.9	57	0.7	70	0.7	81	0.6	91				
130							2	16	1.6	24	1.4	31	1.2	36	1.1	42	1	46	0.9	62	0.7	76	0.7	88	0.6	99				
140							2	18	1.6	27	1.4	34	1.2	40	1.1	45	1	50	0.9	67	0.7	82	0.7	95						
150							2	20	1.6	29	1.4	36	1.2	43	1.1	49	1	54	0.9	72	0.7	88								
160							2	22	1.6	32	1.4	39	1.2	46	1.1	52	1	58	0.8	77	0.7	94								
170					2.7	10	1.9	24	1.6	34	1.4	42	1.2	49	1.1	56	1	62	0.8	82	0.7	100								
180					2.7	12	1.9	27	1.6	37	1.3	45	1.2	52	1.1	59	1	66	0.8	88										
190					2.6	14	1.9	29	1.5	39	1.3	48	1.2	56	1.1	63	1	69	0.8	93										
200					2.6	16	1.9	31	1.5	41	1.3	51	1.2	59	1.1	66	1	73	0.8	98										
210					2.6	17	1.9	33	1.5	44	1.3	53	1.2	62	1.1	70	1	77												
220					2.5	19	1.9	35	1.5	46	1.3	56	1.2	65	1.1	73	1	81												
230					2.5	21	1.8	37	1.5	49	1.3	59	1.2	68	1.1	77	1	85												
240					2.5	22	1.8	39	1.5	51	1.3	62	1.2	71	1.1	80	1	89												
250					2.5	24	1.8	41	1.5	53	1.3	65	1.2	75	1.1	84	1	92												
260					2.5	26	1.8	43	1.5	56	1.3	68	1.2	78	1.1	87	1	96												
270					2.4	27	1.8	45	1.5	58	1.3	70	1.2	81	1.1	91	1	100												
280					2.4	29	1.8	47	1.5	61	1.3	73	1.2	84	1.1	94														
290					2.4	30	1.8	49	1.5	63	1.3	76	1.2	87	1.1	98														
300					2.4	32	1.8	51	1.5	66	1.3	79	1.2	90																
310					2.4	33	1.8	52	1.5	68	1.3	81	1.2	94																
320					2.4	35	1.8	54	1.5	70	1.3	84	1.2	97																
330					2.4	36	1.8	56	1.5	73	1.3	87	1.2	100																
340					2.4	38	1.8	58	1.5	75	1.3	90																		
350					2.4	39	1.8	60	1.5	77	1.3	93																		
360					2.4	41	1.8	62	1.5	80	1.3	95																		
370					2.4	42	1.8	64	1.5	82	1.3	98																		
380					2.4	44	1.8	66	1.5	85																				
390					2.3	45	1.8	68	1.5	87																				
400					2.3	47	1.8	70	1.5	89																				
410			4.2	10	2.3	48	1.8	72	1.5	92																				
420			4.2	11	2.3	50	1.8	74	1.5	94																				
430			4.2	12	2.3	51	1.8	76	1.5	96																				
440			4.1	13	2.3	53	1.8	78	1.5	99																				
450			4.1	14	2.3	54	1.8	80																						
460			4.1	15	2.3	55	1.8	81																						
470			4.1	17	2.3	57	1.8	83																						
480			4	18	2.3	58	1.8	85																						
490			4	19	2.3	60	1.8	87																						
500			4	20	2.3	61	1.8	89																						

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																											0.7	10	0.6	12
30																							0.8	11	0.7	13	0.6	16	0.6	19
40																			1.1	10	0.9	13	0.8	16	0.7	18	0.6	22	0.6	26
50																			1.1	13	0.9	17	0.8	20	0.7	23	0.6	28	0.6	33
60																	1.4	11	1	16	0.9	21	0.8	24	0.7	28	0.6	34	0.6	40
70															1.5	11	1.3	13	1	19	0.9	24	0.8	29	0.7	33	0.6	40	0.6	46
80													1.6	11	1.5	13	1.3	15	1	22	0.9	28	0.8	33	0.7	38	0.6	46	0.6	53
90											1.8	10	1.6	13	1.4	16	1.3	18	1	26	0.9	32	0.8	38	0.7	43	0.6	52	0.6	60
100											1.8	12	1.6	15	1.4	18	1.3	20	1	29	0.9	36	0.8	42	0.7	48	0.6	58	0.5	67
110									2.1	10	1.8	14	1.6	17	1.4	20	1.3	23	1	32	0.9	39	0.8	46	0.7	53	0.6	64	0.5	74
120									2.1	11	1.8	15	1.5	19	1.4	22	1.3	25	1	35	0.9	43	0.8	51	0.7	57	0.6	70	0.5	80
130									2.1	13	1.7	17	1.5	21	1.4	24	1.3	27	1	38	0.8	47	0.8	55	0.7	62	0.6	75	0.5	87
140									2	14	1.7	19	1.5	23	1.4	26	1.3	29	1	41	0.8	51	0.8	59	0.7	67	0.6	81	0.5	94
150							2.5	10	2	16	1.7	20	1.5	25	1.4	28	1.2	32	1	44	0.8	54	0.8	64	0.7	72	0.6	87		
160							2.5	11	2	17	1.7	22	1.5	26	1.4	30	1.2	34	1	47	0.8	58	0.8	68	0.7	77	0.6	93		
170							2.5	12	2	19	1.7	24	1.5	28	1.3	33	1.2	36	1	50	0.8	62	0.8	72	0.7	82	0.6	99		
180							2.5	13	2	20	1.7	25	1.5	30	1.3	35	1.2	39	1	53	0.8	66	0.8	77	0.7	87				
190							2.4	15	2	21	1.7	27	1.5	32	1.3	37	1.2	41	1	56	0.8	69	0.8	81	0.7	92				
200							2.4	16	2	23	1.7	29	1.5	34	1.3	39	1.2	43	1	59	0.8	73	0.8	86	0.7	97				
210							2.4	17	1.9	24	1.7	30	1.5	36	1.3	41	1.2	46	1	62	0.8	77	0.8	90						
220							2.4	18	1.9	26	1.7	32	1.5	38	1.3	43	1.2	48	1	66	0.8	81	0.8	94						
230							2.4	19	1.9	27	1.7	34	1.5	40	1.3	45	1.2	50	1	69	0.8	84	0.8	98						
240					3.3	10	2.4	20	1.9	28	1.6	35	1.5	42	1.3	47	1.2	53	1	72	0.8	88								
250					3.3	11	2.4	21	1.9	30	1.6	37	1.5	43	1.3	49	1.2	55	1	75	0.8	92								
260					3.3	11	2.3	23	1.9	31	1.6	38	1.5	45	1.3	51	1.2	57	1	78	0.8	96								
270					3.3	12	2.3	24	1.9	32	1.6	40	1.5	47	1.3	53	1.2	60	1	81	0.8	99								
280					3.3	13	2.3	25	1.9	34	1.6	42	1.5	49	1.3	56	1.2	62	1	84										
290					3.2	14	2.3	26	1.9	35	1.6	43	1.4	51	1.3	58	1.2	64	1	87										
300					3.2	15	2.3	27	1.9	37	1.6	45	1.4	53	1.3	60	1.2	66	1	90										
310					3.2	16	2.3	28	1.9	38	1.6	47	1.4	55	1.3	62	1.2	69	1	93										
320					3.2	17	2.3	29	1.9	39	1.6	48	1.4	56	1.3	64	1.2	71	1	96										
330					3.2	17	2.3	30	1.9	41	1.6	50	1.4	58	1.3	66	1.2	73	1	99										
340					3.2	18	2.3	31	1.9	42	1.6	51	1.4	60	1.3	68	1.2	76												
350					3.2	19	2.3	32	1.9	43	1.6	53	1.4	62	1.3	70	1.2	78												
360					3.1	20	2.3	34	1.9	45	1.6	55	1.4	64	1.3	72	1.2	80												
370					3.1	21	2.3	35	1.9	46	1.6	56	1.4	66	1.3	74	1.2	82												
380					3.1	22	2.3	36	1.9	47	1.6	58	1.4	67	1.3	76	1.2	85												
390					3.1	22	2.3	37	1.9	49	1.6	59	1.4	69	1.3	78	1.2	87												
400					3.1	23	2.3	38	1.9	50	1.6	61	1.4	71	1.3	81	1.2	89												
410					3.1	24	2.3	39	1.9	52	1.6	63	1.4	73	1.3	83	1.2	92												
420					3.1	25	2.3	40	1.9	53	1.6	64	1.4	75	1.3	85	1.2	94												
430					3.1	26	2.3	41	1.9	54	1.6	66	1.4	77	1.3	87	1.2	96												
440					3.1	26	2.3	42	1.9	56	1.6	68	1.4	79	1.3	89	1.2	99												
450					3.1	27	2.3	43	1.9	57	1.6	69	1.4	81	1.3	91														
460					3.1	28	2.3	44	1.9	58	1.6	71	1.4	82	1.3	93														
470					3.1	29	2.3	45	1.9	60	1.6	72	1.4	84	1.3	95														
480					3.1	29	2.3	47	1.9	61	1.6	74	1.4	86	1.3	97														
490					3.1	30	2.2	48	1.9	62	1.6	76	1.4	88	1.3	99														
500					3	31	2.2	49	1.9	64	1.6	77	1.4	90																

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																											0.7	10	0.6	12
30																							0.8	10	0.7	12	0.6	16	0.6	19
40																					0.9	12	0.8	15	0.7	17	0.6	22	0.6	26
50																			1.1	12	0.9	16	0.8	19	0.7	22	0.6	28	0.6	32
60																			1.1	15	0.9	20	0.8	24	0.7	27	0.6	34	0.6	39
70																	1.4	11	1	18	0.9	24	0.8	28	0.7	32	0.6	40	0.6	46
80															1.5	12	1.4	14	1	21	0.9	27	0.8	33	0.7	37	0.6	46	0.6	53
90													1.7	11	1.5	14	1.3	16	1	25	0.9	31	0.8	37	0.7	42	0.6	51	0.6	60
100													1.6	13	1.5	16	1.3	19	1	28	0.9	35	0.8	41	0.7	47	0.6	57	0.5	66
110											1.9	11	1.6	15	1.4	18	1.3	21	1	31	0.9	39	0.8	46	0.7	52	0.6	63	0.5	73
120											1.8	13	1.6	17	1.4	21	1.3	24	1	34	0.9	43	0.8	50	0.7	57	0.6	69	0.5	80
130									2.2	10	1.8	15	1.6	19	1.4	23	1.3	26	1	37	0.9	46	0.8	54	0.7	62	0.6	75	0.5	87
140									2.1	11	1.8	17	1.5	21	1.4	25	1.3	28	1	40	0.8	50	0.8	59	0.7	67	0.6	81	0.5	93
150									2.1	13	1.8	19	1.5	23	1.4	27	1.3	31	1	43	0.8	54	0.8	63	0.7	72	0.6	87	0.5	100
160									2.1	15	1.7	20	1.5	25	1.4	29	1.3	33	1	46	0.8	58	0.8	68	0.7	77	0.6	93		
170									2	16	1.7	22	1.5	27	1.4	31	1.3	35	1	49	0.8	61	0.8	72	0.7	81	0.6	99		
180									2	18	1.7	24	1.5	29	1.4	34	1.2	38	1	53	0.8	65	0.8	76	0.7	86				
190							2.6	11	2	19	1.7	25	1.5	31	1.4	36	1.2	40	1	56	0.8	69	0.8	81	0.7	91				
200							2.5	12	2	21	1.7	27	1.5	33	1.3	38	1.2	42	1	59	0.8	73	0.8	85	0.7	96				
210							2.5	14	2	22	1.7	29	1.5	35	1.3	40	1.2	45	1	62	0.8	76	0.8	89						
220							2.5	15	2	24	1.7	30	1.5	36	1.3	42	1.2	47	1	65	0.8	80	0.8	94						
230							2.5	16	2	25	1.7	32	1.5	38	1.3	44	1.2	49	1	68	0.8	84	0.8	98						
240							2.4	17	2	26	1.7	34	1.5	40	1.3	46	1.2	52	1	71	0.8	88								
250							2.4	19	1.9	28	1.7	35	1.5	42	1.3	48	1.2	54	1	74	0.8	91								
260							2.4	20	1.9	29	1.7	37	1.5	44	1.3	50	1.2	56	1	77	0.8	95								
270							2.4	21	1.9	31	1.7	39	1.5	46	1.3	52	1.2	59	1	80	0.8	99								
280							2.4	22	1.9	32	1.6	40	1.5	48	1.3	55	1.2	61	1	83										
290							2.4	23	1.9	33	1.6	42	1.5	50	1.3	57	1.2	63	1	86										
300					3.4	10	2.4	24	1.9	35	1.6	44	1.5	52	1.3	59	1.2	66	1	90										
310					3.4	11	2.4	26	1.9	36	1.6	45	1.5	53	1.3	61	1.2	68	1	93										
320					3.3	12	2.3	27	1.9	38	1.6	47	1.5	55	1.3	63	1.2	70	1	96										
330					3.3	13	2.3	28	1.9	39	1.6	49	1.4	57	1.3	65	1.2	72	1	99										
340					3.3	14	2.3	29	1.9	40	1.6	50	1.4	59	1.3	67	1.2	75												
350					3.3	15	2.3	30	1.9	42	1.6	52	1.4	61	1.3	69	1.2	77												
360					3.2	16	2.3	31	1.9	43	1.6	53	1.4	63	1.3	71	1.2	80												
370					3.2	16	2.3	32	1.9	45	1.6	55	1.4	65	1.3	73	1.2	82												
380					3.2	17	2.3	34	1.9	46	1.6	57	1.4	67	1.3	76	1.2	84												
390					3.2	18	2.3	35	1.9	47	1.6	58	1.4	68	1.3	78	1.2	86												
400					3.2	19	2.3	36	1.9	49	1.6	60	1.4	70	1.3	80	1.2	89												
410					3.2	20	2.3	37	1.9	50	1.6	62	1.4	72	1.3	82	1.2	91												
420					3.2	21	2.3	38	1.9	51	1.6	63	1.4	74	1.3	84	1.2	93												
430					3.2	22	2.3	39	1.9	53	1.6	65	1.4	76	1.3	86	1.2	96												
440					3.1	23	2.3	40	1.9	54	1.6	66	1.4	78	1.3	88	1.2	98												
450					3.1	24	2.3	41	1.9	56	1.6	68	1.4	80	1.3	90	1.2	100												
460					3.1	24	2.3	42	1.9	57	1.6	70	1.4	81	1.3	92														
470					3.1	25	2.3	44	1.9	58	1.6	71	1.4	83	1.3	94														
480					3.1	26	2.3	45	1.9	60	1.6	73	1.4	85	1.3	96														
490					3.1	27	2.3	46	1.9	61	1.6	75	1.4	87	1.3	98														
500					3.1	28	2.3	47	1.9	62	1.6	76	1.4	89	1.3	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																													0.6	11
30																									0.8	12	0.6	15	0.6	18
40																					0.9	11	0.8	14	0.7	17	0.6	21	0.6	25
50																			1.1	10	0.9	15	0.8	19	0.7	22	0.6	27	0.6	32
60																			1.1	14	0.9	19	0.8	23	0.7	27	0.6	33	0.6	39
70																			1.1	17	0.9	23	0.8	28	0.7	32	0.6	39	0.6	46
80																	1.4	12	1	21	0.9	27	0.8	32	0.7	37	0.6	45	0.6	52
90															1.6	12	1.4	15	1	24	0.9	31	0.8	36	0.7	42	0.6	51	0.6	59
100													1.7	11	1.5	14	1.3	17	1	27	0.9	34	0.8	41	0.7	47	0.6	57	0.5	66
110													1.7	13	1.5	17	1.3	20	1	30	0.9	38	0.8	45	0.7	52	0.6	63	0.5	73
120											1.9	10	1.6	15	1.4	19	1.3	22	1	33	0.9	42	0.8	50	0.7	56	0.6	69	0.5	80
130											1.9	12	1.6	17	1.4	21	1.3	25	1	36	0.9	46	0.8	54	0.7	61	0.6	75	0.5	86
140											1.8	14	1.6	19	1.4	24	1.3	27	1	39	0.9	49	0.8	58	0.7	66	0.6	81	0.5	93
150											1.8	16	1.6	21	1.4	26	1.3	30	1	43	0.8	53	0.8	63	0.7	71	0.6	86	0.5	100
160									2.2	11	1.8	18	1.6	23	1.4	28	1.3	32	1	46	0.8	57	0.8	67	0.7	76	0.6	92		
170									2.1	13	1.8	20	1.5	25	1.4	30	1.3	34	1	49	0.8	61	0.8	71	0.7	81	0.6	98		
180									2.1	15	1.8	22	1.5	27	1.4	32	1.3	37	1	52	0.8	65	0.8	76	0.7	86				
190									2.1	16	1.7	24	1.5	29	1.4	34	1.3	39	1	55	0.8	68	0.8	80	0.7	91				
200									2	18	1.7	25	1.5	31	1.4	37	1.2	41	1	58	0.8	72	0.8	85	0.7	96				
210									2	20	1.7	27	1.5	33	1.4	39	1.2	44	1	61	0.8	76	0.8	89						
220							2.6	10	2	21	1.7	29	1.5	35	1.4	41	1.2	46	1	64	0.8	80	0.8	93						
230							2.6	12	2	23	1.7	30	1.5	37	1.3	43	1.2	48	1	67	0.8	83	0.8	98						
240							2.5	13	2	24	1.7	32	1.5	39	1.3	45	1.2	51	1	70	0.8	87								
250							2.5	15	2	26	1.7	34	1.5	41	1.3	47	1.2	53	1	73	0.8	91								
260							2.5	16	2	27	1.7	36	1.5	43	1.3	49	1.2	55	1	77	0.8	95								
270							2.5	18	2	29	1.7	37	1.5	45	1.3	52	1.2	58	1	80	0.8	98								
280							2.4	19	2	30	1.7	39	1.5	47	1.3	54	1.2	60	1	83										
290							2.4	20	1.9	31	1.7	41	1.5	48	1.3	56	1.2	62	1	86										
300							2.4	21	1.9	33	1.7	42	1.5	50	1.3	58	1.2	65	1	89										
310							2.4	23	1.9	34	1.7	44	1.5	52	1.3	60	1.2	67	1	92										
320							2.4	24	1.9	36	1.7	46	1.5	54	1.3	62	1.2	69	1	95										
330							2.4	25	1.9	37	1.6	47	1.5	56	1.3	64	1.2	72	1	98										
340							2.4	26	1.9	39	1.6	49	1.5	58	1.3	66	1.2	74												
350							2.4	27	1.9	40	1.6	50	1.5	60	1.3	68	1.2	76												
360							2.4	29	1.9	41	1.6	52	1.5	62	1.3	70	1.2	79												
370					3.4	11	2.3	30	1.9	43	1.6	54	1.5	63	1.3	73	1.2	81												
380					3.4	12	2.3	31	1.9	44	1.6	55	1.4	65	1.3	75	1.2	83												
390					3.4	13	2.3	32	1.9	46	1.6	57	1.4	67	1.3	77	1.2	85												
400					3.3	14	2.3	33	1.9	47	1.6	59	1.4	69	1.3	79	1.2	88												
410					3.3	15	2.3	34	1.9	48	1.6	60	1.4	71	1.3	81	1.2	90												
420					3.3	16	2.3	36	1.9	50	1.6	62	1.4	73	1.3	83	1.2	92												
430					3.3	17	2.3	37	1.9	51	1.6	64	1.4	75	1.3	85	1.2	95												
440					3.2	18	2.3	38	1.9	53	1.6	65	1.4	77	1.3	87	1.2	97												
450					3.2	19	2.3	39	1.9	54	1.6	67	1.4	78	1.3	89	1.2	99												
460					3.2	20	2.3	40	1.9	55	1.6	69	1.4	80	1.3	91														
470					3.2	21	2.3	41	1.9	57	1.6	70	1.4	82	1.3	93														
480					3.2	22	2.3	42	1.9	58	1.6	72	1.4	84	1.3	95														
490					3.2	23	2.3	44	1.9	60	1.6	73	1.4	86	1.3	98														
500					3.2	23	2.3	45	1.9	61	1.6	75	1.4	88	1.3	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.7	11	0.6	14
40																							0.9	11	0.8	12	0.7	16	0.6	19
50																					1	11	0.9	14	0.8	16	0.7	20	0.6	24
60																			1.2	10	1	14	0.9	17	0.8	20	0.7	25	0.6	29
70																			1.2	13	1	17	0.9	20	0.8	23	0.7	29	0.6	34
80																			1.2	15	1	19	0.9	23	0.8	27	0.7	33	0.6	39
90																	1.6	11	1.2	17	1	22	0.9	26	0.8	30	0.7	38	0.6	44
100															1.7	10	1.5	12	1.2	19	1	25	0.8	30	0.8	34	0.7	42	0.6	49
110															1.7	12	1.5	14	1.1	21	1	27	0.8	33	0.8	38	0.7	46	0.6	54
120													1.9	11	1.7	13	1.5	16	1.1	24	1	30	0.8	36	0.8	41	0.7	51	0.6	59
130													1.8	12	1.6	15	1.5	17	1.1	26	1	33	0.8	39	0.8	45	0.7	55	0.6	64
140											2.1	10	1.8	14	1.6	17	1.5	19	1.1	28	0.9	36	0.8	42	0.8	48	0.7	59	0.6	69
150											2.1	11	1.8	15	1.6	18	1.5	21	1.1	30	0.9	38	0.8	45	0.8	52	0.7	63	0.6	74
160											2.1	13	1.8	16	1.6	20	1.5	22	1.1	32	0.9	41	0.8	49	0.8	55	0.7	68	0.6	79
170											2.1	14	1.8	18	1.6	21	1.5	24	1.1	35	0.9	44	0.8	52	0.8	59	0.7	72	0.6	84
180									2.5	10	2	15	1.8	19	1.6	22	1.5	26	1.1	37	0.9	46	0.8	55	0.8	63	0.7	76	0.6	89
190									2.4	11	2	16	1.8	20	1.6	24	1.4	27	1.1	39	0.9	49	0.8	58	0.8	66	0.7	81	0.6	94
200									2.4	12	2	17	1.8	22	1.6	25	1.4	29	1.1	41	0.9	52	0.8	61	0.8	70	0.7	85	0.6	99
210									2.4	13	2	19	1.8	23	1.6	27	1.4	31	1.1	43	0.9	54	0.8	64	0.8	73	0.7	89		
220									2.4	14	2	20	1.7	24	1.6	28	1.4	32	1.1	46	0.9	57	0.8	67	0.8	77	0.7	94		
230									2.4	15	2	21	1.7	26	1.6	30	1.4	34	1.1	48	0.9	60	0.8	70	0.8	80	0.7	98		
240									2.4	16	2	22	1.7	27	1.6	31	1.4	35	1.1	50	0.9	62	0.8	74	0.8	84				
250							3	10	2.3	17	2	23	1.7	28	1.6	33	1.4	37	1.1	52	0.9	65	0.8	77	0.8	87				
260							3	11	2.3	18	2	24	1.7	29	1.6	34	1.4	39	1.1	54	0.9	68	0.8	80	0.8	91				
270							3	12	2.3	19	2	25	1.7	31	1.6	36	1.4	40	1.1	56	0.9	70	0.8	83	0.8	95				
280							2.9	13	2.3	20	2	26	1.7	32	1.5	37	1.4	42	1.1	59	0.9	73	0.8	86	0.8	98				
290							2.9	13	2.3	21	1.9	28	1.7	33	1.5	39	1.4	43	1.1	61	0.9	76	0.8	89						
300							2.9	14	2.3	22	1.9	29	1.7	35	1.5	40	1.4	45	1.1	63	0.9	79	0.8	92						
310							2.9	15	2.3	23	1.9	30	1.7	36	1.5	41	1.4	47	1.1	65	0.9	81	0.8	96						
320							2.9	16	2.3	24	1.9	31	1.7	37	1.5	43	1.4	48	1.1	67	0.9	84	0.8	99						
330							2.9	17	2.3	25	1.9	32	1.7	38	1.5	44	1.4	50	1.1	70	0.9	86								
340							2.9	17	2.3	26	1.9	33	1.7	40	1.5	46	1.4	51	1.1	72	0.9	89								
350							2.9	18	2.3	27	1.9	34	1.7	41	1.5	47	1.4	53	1.1	74	0.9	92								
360							2.9	19	2.3	28	1.9	35	1.7	42	1.5	49	1.4	55	1.1	76	0.9	95								
370							2.8	20	2.3	29	1.9	36	1.7	44	1.5	50	1.4	56	1.1	78	0.9	97								
380							2.8	20	2.3	30	1.9	38	1.7	45	1.5	51	1.4	58	1.1	80	0.9	100								
390							2.8	21	2.3	31	1.9	39	1.7	46	1.5	53	1.4	59	1.1	83										
400							2.8	22	2.2	31	1.9	40	1.7	47	1.5	54	1.4	61	1.1	85										
410					4	10	2.8	23	2.2	32	1.9	41	1.7	49	1.5	56	1.4	63	1.1	87										
420					4	10	2.8	23	2.2	33	1.9	42	1.7	50	1.5	57	1.4	64	1.1	89										
430					4	11	2.8	24	2.2	34	1.9	43	1.7	51	1.5	59	1.4	66	1.1	91										
440					4	12	2.8	25	2.2	35	1.9	44	1.7	52	1.5	60	1.4	67	1.1	93										
450					4	12	2.8	26	2.2	36	1.9	45	1.7	54	1.5	62	1.4	69	1.1	96										
460					4	13	2.8	26	2.2	37	1.9	46	1.7	55	1.5	63	1.4	71	1.1	98										
470					4	13	2.8	27	2.2	38	1.9	47	1.7	56	1.5	65	1.4	72	1.1	100										
480					4	14	2.8	28	2.2	39	1.9	49	1.7	58	1.5	66	1.4	74												
490					3.9	14	2.8	28	2.2	40	1.9	50	1.7	59	1.5	67	1.4	75												
500					3.9	15	2.8	29	2.2	41	1.9	51	1.7	60	1.5	69	1.4	77												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.7	11	0.6	13
40																							0.9	10	0.8	12	0.7	15	0.6	18
50																					1.1	10	0.9	13	0.8	15	0.7	20	0.6	23
60																					1	13	0.9	16	0.8	19	0.7	24	0.6	28
70																			1.2	11	1	16	0.9	19	0.8	23	0.7	28	0.6	33
80																			1.2	13	1	18	0.9	23	0.8	26	0.7	33	0.6	38
90																			1.2	16	1	21	0.9	26	0.8	30	0.7	37	0.6	43
100																	1.6	10	1.2	18	1	24	0.9	29	0.8	33	0.7	41	0.6	48
110															1.8	10	1.6	12	1.2	20	1	27	0.8	32	0.8	37	0.7	46	0.6	53
120															1.7	11	1.6	14	1.2	23	1	29	0.8	35	0.8	41	0.7	50	0.6	58
130													1.9	10	1.7	13	1.5	16	1.1	25	1	32	0.8	38	0.8	44	0.7	54	0.6	63
140													1.9	11	1.7	15	1.5	18	1.1	27	1	35	0.8	42	0.8	48	0.7	59	0.6	68
150													1.9	13	1.7	16	1.5	19	1.1	29	1	38	0.8	45	0.8	51	0.7	63	0.6	73
160											2.2	10	1.8	14	1.6	18	1.5	21	1.1	32	0.9	40	0.8	48	0.8	55	0.7	67	0.6	79
170											2.1	11	1.8	16	1.6	19	1.5	23	1.1	34	0.9	43	0.8	51	0.8	58	0.7	72	0.6	83
180											2.1	12	1.8	17	1.6	21	1.5	24	1.1	36	0.9	46	0.8	54	0.8	62	0.7	76	0.6	88
190											2.1	14	1.8	18	1.6	22	1.5	26	1.1	38	0.9	48	0.8	57	0.8	66	0.7	80	0.6	93
200											2.1	15	1.8	20	1.6	24	1.5	28	1.1	40	0.9	51	0.8	61	0.8	69	0.7	85	0.6	99
210									2.5	10	2.1	16	1.8	21	1.6	25	1.5	29	1.1	43	0.9	54	0.8	64	0.8	73	0.7	89		
220									2.5	11	2	17	1.8	22	1.6	27	1.5	31	1.1	45	0.9	56	0.8	67	0.8	76	0.7	93		
230									2.5	12	2	19	1.8	24	1.6	28	1.4	33	1.1	47	0.9	59	0.8	70	0.8	80	0.7	98		
240									2.4	13	2	20	1.8	25	1.6	30	1.4	34	1.1	49	0.9	62	0.8	73	0.8	83				
250									2.4	14	2	21	1.8	26	1.6	31	1.4	36	1.1	51	0.9	64	0.8	76	0.8	87				
260									2.4	15	2	22	1.7	28	1.6	33	1.4	37	1.1	53	0.9	67	0.8	79	0.8	91				
270									2.4	16	2	23	1.7	29	1.6	34	1.4	39	1.1	56	0.9	70	0.8	82	0.8	94				
280									2.4	17	2	24	1.7	30	1.6	36	1.4	41	1.1	58	0.9	73	0.8	86	0.8	98				
290									2.4	18	2	26	1.7	32	1.6	37	1.4	42	1.1	60	0.9	75	0.8	89						
300							3.1	10	2.3	19	2	27	1.7	33	1.6	39	1.4	44	1.1	62	0.9	78	0.8	92						
310							3	11	2.3	20	2	28	1.7	34	1.6	40	1.4	46	1.1	64	0.9	81	0.8	95						
320							3	12	2.3	21	2	29	1.7	36	1.6	42	1.4	47	1.1	67	0.9	83	0.8	98						
330							3	12	2.3	22	2	30	1.7	37	1.5	43	1.4	49	1.1	69	0.9	86								
340							3	13	2.3	24	1.9	31	1.7	38	1.5	45	1.4	50	1.1	71	0.9	89								
350							3	14	2.3	24	1.9	33	1.7	40	1.5	46	1.4	52	1.1	73	0.9	91								
360							2.9	15	2.3	25	1.9	34	1.7	41	1.5	48	1.4	54	1.1	75	0.9	94								
370							2.9	16	2.3	26	1.9	35	1.7	42	1.5	49	1.4	55	1.1	77	0.9	97								
380							2.9	17	2.3	27	1.9	36	1.7	43	1.5	50	1.4	57	1.1	80	0.9	99								
390							2.9	18	2.3	28	1.9	37	1.7	45	1.5	52	1.4	58	1.1	82										
400							2.9	18	2.3	29	1.9	38	1.7	46	1.5	53	1.4	60	1.1	84										
410							2.9	19	2.3	30	1.9	39	1.7	47	1.5	55	1.4	62	1.1	86										
420							2.9	20	2.3	31	1.9	40	1.7	49	1.5	56	1.4	63	1.1	88										
430							2.9	21	2.3	32	1.9	42	1.7	50	1.5	58	1.4	65	1.1	90										
440							2.9	22	2.3	33	1.9	43	1.7	51	1.5	59	1.4	66	1.1	93										
450							2.8	22	2.2	34	1.9	44	1.7	53	1.5	60	1.4	68	1.1	95										
460							2.8	23	2.2	35	1.9	45	1.7	54	1.5	62	1.4	70	1.1	97										
470							2.8	24	2.2	36	1.9	46	1.7	55	1.5	63	1.4	71	1.1	99										
480							2.8	25	2.2	37	1.9	47	1.7	56	1.5	65	1.4	73												
490							2.8	25	2.2	38	1.9	48	1.7	58	1.5	66	1.4	74												
500							2.8	26	2.2	39	1.9	49	1.7	59	1.5	68	1.4	76												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.7	10	0.6	13
40																									0.8	11	0.7	15	0.6	18
50																							0.9	12	0.8	15	0.7	19	0.6	23
60																					1.1	12	0.9	15	0.8	18	0.7	23	0.6	28
70																					1	15	0.9	19	0.8	22	0.7	28	0.6	33
80																			1.3	12	1	17	0.9	22	0.8	26	0.7	32	0.6	38
90																			1.2	14	1	20	0.9	25	0.8	29	0.7	37	0.6	43
100																			1.2	17	1	23	0.9	28	0.8	33	0.7	41	0.6	48
110																	1.6	10	1.2	19	1	26	0.9	31	0.8	36	0.7	45	0.6	53
120																	1.6	12	1.2	21	1	29	0.8	35	0.8	40	0.7	50	0.6	58
130															1.8	10	1.6	14	1.2	24	1	31	0.8	38	0.8	44	0.7	54	0.6	63
140															1.7	12	1.6	16	1.2	26	1	34	0.8	41	0.8	47	0.7	58	0.6	68
150															1.7	14	1.5	17	1.1	28	1	37	0.8	44	0.8	51	0.7	63	0.6	73
160													1.9	11	1.7	16	1.5	19	1.1	31	1	40	0.8	47	0.8	54	0.7	67	0.6	78
170													1.9	13	1.7	17	1.5	21	1.1	33	1	42	0.8	50	0.8	58	0.7	71	0.6	83
180													1.9	14	1.7	19	1.5	23	1.1	35	0.9	45	0.8	54	0.8	62	0.7	76	0.6	88
190											2.2	10	1.9	16	1.6	21	1.5	25	1.1	37	0.9	48	0.8	57	0.8	65	0.7	80	0.6	93
200											2.2	12	1.8	17	1.6	22	1.5	26	1.1	39	0.9	50	0.8	60	0.8	69	0.7	84	0.6	98
210											2.1	13	1.8	19	1.6	24	1.5	28	1.1	42	0.9	53	0.8	63	0.8	72	0.7	88		
220											2.1	14	1.8	20	1.6	25	1.5	30	1.1	44	0.9	56	0.8	66	0.8	76	0.7	93		
230											2.1	16	1.8	22	1.6	27	1.5	31	1.1	46	0.9	58	0.8	69	0.8	79	0.7	97		
240											2.1	17	1.8	23	1.6	28	1.5	33	1.1	48	0.9	61	0.8	73	0.8	83				
250									2.5	10	2.1	18	1.8	25	1.6	30	1.5	34	1.1	50	0.9	64	0.8	76	0.8	86				
260									2.5	11	2	20	1.8	26	1.6	31	1.4	36	1.1	53	0.9	67	0.8	79	0.8	90				
270									2.5	13	2	21	1.8	27	1.6	33	1.4	38	1.1	55	0.9	69	0.8	82	0.8	94				
280									2.5	14	2	22	1.8	29	1.6	34	1.4	40	1.1	57	0.9	72	0.8	85	0.8	97				
290									2.4	15	2	23	1.8	30	1.6	36	1.4	41	1.1	59	0.9	75	0.8	88						
300									2.4	16	2	25	1.7	31	1.6	37	1.4	43	1.1	61	0.9	77	0.8	91						
310									2.4	17	2	26	1.7	33	1.6	39	1.4	44	1.1	64	0.9	80	0.8	95						
320									2.4	18	2	27	1.7	34	1.6	40	1.4	46	1.1	66	0.9	83	0.8	98						
330									2.4	19	2	28	1.7	35	1.6	42	1.4	48	1.1	68	0.9	85								
340									2.4	21	2	29	1.7	37	1.6	43	1.4	49	1.1	70	0.9	88								
350									2.4	22	2	31	1.7	38	1.6	45	1.4	51	1.1	72	0.9	91								
360							3.1	10	2.3	23	2	32	1.7	39	1.6	46	1.4	52	1.1	75	0.9	93								
370							3.1	11	2.3	24	2	33	1.7	41	1.6	48	1.4	54	1.1	77	0.9	96								
380							3	12	2.3	25	2	34	1.7	42	1.5	49	1.4	56	1.1	79	0.9	99								
390							3	13	2.3	26	1.9	35	1.7	43	1.5	51	1.4	57	1.1	81										
400							3	14	2.3	27	1.9	36	1.7	45	1.5	52	1.4	59	1.1	83										
410							3	15	2.3	28	1.9	38	1.7	46	1.5	54	1.4	61	1.1	85										
420							3	16	2.3	29	1.9	39	1.7	47	1.5	55	1.4	62	1.1	88										
430							2.9	16	2.3	30	1.9	40	1.7	48	1.5	56	1.4	64	1.1	90										
440							2.9	17	2.3	31	1.9	41	1.7	50	1.5	58	1.4	65	1.1	92										
450							2.9	18	2.3	32	1.9	42	1.7	51	1.5	59	1.4	67	1.1	94										
460							2.9	19	2.3	33	1.9	43	1.7	52	1.5	61	1.4	69	1.1	96										
470							2.9	20	2.3	34	1.9	44	1.7	54	1.5	62	1.4	70	1.1	98										
480							2.9	21	2.3	35	1.9	45	1.7	55	1.5	64	1.4	72												
490							2.9	22	2.3	36	1.9	47	1.7	56	1.5	65	1.4	73												
500							2.9	23	2.3	37	1.9	48	1.7	58	1.5	67	1.4	75												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																									0.7	11	0.6	14	0.5	16
30																			1	10	0.8	13	0.7	15	0.7	17	0.6	21	0.5	24
40																			1	14	0.8	17	0.7	21	0.7	24	0.6	29	0.5	33
50															1.4	11	1.2	12	1	18	0.8	22	0.7	26	0.7	30	0.6	36	0.5	42
60													1.5	11	1.3	13	1.2	15	0.9	22	0.8	27	0.7	32	0.7	36	0.6	44	0.5	50
70											1.7	11	1.4	14	1.3	16	1.2	18	0.9	26	0.8	32	0.7	37	0.7	42	0.6	51	0.5	59
80									1.9	10	1.6	13	1.4	16	1.3	19	1.2	22	0.9	30	0.8	37	0.7	43	0.7	49	0.6	58	0.5	67
90									1.9	12	1.6	16	1.4	19	1.3	22	1.2	25	0.9	34	0.8	42	0.7	48	0.7	55	0.6	66	0.5	76
100									1.8	14	1.6	18	1.4	22	1.2	25	1.1	28	0.9	38	0.8	46	0.7	54	0.7	61	0.6	73	0.5	84
110							2.2	10	1.8	16	1.5	20	1.4	24	1.2	27	1.1	31	0.9	42	0.8	51	0.7	60	0.7	67	0.6	81	0.5	93
120							2.2	12	1.8	18	1.5	22	1.4	27	1.2	30	1.1	34	0.9	46	0.8	56	0.7	65	0.7	73	0.6	88		
130							2.2	14	1.8	20	1.5	25	1.3	29	1.2	33	1.1	37	0.9	50	0.8	61	0.7	71	0.7	80	0.6	96		
140							2.2	15	1.8	22	1.5	27	1.3	31	1.2	36	1.1	40	0.9	54	0.8	66	0.7	76	0.7	86				
150							2.1	17	1.7	23	1.5	29	1.3	34	1.2	39	1.1	43	0.9	58	0.8	70	0.7	82	0.7	92				
160							2.1	18	1.7	25	1.5	31	1.3	36	1.2	41	1.1	46	0.9	62	0.8	75	0.7	87	0.7	98				
170					2.9	10	2.1	20	1.7	27	1.5	33	1.3	39	1.2	44	1.1	49	0.9	66	0.8	80	0.7	93						
180					2.9	12	2.1	21	1.7	29	1.5	36	1.3	41	1.2	47	1.1	52	0.9	70	0.8	85	0.7	98						
190					2.9	13	2.1	23	1.7	31	1.5	38	1.3	44	1.2	50	1.1	55	0.9	74	0.8	90								
200					2.8	14	2.1	24	1.7	33	1.5	40	1.3	46	1.2	52	1.1	58	0.9	78	0.8	94								
210					2.8	15	2.1	26	1.7	34	1.5	42	1.3	49	1.2	55	1.1	61	0.9	82	0.8	99								
220					2.8	16	2.1	27	1.7	36	1.5	44	1.3	51	1.2	58	1.1	64	0.9	86										
230					2.8	17	2.1	29	1.7	38	1.5	46	1.3	54	1.2	60	1.1	67	0.9	89										
240					2.8	19	2	30	1.7	40	1.5	48	1.3	56	1.2	63	1.1	70	0.9	93										
250					2.7	20	2	32	1.7	42	1.5	51	1.3	59	1.2	66	1.1	73	0.9	97										
260					2.7	21	2	33	1.7	44	1.5	53	1.3	61	1.2	69	1.1	76												
270					2.7	22	2	35	1.7	45	1.5	55	1.3	63	1.2	71	1.1	79												
280					2.7	23	2	36	1.7	47	1.4	57	1.3	66	1.2	74	1.1	82												
290					2.7	24	2	38	1.7	49	1.4	59	1.3	68	1.2	77	1.1	85												
300					2.7	25	2	39	1.7	51	1.4	61	1.3	71	1.2	80	1.1	88												
310					2.7	26	2	41	1.7	53	1.4	63	1.3	73	1.2	82	1.1	91												
320					2.7	27	2	42	1.7	55	1.4	66	1.3	76	1.2	85	1.1	94												
330					2.7	29	2	44	1.7	56	1.4	68	1.3	78	1.2	88	1.1	97												
340					2.6	30	2	45	1.7	58	1.4	70	1.3	81	1.2	91	1.1	100												
350					2.6	31	2	47	1.6	60	1.4	72	1.3	83	1.2	93														
360					2.6	32	2	48	1.6	62	1.4	74	1.3	85	1.2	96														
370					2.6	33	2	49	1.6	64	1.4	76	1.3	88	1.2	99														
380					2.6	34	2	51	1.6	65	1.4	78	1.3	90																
390			4.7	10	2.6	35	2	52	1.6	67	1.4	81	1.3	93																
400			4.7	11	2.6	36	2	54	1.6	69	1.4	83	1.3	95																
410			4.7	11	2.6	37	2	55	1.6	71	1.4	85	1.3	98																
420			4.6	12	2.6	38	2	57	1.6	73	1.4	87	1.3	100																
430			4.6	13	2.6	39	2	58	1.6	74	1.4	89																		
440			4.6	14	2.6	40	2	60	1.6	76	1.4	91																		
450			4.6	14	2.6	41	2	61	1.6	78	1.4	93																		
460			4.6	15	2.6	42	2	63	1.6	80	1.4	96																		
470			4.6	15	2.6	43	2	64	1.6	82	1.4	98																		
480			4.6	16	2.6	44	2	65	1.6	83	1.4	100																		
490			4.5	17	2.6	46	2	67	1.6	85																				
500			4.5	17	2.6	47	2	68	1.6	87																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																									0.7	10	0.6	13	0.5	15
30																					0.9	12	0.8	14	0.7	17	0.6	21	0.5	24
40																			1	13	0.8	17	0.7	20	0.7	23	0.6	28	0.5	33
50																	1.3	11	1	17	0.8	22	0.7	26	0.7	29	0.6	36	0.5	41
60															1.4	12	1.2	14	0.9	21	0.8	27	0.7	31	0.7	36	0.6	43	0.5	50
70													1.5	12	1.3	15	1.2	17	0.9	25	0.8	31	0.7	37	0.7	42	0.6	51	0.5	58
80											1.7	11	1.5	15	1.3	18	1.2	20	0.9	29	0.8	36	0.7	42	0.7	48	0.6	58	0.5	67
90											1.6	14	1.4	18	1.3	21	1.2	24	0.9	33	0.8	41	0.7	48	0.7	54	0.6	65	0.5	75
100									1.9	11	1.6	16	1.4	20	1.3	24	1.2	27	0.9	37	0.8	46	0.7	54	0.7	61	0.6	73	0.5	84
110									1.9	14	1.6	19	1.4	23	1.3	26	1.2	30	0.9	41	0.8	51	0.7	59	0.7	67	0.6	80	0.5	92
120									1.9	16	1.6	21	1.4	25	1.2	29	1.1	33	0.9	45	0.8	56	0.7	65	0.7	73	0.6	88		
130							2.3	10	1.8	18	1.5	23	1.4	28	1.2	32	1.1	36	0.9	49	0.8	60	0.7	70	0.7	79	0.6	95		
140							2.3	12	1.8	20	1.5	25	1.4	30	1.2	35	1.1	39	0.9	53	0.8	65	0.7	76	0.7	85				
150							2.2	14	1.8	22	1.5	28	1.3	33	1.2	38	1.1	42	0.9	57	0.8	70	0.7	81	0.7	92				
160							2.2	16	1.8	23	1.5	30	1.3	35	1.2	40	1.1	45	0.9	61	0.8	75	0.7	87	0.7	98				
170							2.2	17	1.8	25	1.5	32	1.3	38	1.2	43	1.1	48	0.9	65	0.8	80	0.7	93						
180							2.2	19	1.7	27	1.5	34	1.3	40	1.2	46	1.1	51	0.9	69	0.8	84	0.7	98						
190							2.1	21	1.7	29	1.5	36	1.3	43	1.2	49	1.1	54	0.9	73	0.8	89								
200							2.1	22	1.7	31	1.5	39	1.3	45	1.2	51	1.1	57	0.9	77	0.8	94								
210					3	11	2.1	24	1.7	33	1.5	41	1.3	48	1.2	54	1.1	60	0.9	81	0.8	99								
220					2.9	12	2.1	25	1.7	35	1.5	43	1.3	50	1.2	57	1.1	63	0.9	85										
230					2.9	13	2.1	27	1.7	37	1.5	45	1.3	53	1.2	60	1.1	66	0.9	89										
240					2.9	15	2.1	28	1.7	39	1.5	47	1.3	55	1.2	62	1.1	69	0.9	93										
250					2.8	16	2.1	30	1.7	40	1.5	49	1.3	58	1.2	65	1.1	72	0.9	97										
260					2.8	17	2.1	31	1.7	42	1.5	52	1.3	60	1.2	68	1.1	75												
270					2.8	18	2.1	33	1.7	44	1.5	54	1.3	62	1.2	71	1.1	78												
280					2.8	20	2	34	1.7	46	1.5	56	1.3	65	1.2	73	1.1	81												
290					2.8	21	2	36	1.7	48	1.5	58	1.3	67	1.2	76	1.1	84												
300					2.7	22	2	37	1.7	50	1.5	60	1.3	70	1.2	79	1.1	87												
310					2.7	23	2	39	1.7	51	1.4	62	1.3	72	1.2	82	1.1	90												
320					2.7	24	2	40	1.7	53	1.4	64	1.3	75	1.2	84	1.1	93												
330					2.7	26	2	42	1.7	55	1.4	67	1.3	77	1.2	87	1.1	96												
340					2.7	27	2	43	1.7	57	1.4	69	1.3	80	1.2	90	1.1	99												
350					2.7	28	2	45	1.7	59	1.4	71	1.3	82	1.2	93														
360					2.7	29	2	46	1.7	61	1.4	73	1.3	85	1.2	95														
370					2.7	30	2	48	1.7	62	1.4	75	1.3	87	1.2	98														
380					2.7	31	2	49	1.7	64	1.4	77	1.3	89																
390					2.7	32	2	51	1.7	66	1.4	80	1.3	92																
400					2.7	33	2	52	1.6	68	1.4	82	1.3	94																
410					2.6	34	2	54	1.6	70	1.4	84	1.3	97																
420					2.6	36	2	55	1.6	71	1.4	86	1.3	99																
430					2.6	37	2	57	1.6	73	1.4	88																		
440					2.6	38	2	58	1.6	75	1.4	90																		
450					2.6	39	2	60	1.6	77	1.4	92																		
460					2.6	40	2	61	1.6	79	1.4	95																		
470					2.6	41	2	63	1.6	81	1.4	97																		
480					2.6	42	2	64	1.6	82	1.4	99																		
490					2.6	43	2	65	1.6	84																				
500			4.7	10	2.6	44	2	67	1.6	86																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																											0.6	13	0.5	15
30																					0.9	11	0.8	14	0.7	16	0.6	20	0.5	24
40																			1	12	0.8	16	0.7	19	0.7	22	0.6	28	0.5	32
50																			1	16	0.8	21	0.7	25	0.7	29	0.6	35	0.5	41
60															1.4	10	1.3	13	1	20	0.8	26	0.7	31	0.7	35	0.6	43	0.5	49
70													1.6	10	1.4	13	1.2	16	0.9	24	0.8	31	0.7	36	0.7	41	0.6	50	0.5	58
80													1.5	13	1.3	16	1.2	19	0.9	28	0.8	36	0.7	42	0.7	48	0.6	58	0.5	66
90											1.7	11	1.5	16	1.3	19	1.2	22	0.9	32	0.8	40	0.7	47	0.7	54	0.6	65	0.5	75
100											1.7	14	1.4	18	1.3	22	1.2	26	0.9	36	0.8	45	0.7	53	0.7	60	0.6	73	0.5	84
110									2	11	1.6	17	1.4	21	1.3	25	1.2	29	0.9	40	0.8	50	0.7	59	0.7	66	0.6	80	0.5	92
120									1.9	13	1.6	19	1.4	24	1.3	28	1.2	32	0.9	44	0.8	55	0.7	64	0.7	73	0.6	87		
130									1.9	15	1.6	21	1.4	26	1.2	31	1.1	35	0.9	48	0.8	60	0.7	70	0.7	79	0.6	95		
140									1.9	17	1.6	24	1.4	29	1.2	34	1.1	38	0.9	52	0.8	65	0.7	75	0.7	85				
150							2.3	10	1.8	19	1.5	26	1.4	32	1.2	36	1.1	41	0.9	56	0.8	69	0.7	81	0.7	91				
160							2.3	12	1.8	21	1.5	28	1.4	34	1.2	39	1.1	44	0.9	60	0.8	74	0.7	86	0.7	98				
170							2.3	14	1.8	23	1.5	31	1.3	37	1.2	42	1.1	47	0.9	64	0.8	79	0.7	92						
180							2.2	16	1.8	25	1.5	33	1.3	39	1.2	45	1.1	50	0.9	68	0.8	84	0.7	98						
190							2.2	18	1.8	27	1.5	35	1.3	42	1.2	48	1.1	53	0.9	72	0.8	89								
200							2.2	19	1.8	29	1.5	37	1.3	44	1.2	50	1.1	56	0.9	76	0.8	94								
210							2.2	21	1.7	31	1.5	39	1.3	47	1.2	53	1.1	59	0.9	80	0.8	98								
220							2.1	23	1.7	33	1.5	42	1.3	49	1.2	56	1.1	62	0.9	84										
230							2.1	24	1.7	35	1.5	44	1.3	52	1.2	59	1.1	65	0.9	88										
240							2.1	26	1.7	37	1.5	46	1.3	54	1.2	62	1.1	68	0.9	92										
250					3	11	2.1	28	1.7	39	1.5	48	1.3	57	1.2	64	1.1	71	0.9	96										
260					3	12	2.1	29	1.7	41	1.5	50	1.3	59	1.2	67	1.1	74	0.9	100										
270					2.9	14	2.1	31	1.7	43	1.5	53	1.3	62	1.2	70	1.1	77												
280					2.9	15	2.1	32	1.7	44	1.5	55	1.3	64	1.2	72	1.1	80												
290					2.9	17	2.1	34	1.7	46	1.5	57	1.3	66	1.2	75	1.1	84												
300					2.8	18	2.1	35	1.7	48	1.5	59	1.3	69	1.2	78	1.1	86												
310					2.8	19	2.1	37	1.7	50	1.5	61	1.3	71	1.2	81	1.1	90												
320					2.8	21	2.1	38	1.7	52	1.5	63	1.3	74	1.2	83	1.1	92												
330					2.8	22	2	40	1.7	54	1.5	66	1.3	76	1.2	86	1.1	96												
340					2.8	23	2	42	1.7	56	1.4	68	1.3	79	1.2	89	1.1	99												
350					2.8	24	2	43	1.7	57	1.4	70	1.3	81	1.2	92														
360					2.7	26	2	45	1.7	59	1.4	72	1.3	84	1.2	94														
370					2.7	27	2	46	1.7	61	1.4	74	1.3	86	1.2	97														
380					2.7	28	2	48	1.7	63	1.4	76	1.3	89	1.2	100														
390					2.7	29	2	49	1.7	65	1.4	79	1.3	91																
400					2.7	30	2	50	1.7	67	1.4	81	1.3	93																
410					2.7	31	2	52	1.7	68	1.4	83	1.3	96																
420					2.7	33	2	54	1.7	70	1.4	85	1.3	99																
430					2.7	34	2	55	1.7	72	1.4	87																		
440					2.7	35	2	57	1.7	74	1.4	89																		
450					2.7	36	2	58	1.6	76	1.4	91																		
460					2.7	37	2	59	1.6	78	1.4	94																		
470					2.7	38	2	61	1.6	79	1.4	96																		
480					2.6	39	2	62	1.6	81	1.4	98																		
490					2.6	41	2	64	1.6	83	1.4	100																		
500					2.6	42	2	65	1.6	85																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																													0.6	11
30																									0.8	11	0.7	14	0.6	17
40																					1	11	0.8	13	0.8	16	0.6	19	0.6	23
50																			1.1	11	0.9	14	0.8	17	0.7	20	0.6	25	0.6	29
60																			1.1	13	0.9	18	0.8	21	0.7	24	0.6	30	0.6	35
70																	1.5	10	1.1	16	0.9	21	0.8	25	0.7	28	0.6	35	0.6	41
80															1.6	11	1.4	13	1.1	19	0.9	24	0.8	29	0.7	33	0.6	40	0.6	47
90													1.7	10	1.6	13	1.4	15	1.1	22	0.9	27	0.8	33	0.7	37	0.6	45	0.6	53
100													1.7	12	1.5	14	1.4	17	1.1	24	0.9	31	0.8	36	0.7	41	0.6	50	0.6	58
110											1.9	10	1.7	14	1.5	16	1.4	19	1.1	27	0.9	34	0.8	40	0.7	46	0.6	56	0.6	64
120											1.9	12	1.7	15	1.5	18	1.4	21	1	30	0.9	37	0.8	44	0.7	50	0.6	61	0.6	70
130											1.9	13	1.7	17	1.5	20	1.3	23	1	32	0.9	41	0.8	48	0.7	54	0.6	66	0.6	76
140									2.2	11	1.9	15	1.6	19	1.5	22	1.3	25	1	35	0.9	44	0.8	52	0.7	59	0.6	71	0.6	82
150									2.2	12	1.9	16	1.6	20	1.5	24	1.3	27	1	38	0.9	47	0.8	55	0.7	63	0.6	76	0.6	88
160									2.2	13	1.8	18	1.6	22	1.5	25	1.3	29	1	40	0.9	50	0.8	59	0.7	67	0.6	82	0.6	94
170									2.2	14	1.8	19	1.6	23	1.4	27	1.3	31	1	43	0.9	54	0.8	63	0.7	71	0.6	87	0.6	100
180									2.1	16	1.8	21	1.6	25	1.4	29	1.3	33	1	46	0.9	57	0.8	67	0.7	76	0.6	92		
190							2.7	10	2.1	17	1.8	22	1.6	27	1.4	31	1.3	35	1	48	0.9	60	0.8	71	0.7	80	0.6	97		
200							2.7	11	2.1	18	1.8	24	1.6	28	1.4	33	1.3	37	1	51	0.9	63	0.8	74	0.7	84				
210							2.7	12	2.1	19	1.8	25	1.6	30	1.4	35	1.3	39	1	54	0.9	67	0.8	78	0.7	89				
220							2.6	14	2.1	21	1.8	26	1.6	32	1.4	36	1.3	41	1	56	0.9	70	0.8	82	0.7	93				
230							2.6	14	2.1	22	1.8	28	1.6	33	1.4	38	1.3	43	1	59	0.9	73	0.8	86	0.7	97				
240							2.6	15	2.1	23	1.8	29	1.6	35	1.4	40	1.3	45	1	62	0.9	76	0.8	89						
250							2.6	16	2.1	24	1.8	31	1.6	36	1.4	42	1.3	47	1	64	0.9	80	0.8	93						
260							2.6	17	2.1	25	1.8	32	1.6	38	1.4	43	1.3	49	1	67	0.9	83	0.8	97						
270							2.6	18	2.1	26	1.8	33	1.6	40	1.4	45	1.3	51	1	70	0.9	86								
280							2.6	19	2.1	28	1.8	35	1.6	41	1.4	47	1.3	53	1	72	0.9	89								
290							2.5	20	2	29	1.8	36	1.6	43	1.4	49	1.3	55	1	75	0.9	93								
300					3.6	10	2.5	21	2	30	1.8	37	1.5	44	1.4	51	1.3	57	1	78	0.9	96								
310					3.6	11	2.5	22	2	31	1.8	39	1.5	46	1.4	52	1.3	59	1	80	0.9	99								
320					3.6	11	2.5	23	2	32	1.7	40	1.5	47	1.4	54	1.3	60	1	83										
330					3.6	12	2.5	24	2	33	1.7	42	1.5	49	1.4	56	1.3	62	1	86										
340					3.5	13	2.5	25	2	35	1.7	43	1.5	51	1.4	58	1.3	64	1	88										
350					3.5	13	2.5	26	2	36	1.7	44	1.5	52	1.4	60	1.3	66	1	91										
360					3.5	14	2.5	27	2	37	1.7	46	1.5	54	1.4	61	1.3	68	1	94										
370					3.5	15	2.5	28	2	38	1.7	47	1.5	55	1.4	63	1.3	70	1	96										
380					3.5	16	2.5	29	2	39	1.7	49	1.5	57	1.4	65	1.3	72	1	99										
390					3.5	16	2.5	30	2	40	1.7	50	1.5	59	1.4	67	1.3	74												
400					3.5	17	2.5	31	2	42	1.7	51	1.5	60	1.4	69	1.3	76												
410					3.4	18	2.5	31	2	43	1.7	53	1.5	62	1.4	70	1.3	78												
420					3.4	18	2.5	32	2	44	1.7	54	1.5	63	1.4	72	1.3	80												
430					3.4	19	2.5	33	2	45	1.7	55	1.5	65	1.4	74	1.3	82												
440					3.4	20	2.5	34	2	46	1.7	57	1.5	66	1.4	76	1.3	84												
450					3.4	20	2.5	35	2	47	1.7	58	1.5	68	1.4	77	1.3	86												
460					3.4	21	2.5	36	2	48	1.7	59	1.5	70	1.4	79	1.3	88												
470					3.4	22	2.5	37	2	50	1.7	61	1.5	71	1.4	81	1.3	90												
480					3.4	22	2.4	38	2	51	1.7	62	1.5	73	1.4	83	1.3	92												
490					3.4	23	2.4	39	2	52	1.7	64	1.5	74	1.4	85	1.3	94												
500					3.4	24	2.4	40	2	53	1.7	65	1.5	76	1.4	86	1.3	96												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																													0.6	10
30																									0.8	10	0.7	14	0.6	16
40																					1	10	0.9	13	0.8	15	0.6	19	0.6	22
50																					1	13	0.8	16	0.7	19	0.6	24	0.6	28
60																			1.1	12	0.9	17	0.8	20	0.7	24	0.6	29	0.6	34
70																			1.1	15	0.9	20	0.8	24	0.7	28	0.6	34	0.6	40
80																	1.5	11	1.1	18	0.9	23	0.8	28	0.7	32	0.6	40	0.6	46
90															1.6	10	1.5	13	1.1	21	0.9	27	0.8	32	0.7	37	0.6	45	0.6	52
100															1.6	13	1.4	15	1.1	23	0.9	30	0.8	36	0.7	41	0.6	50	0.6	58
110													1.7	11	1.6	15	1.4	17	1.1	26	0.9	33	0.8	40	0.7	45	0.6	55	0.6	64
120													1.7	13	1.5	17	1.4	19	1.1	29	0.9	37	0.8	43	0.7	50	0.6	60	0.6	70
130											2	11	1.7	15	1.5	18	1.4	21	1.1	32	0.9	40	0.8	47	0.7	54	0.6	66	0.6	76
140											1.9	12	1.7	17	1.5	20	1.4	24	1	34	0.9	43	0.8	51	0.7	58	0.6	71	0.6	82
150											1.9	14	1.7	18	1.5	22	1.4	26	1	37	0.9	46	0.8	55	0.7	62	0.6	76	0.6	88
160									2.3	10	1.9	16	1.7	20	1.5	24	1.3	28	1	40	0.9	50	0.8	59	0.7	67	0.6	81	0.6	94
170									2.3	11	1.9	17	1.6	22	1.5	26	1.3	30	1	42	0.9	53	0.8	62	0.7	71	0.6	86	0.6	100
180									2.2	13	1.9	19	1.6	24	1.5	28	1.3	32	1	45	0.9	56	0.8	66	0.7	75	0.6	91		
190									2.2	14	1.8	20	1.6	25	1.5	30	1.3	34	1	48	0.9	59	0.8	70	0.7	80	0.6	97		
200									2.2	15	1.8	22	1.6	27	1.4	31	1.3	36	1	50	0.9	63	0.8	74	0.7	84				
210									2.2	17	1.8	23	1.6	29	1.4	33	1.3	38	1	53	0.9	66	0.8	78	0.7	88				
220									2.1	18	1.8	25	1.6	30	1.4	35	1.3	40	1	56	0.9	69	0.8	81	0.7	92				
230							2.8	10	2.1	19	1.8	26	1.6	32	1.4	37	1.3	42	1	58	0.9	73	0.8	85	0.7	97				
240							2.7	12	2.1	21	1.8	27	1.6	33	1.4	39	1.3	44	1	61	0.9	76	0.8	89						
250							2.7	13	2.1	22	1.8	29	1.6	35	1.4	41	1.3	46	1	64	0.9	79	0.8	93						
260							2.7	14	2.1	23	1.8	30	1.6	37	1.4	42	1.3	48	1	66	0.9	82	0.8	97						
270							2.7	15	2.1	24	1.8	32	1.6	38	1.4	44	1.3	50	1	69	0.9	85	0.8	100						
280							2.6	16	2.1	25	1.8	33	1.6	40	1.4	46	1.3	52	1	72	0.9	89								
290							2.6	17	2.1	27	1.8	35	1.6	41	1.4	48	1.3	54	1	74	0.9	92								
300							2.6	18	2.1	28	1.8	36	1.6	43	1.4	50	1.3	56	1	77	0.9	95								
310							2.6	19	2.1	29	1.8	37	1.6	45	1.4	51	1.3	58	1	80	0.9	99								
320							2.6	20	2.1	30	1.8	39	1.6	46	1.4	53	1.3	60	1	82										
330							2.6	21	2.1	32	1.8	40	1.6	48	1.4	55	1.3	62	1	85										
340							2.6	22	2	33	1.8	42	1.6	50	1.4	57	1.3	64	1	88										
350							2.6	23	2	34	1.8	43	1.5	51	1.4	59	1.3	66	1	90										
360							2.5	24	2	35	1.8	44	1.5	53	1.4	60	1.3	68	1	93										
370							2.5	25	2	36	1.7	46	1.5	54	1.4	62	1.3	70	1	96										
380					3.6	10	2.5	26	2	37	1.7	47	1.5	56	1.4	64	1.3	71	1	98										
390					3.6	11	2.5	27	2	39	1.7	49	1.5	57	1.4	66	1.3	73												
400					3.6	12	2.5	28	2	40	1.7	50	1.5	59	1.4	68	1.3	76												
410					3.6	12	2.5	29	2	41	1.7	51	1.5	61	1.4	69	1.3	77												
420					3.6	13	2.5	30	2	42	1.7	53	1.5	62	1.4	71	1.3	79												
430					3.5	14	2.5	31	2	43	1.7	54	1.5	64	1.4	73	1.3	81												
440					3.5	15	2.5	32	2	45	1.7	56	1.5	65	1.4	75	1.3	83												
450					3.5	16	2.5	33	2	46	1.7	57	1.5	67	1.4	76	1.3	85												
460					3.5	16	2.5	34	2	47	1.7	58	1.5	69	1.4	78	1.3	87												
470					3.5	17	2.5	35	2	48	1.7	60	1.5	70	1.4	80	1.3	89												
480					3.5	18	2.5	36	2	49	1.7	61	1.5	72	1.4	82	1.3	91												
490					3.5	19	2.5	37	2	50	1.7	62	1.5	73	1.4	84	1.3	93												
500					3.5	19	2.5	38	2	51	1.7	64	1.5	75	1.4	85	1.3	95												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.7	13	0.6	16
40																							0.9	12	0.8	14	0.7	18	0.6	22
50																					1	12	0.8	16	0.8	19	0.6	24	0.6	28
60																			1.2	11	1	16	0.8	20	0.7	23	0.6	29	0.6	34
70																			1.1	14	0.9	19	0.8	23	0.7	27	0.6	34	0.6	40
80																			1.1	17	0.9	23	0.8	27	0.7	32	0.6	39	0.6	46
90																	1.5	11	1.1	20	0.9	26	0.8	31	0.7	36	0.6	44	0.6	52
100															1.6	10	1.5	13	1.1	22	0.9	29	0.8	35	0.7	40	0.6	50	0.6	58
110															1.6	12	1.5	16	1.1	25	0.9	33	0.8	39	0.7	45	0.6	55	0.6	64
120													1.8	11	1.6	15	1.4	18	1.1	28	0.9	36	0.8	43	0.7	49	0.6	60	0.6	70
130													1.8	13	1.6	17	1.4	20	1.1	31	0.9	39	0.8	47	0.7	53	0.6	65	0.6	76
140													1.7	14	1.5	19	1.4	22	1.1	33	0.9	42	0.8	50	0.7	58	0.6	70	0.6	82
150											2	11	1.7	16	1.5	21	1.4	24	1.1	36	0.9	46	0.8	54	0.7	62	0.6	76	0.6	88
160											2	13	1.7	18	1.5	23	1.4	26	1	39	0.9	49	0.8	58	0.7	66	0.6	81	0.6	94
170											1.9	14	1.7	20	1.5	24	1.4	28	1	41	0.9	52	0.8	62	0.7	70	0.6	86	0.6	100
180											1.9	16	1.7	22	1.5	26	1.3	30	1	44	0.9	56	0.8	66	0.7	75	0.6	91		
190									2.3	10	1.9	18	1.7	23	1.5	28	1.3	32	1	47	0.9	59	0.8	69	0.7	79	0.6	96		
200									2.3	12	1.9	19	1.6	25	1.5	30	1.3	35	1	50	0.9	62	0.8	73	0.7	83				
210									2.2	13	1.9	21	1.6	27	1.5	32	1.3	37	1	52	0.9	65	0.8	77	0.7	88				
220									2.2	15	1.9	22	1.6	28	1.5	34	1.3	39	1	55	0.9	69	0.8	81	0.7	92				
230									2.2	16	1.8	24	1.6	30	1.4	36	1.3	41	1	58	0.9	72	0.8	85	0.7	96				
240									2.2	18	1.8	26	1.6	32	1.4	37	1.3	43	1	60	0.9	75	0.8	88	0.7	100				
250									2.2	19	1.8	27	1.6	34	1.4	39	1.3	45	1	63	0.9	78	0.8	92						
260									2.2	20	1.8	28	1.6	35	1.4	41	1.3	47	1	66	0.9	82	0.8	96						
270							2.8	10	2.1	22	1.8	30	1.6	37	1.4	43	1.3	49	1	68	0.9	85	0.8	100						
280							2.8	11	2.1	23	1.8	31	1.6	38	1.4	45	1.3	51	1	71	0.9	88								
290							2.7	13	2.1	24	1.8	33	1.6	40	1.4	47	1.3	53	1	74	0.9	92								
300							2.7	14	2.1	26	1.8	34	1.6	42	1.4	48	1.3	55	1	76	0.9	95								
310							2.7	15	2.1	27	1.8	36	1.6	43	1.4	50	1.3	57	1	79	0.9	98								
320							2.7	16	2.1	28	1.8	37	1.6	45	1.4	52	1.3	59	1	82										
330							2.6	17	2.1	29	1.8	39	1.6	47	1.4	54	1.3	61	1	84										
340							2.6	19	2.1	31	1.8	40	1.6	48	1.4	56	1.3	63	1	87										
350							2.6	20	2.1	32	1.8	41	1.6	50	1.4	57	1.3	65	1	90										
360							2.6	21	2.1	33	1.8	43	1.6	52	1.4	59	1.3	67	1	92										
370							2.6	22	2.1	34	1.8	44	1.6	53	1.4	61	1.3	69	1	95										
380							2.6	23	2.1	35	1.8	46	1.6	55	1.4	63	1.3	71	1	98										
390							2.6	24	2	37	1.8	47	1.6	56	1.4	65	1.3	73	1	100										
400							2.6	25	2	38	1.8	49	1.5	58	1.4	67	1.3	74												
410							2.6	26	2	39	1.8	50	1.5	60	1.4	68	1.3	77												
420							2.5	27	2	40	1.7	51	1.5	61	1.4	70	1.3	79												
430							2.5	28	2	41	1.7	53	1.5	63	1.4	72	1.3	80												
440							2.5	29	2	43	1.7	54	1.5	64	1.4	74	1.3	83												
450							2.5	30	2	44	1.7	56	1.5	66	1.4	76	1.3	84												
460					3.7	10	2.5	31	2	45	1.7	57	1.5	68	1.4	77	1.3	86												
470					3.7	11	2.5	32	2	46	1.7	58	1.5	69	1.4	79	1.3	88												
480					3.6	12	2.5	33	2	47	1.7	60	1.5	71	1.4	81	1.3	90												
490					3.6	13	2.5	34	2	49	1.7	61	1.5	72	1.4	83	1.3	92												
500					3.6	14	2.5	35	2	50	1.7	62	1.5	74	1.4	85	1.3	94												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																													0.7	10
40																											0.8	11	0.7	13
50																									0.9	11	0.8	14	0.7	17
60																							1	11	0.9	14	0.7	17	0.7	21
70																					1.2	11	1	14	0.9	16	0.7	21	0.7	25
80																					1.1	13	1	16	0.9	19	0.7	24	0.7	28
90																			1.4	11	1.1	15	1	18	0.9	21	0.7	27	0.6	32
100																			1.4	12	1.1	17	1	21	0.9	24	0.7	30	0.6	36
110																			1.4	14	1.1	19	1	23	0.9	27	0.7	33	0.6	39
120																			1.3	16	1.1	21	1	25	0.9	29	0.7	37	0.6	43
130																	1.8	10	1.3	17	1.1	23	0.9	28	0.9	32	0.7	40	0.6	47
140																	1.8	11	1.3	19	1.1	25	0.9	30	0.8	35	0.7	43	0.6	51
150															2	10	1.8	13	1.3	20	1.1	27	0.9	32	0.8	37	0.7	46	0.6	54
160															2	11	1.8	14	1.3	22	1.1	29	0.9	34	0.8	40	0.7	49	0.6	58
170															1.9	12	1.7	15	1.3	23	1.1	30	0.9	37	0.8	42	0.7	53	0.6	62
180													2.2	10	1.9	13	1.7	16	1.3	25	1.1	32	0.9	39	0.8	45	0.7	56	0.6	65
190													2.2	11	1.9	15	1.7	17	1.3	27	1.1	34	0.9	41	0.8	48	0.7	59	0.6	69
200													2.2	12	1.9	16	1.7	18	1.3	28	1.1	36	0.9	43	0.8	50	0.7	62	0.6	73
210													2.1	13	1.9	17	1.7	20	1.3	30	1.1	38	0.9	46	0.8	53	0.7	65	0.6	76
220											2.5	10	2.1	14	1.9	18	1.7	21	1.3	31	1.1	40	0.9	48	0.8	55	0.7	68	0.6	80
230											2.5	11	2.1	15	1.9	19	1.7	22	1.3	33	1.1	42	0.9	50	0.8	58	0.7	72	0.6	84
240											2.5	12	2.1	16	1.9	20	1.7	23	1.3	34	1.1	44	0.9	52	0.8	60	0.7	75	0.6	87
250											2.4	13	2.1	17	1.9	21	1.7	24	1.3	36	1.1	46	0.9	55	0.8	63	0.7	78	0.6	91
260											2.4	14	2.1	18	1.8	22	1.7	25	1.3	37	1.1	48	0.9	57	0.8	66	0.7	81	0.6	95
270											2.4	14	2.1	19	1.8	23	1.7	26	1.3	39	1.1	50	0.9	59	0.8	68	0.7	84	0.6	99
280									2.9	10	2.4	15	2.1	20	1.8	24	1.7	28	1.3	40	1.1	52	0.9	62	0.8	71	0.7	87		
290									2.9	11	2.4	16	2.1	21	1.8	25	1.7	29	1.3	42	1.1	54	0.9	64	0.8	73	0.7	91		
300									2.9	11	2.4	17	2.1	22	1.8	26	1.7	30	1.3	44	1.1	55	0.9	66	0.8	76	0.7	94		
310									2.9	12	2.4	18	2.1	23	1.8	27	1.7	31	1.3	45	1.1	57	0.9	68	0.8	79	0.7	97		
320									2.9	13	2.4	18	2	23	1.8	28	1.7	32	1.3	47	1.1	59	0.9	71	0.8	81	0.7	100		
330									2.9	13	2.4	19	2	24	1.8	29	1.7	33	1.3	48	1.1	61	0.9	73	0.8	84				
340									2.9	14	2.4	20	2	25	1.8	30	1.7	34	1.3	50	1.1	63	0.9	75	0.8	86				
350									2.8	15	2.4	21	2	26	1.8	31	1.7	35	1.3	51	1	65	0.9	77	0.8	89				
360									2.8	15	2.3	22	2	27	1.8	32	1.6	37	1.3	53	1	67	0.9	80	0.8	92				
370									2.8	16	2.3	22	2	28	1.8	33	1.6	38	1.3	54	1	69	0.9	82	0.8	94				
380									2.8	17	2.3	23	2	29	1.8	34	1.6	39	1.3	56	1	71	0.9	84	0.8	97				
390									2.8	17	2.3	24	2	30	1.8	35	1.6	40	1.3	57	1	73	0.9	87	0.8	99				
400							3.6	10	2.8	18	2.3	25	2	31	1.8	36	1.6	41	1.3	59	1	75	0.9	89						
410							3.6	10	2.8	19	2.3	25	2	31	1.8	37	1.6	42	1.3	61	1	77	0.9	91						
420							3.6	11	2.8	19	2.3	26	2	32	1.8	38	1.6	43	1.2	62	1	78	0.9	93						
430							3.6	11	2.8	20	2.3	27	2	33	1.8	39	1.6	44	1.2	64	1	80	0.9	96						
440							3.6	12	2.8	21	2.3	28	2	34	1.8	40	1.6	45	1.2	65	1	82	0.9	98						
450							3.6	12	2.8	21	2.3	28	2	35	1.8	41	1.6	47	1.2	67	1	84	0.9	100						
460							3.6	13	2.8	22	2.3	29	2	36	1.8	42	1.6	48	1.2	68	1	86								
470							3.6	13	2.8	22	2.3	30	2	37	1.8	43	1.6	49	1.2	70	1	88								
480							3.5	14	2.8	23	2.3	31	2	38	1.8	44	1.6	50	1.2	71	1	90								
490							3.5	14	2.8	24	2.3	31	2	38	1.8	45	1.6	51	1.2	73	1	92								
500							3.5	15	2.7	24	2.3	32	2	39	1.8	46	1.6	52	1.2	74	1	94								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																											0.8	10	0.7	13
50																									0.9	10	0.8	14	0.7	17
60																							1	10	0.9	13	0.8	17	0.7	20
70																							1	13	0.9	15	0.7	20	0.7	24
80																					1.2	12	1	15	0.9	18	0.7	23	0.7	28
90																					1.2	14	1	17	0.9	21	0.7	26	0.7	31
100																			1.4	11	1.1	16	1	20	0.9	23	0.7	30	0.6	35
110																			1.4	12	1.1	18	1	22	0.9	26	0.7	33	0.6	39
120																			1.4	14	1.1	20	1	24	0.9	29	0.7	36	0.6	43
130																			1.4	16	1.1	22	1	27	0.9	31	0.7	39	0.6	46
140																			1.4	17	1.1	24	1	29	0.9	34	0.7	42	0.6	50
150																	1.8	10	1.3	19	1.1	26	0.9	31	0.8	36	0.7	46	0.6	54
160																	1.8	11	1.3	21	1.1	28	0.9	34	0.8	39	0.7	49	0.6	57
170															2	10	1.8	13	1.3	22	1.1	30	0.9	36	0.8	42	0.7	52	0.6	61
180															2	11	1.8	14	1.3	24	1.1	32	0.9	38	0.8	44	0.7	55	0.6	65
190															2	12	1.8	15	1.3	25	1.1	33	0.9	40	0.8	47	0.7	58	0.6	69
200															2	13	1.7	17	1.3	27	1.1	35	0.9	43	0.8	50	0.7	62	0.6	72
210													2.2	10	1.9	14	1.7	18	1.3	29	1.1	37	0.9	45	0.8	52	0.7	65	0.6	76
220													2.2	11	1.9	15	1.7	19	1.3	30	1.1	39	0.9	47	0.8	55	0.7	68	0.6	80
230													2.2	12	1.9	17	1.7	20	1.3	32	1.1	41	0.9	50	0.8	57	0.7	71	0.6	83
240													2.2	13	1.9	18	1.7	21	1.3	33	1.1	43	0.9	52	0.8	60	0.7	74	0.6	87
250													2.1	14	1.9	19	1.7	22	1.3	35	1.1	45	0.9	54	0.8	62	0.7	77	0.6	91
260											2.5	10	2.1	15	1.9	20	1.7	24	1.3	36	1.1	47	0.9	56	0.8	65	0.7	81	0.6	95
270											2.5	11	2.1	16	1.9	21	1.7	25	1.3	38	1.1	49	0.9	59	0.8	68	0.7	84	0.6	98
280											2.5	12	2.1	17	1.9	22	1.7	26	1.3	39	1.1	51	0.9	61	0.8	70	0.7	87		
290											2.5	13	2.1	18	1.9	23	1.7	27	1.3	41	1.1	53	0.9	63	0.8	73	0.7	90		
300											2.5	14	2.1	19	1.9	24	1.7	28	1.3	43	1.1	55	0.9	65	0.8	75	0.7	93		
310											2.4	15	2.1	20	1.8	25	1.7	29	1.3	44	1.1	57	0.9	68	0.8	78	0.7	96		
320											2.4	15	2.1	21	1.8	26	1.7	31	1.3	46	1.1	59	0.9	70	0.8	81	0.7	100		
330											2.4	16	2.1	22	1.8	27	1.7	32	1.3	47	1.1	60	0.9	72	0.8	83				
340									3	10	2.4	17	2.1	23	1.8	28	1.7	33	1.3	49	1.1	62	0.9	75	0.8	86				
350									2.9	10	2.4	18	2.1	24	1.8	29	1.7	34	1.3	50	1.1	64	0.9	77	0.8	88				
360									2.9	11	2.4	19	2.1	25	1.8	30	1.7	35	1.3	52	1.1	66	0.9	79	0.8	91				
370									2.9	12	2.4	20	2	26	1.8	31	1.7	36	1.3	53	1.1	68	0.9	81	0.8	94				
380									2.9	13	2.4	20	2	27	1.8	32	1.7	37	1.3	55	1.1	70	0.9	84	0.8	96				
390									2.9	13	2.4	21	2	28	1.8	33	1.7	39	1.3	57	1	72	0.9	86	0.8	99				
400									2.9	14	2.4	22	2	29	1.8	34	1.6	40	1.3	58	1	74	0.9	88						
410									2.9	15	2.4	23	2	30	1.8	35	1.6	41	1.3	60	1	76	0.9	91						
420									2.8	16	2.3	24	2	30	1.8	36	1.6	42	1.3	61	1	78	0.9	93						
430									2.8	16	2.3	25	2	31	1.8	37	1.6	43	1.3	63	1	80	0.9	95						
440									2.8	17	2.3	25	2	32	1.8	39	1.6	44	1.3	64	1	82	0.9	97						
450									2.8	18	2.3	26	2	33	1.8	39	1.6	45	1.3	66	1	84	0.9	100						
460									2.8	18	2.3	27	2	34	1.8	41	1.6	46	1.3	67	1	85								
470									2.8	19	2.3	28	2	35	1.8	42	1.6	48	1.3	69	1	87								
480									2.8	20	2.3	28	2	36	1.8	42	1.6	49	1.2	70	1	89								
490									2.8	20	2.3	29	2	37	1.8	44	1.6	50	1.2	72	1	91								
500									2.8	21	2.3	30	2	38	1.8	44	1.6	51	1.2	74	1	93								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																													0.7	12
50																											0.8	13	0.7	16
60																									0.9	12	0.8	16	0.7	20
70																							1	11	0.9	14	0.8	19	0.7	23
80																					1.2	10	1	14	0.9	17	0.7	23	0.7	27
90																					1.2	12	1	16	0.9	20	0.7	26	0.7	31
100																					1.2	14	1	19	0.9	23	0.7	29	0.7	35
110																			1.4	10	1.2	16	1	21	0.9	25	0.7	32	0.6	38
120																			1.4	12	1.1	19	1	24	0.9	28	0.7	35	0.6	42
130																			1.4	14	1.1	21	1	26	0.9	31	0.7	39	0.6	46
140																			1.4	16	1.1	23	1	28	0.9	33	0.7	42	0.6	50
150																			1.4	17	1.1	25	1	31	0.9	36	0.7	45	0.6	53
160																			1.4	19	1.1	27	0.9	33	0.9	38	0.7	48	0.6	57
170																	1.9	10	1.3	21	1.1	29	0.9	35	0.8	41	0.7	52	0.6	61
180																	1.8	11	1.3	22	1.1	31	0.9	37	0.8	44	0.7	55	0.6	64
190																	1.8	13	1.3	24	1.1	33	0.9	40	0.8	46	0.7	58	0.6	68
200															2	10	1.8	14	1.3	26	1.1	34	0.9	42	0.8	49	0.7	61	0.6	72
210															2	11	1.8	15	1.3	27	1.1	36	0.9	44	0.8	51	0.7	64	0.6	76
220															2	13	1.8	17	1.3	29	1.1	38	0.9	47	0.8	54	0.7	67	0.6	79
230															2	14	1.8	18	1.3	31	1.1	40	0.9	49	0.8	57	0.7	71	0.6	83
240													2.3	10	2	15	1.7	19	1.3	32	1.1	42	0.9	51	0.8	59	0.7	74	0.6	87
250													2.2	11	1.9	16	1.7	20	1.3	34	1.1	44	0.9	53	0.8	62	0.7	77	0.6	90
260													2.2	12	1.9	17	1.7	22	1.3	35	1.1	46	0.9	56	0.8	65	0.7	80	0.6	94
270													2.2	13	1.9	19	1.7	23	1.3	37	1.1	48	0.9	58	0.8	67	0.7	83	0.6	98
280													2.2	14	1.9	20	1.7	24	1.3	38	1.1	50	0.9	60	0.8	70	0.7	86		
290													2.2	15	1.9	21	1.7	25	1.3	40	1.1	52	0.9	63	0.8	72	0.7	90		
300													2.1	16	1.9	22	1.7	27	1.3	42	1.1	54	0.9	65	0.8	75	0.7	93		
310											2.5	11	2.1	18	1.9	23	1.7	28	1.3	43	1.1	56	0.9	67	0.8	78	0.7	96		
320											2.5	11	2.1	19	1.9	24	1.7	29	1.3	45	1.1	58	0.9	69	0.8	80	0.7	99		
330											2.5	13	2.1	20	1.9	25	1.7	30	1.3	46	1.1	60	0.9	72	0.8	83				
340											2.5	13	2.1	21	1.9	26	1.7	31	1.3	48	1.1	62	0.9	74	0.8	85				
350											2.5	14	2.1	22	1.9	27	1.7	32	1.3	49	1.1	64	0.9	76	0.8	88				
360											2.5	15	2.1	23	1.8	28	1.7	34	1.3	51	1.1	66	0.9	79	0.8	90				
370											2.4	16	2.1	23	1.8	29	1.7	35	1.3	53	1.1	67	0.9	81	0.8	93				
380											2.4	17	2.1	24	1.8	31	1.7	36	1.3	54	1.1	69	0.9	83	0.8	96				
390											2.4	18	2.1	25	1.8	32	1.7	37	1.3	56	1.1	71	0.9	85	0.8	98				
400											2.4	19	2.1	26	1.8	33	1.7	38	1.3	57	1.1	73	0.9	88						
410									3	10	2.4	20	2.1	27	1.8	34	1.7	39	1.3	59	1.1	75	0.9	90						
420									3	11	2.4	21	2.1	28	1.8	35	1.7	41	1.3	60	1	77	0.9	92						
430									2.9	12	2.4	22	2	29	1.8	36	1.7	42	1.3	62	1	79	0.9	94						
440									2.9	12	2.4	22	2	30	1.8	37	1.7	43	1.3	63	1	81	0.9	97						
450									2.9	13	2.4	23	2	31	1.8	38	1.6	44	1.3	65	1	83	0.9	99						
460									2.9	14	2.4	24	2	32	1.8	39	1.6	45	1.3	67	1	85								
470									2.9	15	2.4	25	2	33	1.8	40	1.6	46	1.3	68	1	87								
480									2.9	16	2.3	26	2	34	1.8	41	1.6	47	1.3	70	1	89								
490									2.9	16	2.3	27	2	35	1.8	42	1.6	48	1.3	71	1	91								
500									2.9	17	2.3	28	2	36	1.8	43	1.6	50	1.3	73	1	92								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.8	12
60																											0.9	12	0.7	14
70																									1	10	0.9	14	0.7	17
80																							1.2	10	1	12	0.8	16	0.7	20
90																							1.2	12	1	14	0.8	18	0.7	22
100																					1.3	10	1.1	13	1	16	0.8	21	0.7	25
110																					1.3	12	1.1	15	1	18	0.8	23	0.7	28
120																					1.3	13	1.1	17	1	20	0.8	25	0.7	30
130																			1.6	10	1.3	14	1.1	18	1	22	0.8	28	0.7	33
140																			1.6	11	1.3	16	1.1	20	1	23	0.8	30	0.7	36
150																			1.6	12	1.3	17	1.1	21	1	25	0.8	32	0.7	38
160																			1.6	13	1.3	18	1.1	23	1	27	0.8	34	0.7	41
170																			1.6	14	1.3	20	1.1	25	1	29	0.8	37	0.7	44
180																			1.6	15	1.3	21	1.1	26	1	31	0.8	39	0.7	46
190																			1.6	16	1.3	22	1.1	28	1	32	0.8	41	0.7	49
200																	2.2	10	1.5	17	1.3	24	1.1	29	1	34	0.8	43	0.7	51
210																	2.1	10	1.5	19	1.3	25	1.1	31	1	36	0.8	46	0.7	54
220																	2.1	11	1.5	20	1.3	26	1.1	32	1	38	0.8	48	0.7	57
230																	2.1	12	1.5	21	1.3	28	1.1	34	1	40	0.8	50	0.7	59
240															2.4	10	2.1	13	1.5	22	1.3	29	1.1	36	1	42	0.8	52	0.7	62
250															2.3	11	2.1	14	1.5	23	1.2	30	1.1	37	1	43	0.8	55	0.7	65
260															2.3	11	2.1	14	1.5	24	1.2	32	1.1	39	1	45	0.8	57	0.7	67
270															2.3	12	2.1	15	1.5	25	1.2	33	1.1	40	1	47	0.8	59	0.7	70
280															2.3	13	2.1	16	1.5	26	1.2	34	1.1	42	1	49	0.8	61	0.7	73
290													2.6	10	2.3	14	2.1	17	1.5	27	1.2	36	1.1	43	1	51	0.8	64	0.7	75
300													2.6	11	2.3	14	2.1	17	1.5	28	1.2	37	1.1	45	1	52	0.8	66	0.7	78
310													2.6	11	2.3	15	2	18	1.5	29	1.2	38	1.1	47	1	54	0.8	68	0.7	80
320													2.6	12	2.3	16	2	19	1.5	30	1.2	40	1.1	48	0.9	56	0.8	70	0.7	83
330													2.6	13	2.3	16	2	20	1.5	31	1.2	41	1.1	50	0.9	58	0.8	73	0.7	86
340													2.6	13	2.3	17	2	21	1.5	32	1.2	42	1.1	51	0.9	60	0.8	75	0.7	88
350													2.6	14	2.3	18	2	21	1.5	33	1.2	44	1.1	53	0.9	61	0.8	77	0.7	91
360											3	10	2.6	14	2.3	18	2	22	1.5	34	1.2	45	1.1	55	0.9	63	0.8	79	0.7	94
370											3	10	2.6	15	2.3	19	2	23	1.5	35	1.2	46	1.1	56	0.9	65	0.8	82	0.7	96
380											3	11	2.6	16	2.2	20	2	24	1.5	36	1.2	48	1.1	58	0.9	67	0.8	84	0.7	99
390											3	11	2.6	16	2.2	20	2	24	1.5	38	1.2	49	1.1	59	0.9	69	0.8	86		
400											3	12	2.6	17	2.2	21	2	25	1.5	39	1.2	50	1.1	61	0.9	71	0.8	88		
410											3	13	2.5	17	2.2	22	2	26	1.5	40	1.2	52	1.1	62	0.9	72	0.8	91		
420											3	13	2.5	18	2.2	23	2	27	1.5	41	1.2	53	1.1	64	0.9	74	0.8	93		
430											3	14	2.5	19	2.2	23	2	27	1.5	42	1.2	54	1.1	66	0.9	76	0.8	95		
440											3	14	2.5	19	2.2	24	2	28	1.5	43	1.2	56	1.1	67	0.9	78	0.8	97		
450											3	15	2.5	20	2.2	25	2	29	1.5	44	1.2	57	1.1	69	0.9	80	0.8	99		
460											3	15	2.5	20	2.2	25	2	30	1.5	45	1.2	58	1.1	70	0.9	81				
470											3	16	2.5	21	2.2	26	2	30	1.5	46	1.2	59	1.1	72	0.9	83				
480									3.6	10	2.9	16	2.5	22	2.2	27	2	31	1.5	47	1.2	61	1.1	73	0.9	85				
490									3.6	10	2.9	17	2.5	22	2.2	27	2	32	1.5	48	1.2	62	1.1	75	0.9	87				
500									3.6	11	2.9	17	2.5	23	2.2	28	2	33	1.5	49	1.2	63	1.1	76	0.9	89				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.8	11
60																											0.9	11	0.8	14
70																											0.9	13	0.7	16
80																									1.1	11	0.9	15	0.7	19
90																							1.2	10	1	13	0.8	18	0.7	22
100																							1.2	12	1	15	0.8	20	0.7	24
110																					1.4	10	1.2	14	1	17	0.8	22	0.7	27
120																					1.3	11	1.1	15	1	19	0.8	25	0.7	30
130																					1.3	13	1.1	17	1	21	0.8	27	0.7	32
140																					1.3	14	1.1	19	1	22	0.8	29	0.7	35
150																			1.6	10	1.3	16	1.1	20	1	24	0.8	31	0.7	38
160																			1.6	11	1.3	17	1.1	22	1	26	0.8	34	0.7	40
170																			1.6	12	1.3	18	1.1	24	1	28	0.8	36	0.7	43
180																			1.6	14	1.3	20	1.1	25	1	30	0.8	38	0.7	46
190																			1.6	15	1.3	21	1.1	27	1	32	0.8	40	0.7	48
200																			1.6	16	1.3	23	1.1	28	1	34	0.8	43	0.7	51
210																			1.6	17	1.3	24	1.1	30	1	35	0.8	45	0.7	54
220																			1.6	18	1.3	25	1.1	32	1	37	0.8	47	0.7	56
230																			1.6	19	1.3	27	1.1	33	1	39	0.8	50	0.7	59
240																	2.2	10	1.5	20	1.3	28	1.1	35	1	41	0.8	52	0.7	62
250																	2.2	11	1.5	21	1.3	29	1.1	36	1	43	0.8	54	0.7	64
260																	2.1	12	1.5	22	1.3	31	1.1	38	1	45	0.8	56	0.7	67
270																	2.1	12	1.5	24	1.3	32	1.1	40	1	46	0.8	59	0.7	70
280																	2.1	13	1.5	25	1.2	33	1.1	41	1	48	0.8	61	0.7	72
290															2.4	10	2.1	14	1.5	26	1.2	35	1.1	43	1	50	0.8	63	0.7	75
300															2.4	11	2.1	15	1.5	27	1.2	36	1.1	44	1	52	0.8	65	0.7	77
310															2.4	12	2.1	16	1.5	28	1.2	37	1.1	46	1	54	0.8	68	0.7	80
320															2.3	13	2.1	17	1.5	29	1.2	39	1.1	48	1	55	0.8	70	0.7	83
330															2.3	13	2.1	18	1.5	30	1.2	40	1.1	49	1	57	0.8	72	0.7	85
340															2.3	14	2.1	18	1.5	31	1.2	41	1.1	51	1	59	0.8	74	0.7	88
350													2.7	10	2.3	15	2.1	19	1.5	32	1.2	43	1.1	52	1	61	0.8	77	0.7	91
360													2.7	11	2.3	16	2.1	20	1.5	33	1.2	44	1.1	54	0.9	63	0.8	79	0.7	93
370													2.6	12	2.3	16	2	21	1.5	34	1.2	45	1.1	55	0.9	64	0.8	81	0.7	96
380													2.6	12	2.3	17	2	22	1.5	35	1.2	47	1.1	57	0.9	66	0.8	83	0.7	99
390													2.6	13	2.3	18	2	22	1.5	36	1.2	48	1.1	59	0.9	68	0.8	86		
400													2.6	14	2.3	19	2	23	1.5	37	1.2	49	1.1	60	0.9	70	0.8	88		
410													2.6	14	2.3	19	2	24	1.5	38	1.2	51	1.1	62	0.9	72	0.8	90		
420													2.6	15	2.3	20	2	25	1.5	40	1.2	52	1.1	63	0.9	74	0.8	92		
430													2.6	16	2.3	21	2	25	1.5	41	1.2	53	1.1	65	0.9	75	0.8	95		
440											3.1	10	2.6	16	2.2	22	2	26	1.5	42	1.2	55	1.1	66	0.9	77	0.8	97		
450											3.1	10	2.6	17	2.2	22	2	27	1.5	43	1.2	56	1.1	68	0.9	79	0.8	99		
460											3	11	2.6	17	2.2	23	2	28	1.5	44	1.2	57	1.1	70	0.9	81				
470											3	11	2.6	18	2.2	24	2	28	1.5	45	1.2	59	1.1	71	0.9	83				
480											3	12	2.5	19	2.2	24	2	29	1.5	46	1.2	60	1.1	73	0.9	84				
490											3	13	2.5	19	2.2	25	2	30	1.5	47	1.2	61	1.1	74	0.9	86				
500											3	13	2.5	20	2.2	26	2	31	1.5	48	1.2	63	1.1	76	0.9	88				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.8	10
60																											0.9	10	0.8	13
70																											0.9	12	0.8	16
80																									1.1	10	0.9	15	0.7	18
90																									1.1	12	0.9	17	0.7	21
100																							1.2	10	1.1	14	0.8	19	0.7	24
110																							1.2	12	1	16	0.8	22	0.7	26
120																							1.2	14	1	18	0.8	24	0.7	29
130																					1.4	11	1.2	16	1	20	0.8	26	0.7	32
140																					1.4	13	1.1	17	1	22	0.8	29	0.7	34
150																					1.3	14	1.1	19	1	23	0.8	31	0.7	37
160																					1.3	16	1.1	21	1	25	0.8	33	0.7	40
170																			1.7	10	1.3	17	1.1	22	1	27	0.8	35	0.7	42
180																			1.7	11	1.3	19	1.1	24	1	29	0.8	38	0.7	45
190																			1.6	12	1.3	20	1.1	26	1	31	0.8	40	0.7	48
200																			1.6	14	1.3	21	1.1	27	1	33	0.8	42	0.7	51
210																			1.6	15	1.3	23	1.1	29	1	35	0.8	44	0.7	53
220																			1.6	16	1.3	24	1.1	31	1	36	0.8	47	0.7	56
230																			1.6	17	1.3	25	1.1	32	1	38	0.8	49	0.7	58
240																			1.6	18	1.3	27	1.1	34	1	40	0.8	51	0.7	61
250																			1.6	20	1.3	28	1.1	36	1	42	0.8	54	0.7	64
260																			1.6	21	1.3	30	1.1	37	1	44	0.8	56	0.7	66
270																			1.6	22	1.3	31	1.1	39	1	46	0.8	58	0.7	69
280																	2.2	10	1.5	23	1.3	32	1.1	40	1	47	0.8	60	0.7	72
290																	2.2	11	1.5	24	1.3	34	1.1	42	1	49	0.8	63	0.7	74
300																	2.2	12	1.5	25	1.3	35	1.1	43	1	51	0.8	65	0.7	77
310																	2.1	13	1.5	26	1.3	36	1.1	45	1	53	0.8	67	0.7	80
320																	2.1	14	1.5	27	1.2	38	1.1	47	1	55	0.8	69	0.7	82
330															2.4	10	2.1	15	1.5	29	1.2	39	1.1	48	1	57	0.8	72	0.7	85
340															2.4	10	2.1	15	1.5	30	1.2	41	1.1	50	1	58	0.8	74	0.7	88
350															2.4	11	2.1	16	1.5	31	1.2	42	1.1	51	1	60	0.8	76	0.7	90
360															2.4	12	2.1	17	1.5	32	1.2	43	1.1	53	1	62	0.8	78	0.7	93
370															2.4	13	2.1	18	1.5	33	1.2	44	1.1	55	1	64	0.8	81	0.7	96
380															2.3	14	2.1	19	1.5	34	1.2	46	1.1	56	1	66	0.8	83	0.7	98
390															2.3	15	2.1	20	1.5	35	1.2	47	1.1	58	1	68	0.8	85		
400															2.3	16	2.1	21	1.5	36	1.2	48	1.1	59	0.9	69	0.8	87		
410													2.7	10	2.3	16	2.1	21	1.5	37	1.2	50	1.1	61	0.9	71	0.8	90		
420													2.7	11	2.3	17	2	22	1.5	38	1.2	51	1.1	63	0.9	73	0.8	92		
430													2.7	11	2.3	18	2	23	1.5	39	1.2	52	1.1	64	0.9	75	0.8	94		
440													2.7	12	2.3	19	2	24	1.5	40	1.2	54	1.1	66	0.9	77	0.8	96		
450													2.6	13	2.3	19	2	25	1.5	42	1.2	55	1.1	67	0.9	79	0.8	99		
460													2.6	14	2.3	20	2	26	1.5	43	1.2	56	1.1	69	0.9	80				
470													2.6	14	2.3	21	2	26	1.5	44	1.2	58	1.1	70	0.9	82				
480													2.6	15	2.3	22	2	27	1.5	45	1.2	59	1.1	72	0.9	84				
490													2.6	16	2.3	22	2	28	1.5	46	1.2	60	1.1	74	0.9	86				
500													2.6	16	2.3	23	2	29	1.5	47	1.2	62	1.1	75	0.9	88				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																											0.7	10	0.6	12
30																							0.8	11	0.7	13	0.6	16	0.6	19
40																			1.1	10	0.9	13	0.8	16	0.7	18	0.6	22	0.6	26
50																			1.1	13	0.9	17	0.8	20	0.7	23	0.6	28	0.6	33
60																	1.4	11	1	16	0.9	21	0.8	24	0.7	28	0.6	34	0.6	40
70															1.5	11	1.3	13	1	19	0.9	24	0.8	29	0.7	33	0.6	40	0.6	46
80													1.6	11	1.5	13	1.3	15	1	22	0.9	28	0.8	33	0.7	38	0.6	46	0.6	53
90											1.8	10	1.6	13	1.4	16	1.3	18	1	26	0.9	32	0.8	38	0.7	43	0.6	52	0.6	60
100											1.8	12	1.6	15	1.4	18	1.3	20	1	29	0.9	36	0.8	42	0.7	48	0.6	58	0.5	67
110									2.1	10	1.8	14	1.6	17	1.4	20	1.3	23	1	32	0.9	39	0.8	46	0.7	53	0.6	64	0.5	74
120									2.1	11	1.8	15	1.5	19	1.4	22	1.3	25	1	35	0.9	43	0.8	51	0.7	57	0.6	70	0.5	80
130									2.1	13	1.7	17	1.5	21	1.4	24	1.3	27	1	38	0.8	47	0.8	55	0.7	62	0.6	75	0.5	87
140									2	14	1.7	19	1.5	23	1.4	26	1.3	29	1	41	0.8	51	0.8	59	0.7	67	0.6	81	0.5	94
150							2.5	10	2	16	1.7	20	1.5	25	1.4	28	1.2	32	1	44	0.8	54	0.8	64	0.7	72	0.6	87		
160							2.5	11	2	17	1.7	22	1.5	26	1.4	30	1.2	34	1	47	0.8	58	0.8	68	0.7	77	0.6	93		
170							2.5	12	2	19	1.7	24	1.5	28	1.3	33	1.2	36	1	50	0.8	62	0.8	72	0.7	82	0.6	99		
180							2.5	13	2	20	1.7	25	1.5	30	1.3	35	1.2	39	1	53	0.8	66	0.8	77	0.7	87				
190							2.4	15	2	21	1.7	27	1.5	32	1.3	37	1.2	41	1	56	0.8	69	0.8	81	0.7	92				
200							2.4	16	2	23	1.7	29	1.5	34	1.3	39	1.2	43	1	59	0.8	73	0.8	86	0.7	97				
210							2.4	17	1.9	24	1.7	30	1.5	36	1.3	41	1.2	46	1	62	0.8	77	0.8	90						
220							2.4	18	1.9	26	1.7	32	1.5	38	1.3	43	1.2	48	1	66	0.8	81	0.8	94						
230							2.4	19	1.9	27	1.7	34	1.5	40	1.3	45	1.2	50	1	69	0.8	84	0.8	98						
240					3.3	10	2.4	20	1.9	28	1.6	35	1.5	42	1.3	47	1.2	53	1	72	0.8	88								
250					3.3	11	2.4	21	1.9	30	1.6	37	1.5	43	1.3	49	1.2	55	1	75	0.8	92								
260					3.3	11	2.3	23	1.9	31	1.6	38	1.5	45	1.3	51	1.2	57	1	78	0.8	96								
270					3.3	12	2.3	24	1.9	32	1.6	40	1.5	47	1.3	53	1.2	60	1	81	0.8	99								
280					3.3	13	2.3	25	1.9	34	1.6	42	1.5	49	1.3	56	1.2	62	1	84										
290					3.2	14	2.3	26	1.9	35	1.6	43	1.4	51	1.3	58	1.2	64	1	87										
300					3.2	15	2.3	27	1.9	37	1.6	45	1.4	53	1.3	60	1.2	66	1	90										
310					3.2	16	2.3	28	1.9	38	1.6	47	1.4	55	1.3	62	1.2	69	1	93										
320					3.2	17	2.3	29	1.9	39	1.6	48	1.4	56	1.3	64	1.2	71	1	96										
330					3.2	17	2.3	30	1.9	41	1.6	50	1.4	58	1.3	66	1.2	73	1	99										
340					3.2	18	2.3	31	1.9	42	1.6	51	1.4	60	1.3	68	1.2	76												
350					3.2	19	2.3	32	1.9	43	1.6	53	1.4	62	1.3	70	1.2	78												
360					3.1	20	2.3	34	1.9	45	1.6	55	1.4	64	1.3	72	1.2	80												
370					3.1	21	2.3	35	1.9	46	1.6	56	1.4	66	1.3	74	1.2	82												
380					3.1	22	2.3	36	1.9	47	1.6	58	1.4	67	1.3	76	1.2	85												
390					3.1	22	2.3	37	1.9	49	1.6	59	1.4	69	1.3	78	1.2	87												
400					3.1	23	2.3	38	1.9	50	1.6	61	1.4	71	1.3	81	1.2	89												
410					3.1	24	2.3	39	1.9	52	1.6	63	1.4	73	1.3	83	1.2	92												
420					3.1	25	2.3	40	1.9	53	1.6	64	1.4	75	1.3	85	1.2	94												
430					3.1	26	2.3	41	1.9	54	1.6	66	1.4	77	1.3	87	1.2	96												
440					3.1	26	2.3	42	1.9	56	1.6	68	1.4	79	1.3	89	1.2	99												
450					3.1	27	2.3	43	1.9	57	1.6	69	1.4	81	1.3	91														
460					3.1	28	2.3	44	1.9	58	1.6	71	1.4	82	1.3	93														
470					3.1	29	2.3	45	1.9	60	1.6	72	1.4	84	1.3	95														
480					3.1	29	2.3	47	1.9	61	1.6	74	1.4	86	1.3	97														
490					3.1	30	2.2	48	1.9	62	1.6	76	1.4	88	1.3	99														
500					3	31	2.2	49	1.9	64	1.6	77	1.4	90																

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																											0.7	10	0.6	12
30																							0.8	10	0.7	12	0.6	16	0.6	19
40																					0.9	12	0.8	15	0.7	17	0.6	22	0.6	26
50																			1.1	12	0.9	16	0.8	19	0.7	22	0.6	28	0.6	32
60																			1.1	15	0.9	20	0.8	24	0.7	27	0.6	34	0.6	39
70																	1.4	11	1	18	0.9	24	0.8	28	0.7	32	0.6	40	0.6	46
80															1.5	12	1.4	14	1	21	0.9	27	0.8	33	0.7	37	0.6	46	0.6	53
90													1.7	11	1.5	14	1.3	16	1	25	0.9	31	0.8	37	0.7	42	0.6	51	0.6	60
100													1.6	13	1.5	16	1.3	19	1	28	0.9	35	0.8	41	0.7	47	0.6	57	0.5	66
110											1.9	11	1.6	15	1.4	18	1.3	21	1	31	0.9	39	0.8	46	0.7	52	0.6	63	0.5	73
120											1.8	13	1.6	17	1.4	21	1.3	24	1	34	0.9	43	0.8	50	0.7	57	0.6	69	0.5	80
130									2.2	10	1.8	15	1.6	19	1.4	23	1.3	26	1	37	0.9	46	0.8	54	0.7	62	0.6	75	0.5	87
140									2.1	11	1.8	17	1.5	21	1.4	25	1.3	28	1	40	0.8	50	0.8	59	0.7	67	0.6	81	0.5	93
150									2.1	13	1.8	19	1.5	23	1.4	27	1.3	31	1	43	0.8	54	0.8	63	0.7	72	0.6	87	0.5	100
160									2.1	15	1.7	20	1.5	25	1.4	29	1.3	33	1	46	0.8	58	0.8	68	0.7	77	0.6	93		
170									2	16	1.7	22	1.5	27	1.4	31	1.3	35	1	49	0.8	61	0.8	72	0.7	81	0.6	99		
180									2	18	1.7	24	1.5	29	1.4	34	1.2	38	1	53	0.8	65	0.8	76	0.7	86				
190							2.6	11	2	19	1.7	25	1.5	31	1.4	36	1.2	40	1	56	0.8	69	0.8	81	0.7	91				
200							2.5	12	2	21	1.7	27	1.5	33	1.3	38	1.2	42	1	59	0.8	73	0.8	85	0.7	96				
210							2.5	14	2	22	1.7	29	1.5	35	1.3	40	1.2	45	1	62	0.8	76	0.8	89						
220							2.5	15	2	24	1.7	30	1.5	36	1.3	42	1.2	47	1	65	0.8	80	0.8	94						
230							2.5	16	2	25	1.7	32	1.5	38	1.3	44	1.2	49	1	68	0.8	84	0.8	98						
240							2.4	17	2	26	1.7	34	1.5	40	1.3	46	1.2	52	1	71	0.8	88								
250							2.4	19	1.9	28	1.7	35	1.5	42	1.3	48	1.2	54	1	74	0.8	91								
260							2.4	20	1.9	29	1.7	37	1.5	44	1.3	50	1.2	56	1	77	0.8	95								
270							2.4	21	1.9	31	1.7	39	1.5	46	1.3	52	1.2	59	1	80	0.8	99								
280							2.4	22	1.9	32	1.6	40	1.5	48	1.3	55	1.2	61	1	83										
290							2.4	23	1.9	33	1.6	42	1.5	50	1.3	57	1.2	63	1	86										
300					3.4	10	2.4	24	1.9	35	1.6	44	1.5	52	1.3	59	1.2	66	1	90										
310					3.4	11	2.4	26	1.9	36	1.6	45	1.5	53	1.3	61	1.2	68	1	93										
320					3.3	12	2.3	27	1.9	38	1.6	47	1.5	55	1.3	63	1.2	70	1	96										
330					3.3	13	2.3	28	1.9	39	1.6	49	1.4	57	1.3	65	1.2	72	1	99										
340					3.3	14	2.3	29	1.9	40	1.6	50	1.4	59	1.3	67	1.2	75												
350					3.3	15	2.3	30	1.9	42	1.6	52	1.4	61	1.3	69	1.2	77												
360					3.2	16	2.3	31	1.9	43	1.6	53	1.4	63	1.3	71	1.2	80												
370					3.2	16	2.3	32	1.9	45	1.6	55	1.4	65	1.3	73	1.2	82												
380					3.2	17	2.3	34	1.9	46	1.6	57	1.4	67	1.3	76	1.2	84												
390					3.2	18	2.3	35	1.9	47	1.6	58	1.4	68	1.3	78	1.2	86												
400					3.2	19	2.3	36	1.9	49	1.6	60	1.4	70	1.3	80	1.2	89												
410					3.2	20	2.3	37	1.9	50	1.6	62	1.4	72	1.3	82	1.2	91												
420					3.2	21	2.3	38	1.9	51	1.6	63	1.4	74	1.3	84	1.2	93												
430					3.2	22	2.3	39	1.9	53	1.6	65	1.4	76	1.3	86	1.2	96												
440					3.1	23	2.3	40	1.9	54	1.6	66	1.4	78	1.3	88	1.2	98												
450					3.1	24	2.3	41	1.9	56	1.6	68	1.4	80	1.3	90	1.2	100												
460					3.1	24	2.3	42	1.9	57	1.6	70	1.4	81	1.3	92														
470					3.1	25	2.3	44	1.9	58	1.6	71	1.4	83	1.3	94														
480					3.1	26	2.3	45	1.9	60	1.6	73	1.4	85	1.3	96														
490					3.1	27	2.3	46	1.9	61	1.6	75	1.4	87	1.3	98														
500					3.1	28	2.3	47	1.9	62	1.6	76	1.4	89	1.3	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.02
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																													0.6	11
30																									0.8	12	0.6	15	0.6	18
40																					0.9	11	0.8	14	0.7	17	0.6	21	0.6	25
50																			1.1	10	0.9	15	0.8	19	0.7	22	0.6	27	0.6	32
60																			1.1	14	0.9	19	0.8	23	0.7	27	0.6	33	0.6	39
70																			1.1	17	0.9	23	0.8	28	0.7	32	0.6	39	0.6	46
80																	1.4	12	1	21	0.9	27	0.8	32	0.7	37	0.6	45	0.6	52
90															1.6	12	1.4	15	1	24	0.9	31	0.8	36	0.7	42	0.6	51	0.6	59
100													1.7	11	1.5	14	1.3	17	1	27	0.9	34	0.8	41	0.7	47	0.6	57	0.5	66
110													1.7	13	1.5	17	1.3	20	1	30	0.9	38	0.8	45	0.7	52	0.6	63	0.5	73
120											1.9	10	1.6	15	1.4	19	1.3	22	1	33	0.9	42	0.8	50	0.7	56	0.6	69	0.5	80
130											1.9	12	1.6	17	1.4	21	1.3	25	1	36	0.9	46	0.8	54	0.7	61	0.6	75	0.5	86
140											1.8	14	1.6	19	1.4	24	1.3	27	1	39	0.9	49	0.8	58	0.7	66	0.6	81	0.5	93
150											1.8	16	1.6	21	1.4	26	1.3	30	1	43	0.8	53	0.8	63	0.7	71	0.6	86	0.5	100
160									2.2	11	1.8	18	1.6	23	1.4	28	1.3	32	1	46	0.8	57	0.8	67	0.7	76	0.6	92		
170									2.1	13	1.8	20	1.5	25	1.4	30	1.3	34	1	49	0.8	61	0.8	71	0.7	81	0.6	98		
180									2.1	15	1.8	22	1.5	27	1.4	32	1.3	37	1	52	0.8	65	0.8	76	0.7	86				
190									2.1	16	1.7	24	1.5	29	1.4	34	1.3	39	1	55	0.8	68	0.8	80	0.7	91				
200									2	18	1.7	25	1.5	31	1.4	37	1.2	41	1	58	0.8	72	0.8	85	0.7	96				
210									2	20	1.7	27	1.5	33	1.4	39	1.2	44	1	61	0.8	76	0.8	89						
220							2.6	10	2	21	1.7	29	1.5	35	1.4	41	1.2	46	1	64	0.8	80	0.8	93						
230							2.6	12	2	23	1.7	30	1.5	37	1.3	43	1.2	48	1	67	0.8	83	0.8	98						
240							2.5	13	2	24	1.7	32	1.5	39	1.3	45	1.2	51	1	70	0.8	87								
250							2.5	15	2	26	1.7	34	1.5	41	1.3	47	1.2	53	1	73	0.8	91								
260							2.5	16	2	27	1.7	36	1.5	43	1.3	49	1.2	55	1	77	0.8	95								
270							2.5	18	2	29	1.7	37	1.5	45	1.3	52	1.2	58	1	80	0.8	98								
280							2.4	19	2	30	1.7	39	1.5	47	1.3	54	1.2	60	1	83										
290							2.4	20	1.9	31	1.7	41	1.5	48	1.3	56	1.2	62	1	86										
300							2.4	21	1.9	33	1.7	42	1.5	50	1.3	58	1.2	65	1	89										
310							2.4	23	1.9	34	1.7	44	1.5	52	1.3	60	1.2	67	1	92										
320							2.4	24	1.9	36	1.7	46	1.5	54	1.3	62	1.2	69	1	95										
330							2.4	25	1.9	37	1.6	47	1.5	56	1.3	64	1.2	72	1	98										
340							2.4	26	1.9	39	1.6	49	1.5	58	1.3	66	1.2	74												
350							2.4	27	1.9	40	1.6	50	1.5	60	1.3	68	1.2	76												
360							2.4	29	1.9	41	1.6	52	1.5	62	1.3	70	1.2	79												
370					3.4	11	2.3	30	1.9	43	1.6	54	1.5	63	1.3	73	1.2	81												
380					3.4	12	2.3	31	1.9	44	1.6	55	1.4	65	1.3	75	1.2	83												
390					3.4	13	2.3	32	1.9	46	1.6	57	1.4	67	1.3	77	1.2	85												
400					3.3	14	2.3	33	1.9	47	1.6	59	1.4	69	1.3	79	1.2	88												
410					3.3	15	2.3	34	1.9	48	1.6	60	1.4	71	1.3	81	1.2	90												
420					3.3	16	2.3	36	1.9	50	1.6	62	1.4	73	1.3	83	1.2	92												
430					3.3	17	2.3	37	1.9	51	1.6	64	1.4	75	1.3	85	1.2	95												
440					3.2	18	2.3	38	1.9	53	1.6	65	1.4	77	1.3	87	1.2	97												
450					3.2	19	2.3	39	1.9	54	1.6	67	1.4	78	1.3	89	1.2	99												
460					3.2	20	2.3	40	1.9	55	1.6	69	1.4	80	1.3	91														
470					3.2	21	2.3	41	1.9	57	1.6	70	1.4	82	1.3	93														
480					3.2	22	2.3	42	1.9	58	1.6	72	1.4	84	1.3	95														
490					3.2	23	2.3	44	1.9	60	1.6	73	1.4	86	1.3	98														
500					3.2	23	2.3	45	1.9	61	1.6	75	1.4	88	1.3	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.7	11	0.6	13
40																							0.9	10	0.8	11	0.7	15	0.6	17
50																					1.1	10	0.9	13	0.8	15	0.7	19	0.6	22
60																					1	13	0.9	16	0.8	18	0.7	23	0.6	27
70																			1.3	11	1	15	0.9	19	0.8	22	0.7	27	0.6	32
80																			1.2	13	1	18	0.9	22	0.8	25	0.7	31	0.6	36
90																			1.2	16	1	20	0.9	25	0.8	28	0.7	35	0.6	41
100																	1.6	11	1.2	18	1	23	0.9	27	0.8	32	0.7	39	0.6	46
110															1.7	10	1.6	13	1.2	20	1	25	0.9	30	0.8	35	0.7	43	0.6	50
120															1.7	12	1.6	14	1.2	22	1	28	0.9	33	0.8	38	0.7	47	0.6	55
130													1.9	11	1.7	13	1.6	16	1.2	24	1	30	0.9	36	0.8	42	0.7	51	0.6	60
140													1.9	12	1.7	15	1.5	17	1.2	26	1	33	0.9	39	0.8	45	0.7	55	0.6	64
150											2.2	10	1.9	13	1.7	16	1.5	19	1.2	28	1	35	0.9	42	0.8	48	0.7	59	0.6	69
160											2.2	11	1.9	15	1.7	18	1.5	20	1.2	30	1	38	0.9	45	0.8	52	0.7	63	0.6	74
170											2.2	12	1.9	16	1.7	19	1.5	22	1.2	32	1	40	0.9	48	0.8	55	0.7	67	0.6	78
180											2.1	13	1.8	17	1.7	20	1.5	23	1.1	34	1	43	0.9	51	0.8	58	0.7	71	0.6	83
190									2.6	10	2.1	14	1.8	18	1.6	22	1.5	25	1.1	36	1	45	0.9	54	0.8	62	0.7	76	0.6	88
200									2.5	10	2.1	15	1.8	19	1.6	23	1.5	26	1.1	38	1	48	0.9	57	0.8	65	0.7	80	0.6	93
210									2.5	11	2.1	16	1.8	21	1.6	24	1.5	28	1.1	40	1	50	0.8	60	0.8	68	0.7	84	0.6	97
220									2.5	12	2.1	17	1.8	22	1.6	26	1.5	29	1.1	42	1	53	0.8	63	0.8	72	0.7	88		
230									2.5	13	2.1	19	1.8	23	1.6	27	1.5	31	1.1	44	1	55	0.8	66	0.8	75	0.7	92		
240									2.5	14	2.1	20	1.8	24	1.6	29	1.5	32	1.1	46	1	58	0.8	69	0.8	78	0.7	96		
250									2.5	15	2.1	21	1.8	26	1.6	30	1.5	34	1.1	48	1	60	0.8	71	0.8	82	0.7	100		
260									2.4	16	2	22	1.8	27	1.6	31	1.5	35	1.1	50	1	63	0.8	74	0.8	85				
270							3.1	10	2.4	17	2	23	1.8	28	1.6	33	1.5	37	1.1	52	1	65	0.8	77	0.8	88				
280							3.1	10	2.4	18	2	24	1.8	29	1.6	34	1.5	38	1.1	54	1	68	0.8	80	0.8	92				
290							3.1	11	2.4	19	2	25	1.8	30	1.6	35	1.5	40	1.1	56	1	70	0.8	83	0.8	95				
300							3.1	12	2.4	20	2	26	1.8	31	1.6	37	1.5	41	1.1	58	1	73	0.8	86	0.8	98				
310							3.1	13	2.4	21	2	27	1.8	33	1.6	38	1.5	43	1.1	60	1	75	0.8	89						
320							3.1	13	2.4	21	2	28	1.8	34	1.6	39	1.5	44	1.1	62	1	78	0.8	92						
330							3	14	2.4	22	2	29	1.8	35	1.6	41	1.5	46	1.1	64	1	80	0.8	95						
340							3	15	2.4	23	2	30	1.8	36	1.6	42	1.5	47	1.1	66	1	83	0.8	98						
350							3	16	2.4	24	2	31	1.8	37	1.6	43	1.5	49	1.1	68	1	85								
360							3	16	2.4	25	2	32	1.8	39	1.6	45	1.4	50	1.1	70	1	88								
370							3	17	2.4	26	2	33	1.8	40	1.6	46	1.4	52	1.1	72	1	90								
380							3	18	2.4	27	2	34	1.8	41	1.6	47	1.4	53	1.1	74	1	93								
390							3	18	2.4	27	2	35	1.8	42	1.6	49	1.4	55	1.1	76	1	95								
400							3	19	2.4	28	2	36	1.8	43	1.6	50	1.4	56	1.1	79	1	98								
410							3	20	2.3	29	2	37	1.7	44	1.6	51	1.4	58	1.1	80	0.9	100								
420							3	20	2.3	30	2	38	1.7	46	1.6	53	1.4	59	1.1	82										
430							2.9	21	2.3	31	2	39	1.7	47	1.6	54	1.4	61	1.1	85										
440							2.9	22	2.3	32	2	40	1.7	48	1.6	55	1.4	62	1.1	87										
450							2.9	22	2.3	33	2	41	1.7	49	1.6	57	1.4	64	1.1	89										
460					4.2	10	2.9	23	2.3	33	2	42	1.7	50	1.6	58	1.4	65	1.1	91										
470					4.2	10	2.9	24	2.3	34	2	43	1.7	51	1.6	59	1.4	66	1.1	92										
480					4.2	11	2.9	24	2.3	35	2	44	1.7	53	1.6	61	1.4	68	1.1	95										
490					4.2	11	2.9	25	2.3	36	2	45	1.7	54	1.6	62	1.4	69	1.1	97										
500					4.2	12	2.9	26	2.3	37	2	46	1.7	55	1.6	63	1.4	71	1.1	99										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.7	10	0.6	12
40																									0.9	11	0.7	14	0.6	17
50																							0.9	12	0.8	14	0.7	18	0.6	22
60																					1.1	12	0.9	15	0.8	18	0.7	22	0.6	26
70																			1.3	10	1	14	0.9	18	0.8	21	0.7	26	0.6	31
80																			1.3	12	1	17	0.9	21	0.8	24	0.7	30	0.6	36
90																			1.2	14	1	19	0.9	24	0.8	28	0.7	35	0.6	41
100																			1.2	16	1	22	0.9	27	0.8	31	0.7	39	0.6	45
110																	1.6	11	1.2	19	1	25	0.9	30	0.8	34	0.7	43	0.6	50
120																	1.6	12	1.2	21	1	27	0.9	33	0.8	38	0.7	47	0.6	55
130															1.8	11	1.6	14	1.2	23	1	30	0.9	36	0.8	41	0.7	51	0.6	59
140															1.7	13	1.6	16	1.2	25	1	32	0.9	39	0.8	44	0.7	55	0.6	64
150													2	11	1.7	14	1.6	17	1.2	27	1	35	0.9	42	0.8	48	0.7	59	0.6	69
160													1.9	12	1.7	16	1.6	19	1.2	29	1	37	0.9	44	0.8	51	0.7	63	0.6	73
170													1.9	13	1.7	17	1.5	20	1.2	31	1	40	0.9	47	0.8	54	0.7	67	0.6	78
180											2.2	10	1.9	15	1.7	19	1.5	22	1.2	33	1	42	0.9	50	0.8	58	0.7	71	0.6	83
190											2.2	11	1.9	16	1.7	20	1.5	24	1.2	35	1	45	0.9	53	0.8	61	0.7	75	0.6	87
200											2.2	12	1.9	17	1.7	21	1.5	25	1.2	37	1	47	0.9	56	0.8	64	0.7	79	0.6	92
210											2.2	14	1.9	19	1.7	23	1.5	27	1.1	39	1	50	0.9	59	0.8	68	0.7	83	0.6	97
220											2.1	15	1.8	20	1.7	24	1.5	28	1.1	41	1	52	0.8	62	0.8	71	0.7	87		
230											2.1	16	1.8	21	1.6	26	1.5	30	1.1	43	1	55	0.8	65	0.8	74	0.7	91		
240									2.6	11	2.1	17	1.8	22	1.6	27	1.5	31	1.1	45	1	57	0.8	68	0.8	78	0.7	95		
250									2.6	12	2.1	18	1.8	24	1.6	28	1.5	33	1.1	47	1	60	0.8	71	0.8	81	0.7	99		
260									2.5	13	2.1	19	1.8	25	1.6	30	1.5	34	1.1	49	1	62	0.8	74	0.8	84				
270									2.5	14	2.1	21	1.8	26	1.6	31	1.5	36	1.1	51	1	65	0.8	77	0.8	88				
280									2.5	15	2.1	22	1.8	27	1.6	33	1.5	37	1.1	53	1	67	0.8	80	0.8	91				
290									2.5	16	2.1	23	1.8	29	1.6	34	1.5	39	1.1	55	1	70	0.8	83	0.8	94				
300									2.5	17	2.1	24	1.8	30	1.6	35	1.5	40	1.1	57	1	72	0.8	85	0.8	98				
310									2.5	18	2	25	1.8	31	1.6	37	1.5	42	1.1	60	1	75	0.8	88						
320									2.4	18	2	26	1.8	32	1.6	38	1.5	43	1.1	62	1	77	0.8	91						
330									2.4	19	2	27	1.8	34	1.6	39	1.5	45	1.1	64	1	80	0.8	94						
340							3.2	10	2.4	20	2	28	1.8	35	1.6	41	1.5	46	1.1	66	1	82	0.8	97						
350							3.1	11	2.4	21	2	29	1.8	36	1.6	42	1.5	48	1.1	68	1	85	0.8	100						
360							3.1	12	2.4	22	2	30	1.8	37	1.6	43	1.5	49	1.1	70	1	87								
370							3.1	13	2.4	23	2	31	1.8	38	1.6	45	1.5	51	1.1	72	1	90								
380							3.1	13	2.4	24	2	32	1.8	39	1.6	46	1.5	52	1.1	74	1	92								
390							3.1	14	2.4	25	2	33	1.8	41	1.6	47	1.5	54	1.1	76	1	95								
400							3.1	15	2.4	26	2	34	1.8	42	1.6	49	1.5	55	1.1	78	1	97								
410							3	16	2.4	27	2	35	1.8	43	1.6	50	1.4	57	1.1	80	1	100								
420							3	17	2.4	28	2	37	1.8	44	1.6	51	1.4	58	1.1	82										
430							3	17	2.4	28	2	37	1.8	46	1.6	53	1.4	60	1.1	84										
440							3	18	2.4	29	2	39	1.8	47	1.6	54	1.4	61	1.1	86										
450							3	19	2.4	30	2	40	1.8	48	1.6	55	1.4	63	1.1	88										
460							3	20	2.3	31	2	41	1.7	49	1.6	57	1.4	64	1.1	90										
470							3	20	2.3	32	2	42	1.7	50	1.6	58	1.4	66	1.1	92										
480							3	21	2.3	33	2	43	1.7	51	1.6	59	1.4	67	1.1	94										
490							3	22	2.3	34	2	44	1.7	53	1.6	61	1.4	68	1.1	96										
500							3	22	2.3	35	2	45	1.7	54	1.6	62	1.4	70	1.1	98										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.03
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																													0.6	11
40																									0.9	10	0.7	13	0.6	16
50																							1	11	0.8	13	0.7	18	0.6	21
60																					1.1	10	0.9	14	0.8	17	0.7	22	0.6	26
70																					1.1	13	0.9	17	0.8	20	0.7	26	0.6	31
80																			1.3	10	1	16	0.9	20	0.8	24	0.7	30	0.6	35
90																			1.3	13	1	18	0.9	23	0.8	27	0.7	34	0.6	40
100																			1.3	15	1	21	0.9	26	0.8	30	0.7	38	0.6	45
110																			1.2	17	1	24	0.9	29	0.8	34	0.7	42	0.6	50
120																	1.7	10	1.2	19	1	26	0.9	32	0.8	37	0.7	46	0.6	54
130																	1.6	12	1.2	22	1	29	0.9	35	0.8	40	0.7	50	0.6	59
140															1.8	10	1.6	13	1.2	24	1	31	0.9	38	0.8	44	0.7	54	0.6	64
150															1.8	12	1.6	15	1.2	26	1	34	0.9	41	0.8	47	0.7	58	0.6	68
160															1.8	13	1.6	17	1.2	28	1	36	0.9	44	0.8	51	0.7	63	0.6	73
170													2	10	1.7	15	1.6	19	1.2	30	1	39	0.9	47	0.8	54	0.7	67	0.6	78
180													2	12	1.7	16	1.6	20	1.2	32	1	41	0.9	50	0.8	57	0.7	71	0.6	82
190													1.9	13	1.7	18	1.6	22	1.2	34	1	44	0.9	53	0.8	61	0.7	75	0.6	87
200													1.9	15	1.7	19	1.5	23	1.2	36	1	47	0.9	56	0.8	64	0.7	79	0.6	92
210											2.3	10	1.9	16	1.7	21	1.5	25	1.2	38	1	49	0.9	59	0.8	67	0.7	83	0.6	96
220											2.2	11	1.9	18	1.7	22	1.5	27	1.2	40	1	52	0.9	62	0.8	71	0.7	87		
230											2.2	13	1.9	19	1.7	24	1.5	28	1.2	42	1	54	0.9	65	0.8	74	0.7	91		
240											2.2	14	1.9	20	1.7	25	1.5	30	1.1	44	1	57	0.8	67	0.8	77	0.7	95		
250											2.2	15	1.9	22	1.7	27	1.5	31	1.1	46	1	59	0.8	70	0.8	81	0.7	99		
260											2.1	17	1.8	23	1.6	28	1.5	33	1.1	49	1	62	0.8	73	0.8	84				
270											2.1	18	1.8	24	1.6	30	1.5	34	1.1	51	1	64	0.8	76	0.8	87				
280									2.6	10	2.1	19	1.8	25	1.6	31	1.5	36	1.1	53	1	67	0.8	79	0.8	91				
290									2.6	11	2.1	20	1.8	27	1.6	32	1.5	37	1.1	55	1	69	0.8	82	0.8	94				
300									2.6	13	2.1	21	1.8	28	1.6	34	1.5	39	1.1	57	1	72	0.8	85	0.8	97				
310									2.5	14	2.1	22	1.8	29	1.6	35	1.5	40	1.1	59	1	74	0.8	88						
320									2.5	15	2.1	24	1.8	30	1.6	37	1.5	42	1.1	61	1	77	0.8	91						
330									2.5	16	2.1	25	1.8	32	1.6	38	1.5	44	1.1	63	1	79	0.8	94						
340									2.5	17	2.1	26	1.8	33	1.6	39	1.5	45	1.1	65	1	82	0.8	97						
350									2.5	18	2.1	27	1.8	34	1.6	41	1.5	47	1.1	67	1	84	0.8	100						
360									2.5	19	2	28	1.8	35	1.6	42	1.5	48	1.1	69	1	87								
370									2.5	20	2	29	1.8	37	1.6	43	1.5	50	1.1	71	1	89								
380									2.4	21	2	30	1.8	38	1.6	45	1.5	51	1.1	73	1	92								
390									2.4	22	2	31	1.8	39	1.6	46	1.5	52	1.1	75	1	94								
400									2.4	23	2	32	1.8	40	1.6	47	1.5	54	1.1	77	1	97								
410							3.2	10	2.4	24	2	33	1.8	41	1.6	49	1.5	56	1.1	79	1	99								
420							3.2	11	2.4	25	2	35	1.8	43	1.6	50	1.5	57	1.1	81										
430							3.1	12	2.4	26	2	36	1.8	44	1.6	52	1.5	59	1.1	83										
440							3.1	13	2.4	27	2	37	1.8	45	1.6	53	1.5	60	1.1	85										
450							3.1	14	2.4	28	2	38	1.8	46	1.6	54	1.5	61	1.1	87										
460							3.1	15	2.4	29	2	39	1.8	48	1.6	56	1.4	63	1.1	89										
470							3.1	16	2.4	29	2	40	1.8	49	1.6	57	1.4	65	1.1	91										
480							3.1	17	2.4	30	2	41	1.8	50	1.6	58	1.4	66	1.1	93										
490							3	17	2.4	31	2	42	1.8	51	1.6	60	1.4	67	1.1	95										
500							3	18	2.4	32	2	43	1.8	52	1.6	61	1.4	69	1.1	97										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																													0.8	10
50																											0.9	10	0.7	13
60																											0.8	13	0.7	16
70																									1	12	0.8	15	0.7	18
80																							1.1	11	1	14	0.8	18	0.7	21
90																					1.3	10	1.1	13	1	16	0.8	20	0.7	24
100																					1.3	11	1.1	15	1	18	0.8	23	0.7	27
110																					1.3	13	1.1	16	1	20	0.8	25	0.7	30
120																			1.6	10	1.3	14	1.1	18	1	22	0.8	28	0.7	33
130																			1.5	11	1.3	16	1.1	20	1	24	0.8	30	0.7	36
140																			1.5	12	1.2	17	1.1	22	0.9	26	0.8	32	0.7	39
150																			1.5	14	1.2	19	1.1	23	0.9	28	0.8	35	0.7	41
160																			1.5	15	1.2	20	1.1	25	0.9	30	0.8	37	0.7	44
170																			1.5	16	1.2	22	1.1	27	0.9	31	0.8	40	0.7	47
180																	2.1	10	1.5	17	1.2	23	1.1	29	0.9	33	0.8	42	0.7	50
190																	2.1	10	1.5	18	1.2	25	1	30	0.9	35	0.8	45	0.7	53
200																	2	11	1.5	20	1.2	26	1	32	0.9	37	0.8	47	0.7	56
210															2.3	10	2	12	1.5	21	1.2	28	1	34	0.9	39	0.8	49	0.7	58
220															2.3	10	2	13	1.5	22	1.2	29	1	35	0.9	41	0.8	52	0.7	61
230															2.2	11	2	14	1.5	23	1.2	31	1	37	0.9	43	0.8	54	0.7	64
240															2.2	12	2	15	1.5	24	1.2	32	1	39	0.9	45	0.8	57	0.7	67
250															2.2	13	2	16	1.5	25	1.2	33	1	41	0.9	47	0.8	59	0.7	70
260													2.5	10	2.2	14	2	17	1.5	27	1.2	35	1	42	0.9	49	0.8	62	0.7	73
270													2.5	11	2.2	14	2	17	1.5	28	1.2	36	1	44	0.9	51	0.8	64	0.7	76
280													2.5	12	2.2	15	2	18	1.5	29	1.2	38	1	46	0.9	53	0.8	66	0.7	78
290													2.5	12	2.2	16	2	19	1.4	30	1.2	39	1	48	0.9	55	0.8	69	0.7	81
300													2.5	13	2.2	17	2	20	1.4	31	1.2	41	1	49	0.9	57	0.8	71	0.7	84
310													2.5	14	2.2	17	1.9	21	1.4	32	1.2	42	1	51	0.9	59	0.8	74	0.7	87
320											2.9	10	2.5	14	2.2	18	1.9	22	1.4	33	1.2	44	1	53	0.9	61	0.8	76	0.7	90
330											2.9	10	2.5	15	2.2	19	1.9	22	1.4	35	1.2	45	1	54	0.9	63	0.8	79	0.7	93
340											2.9	11	2.4	16	2.2	20	1.9	23	1.4	36	1.2	46	1	56	0.9	65	0.8	81	0.7	96
350											2.9	12	2.4	16	2.1	20	1.9	24	1.4	37	1.2	48	1	58	0.9	67	0.8	83	0.7	99
360											2.9	12	2.4	17	2.1	21	1.9	25	1.4	38	1.2	49	1	59	0.9	69	0.8	86		
370											2.9	13	2.4	18	2.1	22	1.9	26	1.4	39	1.2	51	1	61	0.9	71	0.8	88		
380											2.8	13	2.4	18	2.1	23	1.9	27	1.4	40	1.2	52	1	63	0.9	73	0.8	91		
390											2.8	14	2.4	19	2.1	23	1.9	27	1.4	41	1.2	54	1	65	0.9	75	0.8	93		
400											2.8	15	2.4	20	2.1	24	1.9	28	1.4	43	1.2	55	1	66	0.9	77	0.8	96		
410											2.8	15	2.4	20	2.1	25	1.9	29	1.4	44	1.2	56	1	68	0.9	79	0.8	98		
420											2.8	16	2.4	21	2.1	26	1.9	30	1.4	45	1.2	58	1	70	0.9	81	0.8	100		
430									3.4	10	2.8	16	2.4	22	2.1	26	1.9	31	1.4	46	1.2	59	1	71	0.9	83				
440									3.4	10	2.8	17	2.4	22	2.1	27	1.9	31	1.4	47	1.2	61	1	73	0.9	85				
450									3.4	11	2.8	17	2.4	23	2.1	28	1.9	32	1.4	48	1.2	62	1	75	0.9	87				
460									3.4	11	2.8	18	2.4	24	2.1	28	1.9	33	1.4	49	1.2	64	1	77	0.9	88				
470									3.4	12	2.8	18	2.4	24	2.1	29	1.9	34	1.4	51	1.2	65	1	78	0.9	90				
480									3.4	12	2.8	19	2.4	25	2.1	30	1.9	35	1.4	52	1.2	67	1	80	0.9	92				
490									3.4	13	2.8	20	2.4	25	2.1	31	1.9	35	1.4	53	1.2	68	1	82	0.9	94				
500									3.4	13	2.8	20	2.4	26	2.1	31	1.9	36	1.4	54	1.2	69	1	83	0.9	96				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.7	12
60																											0.9	12	0.7	15
70																									1	10	0.8	14	0.7	18
80																							1.2	10	1	13	0.8	17	0.7	21
90																							1.1	12	1	15	0.8	19	0.7	24
100																					1.3	10	1.1	14	1	17	0.8	22	0.7	27
110																					1.3	12	1.1	15	1	19	0.8	24	0.7	29
120																					1.3	13	1.1	17	1	21	0.8	27	0.7	32
130																					1.3	15	1.1	19	1	23	0.8	29	0.7	35
140																			1.6	10	1.3	16	1.1	21	1	25	0.8	32	0.7	38
150																			1.6	12	1.3	18	1.1	23	1	27	0.8	34	0.7	41
160																			1.5	13	1.3	19	1.1	24	0.9	29	0.8	37	0.7	44
170																			1.5	14	1.2	21	1.1	26	0.9	31	0.8	39	0.7	47
180																			1.5	16	1.2	22	1.1	28	0.9	33	0.8	42	0.7	49
190																			1.5	17	1.2	24	1.1	29	0.9	35	0.8	44	0.7	52
200																			1.5	18	1.2	25	1.1	31	0.9	37	0.8	46	0.7	55
210																			1.5	19	1.2	27	1.1	33	0.9	39	0.8	49	0.7	58
220																	2.1	10	1.5	20	1.2	28	1	35	0.9	41	0.8	51	0.7	61
230																	2.1	11	1.5	22	1.2	30	1	36	0.9	43	0.8	54	0.7	64
240																	2	12	1.5	23	1.2	31	1	38	0.9	45	0.8	56	0.7	67
250															2.3	10	2	13	1.5	24	1.2	32	1	40	0.9	47	0.8	59	0.7	69
260															2.3	10	2	14	1.5	25	1.2	34	1	42	0.9	49	0.8	61	0.7	72
270															2.3	11	2	15	1.5	26	1.2	35	1	43	0.9	50	0.8	64	0.7	75
280															2.3	12	2	16	1.5	28	1.2	37	1	45	0.9	53	0.8	66	0.7	78
290															2.2	13	2	17	1.5	29	1.2	38	1	47	0.9	55	0.8	68	0.7	81
300															2.2	14	2	18	1.5	30	1.2	40	1	48	0.9	56	0.8	71	0.7	84
310													2.6	10	2.2	15	2	19	1.5	31	1.2	41	1	50	0.9	58	0.8	73	0.7	87
320													2.5	11	2.2	16	2	20	1.5	32	1.2	43	1	52	0.9	60	0.8	76	0.7	89
330													2.5	12	2.2	16	2	20	1.4	33	1.2	44	1	54	0.9	62	0.8	78	0.7	92
340													2.5	12	2.2	17	2	21	1.4	35	1.2	46	1	55	0.9	64	0.8	81	0.7	95
350													2.5	13	2.2	18	2	22	1.4	36	1.2	47	1	57	0.9	66	0.8	83	0.7	98
360													2.5	14	2.2	19	1.9	23	1.4	37	1.2	48	1	59	0.9	68	0.8	85		
370													2.5	15	2.2	20	1.9	24	1.4	38	1.2	50	1	60	0.9	70	0.8	88		
380													2.5	15	2.2	20	1.9	25	1.4	39	1.2	51	1	62	0.9	72	0.8	90		
390											2.9	10	2.5	16	2.2	21	1.9	26	1.4	40	1.2	53	1	64	0.9	74	0.8	93		
400											2.9	10	2.5	17	2.2	22	1.9	26	1.4	42	1.2	54	1	66	0.9	76	0.8	95		
410											2.9	11	2.4	17	2.1	23	1.9	27	1.4	43	1.2	56	1	67	0.9	78	0.8	98		
420											2.9	12	2.4	18	2.1	23	1.9	28	1.4	44	1.2	57	1	69	0.9	80	0.8	100		
430											2.9	12	2.4	19	2.1	24	1.9	29	1.4	45	1.2	59	1	71	0.9	82				
440											2.9	13	2.4	20	2.1	25	1.9	30	1.4	46	1.2	60	1	72	0.9	84				
450											2.9	14	2.4	20	2.1	26	1.9	31	1.4	47	1.2	61	1	74	0.9	86				
460											2.8	14	2.4	21	2.1	26	1.9	31	1.4	48	1.2	63	1	76	0.9	88				
470											2.8	15	2.4	22	2.1	27	1.9	32	1.4	50	1.2	64	1	78	0.9	90				
480											2.8	16	2.4	22	2.1	28	1.9	33	1.4	51	1.2	66	1	79	0.9	92				
490											2.8	16	2.4	23	2.1	29	1.9	34	1.4	52	1.2	67	1	81	0.9	94				
500											2.8	17	2.4	24	2.1	29	1.9	35	1.4	53	1.2	69	1	83	0.9	96				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.05
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.8	11
60																											0.9	11	0.7	14
70																											0.9	14	0.7	17
80																									1	11	0.8	16	0.7	20
90																							1.2	10	1	14	0.8	19	0.7	23
100																							1.2	12	1	16	0.8	21	0.7	26
110																					1.4	10	1.1	14	1	18	0.8	24	0.7	29
120																					1.3	11	1.1	16	1	20	0.8	26	0.7	32
130																					1.3	13	1.1	18	1	22	0.8	29	0.7	35
140																					1.3	15	1.1	20	1	24	0.8	31	0.7	37
150																					1.3	16	1.1	21	1	26	0.8	34	0.7	40
160																			1.6	11	1.3	18	1.1	23	1	28	0.8	36	0.7	43
170																			1.6	12	1.3	19	1.1	25	1	30	0.8	39	0.7	46
180																			1.6	14	1.3	21	1.1	27	0.9	32	0.8	41	0.7	49
190																			1.5	15	1.2	22	1.1	29	0.9	34	0.8	43	0.7	52
200																			1.5	16	1.2	24	1.1	30	0.9	36	0.8	46	0.7	55
210																			1.5	18	1.2	25	1.1	32	0.9	38	0.8	48	0.7	58
220																			1.5	19	1.2	27	1.1	34	0.9	40	0.8	51	0.7	60
230																			1.5	20	1.2	28	1.1	36	0.9	42	0.8	53	0.7	63
240																			1.5	21	1.2	30	1.1	37	0.9	44	0.8	56	0.7	66
250																	2.1	10	1.5	23	1.2	31	1	39	0.9	46	0.8	58	0.7	69
260																	2.1	11	1.5	24	1.2	33	1	41	0.9	48	0.8	61	0.7	72
270																	2.1	12	1.5	25	1.2	34	1	43	0.9	50	0.8	63	0.7	75
280																	2.1	13	1.5	26	1.2	36	1	44	0.9	52	0.8	65	0.7	78
290																	2	14	1.5	27	1.2	37	1	46	0.9	54	0.8	68	0.7	80
300															2.3	10	2	15	1.5	29	1.2	39	1	48	0.9	56	0.8	70	0.7	83
310															2.3	11	2	16	1.5	30	1.2	40	1	49	0.9	58	0.8	73	0.7	86
320															2.3	12	2	17	1.5	31	1.2	42	1	51	0.9	60	0.8	75	0.7	89
330															2.3	13	2	18	1.5	32	1.2	43	1	53	0.9	62	0.8	78	0.7	92
340															2.3	14	2	19	1.5	33	1.2	45	1	55	0.9	64	0.8	80	0.7	95
350															2.2	15	2	20	1.5	35	1.2	46	1	56	0.9	66	0.8	83	0.7	98
360													2.6	10	2.2	16	2	21	1.5	36	1.2	48	1	58	0.9	68	0.8	85	0.7	100
370													2.6	10	2.2	17	2	22	1.4	37	1.2	49	1	60	0.9	70	0.8	87		
380													2.6	11	2.2	17	2	23	1.4	38	1.2	50	1	61	0.9	72	0.8	90		
390													2.5	12	2.2	18	2	23	1.4	39	1.2	52	1	63	0.9	74	0.8	92		
400													2.5	13	2.2	19	2	24	1.4	40	1.2	53	1	65	0.9	76	0.8	95		
410													2.5	14	2.2	20	1.9	25	1.4	41	1.2	55	1	67	0.9	77	0.8	97		
420													2.5	15	2.2	21	1.9	26	1.4	43	1.2	56	1	68	0.9	79	0.8	100		
430													2.5	15	2.2	22	1.9	27	1.4	44	1.2	58	1	70	0.9	81				
440													2.5	16	2.2	22	1.9	28	1.4	45	1.2	59	1	72	0.9	83				
450													2.5	17	2.2	23	1.9	29	1.4	46	1.2	61	1	73	0.9	85				
460													2.5	18	2.2	24	1.9	29	1.4	47	1.2	62	1	75	0.9	87				
470											2.9	10	2.5	18	2.1	25	1.9	30	1.4	48	1.2	64	1	77	0.9	89				
480											2.9	11	2.4	19	2.1	26	1.9	31	1.4	50	1.2	65	1	79	0.9	91				
490											2.9	12	2.4	20	2.1	26	1.9	32	1.4	51	1.2	66	1	80	0.9	93				
500											2.9	12	2.4	21	2.1	27	1.9	33	1.4	52	1.2	68	1	82	0.9	95				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.8	10
60																													0.8	12
70																											1	10	0.8	14
80																											1	11	0.8	16
90																									1.2	10	1	13	0.8	18
100																									1.2	11	0.9	15	0.8	20
110																							1.3	10	1.1	12	0.9	17	0.8	22
120																							1.3	11	1.1	14	0.9	18	0.8	24
130																							1.3	12	1.1	15	0.9	20	0.8	26
140																					1.5	10	1.3	14	1.1	17	0.9	22	0.8	28
150																					1.5	11	1.3	15	1.1	18	0.9	24	0.8	30
160																					1.5	12	1.3	16	1.1	19	0.9	25	0.8	32
170																					1.5	13	1.3	17	1.1	21	0.9	27	0.8	34
180																					1.5	14	1.3	18	1.1	22	0.9	29	0.8	36
190																			1.9	10	1.5	15	1.2	20	1.1	23	0.9	30	0.8	38
200																			1.8	11	1.5	16	1.2	21	1.1	25	0.9	32	0.8	40
210																			1.8	12	1.5	17	1.2	22	1.1	26	0.9	34	0.8	42
220																			1.8	12	1.5	18	1.2	23	1.1	27	0.9	35	0.8	44
230																			1.8	13	1.4	19	1.2	24	1.1	29	0.9	37	0.8	46
240																			1.8	14	1.4	20	1.2	25	1.1	30	0.9	39	0.8	48
250																			1.8	15	1.4	21	1.2	27	1.1	32	0.9	41	0.8	50
260																			1.8	16	1.4	22	1.2	28	1.1	33	0.9	42	0.8	52
270																			1.8	16	1.4	23	1.2	29	1.1	34	0.9	44	0.8	54
280																			1.8	17	1.4	24	1.2	30	1.1	36	0.9	46	0.8	56
290																			1.8	18	1.4	25	1.2	31	1.1	37	0.9	47	0.8	58
300																	2.5	10	1.8	19	1.4	26	1.2	32	1.1	38	0.9	49	0.8	60
310																	2.5	10	1.8	20	1.4	27	1.2	34	1.1	40	0.9	51	0.8	62
320																	2.5	11	1.8	20	1.4	28	1.2	35	1.1	41	0.9	52	0.8	64
330																	2.5	11	1.8	21	1.4	29	1.2	36	1.1	42	0.9	54	0.8	66
340																	2.5	12	1.8	22	1.4	30	1.2	37	1.1	44	0.9	56	0.8	69
350																	2.5	13	1.8	23	1.4	31	1.2	38	1.1	45	0.9	58	0.8	70
360															2.8	10	2.5	13	1.8	23	1.4	32	1.2	39	1.1	46	0.9	59	0.8	72
370															2.8	10	2.5	14	1.8	24	1.4	33	1.2	41	1.1	48	0.9	61	0.8	74
380															2.8	11	2.4	14	1.7	25	1.4	34	1.2	42	1.1	49	0.9	63	0.8	76
390															2.8	11	2.4	15	1.7	26	1.4	35	1.2	43	1.1	51	0.9	64	0.8	78
400															2.7	12	2.4	15	1.7	26	1.4	36	1.2	44	1.1	52	0.9	66	0.8	80
410															2.7	12	2.4	16	1.7	27	1.4	37	1.2	45	1.1	53	0.9	68	0.8	82
420															2.7	13	2.4	16	1.7	28	1.4	38	1.2	46	1.1	55	0.9	69	0.8	84
430															2.7	13	2.4	17	1.7	29	1.4	39	1.2	48	1.1	56	0.9	71	0.8	86
440													3.1	10	2.7	14	2.4	18	1.7	30	1.4	40	1.2	49	1.1	57	0.9	73	0.8	89
450													3.1	10	2.7	14	2.4	18	1.7	30	1.4	41	1.2	50	1.1	59	0.9	74	0.8	91
460													3.1	11	2.7	15	2.4	19	1.7	31	1.4	42	1.2	51	1.1	60	0.9	76	0.8	93
470													3.1	11	2.7	15	2.4	19	1.7	32	1.4	43	1.2	52	1.1	61	0.9	78	0.8	95
480													3.1	12	2.7	16	2.4	20	1.7	33	1.4	44	1.2	53	1.1	63	0.9	79	0.8	97
490													3.1	12	2.7	16	2.4	20	1.7	33	1.4	45	1.2	55	1.1	64	0.9	81	0.8	99
500													3.1	13	2.7	17	2.4	21	1.7	34	1.4	45	1.2	56	1.1	65	0.9	83		

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.8	10
60																													0.8	12
70																													0.8	14
80																											1	11	0.8	16
90																											1	12	0.8	18
100																									1.2	10	1	14	0.8	20
110																									1.2	11	1	16	0.8	22
120																									1.2	13	0.9	18	0.8	24
130																							1.3	11	1.1	14	0.9	19	0.8	26
140																							1.3	12	1.1	15	0.9	21	0.8	28
150																							1.3	13	1.1	17	0.9	23	0.8	30
160																					1.5	10	1.3	15	1.1	18	0.9	25	0.8	32
170																					1.5	11	1.3	16	1.1	20	0.9	26	0.8	34
180																					1.5	12	1.3	17	1.1	21	0.9	28	0.8	36
190																					1.5	14	1.3	18	1.1	23	0.9	30	0.8	38
200																					1.5	15	1.3	20	1.1	24	0.9	31	0.8	40
210																					1.5	16	1.3	21	1.1	25	0.9	33	0.8	42
220																			1.9	10	1.5	17	1.2	22	1.1	27	0.9	35	0.8	44
230																			1.9	11	1.5	18	1.2	23	1.1	28	0.9	37	0.8	46
240																			1.9	12	1.5	19	1.2	24	1.1	29	0.9	38	0.8	48
250																			1.8	13	1.5	20	1.2	26	1.1	31	0.9	40	0.8	50
260																			1.8	14	1.4	21	1.2	27	1.1	32	0.9	42	0.8	52
270																			1.8	14	1.4	22	1.2	28	1.1	33	0.9	43	0.8	54
280																			1.8	15	1.4	23	1.2	29	1.1	35	0.9	45	0.8	56
290																			1.8	16	1.4	24	1.2	30	1.1	36	0.9	47	0.8	58
300																			1.8	17	1.4	25	1.2	32	1.1	38	0.9	48	0.8	60
310																			1.8	18	1.4	26	1.2	33	1.1	39	0.9	50	0.8	62
320																			1.8	19	1.4	27	1.2	34	1.1	40	0.9	52	0.8	64
330																			1.8	19	1.4	28	1.2	35	1.1	42	0.9	54	0.8	66
340																			1.8	20	1.4	29	1.2	36	1.1	43	0.9	55	0.8	68
350																			1.8	21	1.4	30	1.2	37	1.1	44	0.9	57	0.8	70
360																	2.5	10	1.8	22	1.4	31	1.2	39	1.1	46	0.9	59	0.8	72
370																	2.5	10	1.8	23	1.4	32	1.2	40	1.1	47	0.9	60	0.8	74
380																	2.5	11	1.8	23	1.4	33	1.2	41	1.1	48	0.9	62	0.8	76
390																	2.5	12	1.8	24	1.4	34	1.2	42	1.1	50	0.9	64	0.8	78
400																	2.5	12	1.8	25	1.4	35	1.2	43	1.1	51	0.9	65	0.8	80
410																	2.5	13	1.8	26	1.4	36	1.2	44	1.1	53	0.9	67	0.8	82
420																	2.5	13	1.7	26	1.4	37	1.2	46	1.1	54	0.9	69	0.8	84
430															2.8	10	2.5	14	1.7	27	1.4	38	1.2	47	1.1	55	0.9	71	0.8	86
440															2.8	10	2.5	15	1.7	28	1.4	39	1.2	48	1.1	57	0.9	72	0.8	88
450															2.8	11	2.4	15	1.7	29	1.4	40	1.2	49	1.1	58	0.9	74	0.8	90
460															2.8	11	2.4	16	1.7	30	1.4	41	1.2	50	1.1	59	0.9	76	0.8	92
470															2.8	12	2.4	16	1.7	30	1.4	42	1.2	52	1.1	61	0.9	77	0.8	94
480															2.8	12	2.4	17	1.7	31	1.4	43	1.2	53	1.1	62	0.9	79	0.8	96
490															2.7	13	2.4	18	1.7	32	1.4	44	1.2	54	1.1	63	0.9	81	0.8	98
500															2.7	13	2.4	18	1.7	33	1.4	44	1.2	55	1.1	65	0.9	82	0.8	100

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.07
B-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																														
60																													0.8	11
70																													0.8	13
80																											1	10	0.8	15
90																											1	12	0.8	17
100																											1	13	0.8	19
110																											1	15	0.8	21
120																									1.2	11	1	17	0.8	23
130																									1.2	13	1	18	0.8	25
140																							1.3	10	1.2	14	0.9	20	0.8	27
150																							1.3	12	1.2	16	0.9	22	0.8	29
160																							1.3	13	1.1	17	0.9	24	0.8	31
170																							1.3	14	1.1	19	0.9	25	0.8	33
180																					1.6	10	1.3	16	1.1	20	0.9	27	0.8	35
190																					1.5	11	1.3	17	1.1	21	0.9	29	0.8	37
200																					1.5	13	1.3	18	1.1	23	0.9	31	0.8	39
210																					1.5	14	1.3	19	1.1	24	0.9	32	0.8	41
220																					1.5	15	1.3	21	1.1	26	0.9	34	0.8	44
230																					1.5	16	1.3	22	1.1	27	0.9	36	0.8	46
240																					1.5	17	1.3	23	1.1	28	0.9	38	0.8	47
250																			1.9	10	1.5	18	1.2	24	1.1	30	0.9	39	0.8	49
260																			1.9	11	1.5	19	1.2	26	1.1	31	0.9	41	0.8	52
270																			1.9	12	1.5	20	1.2	27	1.1	33	0.9	43	0.8	54
280																			1.9	13	1.5	21	1.2	28	1.1	34	0.9	44	0.8	56
290																			1.9	14	1.5	22	1.2	29	1.1	35	0.9	46	0.8	58
300																			1.8	14	1.4	23	1.2	30	1.1	37	0.9	48	0.8	60
310																			1.8	15	1.4	24	1.2	32	1.1	38	0.9	50	0.8	62
320																			1.8	16	1.4	25	1.2	33	1.1	39	0.9	51	0.8	64
330																			1.8	17	1.4	26	1.2	34	1.1	41	0.9	53	0.8	65
340																			1.8	18	1.4	27	1.2	35	1.1	42	0.9	55	0.8	67
350																			1.8	19	1.4	28	1.2	36	1.1	44	0.9	56	0.8	70
360																			1.8	20	1.4	29	1.2	38	1.1	45	0.9	58	0.8	72
370																			1.8	21	1.4	31	1.2	39	1.1	46	0.9	60	0.8	74
380																			1.8	21	1.4	32	1.2	40	1.1	48	0.9	61	0.8	76
390																			1.8	22	1.4	32	1.2	41	1.1	49	0.9	63	0.8	78
400																			1.8	23	1.4	34	1.2	42	1.1	50	0.9	65	0.8	80
410																			1.8	24	1.4	34	1.2	44	1.1	52	0.9	67	0.8	82
420																			1.8	25	1.4	36	1.2	45	1.1	53	0.9	68	0.8	84
430																	2.5	10	1.8	25	1.4	36	1.2	46	1.1	55	0.9	70	0.8	86
440																	2.5	11	1.8	26	1.4	37	1.2	47	1.1	56	0.9	72	0.8	88
450																	2.5	11	1.8	27	1.4	38	1.2	48	1.1	57	0.9	73	0.8	90
460																	2.5	12	1.8	28	1.4	39	1.2	50	1.1	59	0.9	75	0.8	92
470																	2.5	13	1.8	29	1.4	40	1.2	51	1.1	60	0.9	77	0.8	94
480																	2.5	13	1.7	29	1.4	41	1.2	52	1.1	61	0.9	78	0.8	96
490																	2.5	14	1.7	30	1.4	42	1.2	53	1.1	63	0.9	80	0.8	98
500																	2.5	15	1.7	31	1.4	43	1.2	54	1.1	64	0.9	82	0.8	100

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																			0.5	11										
20									0.9	11	0.8	13	0.7	15	0.6	17	0.6	19												
30							1	14	0.8	18	0.7	21	0.7	24	0.6	27	0.6	29												
40					1.3	13	1	20	0.8	25	0.7	29	0.7	33	0.6	36	0.6	39												
50					1.2	18	1	25	0.8	31	0.7	37	0.7	41	0.6	46	0.6	50												
60					1.2	22	1	31	0.8	38	0.7	44	0.7	50	0.6	55	0.6	60												
70			2	13	1.2	27	0.9	37	0.8	45	0.7	52	0.7	59	0.6	65	0.6	70												
80			1.9	16	1.2	31	0.9	42	0.8	52	0.7	60	0.7	67	0.6	74	0.6	81												
90			1.9	19	1.2	36	0.9	48	0.8	59	0.7	68	0.7	76	0.6	84	0.6	91												
100			1.8	21	1.2	40	0.9	54	0.8	65	0.7	76	0.7	85	0.6	93														
110			1.8	24	1.2	45	0.9	60	0.8	72	0.7	83	0.7	93																
120			1.8	27	1.2	49	0.9	65	0.8	79	0.7	91																		
130			1.8	30	1.2	53	0.9	71	0.8	86	0.7	99																		
140			1.8	33	1.2	58	0.9	77	0.8	93																				
150			1.8	35	1.2	62	0.9	82	0.8	99																				
160			1.8	38	1.2	66	0.9	88																						
170	3.6	11	1.8	41	1.2	71	0.9	93																						
180	3.6	13	1.7	44	1.2	75	0.9	99																						
190	3.5	15	1.7	46	1.1	79																								
200	3.5	16	1.7	49	1.1	84																								
210	3.4	18	1.7	52	1.1	88																								
220	3.4	19	1.7	55	1.1	92																								
230	3.4	21	1.7	57	1.1	97																								
240	3.3	22	1.7	60																										
250	3.3	24	1.7	63																										
260	3.3	25	1.7	65																										
270	3.3	27	1.7	68																										
280	3.3	28	1.7	71																										
290	3.3	30	1.7	74																										
300	3.2	31	1.7	76																										
310	3.2	33	1.7	79																										
320	3.2	34	1.7	82																										
330	3.2	35	1.7	84																										
340	3.2	37	1.7	87																										
350	3.2	38	1.7	90																										
360	3.2	40	1.7	93																										
370	3.2	41	1.7	95																										
380	3.2	43	1.7	98																										
390	3.1	44																												
400	3.1	45																												
410	3.1	47																												
420	3.1	48																												
430	3.1	50																												
440	3.1	51																												
450	3.1	52																												
460	3.1	54																												
470	3.1	55																												
480	3.1	56																												
490	3.1	58																												
500	3.1	59																												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																			0.5	11										
20											0.8	12	0.7	14	0.6	16	0.6	18												
30							1.1	12	0.9	17	0.8	20	0.7	23	0.6	26	0.6	29												
40					1.3	11	1	18	0.8	24	0.7	28	0.7	32	0.6	36	0.6	39												
50					1.3	16	1	24	0.8	30	0.7	36	0.7	41	0.6	45	0.6	49												
60					1.2	21	1	30	0.8	37	0.7	44	0.7	49	0.6	55	0.6	60												
70					1.2	25	1	36	0.8	44	0.7	52	0.7	58	0.6	64	0.6	70												
80			2	12	1.2	30	0.9	41	0.8	51	0.7	59	0.7	67	0.6	74	0.6	80												
90			2	15	1.2	34	0.9	47	0.8	58	0.7	67	0.7	76	0.6	83	0.6	90												
100			1.9	18	1.2	39	0.9	53	0.8	65	0.7	75	0.7	84	0.6	93														
110			1.9	22	1.2	43	0.9	59	0.8	71	0.7	83	0.7	93																
120			1.8	24	1.2	48	0.9	64	0.8	78	0.7	90																		
130			1.8	27	1.2	52	0.9	70	0.8	85	0.7	98																		
140			1.8	30	1.2	56	0.9	76	0.8	92																				
150			1.8	33	1.2	61	0.9	81	0.8	99																				
160			1.8	36	1.2	65	0.9	87																						
170			1.8	39	1.2	69	0.9	93																						
180			1.8	42	1.2	74	0.9	98																						
190			1.8	44	1.2	78																								
200			1.8	47	1.2	83																								
210	3.7	10	1.7	50	1.2	87																								
220	3.7	12	1.7	53	1.1	91																								
230	3.6	14	1.7	55	1.1	96																								
240	3.6	16	1.7	58	1.1	100																								
250	3.5	17	1.7	61																										
260	3.5	19	1.7	64																										
270	3.4	21	1.7	66																										
280	3.4	23	1.7	69																										
290	3.4	24	1.7	72																										
300	3.4	26	1.7	75																										
310	3.3	27	1.7	77																										
320	3.3	29	1.7	80																										
330	3.3	31	1.7	83																										
340	3.3	32	1.7	85																										
350	3.3	34	1.7	88																										
360	3.2	35	1.7	91																										
370	3.2	37	1.7	94																										
380	3.2	38	1.7	96																										
390	3.2	40	1.7	99																										
400	3.2	41																												
410	3.2	43																												
420	3.2	44																												
430	3.2	45																												
440	3.2	47																												
450	3.2	48																												
460	3.1	50																												
470	3.1	51																												
480	3.1	53																												
490	3.1	54																												
500	3.1	55																												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																			0.5	10										
20											0.8	11	0.7	13	0.7	15	0.6	17												
30							1.1	10	0.9	15	0.8	19	0.7	22	0.6	25	0.6	28												
40							1	17	0.8	22	0.7	27	0.7	31	0.6	35	0.6	38												
50					1.3	14	1	23	0.8	30	0.7	35	0.7	40	0.6	45	0.6	49												
60					1.3	19	1	29	0.8	36	0.7	43	0.7	49	0.6	54	0.6	59												
70					1.3	24	1	35	0.8	43	0.7	51	0.7	58	0.6	64	0.6	69												
80					1.2	28	1	40	0.8	50	0.7	59	0.7	66	0.6	73	0.6	80												
90			2.1	10	1.2	33	0.9	46	0.8	57	0.7	66	0.7	75	0.6	83	0.6	90												
100			2	14	1.2	37	0.9	52	0.8	64	0.7	74	0.7	84	0.6	92	0.6	100												
110			2	18	1.2	42	0.9	58	0.8	71	0.7	82	0.7	92																
120			1.9	21	1.2	46	0.9	63	0.8	77	0.7	90																		
130			1.9	24	1.2	51	0.9	69	0.8	84	0.7	98																		
140			1.9	27	1.2	55	0.9	75	0.8	91																				
150			1.8	30	1.2	60	0.9	80	0.8	98																				
160			1.8	33	1.2	64	0.9	86																						
170			1.8	36	1.2	68	0.9	92																						
180			1.8	39	1.2	73	0.9	97																						
190			1.8	42	1.2	77																								
200			1.8	45	1.2	81																								
210			1.8	48	1.2	86																								
220			1.8	51	1.2	90																								
230			1.8	53	1.2	95																								
240			1.7	56	1.2	99																								
250			1.7	59																										
260	3.8	10	1.7	62																										
270	3.7	12	1.7	64																										
280	3.7	14	1.7	67																										
290	3.6	16	1.7	70																										
300	3.6	18	1.7	73																										
310	3.5	20	1.7	75																										
320	3.5	22	1.7	78																										
330	3.4	24	1.7	81																										
340	3.4	26	1.7	84																										
350	3.4	28	1.7	86																										
360	3.4	29	1.7	89																										
370	3.3	31	1.7	92																										
380	3.3	33	1.7	95																										
390	3.3	34	1.7	97																										
400	3.3	36	1.7	100																										
410	3.3	37																												
420	3.3	39																												
430	3.2	41																												
440	3.2	42																												
450	3.2	44																												
460	3.2	45																												
470	3.2	47																												
480	3.2	48																												
490	3.2	50																												
500	3.2	51																												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20													0.8	10	0.7	11	0.7	12	0.5	17										
30									1	11	0.9	14	0.8	16	0.7	18	0.7	20	0.5	26										
40							1.2	12	1	16	0.8	19	0.8	22	0.7	25	0.6	27	0.5	36										
50					1.6	10	1.2	16	1	21	0.8	25	0.8	28	0.7	31	0.6	34	0.5	45										
60					1.5	13	1.1	20	0.9	25	0.8	30	0.7	34	0.7	38	0.6	42	0.5	54										
70					1.5	16	1.1	24	0.9	30	0.8	36	0.7	40	0.7	45	0.6	49	0.5	64										
80					1.4	19	1.1	28	0.9	35	0.8	41	0.7	46	0.7	52	0.6	56	0.5	73										
90					1.4	22	1.1	32	0.9	40	0.8	46	0.7	53	0.7	58	0.6	64	0.5	82										
100			2.4	10	1.4	25	1.1	36	0.9	44	0.8	52	0.7	59	0.7	65	0.6	71	0.5	91										
110			2.4	12	1.4	28	1.1	39	0.9	49	0.8	57	0.7	65	0.7	72	0.6	78												
120			2.3	14	1.4	31	1.1	43	0.9	54	0.8	63	0.7	71	0.7	78	0.6	85												
130			2.3	16	1.4	34	1.1	47	0.9	58	0.8	68	0.7	77	0.7	85	0.6	93												
140			2.2	18	1.4	37	1.1	51	0.9	63	0.8	74	0.7	83	0.7	92	0.6	100												
150			2.2	20	1.4	40	1.1	55	0.9	68	0.8	79	0.7	89	0.7	98														
160			2.2	22	1.4	43	1.1	59	0.9	72	0.8	84	0.7	95																
170			2.2	24	1.4	46	1.1	63	0.9	77	0.8	90																		
180			2.2	25	1.4	49	1.1	67	0.9	82	0.8	95																		
190			2.2	27	1.4	52	1.1	71	0.9	86																				
200			2.1	29	1.3	55	1.1	74	0.9	91																				
210			2.1	31	1.3	58	1.1	78	0.9	96																				
220			2.1	33	1.3	61	1.1	82																						
230			2.1	34	1.3	64	1.1	86																						
240			2.1	36	1.3	67	1.1	90																						
250			2.1	38	1.3	69	1.1	94																						
260			2.1	40	1.3	72	1.1	98																						
270			2.1	42	1.3	75																								
280			2.1	44	1.3	78																								
290	4.5	10	2.1	45	1.3	81																								
300	4.5	11	2.1	47	1.3	84																								
310	4.5	12	2.1	49	1.3	87																								
320	4.4	13	2.1	51	1.3	90																								
330	4.4	14	2.1	52	1.3	93																								
340	4.4	15	2.1	54	1.3	96																								
350	4.3	16	2.1	56	1.3	99																								
360	4.3	17	2.1	58																										
370	4.3	18	2.1	60																										
380	4.3	19	2.1	61																										
390	4.2	20	2.1	63																										
400	4.2	21	2.1	65																										
410	4.2	22	2.1	67																										
420	4.2	23	2	68																										
430	4.2	24	2	70																										
440	4.2	25	2	72																										
450	4.1	26	2	74																										
460	4.1	27	2	75																										
470	4.1	27	2	77																										
480	4.1	28	2	79																										
490	4.1	29	2	81																										
500	4.1	30	2	83																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20															0.8	10	0.7	11	0.5	16										
30											0.9	12	0.8	15	0.7	17	0.7	19	0.5	26										
40							1.2	10	1	14	0.9	18	0.8	21	0.7	24	0.7	26	0.5	35										
50							1.2	14	1	19	0.8	24	0.8	27	0.7	31	0.6	34	0.5	44										
60					1.6	10	1.2	18	1	24	0.8	29	0.8	34	0.7	37	0.6	41	0.5	54										
70					1.5	14	1.1	22	0.9	29	0.8	35	0.7	40	0.7	44	0.6	48	0.5	63										
80					1.5	17	1.1	26	0.9	34	0.8	40	0.7	46	0.7	51	0.6	56	0.5	72										
90					1.5	20	1.1	30	0.9	39	0.8	46	0.7	52	0.7	58	0.6	63	0.5	82										
100					1.4	23	1.1	34	0.9	43	0.8	51	0.7	58	0.7	64	0.6	70	0.5	91										
110					1.4	26	1.1	38	0.9	48	0.8	56	0.7	64	0.7	71	0.6	78	0.5	100										
120					1.4	29	1.1	42	0.9	53	0.8	62	0.7	70	0.7	78	0.6	85												
130			2.4	11	1.4	32	1.1	46	0.9	57	0.8	67	0.7	76	0.7	84	0.6	92												
140			2.4	14	1.4	36	1.1	50	0.9	62	0.8	73	0.7	82	0.7	91	0.6	99												
150			2.3	16	1.4	38	1.1	54	0.9	67	0.8	78	0.7	88	0.7	98														
160			2.3	18	1.4	41	1.1	58	0.9	72	0.8	84	0.7	94																
170			2.3	20	1.4	44	1.1	62	0.9	76	0.8	89	0.7	100																
180			2.2	22	1.4	48	1.1	66	0.9	81	0.8	94																		
190			2.2	24	1.4	50	1.1	70	0.9	86	0.8	100																		
200			2.2	26	1.4	53	1.1	73	0.9	90																				
210			2.2	28	1.4	56	1.1	77	0.9	95																				
220			2.2	30	1.4	59	1.1	81	0.9	100																				
230			2.2	32	1.3	62	1.1	85																						
240			2.1	34	1.3	65	1.1	89																						
250			2.1	35	1.3	68	1.1	93																						
260			2.1	37	1.3	71	1.1	97																						
270			2.1	39	1.3	74																								
280			2.1	41	1.3	77																								
290			2.1	43	1.3	80																								
300			2.1	45	1.3	83																								
310			2.1	47	1.3	86																								
320			2.1	48	1.3	89																								
330			2.1	50	1.3	92																								
340			2.1	52	1.3	95																								
350			2.1	54	1.3	98																								
360			2.1	56	1.3	100																								
370			2.1	57																										
380	4.6	10	2.1	59																										
390	4.6	11	2.1	61																										
400	4.5	12	2.1	63																										
410	4.5	13	2.1	64																										
420	4.5	14	2.1	66																										
430	4.4	15	2.1	68																										
440	4.4	17	2.1	70																										
450	4.4	18	2.1	72																										
460	4.3	19	2.1	73																										
470	4.3	20	2	75																										
480	4.3	21	2	77																										
490	4.3	22	2	79																										
500	4.3	23	2	80																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																	0.7	10	0.6	16										
30											0.9	11	0.8	14	0.7	16	0.7	18	0.5	25										
40									1	13	0.9	17	0.8	20	0.7	23	0.7	26	0.5	35										
50							1.2	12	1	18	0.9	23	0.8	26	0.7	30	0.7	33	0.5	44										
60							1.2	16	1	23	0.8	28	0.8	33	0.7	37	0.6	40	0.5	53										
70					1.6	10	1.2	21	1	28	0.8	34	0.7	39	0.7	43	0.6	48	0.5	63										
80					1.5	14	1.1	25	0.9	33	0.8	39	0.7	45	0.7	50	0.6	55	0.5	72										
90					1.5	18	1.1	29	0.9	37	0.8	45	0.7	51	0.7	57	0.6	62	0.5	81										
100					1.5	21	1.1	33	0.9	42	0.8	50	0.7	57	0.7	64	0.6	70	0.5	90										
110					1.4	24	1.1	37	0.9	47	0.8	56	0.7	63	0.7	70	0.6	77	0.5	100										
120					1.4	27	1.1	41	0.9	52	0.8	61	0.7	69	0.7	77	0.6	84												
130					1.4	31	1.1	45	0.9	56	0.8	66	0.7	76	0.7	84	0.6	92												
140					1.4	34	1.1	49	0.9	61	0.8	72	0.7	82	0.7	90	0.6	99												
150			2.5	10	1.4	37	1.1	53	0.9	66	0.8	77	0.7	88	0.7	97														
160			2.4	13	1.4	40	1.1	57	0.9	71	0.8	83	0.7	94																
170			2.4	15	1.4	43	1.1	61	0.9	75	0.8	88	0.7	100																
180			2.3	18	1.4	46	1.1	65	0.9	80	0.8	94																		
190			2.3	20	1.4	49	1.1	68	0.9	85	0.8	99																		
200			2.3	22	1.4	52	1.1	72	0.9	89																				
210			2.3	24	1.4	55	1.1	76	0.9	94																				
220			2.2	26	1.4	58	1.1	80	0.9	99																				
230			2.2	28	1.4	61	1.1	84																						
240			2.2	30	1.4	64	1.1	88																						
250			2.2	32	1.4	67	1.1	92																						
260			2.2	34	1.3	70	1.1	96																						
270			2.2	36	1.3	73	1.1	100																						
280			2.1	38	1.3	76																								
290			2.1	40	1.3	79																								
300			2.1	42	1.3	82																								
310			2.1	44	1.3	85																								
320			2.1	46	1.3	87																								
330			2.1	47	1.3	90																								
340			2.1	49	1.3	93																								
350			2.1	51	1.3	96																								
360			2.1	53	1.3	99																								
370			2.1	55																										
380			2.1	57																										
390			2.1	59																										
400			2.1	60																										
410			2.1	62																										
420			2.1	64																										
430			2.1	66																										
440			2.1	68																										
450			2.1	69																										
460			2.1	71																										
470			2.1	73																										
480	4.6	10	2.1	75																										
490	4.6	12	2.1	77																										
500	4.6	13	2.1	78																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																			0.7	10	0.5	13								
30															0.9	10	0.8	11	0.6	16	0.5	20								
40											1.1	10	0.9	12	0.9	14	0.8	16	0.6	22	0.5	27								
50									1.2	10	1	13	0.9	16	0.8	18	0.8	21	0.6	28	0.5	34								
60									1.2	13	1	17	0.9	20	0.8	23	0.8	25	0.6	34	0.5	41								
70							1.5	12	1.2	16	1	20	0.9	24	0.8	27	0.8	30	0.6	40	0.5	48								
80							1.4	14	1.2	19	1	24	0.9	28	0.8	31	0.8	34	0.6	46	0.5	55								
90							1.4	17	1.1	22	1	27	0.9	32	0.8	35	0.8	39	0.6	52	0.5	62								
100					1.9	11	1.4	19	1.1	25	1	31	0.9	35	0.8	40	0.7	44	0.6	58	0.5	70								
110					1.9	13	1.4	22	1.1	28	1	34	0.9	39	0.8	44	0.7	48	0.6	64	0.5	77								
120					1.8	15	1.4	24	1.1	31	1	37	0.9	43	0.8	48	0.7	53	0.6	70	0.5	84								
130					1.8	17	1.3	26	1.1	34	1	41	0.9	47	0.8	52	0.7	57	0.6	76	0.5	91								
140					1.8	19	1.3	29	1.1	37	1	44	0.9	50	0.8	56	0.7	62	0.6	81	0.5	98								
150					1.8	20	1.3	31	1.1	40	1	47	0.9	54	0.8	61	0.7	66	0.6	87										
160					1.8	22	1.3	33	1.1	43	1	51	0.9	58	0.8	65	0.7	71	0.6	93										
170					1.8	24	1.3	36	1.1	45	1	54	0.9	62	0.8	69	0.7	76	0.6	99										
180					1.8	26	1.3	38	1.1	48	1	57	0.9	65	0.8	73	0.7	80												
190					1.7	28	1.3	40	1.1	51	1	61	0.9	69	0.8	77	0.7	85												
200			3.1	10	1.7	29	1.3	43	1.1	54	1	64	0.9	73	0.8	81	0.7	89												
210			3.1	11	1.7	31	1.3	45	1.1	57	1	67	0.9	77	0.8	86	0.7	94												
220			3.1	12	1.7	33	1.3	47	1.1	60	1	71	0.9	81	0.8	90	0.7	98												
230			3	13	1.7	35	1.3	50	1.1	63	1	74	0.9	84	0.8	94														
240			3	14	1.7	36	1.3	52	1.1	65	1	77	0.9	88	0.8	98														
250			3	16	1.7	38	1.3	54	1.1	68	1	81	0.9	92																
260			3	17	1.7	40	1.3	57	1.1	71	1	84	0.9	96																
270			2.9	18	1.7	42	1.3	59	1.1	74	1	87	0.9	100																
280			2.9	19	1.7	43	1.3	61	1.1	77	1	91																		
290			2.9	20	1.7	45	1.3	64	1.1	80	1	94																		
300			2.9	21	1.7	47	1.3	66	1.1	82	1	97																		
310			2.9	22	1.7	48	1.3	68	1.1	85																				
320			2.9	23	1.7	50	1.3	71	1.1	88																				
330			2.9	24	1.7	52	1.3	73	1.1	91																				
340			2.8	25	1.7	54	1.3	75	1.1	94																				
350			2.8	26	1.7	55	1.3	78	1.1	97																				
360			2.8	27	1.7	57	1.3	80	1.1	100																				
370			2.8	28	1.7	59	1.3	82																						
380			2.8	29	1.7	60	1.3	85																						
390			2.8	30	1.7	62	1.3	87																						
400			2.8	31	1.7	64	1.3	89																						
410			2.8	32	1.7	66	1.3	91																						
420			2.8	34	1.7	67	1.3	94																						
430			2.8	35	1.7	69	1.3	96																						
440			2.8	35	1.7	71	1.3	98																						
450			2.8	37	1.7	72																								
460			2.8	38	1.7	74																								
470			2.8	39	1.7	76																								
480			2.8	40	1.7	78																								
490			2.8	41	1.7	79																								
500			2.7	42	1.7	81																								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																					0.6	12								
30																	0.8	10	0.6	15	0.5	19								
40													1	11	0.9	13	0.8	15	0.6	21	0.5	26								
50											1.1	12	0.9	15	0.9	17	0.8	20	0.6	27	0.5	33								
60									1.2	11	1	16	0.9	19	0.8	22	0.8	24	0.6	33	0.5	41								
70									1.2	15	1	19	0.9	23	0.8	26	0.8	29	0.6	39	0.5	48								
80							1.5	12	1.2	18	1	23	0.9	27	0.8	30	0.8	34	0.6	45	0.5	55								
90							1.4	14	1.2	21	1	26	0.9	30	0.8	35	0.8	38	0.6	51	0.5	62								
100							1.4	17	1.2	24	1	29	0.9	34	0.8	39	0.8	43	0.6	57	0.5	69								
110							1.4	20	1.1	27	1	33	0.9	38	0.8	43	0.7	47	0.6	63	0.5	76								
120					1.9	11	1.4	22	1.1	30	1	36	0.9	42	0.8	47	0.7	52	0.6	69	0.5	83								
130					1.9	14	1.4	25	1.1	33	1	40	0.9	46	0.8	51	0.7	57	0.6	75	0.5	90								
140					1.9	16	1.4	27	1.1	36	1	43	0.9	50	0.8	56	0.7	61	0.6	81	0.5	97								
150					1.8	18	1.4	29	1.1	39	1	46	0.9	53	0.8	60	0.7	66	0.6	87										
160					1.8	20	1.3	32	1.1	41	1	50	0.9	57	0.8	64	0.7	70	0.6	93										
170					1.8	22	1.3	34	1.1	44	1	53	0.9	61	0.8	68	0.7	75	0.6	99										
180					1.8	23	1.3	37	1.1	47	1	56	0.9	65	0.8	72	0.7	80												
190					1.8	25	1.3	39	1.1	50	1	60	0.9	69	0.8	77	0.7	84												
200					1.8	27	1.3	41	1.1	53	1	63	0.9	72	0.8	81	0.7	89												
210					1.8	29	1.3	44	1.1	56	1	66	0.9	76	0.8	85	0.7	93												
220					1.7	31	1.3	46	1.1	59	1	70	0.9	80	0.8	89	0.7	98												
230					1.7	33	1.3	48	1.1	61	1	73	0.9	84	0.8	93														
240					1.7	34	1.3	51	1.1	64	1	76	0.9	87	0.8	98														
250					1.7	36	1.3	53	1.1	67	1	80	0.9	91																
260			3.2	11	1.7	38	1.3	55	1.1	70	1	83	0.9	95																
270			3.1	12	1.7	40	1.3	58	1.1	73	1	86	0.9	99																
280			3.1	13	1.7	41	1.3	60	1.1	76	1	90																		
290			3.1	15	1.7	43	1.3	62	1.1	79	1	93																		
300			3	16	1.7	45	1.3	65	1.1	82	1	96																		
310			3	17	1.7	47	1.3	67	1.1	84	1	100																		
320			3	18	1.7	48	1.3	69	1.1	87																				
330			3	19	1.7	50	1.3	72	1.1	90																				
340			2.9	21	1.7	52	1.3	74	1.1	93																				
350			2.9	22	1.7	54	1.3	76	1.1	96																				
360			2.9	23	1.7	55	1.3	79	1.1	99																				
370			2.9	24	1.7	57	1.3	81																						
380			2.9	25	1.7	59	1.3	83																						
390			2.9	26	1.7	61	1.3	86																						
400			2.9	27	1.7	62	1.3	88																						
410			2.8	29	1.7	64	1.3	90																						
420			2.8	30	1.7	66	1.3	93																						
430			2.8	31	1.7	67	1.3	95																						
440			2.8	32	1.7	69	1.3	97																						
450			2.8	33	1.7	71	1.3	100																						
460			2.8	34	1.7	73																								
470			2.8	35	1.7	74																								
480			2.8	36	1.7	76																								
490			2.8	37	1.7	78																								
500			2.8	38	1.7	80																								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																					0.6	11								
30																			0.6	14	0.5	18								
40															0.9	11	0.8	14	0.6	20	0.5	26								
50											1.1	10	1	13	0.9	16	0.8	19	0.6	27	0.5	33								
60											1.1	14	0.9	17	0.9	21	0.8	23	0.6	33	0.5	40								
70									1.3	12	1.1	18	0.9	22	0.8	25	0.8	28	0.6	39	0.5	47								
80									1.2	16	1	21	0.9	26	0.8	29	0.8	33	0.6	45	0.5	54								
90							1.5	12	1.2	19	1	25	0.9	29	0.8	34	0.8	37	0.6	51	0.5	61								
100							1.5	14	1.2	22	1	28	0.9	33	0.8	38	0.8	42	0.6	56	0.5	69								
110							1.4	17	1.2	25	1	32	0.9	37	0.8	42	0.8	47	0.6	63	0.5	76								
120							1.4	20	1.1	28	1	35	0.9	41	0.8	46	0.8	51	0.6	68	0.5	83								
130							1.4	23	1.1	31	1	39	0.9	45	0.8	51	0.7	56	0.6	74	0.5	90								
140					2	12	1.4	25	1.1	34	1	42	0.9	49	0.8	55	0.7	60	0.6	80	0.5	97								
150					1.9	14	1.4	28	1.1	37	1	45	0.9	52	0.8	59	0.7	65	0.6	86										
160					1.9	16	1.4	30	1.1	40	1	49	0.9	56	0.8	63	0.7	70	0.6	92										
170					1.9	18	1.4	32	1.1	43	1	52	0.9	60	0.8	67	0.7	74	0.6	98										
180					1.8	20	1.3	35	1.1	46	1	55	0.9	64	0.8	72	0.7	79												
190					1.8	22	1.3	37	1.1	49	1	59	0.9	68	0.8	76	0.7	83												
200					1.8	24	1.3	40	1.1	52	1	62	0.9	71	0.8	80	0.7	88												
210					1.8	26	1.3	42	1.1	55	1	66	0.9	75	0.8	84	0.7	93												
220					1.8	28	1.3	45	1.1	57	1	69	0.9	79	0.8	88	0.7	97												
230					1.8	30	1.3	47	1.1	60	1	72	0.9	83	0.8	93														
240					1.8	32	1.3	49	1.1	63	1	76	0.9	87	0.8	97														
250					1.8	34	1.3	52	1.1	66	1	79	0.9	90																
260					1.7	36	1.3	54	1.1	69	1	82	0.9	94																
270					1.7	37	1.3	56	1.1	72	1	86	0.9	98																
280					1.7	39	1.3	59	1.1	75	1	89																		
290					1.7	41	1.3	61	1.1	78	1	92																		
300					1.7	43	1.3	63	1.1	81	1	96																		
310			3.2	10	1.7	45	1.3	66	1.1	83	1	99																		
320			3.2	11	1.7	46	1.3	68	1.1	86																				
330			3.2	13	1.7	48	1.3	70	1.1	89																				
340			3.1	14	1.7	50	1.3	73	1.1	92																				
350			3.1	16	1.7	52	1.3	75	1.1	95																				
360			3.1	17	1.7	53	1.3	77	1.1	98																				
370			3	18	1.7	55	1.3	80																						
380			3	20	1.7	57	1.3	82																						
390			3	21	1.7	59	1.3	85																						
400			3	22	1.7	61	1.3	87																						
410			2.9	23	1.7	62	1.3	89																						
420			2.9	25	1.7	64	1.3	92																						
430			2.9	26	1.7	66	1.3	94																						
440			2.9	27	1.7	67	1.3	96																						
450			2.9	28	1.7	69	1.3	98																						
460			2.9	29	1.7	71																								
470			2.9	31	1.7	73																								
480			2.9	32	1.7	74																								
490			2.8	33	1.7	76																								
500			2.8	34	1.7	78																								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.5	10						
30																			0.7	11	0.6	14	0.5	17						
40																	0.9	10	0.7	15	0.6	19	0.5	23						
50													1.1	10	1	12	0.9	14	0.7	20	0.6	25	0.5	29						
60											1.2	10	1.1	13	1	15	0.9	17	0.7	24	0.6	30	0.5	35						
70									1.4	10	1.2	13	1.1	16	0.9	18	0.9	21	0.7	29	0.6	35	0.5	41						
80									1.4	12	1.2	15	1	19	0.9	21	0.9	24	0.7	33	0.6	40	0.5	47						
90									1.4	14	1.2	18	1	21	0.9	24	0.9	27	0.7	37	0.6	46	0.5	53						
100							1.7	11	1.4	16	1.2	20	1	24	0.9	28	0.9	31	0.7	42	0.6	51	0.5	59						
110							1.7	13	1.3	18	1.1	23	1	27	0.9	31	0.9	34	0.7	46	0.6	56	0.5	65						
120							1.7	14	1.3	20	1.1	25	1	30	0.9	34	0.8	37	0.7	50	0.6	61	0.5	71						
130							1.6	16	1.3	22	1.1	28	1	32	0.9	37	0.8	41	0.7	55	0.6	67	0.5	77						
140							1.6	18	1.3	24	1.1	30	1	35	0.9	40	0.8	44	0.7	59	0.6	72	0.5	83						
150					2.3	10	1.6	20	1.3	27	1.1	32	1	38	0.9	43	0.8	47	0.7	63	0.6	77	0.5	89						
160					2.2	12	1.6	21	1.3	29	1.1	35	1	40	0.9	46	0.8	51	0.7	68	0.6	82	0.5	95						
170					2.2	13	1.6	23	1.3	31	1.1	37	1	43	0.9	49	0.8	54	0.7	72	0.6	88								
180					2.2	14	1.6	25	1.3	33	1.1	40	1	46	0.9	52	0.8	57	0.7	77	0.6	93								
190					2.2	16	1.6	26	1.3	35	1.1	42	1	49	0.9	55	0.8	61	0.7	81	0.6	98								
200					2.2	17	1.6	28	1.3	37	1.1	44	1	51	0.9	58	0.8	64	0.7	85										
210					2.1	18	1.6	30	1.3	39	1.1	47	1	54	0.9	61	0.8	67	0.7	89										
220					2.1	20	1.6	31	1.3	41	1.1	49	1	57	0.9	64	0.8	70	0.7	94										
230					2.1	21	1.6	33	1.3	43	1.1	51	1	59	0.9	67	0.8	74	0.7	98										
240					2.1	22	1.6	35	1.3	45	1.1	54	1	62	0.9	70	0.8	77												
250					2.1	23	1.5	36	1.3	47	1.1	56	1	65	0.9	73	0.8	80												
260					2.1	25	1.5	38	1.3	49	1.1	59	1	68	0.9	76	0.8	84												
270					2.1	26	1.5	39	1.3	51	1.1	61	1	70	0.9	79	0.8	87												
280					2.1	27	1.5	41	1.3	53	1.1	63	1	73	0.9	82	0.8	90												
290					2.1	28	1.5	43	1.3	55	1.1	66	1	76	0.9	85	0.8	94												
300					2.1	29	1.5	44	1.3	57	1.1	68	1	78	0.9	88	0.8	97												
310					2.1	31	1.5	46	1.3	59	1.1	70	1	81	0.9	91	0.8	100												
320					2.1	32	1.5	48	1.3	61	1.1	73	1	84	0.9	94														
330			3.8	10	2.1	33	1.5	49	1.3	63	1.1	75	1	87	0.9	97														
340			3.8	10	2.1	34	1.5	51	1.3	65	1.1	78	1	89	0.9	100														
350			3.8	11	2	35	1.5	52	1.3	67	1.1	80	1	92																
360			3.7	12	2	37	1.5	54	1.3	69	1.1	82	1	95																
370			3.7	13	2	38	1.5	56	1.3	71	1.1	85	1	97																
380			3.7	13	2	39	1.5	57	1.3	73	1.1	87	1	100																
390			3.7	14	2	40	1.5	59	1.3	75	1.1	89																		
400			3.7	15	2	41	1.5	61	1.3	77	1.1	92																		
410			3.7	16	2	43	1.5	62	1.3	79	1.1	94																		
420			3.6	16	2	44	1.5	64	1.3	81	1.1	96																		
430			3.6	17	2	45	1.5	65	1.3	83	1.1	99																		
440			3.6	18	2	46	1.5	67	1.3	85																				
450			3.6	19	2	47	1.5	69	1.3	87																				
460			3.6	19	2	48	1.5	70	1.3	89																				
470			3.6	20	2	49	1.5	72	1.3	91																				
480			3.6	21	2	51	1.5	73	1.3	93																				
490			3.6	21	2	52	1.5	75	1.3	95																				
500			3.5	22	2	53	1.5	77	1.3	97																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.6	10						
30																			0.7	10	0.6	13	0.5	16						
40																			0.7	14	0.6	19	0.5	22						
50															1	11	0.9	13	0.7	19	0.6	24	0.5	28						
60													1.1	11	1	14	0.9	16	0.7	23	0.6	29	0.5	34						
70											1.2	11	1.1	14	1	17	0.9	20	0.7	28	0.6	35	0.5	40						
80											1.2	14	1.1	17	1	20	0.9	23	0.7	32	0.6	40	0.5	46						
90									1.4	12	1.2	16	1	20	0.9	23	0.9	26	0.7	37	0.6	45	0.5	53						
100									1.4	14	1.2	19	1	23	0.9	26	0.9	30	0.7	41	0.6	50	0.5	59						
110									1.4	16	1.2	21	1	26	0.9	30	0.9	33	0.7	45	0.6	56	0.5	65						
120							1.7	11	1.4	18	1.2	24	1	28	0.9	33	0.9	36	0.7	50	0.6	61	0.5	71						
130							1.7	13	1.3	21	1.1	26	1	31	0.9	36	0.9	40	0.7	54	0.6	66	0.5	77						
140							1.7	15	1.3	23	1.1	29	1	34	0.9	39	0.8	43	0.7	58	0.6	71	0.5	83						
150							1.7	17	1.3	25	1.1	31	1	37	0.9	42	0.8	47	0.7	63	0.6	77	0.5	89						
160							1.6	19	1.3	27	1.1	34	1	39	0.9	45	0.8	50	0.7	67	0.6	82	0.5	95						
170							1.6	21	1.3	29	1.1	36	1	42	0.9	48	0.8	53	0.7	72	0.6	87								
180					2.3	10	1.6	22	1.3	31	1.1	38	1	45	0.9	51	0.8	57	0.7	76	0.6	92								
190					2.3	12	1.6	24	1.3	33	1.1	41	1	48	0.9	54	0.8	60	0.7	80	0.6	98								
200					2.3	13	1.6	26	1.3	35	1.1	43	1	50	0.9	57	0.8	63	0.7	85										
210					2.2	15	1.6	28	1.3	37	1.1	46	1	53	0.9	60	0.8	66	0.7	89										
220					2.2	16	1.6	29	1.3	39	1.1	48	1	56	0.9	63	0.8	70	0.7	93										
230					2.2	17	1.6	31	1.3	41	1.1	50	1	59	0.9	66	0.8	73	0.7	98										
240					2.2	19	1.6	33	1.3	43	1.1	53	1	61	0.9	69	0.8	76												
250					2.2	20	1.6	34	1.3	46	1.1	55	1	64	0.9	72	0.8	80												
260					2.1	21	1.6	36	1.3	48	1.1	58	1	67	0.9	75	0.8	83												
270					2.1	23	1.6	38	1.3	50	1.1	60	1	69	0.9	78	0.8	86												
280					2.1	24	1.6	39	1.3	52	1.1	62	1	72	0.9	81	0.8	90												
290					2.1	25	1.6	41	1.3	54	1.1	65	1	75	0.9	84	0.8	93												
300					2.1	27	1.5	43	1.3	56	1.1	67	1	78	0.9	87	0.8	96												
310					2.1	28	1.5	44	1.3	58	1.1	69	1	80	0.9	90	0.8	100												
320					2.1	29	1.5	46	1.3	60	1.1	72	1	83	0.9	93														
330					2.1	30	1.5	48	1.3	62	1.1	74	1	86	0.9	96														
340					2.1	32	1.5	49	1.3	64	1.1	77	1	88	0.9	99														
350					2.1	33	1.5	51	1.3	66	1.1	79	1	91																
360					2.1	34	1.5	53	1.3	68	1.1	81	1	94																
370					2.1	35	1.5	54	1.3	70	1.1	84	1	96																
380					2.1	37	1.5	56	1.3	72	1.1	86	1	99																
390					2.1	38	1.5	57	1.3	74	1.1	89																		
400					2	39	1.5	59	1.3	76	1.1	91																		
410					2	40	1.5	61	1.3	78	1.1	93																		
420					2	41	1.5	62	1.3	80	1.1	96																		
430			3.8	10	2	43	1.5	64	1.3	82	1.1	98																		
440			3.8	11	2	44	1.5	66	1.3	84	1.1	100																		
450			3.8	12	2	45	1.5	67	1.3	86																				
460			3.8	13	2	46	1.5	69	1.3	88																				
470			3.8	13	2	47	1.5	70	1.3	90																				
480			3.7	14	2	49	1.5	72	1.3	92																				
490			3.7	15	2	50	1.5	74	1.3	94																				
500			3.7	16	2	51	1.5	75	1.3	96																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.5
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																									0.5	11				
30																					0.6	12	0.5	15						
40																			0.7	13	0.6	18	0.5	22						
50																	1	11	0.7	18	0.6	23	0.5	28						
60															1	12	0.9	15	0.7	23	0.6	29	0.5	34						
70													1.1	12	1	16	0.9	18	0.7	27	0.6	34	0.5	40						
80											1.3	11	1.1	16	1	19	0.9	22	0.7	31	0.6	39	0.5	46						
90											1.2	14	1.1	19	1	22	0.9	25	0.7	36	0.6	45	0.5	52						
100									1.5	11	1.2	17	1.1	21	0.9	25	0.9	29	0.7	40	0.6	50	0.5	58						
110									1.4	14	1.2	20	1	24	0.9	28	0.9	32	0.7	45	0.6	55	0.5	64						
120									1.4	16	1.2	22	1	27	0.9	32	0.9	36	0.7	49	0.6	60	0.5	70						
130							1.8	10	1.4	18	1.2	25	1	30	0.9	35	0.9	39	0.7	53	0.6	66	0.5	76						
140							1.8	12	1.4	21	1.2	27	1	33	0.9	38	0.9	42	0.7	58	0.6	71	0.5	82						
150							1.7	14	1.4	23	1.1	30	1	36	0.9	41	0.8	46	0.7	62	0.6	76	0.5	88						
160							1.7	16	1.3	25	1.1	32	1	38	0.9	44	0.8	49	0.7	66	0.6	81	0.5	95						
170							1.7	18	1.3	27	1.1	35	1	41	0.9	47	0.8	52	0.7	71	0.6	87	0.5	100						
180							1.7	20	1.3	29	1.1	37	1	44	0.9	50	0.8	56	0.7	75	0.6	92								
190							1.6	22	1.3	32	1.1	40	1	47	0.9	53	0.8	59	0.7	80	0.6	97								
200							1.6	24	1.3	34	1.1	42	1	49	0.9	56	0.8	62	0.7	84										
210							1.6	25	1.3	36	1.1	44	1	52	0.9	59	0.8	66	0.7	88										
220					2.3	11	1.6	27	1.3	38	1.1	47	1	55	0.9	62	0.8	69	0.7	93										
230					2.3	13	1.6	29	1.3	40	1.1	49	1	58	0.9	65	0.8	72	0.7	97										
240					2.3	14	1.6	31	1.3	42	1.1	52	1	60	0.9	68	0.8	76												
250					2.2	16	1.6	32	1.3	44	1.1	54	1	63	0.9	71	0.8	79												
260					2.2	17	1.6	34	1.3	46	1.1	56	1	66	0.9	74	0.8	82												
270					2.2	19	1.6	36	1.3	48	1.1	59	1	69	0.9	77	0.8	85												
280					2.2	20	1.6	38	1.3	50	1.1	61	1	71	0.9	80	0.8	89												
290					2.2	22	1.6	39	1.3	52	1.1	64	1	74	0.9	83	0.8	92												
300					2.2	23	1.6	41	1.3	54	1.1	66	1	77	0.9	86	0.8	95												
310					2.1	25	1.6	42	1.3	56	1.1	68	1	79	0.9	89	0.8	99												
320					2.1	26	1.6	44	1.3	58	1.1	71	1	82	0.9	92														
330					2.1	27	1.5	46	1.3	60	1.1	73	1	85	0.9	95														
340					2.1	29	1.5	48	1.3	63	1.1	76	1	87	0.9	98														
350					2.1	30	1.5	49	1.3	65	1.1	78	1	90																
360					2.1	31	1.5	51	1.3	67	1.1	80	1	93																
370					2.1	32	1.5	53	1.3	69	1.1	83	1	96																
380					2.1	34	1.5	54	1.3	71	1.1	85	1	98																
390					2.1	35	1.5	56	1.3	73	1.1	88																		
400					2.1	36	1.5	58	1.3	75	1.1	90																		
410					2.1	38	1.5	59	1.3	77	1.1	92																		
420					2.1	39	1.5	61	1.3	79	1.1	95																		
430					2.1	40	1.5	62	1.3	81	1.1	97																		
440					2.1	41	1.5	64	1.3	83	1.1	99																		
450					2.1	42	1.5	66	1.3	85																				
460					2	44	1.5	67	1.3	87																				
470					2	45	1.5	69	1.3	89																				
480					2	46	1.5	71	1.3	91																				
490					2	47	1.5	72	1.3	93																				
500					2	49	1.5	74	1.3	95																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																			0.6	13	0.5	16								
30													0.9	11	0.8	13	0.7	15	0.6	20										
40									1.1	11	1	14	0.9	16	0.8	18	0.7	20	0.6	27										
50							1.3	10	1.1	15	0.9	18	0.8	21	0.8	24	0.7	26	0.6	35										
60							1.3	13	1.1	18	0.9	22	0.8	26	0.8	29	0.7	32	0.6	42										
70					1.8	10	1.3	17	1.1	22	0.9	26	0.8	30	0.8	34	0.7	37	0.6	49										
80					1.7	12	1.3	20	1	25	0.9	31	0.8	35	0.7	39	0.7	43	0.6	56										
90					1.7	15	1.2	23	1	29	0.9	35	0.8	40	0.7	44	0.7	49	0.6	64										
100					1.6	17	1.2	26	1	33	0.9	39	0.8	44	0.7	50	0.7	54	0.6	71										
110					1.6	19	1.2	29	1	36	0.9	43	0.8	49	0.7	55	0.7	60	0.6	78										
120					1.6	21	1.2	32	1	40	0.9	47	0.8	54	0.7	60	0.7	65	0.6	85										
130					1.6	24	1.2	34	1	43	0.9	51	0.8	58	0.7	65	0.7	71	0.6	93										
140					1.6	26	1.2	37	1	47	0.9	55	0.8	63	0.7	70	0.7	77	0.6	100										
150			2.8	10	1.6	28	1.2	40	1	51	0.9	60	0.8	68	0.7	75	0.7	82												
160			2.7	12	1.6	30	1.2	43	1	54	0.9	64	0.8	72	0.7	80	0.7	88												
170			2.7	13	1.6	33	1.2	46	1	58	0.9	68	0.8	77	0.7	86	0.7	94												
180			2.6	15	1.6	35	1.2	49	1	61	0.9	72	0.8	82	0.7	91	0.7	99												
190			2.6	16	1.5	37	1.2	52	1	65	0.9	76	0.8	86	0.7	96														
200			2.6	18	1.5	39	1.2	55	1	68	0.9	80	0.8	91																
210			2.6	19	1.5	41	1.2	58	1	72	0.9	84	0.8	96																
220			2.6	20	1.5	44	1.2	61	1	76	0.9	89	0.8	100																
230			2.5	22	1.5	46	1.2	64	1	79	0.9	93																		
240			2.5	23	1.5	48	1.2	67	1	83	0.9	97																		
250			2.5	25	1.5	50	1.2	70	1	86																				
260			2.5	26	1.5	52	1.2	72	1	90																				
270			2.5	27	1.5	55	1.2	75	1	93																				
280			2.5	29	1.5	57	1.2	78	1	97																				
290			2.5	30	1.5	59	1.2	81																						
300			2.5	31	1.5	61	1.2	84																						
310			2.5	33	1.5	63	1.2	87																						
320			2.5	34	1.5	65	1.2	90																						
330			2.4	35	1.5	68	1.2	93																						
340			2.4	37	1.5	70	1.2	96																						
350			2.4	38	1.5	72	1.2	99																						
360			2.4	39	1.5	74																								
370			2.4	40	1.5	76																								
380			2.4	42	1.5	79																								
390			2.4	43	1.5	81																								
400			2.4	44	1.5	83																								
410			2.4	46	1.5	85																								
420			2.4	47	1.5	87																								
430			2.4	48	1.5	89																								
440			2.4	50	1.5	92																								
450	5.4	10	2.4	51	1.5	94																								
460	5.3	10	2.4	52	1.5	96																								
470	5.3	11	2.4	53	1.5	98																								
480	5.3	12	2.4	55	1.5	100																								
490	5.3	12	2.4	56																										
500	5.3	13	2.4	57																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																			0.6	12	0.5	15								
30													0.9	10	0.8	12	0.7	14	0.6	19	0.5	24								
40											1	12	0.9	15	0.8	17	0.7	19	0.6	27										
50									1.1	13	1	17	0.9	20	0.8	23	0.7	25	0.6	34										
60							1.4	11	1.1	17	0.9	21	0.8	25	0.8	28	0.7	31	0.6	41										
70							1.3	15	1.1	20	0.9	25	0.8	29	0.8	33	0.7	37	0.6	48										
80							1.3	18	1.1	24	0.9	29	0.8	34	0.8	38	0.7	42	0.6	56										
90					1.8	11	1.3	21	1	28	0.9	34	0.8	39	0.8	44	0.7	48	0.6	63										
100					1.7	14	1.3	24	1	32	0.9	38	0.8	44	0.7	49	0.7	54	0.6	70										
110					1.7	17	1.2	27	1	35	0.9	42	0.8	48	0.7	54	0.7	59	0.6	77										
120					1.6	19	1.2	30	1	39	0.9	46	0.8	53	0.7	59	0.7	65	0.6	85										
130					1.6	21	1.2	33	1	42	0.9	50	0.8	58	0.7	64	0.7	70	0.6	92										
140					1.6	24	1.2	36	1	46	0.9	55	0.8	62	0.7	69	0.7	76	0.6	99										
150					1.6	26	1.2	39	1	50	0.9	59	0.8	67	0.7	75	0.7	82												
160					1.6	28	1.2	42	1	53	0.9	63	0.8	72	0.7	80	0.7	87												
170					1.6	31	1.2	45	1	57	0.9	67	0.8	76	0.7	85	0.7	93												
180					1.6	33	1.2	48	1	60	0.9	71	0.8	81	0.7	90	0.7	98												
190			2.8	11	1.6	35	1.2	51	1	64	0.9	75	0.8	86	0.7	95														
200			2.8	13	1.6	37	1.2	54	1	67	0.9	79	0.8	90	0.7	100														
210			2.7	14	1.6	40	1.2	57	1	71	0.9	84	0.8	95																
220			2.7	16	1.5	42	1.2	60	1	75	0.9	88	0.8	100																
230			2.7	17	1.5	44	1.2	63	1	78	0.9	92																		
240			2.6	19	1.5	46	1.2	66	1	82	0.9	96																		
250			2.6	20	1.5	49	1.2	69	1	85	0.9	100																		
260			2.6	22	1.5	51	1.2	71	1	89																				
270			2.6	23	1.5	53	1.2	74	1	92																				
280			2.6	25	1.5	55	1.2	77	1	96																				
290			2.5	26	1.5	57	1.2	80	1	100																				
300			2.5	28	1.5	60	1.2	83																						
310			2.5	29	1.5	62	1.2	86																						
320			2.5	31	1.5	64	1.2	89																						
330			2.5	32	1.5	66	1.2	92																						
340			2.5	33	1.5	68	1.2	95																						
350			2.5	35	1.5	71	1.2	98																						
360			2.5	36	1.5	73																								
370			2.5	37	1.5	75																								
380			2.5	39	1.5	77																								
390			2.4	40	1.5	79																								
400			2.4	41	1.5	82																								
410			2.4	43	1.5	84																								
420			2.4	44	1.5	86																								
430			2.4	46	1.5	88																								
440			2.4	47	1.5	90																								
450			2.4	48	1.5	92																								
460			2.4	49	1.5	95																								
470			2.4	51	1.5	97																								
480			2.4	52	1.5	99																								
490			2.4	53																										
500			2.4	55																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																			0.6	11	0.5	14								
30															0.9	10	0.8	13	0.6	19	0.5	23								
40											1	10	0.9	14	0.8	16	0.7	19	0.6	26										
50									1.2	11	1	15	0.9	19	0.8	22	0.7	24	0.6	33										
60									1.1	15	1	20	0.8	24	0.8	27	0.7	30	0.6	41										
70							1.4	12	1.1	19	0.9	24	0.8	28	0.8	32	0.7	36	0.6	48										
80							1.3	16	1.1	23	0.9	28	0.8	33	0.8	38	0.7	42	0.6	55										
90							1.3	19	1.1	26	0.9	33	0.8	38	0.8	43	0.7	47	0.6	62										
100					1.8	10	1.3	22	1.1	30	0.9	37	0.8	43	0.8	48	0.7	53	0.6	70										
110					1.8	13	1.3	25	1	34	0.9	41	0.8	47	0.7	53	0.7	59	0.6	77										
120					1.7	16	1.3	28	1	38	0.9	45	0.8	52	0.7	58	0.7	64	0.6	84										
130					1.7	19	1.2	32	1	41	0.9	49	0.8	57	0.7	64	0.7	70	0.6	92										
140					1.7	21	1.2	35	1	45	0.9	54	0.8	62	0.7	69	0.7	75	0.6	99										
150					1.6	24	1.2	38	1	48	0.9	58	0.8	66	0.7	74	0.7	81												
160					1.6	26	1.2	41	1	52	0.9	62	0.8	71	0.7	79	0.7	87												
170					1.6	28	1.2	44	1	56	0.9	66	0.8	76	0.7	84	0.7	92												
180					1.6	31	1.2	47	1	59	0.9	70	0.8	80	0.7	89	0.7	98												
190					1.6	33	1.2	50	1	63	0.9	75	0.8	85	0.7	95														
200					1.6	35	1.2	53	1	66	0.9	79	0.8	90	0.7	100														
210					1.6	38	1.2	55	1	70	0.9	83	0.8	94																
220					1.6	40	1.2	59	1	74	0.9	87	0.8	99																
230			2.8	11	1.6	42	1.2	61	1	77	0.9	91																		
240			2.8	13	1.6	45	1.2	64	1	81	0.9	95																		
250			2.8	15	1.5	47	1.2	67	1	84	0.9	99																		
260			2.7	17	1.5	49	1.2	70	1	88																				
270			2.7	18	1.5	51	1.2	73	1	91																				
280			2.7	20	1.5	54	1.2	76	1	95																				
290			2.6	22	1.5	56	1.2	79	1	99																				
300			2.6	23	1.5	58	1.2	82																						
310			2.6	25	1.5	60	1.2	85																						
320			2.6	26	1.5	62	1.2	88																						
330			2.6	28	1.5	65	1.2	91																						
340			2.5	29	1.5	67	1.2	94																						
350			2.5	31	1.5	69	1.2	97																						
360			2.5	32	1.5	71	1.2	100																						
370			2.5	34	1.5	73																								
380			2.5	35	1.5	76																								
390			2.5	37	1.5	78																								
400			2.5	38	1.5	80																								
410			2.5	39	1.5	82																								
420			2.5	41	1.5	84																								
430			2.5	42	1.5	87																								
440			2.5	44	1.5	89																								
450			2.4	45	1.5	91																								
460			2.4	46	1.5	93																								
470			2.4	48	1.5	95																								
480			2.4	49	1.5	98																								
490			2.4	50	1.5	100																								
500			2.4	52																										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																					0.6	10	0.5	12						
30																			0.7	13	0.6	16	0.5	19						
40															0.9	11	0.9	13	0.7	18	0.6	23								
50											1.2	10	1	13	0.9	15	0.8	17	0.7	23	0.6	29								
60									1.3	10	1.1	13	1	16	0.9	18	0.8	21	0.6	28	0.6	35								
70									1.3	13	1.1	16	1	19	0.9	22	0.8	25	0.6	33	0.6	41								
80							1.6	10	1.3	15	1.1	19	1	22	0.9	26	0.8	29	0.6	38	0.5	47								
90							1.6	12	1.3	18	1.1	22	1	26	0.9	29	0.8	32	0.6	43	0.5	53								
100							1.5	14	1.2	20	1.1	25	1	29	0.9	33	0.8	36	0.6	48	0.5	59								
110							1.5	17	1.2	22	1.1	28	0.9	32	0.9	36	0.8	40	0.6	53	0.5	65								
120					2.1	10	1.5	19	1.2	25	1.1	30	0.9	35	0.9	40	0.8	44	0.6	59	0.5	71								
130					2.1	12	1.5	21	1.2	27	1.1	33	0.9	38	0.9	43	0.8	48	0.6	64	0.5	77								
140					2	13	1.5	23	1.2	30	1.1	36	0.9	42	0.9	47	0.8	52	0.6	69	0.5	83								
150					2	15	1.5	24	1.2	32	1	39	0.9	45	0.9	50	0.8	56	0.6	74	0.5	89								
160					2	16	1.5	26	1.2	35	1	42	0.9	48	0.9	54	0.8	59	0.6	79	0.5	95								
170					2	18	1.5	28	1.2	37	1	44	0.9	51	0.9	57	0.8	63	0.6	84										
180					2	19	1.5	30	1.2	39	1	47	0.9	54	0.9	61	0.8	67	0.6	89										
190					2	21	1.4	32	1.2	42	1	50	0.9	57	0.9	64	0.8	71	0.6	94										
200					1.9	22	1.4	34	1.2	44	1	53	0.9	61	0.9	68	0.8	75	0.6	99										
210					1.9	24	1.4	36	1.2	46	1	55	0.9	64	0.8	71	0.8	79												
220					1.9	25	1.4	38	1.2	49	1	58	0.9	67	0.8	75	0.8	82												
230					1.9	27	1.4	40	1.2	51	1	61	0.9	70	0.8	78	0.8	86												
240					1.9	28	1.4	42	1.2	54	1	64	0.9	73	0.8	82	0.8	90												
250					1.9	30	1.4	44	1.2	56	1	67	0.9	76	0.8	85	0.8	94												
260			3.5	10	1.9	31	1.4	46	1.2	58	1	69	0.9	79	0.8	89	0.8	98												
270			3.4	11	1.9	33	1.4	48	1.2	61	1	72	0.9	83	0.8	92														
280			3.4	11	1.9	34	1.4	50	1.2	63	1	75	0.9	86	0.8	96														
290			3.4	12	1.9	35	1.4	52	1.2	65	1	78	0.9	89	0.8	99														
300			3.4	13	1.9	37	1.4	54	1.2	68	1	80	0.9	92																
310			3.3	14	1.9	38	1.4	55	1.2	70	1	83	0.9	95																
320			3.3	15	1.9	40	1.4	57	1.2	72	1	86	0.9	99																
330			3.3	16	1.9	41	1.4	59	1.2	75	1	89																		
340			3.3	17	1.9	42	1.4	61	1.2	77	1	91																		
350			3.3	18	1.9	44	1.4	63	1.2	80	1	94																		
360			3.3	19	1.9	45	1.4	65	1.2	82	1	97																		
370			3.2	20	1.9	47	1.4	67	1.2	84	1	100																		
380			3.2	20	1.9	48	1.4	69	1.2	87																				
390			3.2	21	1.9	49	1.4	71	1.2	89																				
400			3.2	22	1.9	51	1.4	73	1.2	91																				
410			3.2	23	1.9	52	1.4	75	1.2	94																				
420			3.2	24	1.8	54	1.4	77	1.2	96																				
430			3.2	25	1.8	55	1.4	78	1.2	98																				
440			3.2	26	1.8	56	1.4	80																						
450			3.2	26	1.8	58	1.4	82																						
460			3.2	27	1.8	59	1.4	84																						
470			3.2	28	1.8	61	1.4	86																						
480			3.1	29	1.8	62	1.4	88																						
490			3.1	30	1.8	63	1.4	90																						
500			3.1	31	1.8	65	1.4	92																						

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.5	12						
30																			0.7	12	0.6	16	0.5	19						
40															1	10	0.9	12	0.7	17	0.6	22								
50													1	11	0.9	14	0.9	16	0.7	23	0.6	28								
60											1.2	11	1	15	0.9	17	0.8	20	0.7	28	0.6	34								
70									1.4	10	1.1	15	1	18	0.9	21	0.8	24	0.6	33	0.6	40								
80									1.3	13	1.1	18	1	21	0.9	25	0.8	28	0.6	38	0.6	46								
90									1.3	16	1.1	20	1	25	0.9	28	0.8	32	0.6	43	0.5	52								
100							1.6	12	1.3	18	1.1	23	1	28	0.9	32	0.8	35	0.6	48	0.5	58								
110							1.6	14	1.3	21	1.1	26	1	31	0.9	35	0.8	39	0.6	53	0.5	64								
120							1.5	16	1.2	23	1.1	29	1	34	0.9	39	0.8	43	0.6	58	0.5	70								
130							1.5	18	1.2	26	1.1	32	0.9	37	0.9	42	0.8	47	0.6	63	0.5	76								
140							1.5	20	1.2	28	1.1	35	0.9	41	0.9	46	0.8	51	0.6	68	0.5	83								
150					2.1	11	1.5	23	1.2	31	1.1	38	0.9	44	0.9	50	0.8	55	0.6	73	0.5	89								
160					2.1	13	1.5	25	1.2	33	1.1	40	0.9	47	0.9	53	0.8	59	0.6	78	0.5	95								
170					2.1	15	1.5	27	1.2	36	1	43	0.9	50	0.9	56	0.8	62	0.6	83										
180					2	16	1.5	29	1.2	38	1	46	0.9	53	0.9	60	0.8	66	0.6	88										
190					2	18	1.5	31	1.2	40	1	49	0.9	57	0.9	64	0.8	70	0.6	93										
200					2	19	1.5	33	1.2	43	1	52	0.9	60	0.9	67	0.8	74	0.6	98										
210					2	21	1.5	35	1.2	45	1	54	0.9	63	0.9	71	0.8	78												
220					2	23	1.4	37	1.2	48	1	57	0.9	66	0.9	74	0.8	82												
230					2	24	1.4	38	1.2	50	1	60	0.9	69	0.9	78	0.8	86												
240					1.9	26	1.4	40	1.2	52	1	63	0.9	72	0.8	81	0.8	89												
250					1.9	27	1.4	42	1.2	55	1	66	0.9	76	0.8	85	0.8	93												
260					1.9	29	1.4	44	1.2	57	1	68	0.9	79	0.8	88	0.8	97												
270					1.9	30	1.4	46	1.2	60	1	71	0.9	82	0.8	92														
280					1.9	32	1.4	48	1.2	62	1	74	0.9	85	0.8	95														
290					1.9	33	1.4	50	1.2	64	1	77	0.9	88	0.8	99														
300					1.9	34	1.4	52	1.2	67	1	80	0.9	91																
310					1.9	36	1.4	54	1.2	69	1	82	0.9	94																
320					1.9	37	1.4	56	1.2	71	1	85	0.9	98																
330					1.9	39	1.4	58	1.2	74	1	88																		
340			3.5	10	1.9	40	1.4	60	1.2	76	1	91																		
350			3.5	11	1.9	42	1.4	62	1.2	79	1	94																		
360			3.4	12	1.9	43	1.4	64	1.2	81	1	96																		
370			3.4	13	1.9	45	1.4	66	1.2	83	1	99																		
380			3.4	14	1.9	46	1.4	67	1.2	86																				
390			3.4	16	1.9	47	1.4	69	1.2	88																				
400			3.4	16	1.9	49	1.4	71	1.2	90																				
410			3.3	17	1.9	50	1.4	73	1.2	93																				
420			3.3	18	1.9	52	1.4	75	1.2	95																				
430			3.3	19	1.9	53	1.4	77	1.2	97																				
440			3.3	20	1.9	55	1.4	79	1.2	100																				
450			3.3	21	1.9	56	1.4	81																						
460			3.3	22	1.9	57	1.4	83																						
470			3.2	23	1.8	59	1.4	85																						
480			3.2	24	1.8	60	1.4	87																						
490			3.2	25	1.8	62	1.4	89																						
500			3.2	26	1.8	63	1.4	91																						

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																							0.5	11						
30																			0.7	11	0.6	15	0.5	18						
40																	0.9	10	0.7	16	0.6	21	0.5	25						
50															1	12	0.9	14	0.7	22	0.6	27								
60													1	13	0.9	16	0.8	19	0.7	27	0.6	33								
70											1.2	13	1	16	0.9	20	0.8	23	0.7	32	0.6	40								
80									1.4	10	1.1	16	1	20	0.9	23	0.8	27	0.6	37	0.6	46								
90									1.3	13	1.1	19	1	23	0.9	27	0.8	31	0.6	42	0.6	52								
100									1.3	16	1.1	22	1	27	0.9	31	0.8	34	0.6	47	0.5	58								
110							1.7	11	1.3	19	1.1	25	1	30	0.9	34	0.8	38	0.6	52	0.5	64								
120							1.6	13	1.3	22	1.1	28	1	33	0.9	38	0.8	42	0.6	57	0.5	70								
130							1.6	16	1.3	24	1.1	31	1	36	0.9	42	0.8	46	0.6	62	0.5	76								
140							1.6	18	1.2	27	1.1	34	1	40	0.9	45	0.8	50	0.6	67	0.5	82								
150							1.5	20	1.2	29	1.1	36	0.9	43	0.9	49	0.8	54	0.6	72	0.5	88								
160							1.5	22	1.2	32	1.1	39	0.9	46	0.9	52	0.8	58	0.6	77	0.5	94								
170					2.2	10	1.5	24	1.2	34	1.1	42	0.9	49	0.9	56	0.8	62	0.6	82	0.5	100								
180					2.2	12	1.5	27	1.2	37	1.1	45	0.9	52	0.9	59	0.8	66	0.6	88										
190					2.1	14	1.5	29	1.2	39	1.1	48	0.9	56	0.9	63	0.8	69	0.6	93										
200					2.1	16	1.5	31	1.2	41	1	51	0.9	59	0.9	66	0.8	73	0.6	98										
210					2.1	17	1.5	33	1.2	44	1	53	0.9	62	0.9	70	0.8	77												
220					2	19	1.5	35	1.2	46	1	56	0.9	65	0.9	73	0.8	81												
230					2	21	1.5	37	1.2	49	1	59	0.9	68	0.9	77	0.8	85												
240					2	22	1.5	39	1.2	51	1	62	0.9	71	0.9	80	0.8	89												
250					2	24	1.4	41	1.2	53	1	65	0.9	75	0.9	84	0.8	92												
260					2	26	1.4	43	1.2	56	1	68	0.9	78	0.9	87	0.8	96												
270					2	27	1.4	45	1.2	58	1	70	0.9	81	0.8	91	0.8	100												
280					1.9	29	1.4	47	1.2	61	1	73	0.9	84	0.8	94														
290					1.9	30	1.4	49	1.2	63	1	76	0.9	87	0.8	98														
300					1.9	32	1.4	51	1.2	66	1	79	0.9	90																
310					1.9	33	1.4	52	1.2	68	1	81	0.9	94																
320					1.9	35	1.4	54	1.2	70	1	84	0.9	97																
330					1.9	36	1.4	56	1.2	73	1	87	0.9	100																
340					1.9	38	1.4	58	1.2	75	1	90																		
350					1.9	39	1.4	60	1.2	77	1	93																		
360					1.9	41	1.4	62	1.2	80	1	95																		
370					1.9	42	1.4	64	1.2	82	1	98																		
380					1.9	44	1.4	66	1.2	85																				
390					1.9	45	1.4	68	1.2	87																				
400					1.9	47	1.4	70	1.2	89																				
410			3.6	10	1.9	48	1.4	72	1.2	92																				
420			3.5	11	1.9	50	1.4	74	1.2	94																				
430			3.5	12	1.9	51	1.4	76	1.2	96																				
440			3.5	13	1.9	53	1.4	78	1.2	99																				
450			3.4	14	1.9	54	1.4	80																						
460			3.4	15	1.9	55	1.4	81																						
470			3.4	17	1.9	57	1.4	83																						
480			3.4	18	1.9	58	1.4	85																						
490			3.4	19	1.9	60	1.4	87																						
500			3.3	20	1.9	61	1.4	89																						

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																							0.6	11	0.5	13				
40																			0.8	10	0.7	13	0.6	16	0.5	18				
50																			0.8	13	0.7	17	0.6	20	0.5	23				
60																	1.1	11	0.8	16	0.7	21	0.6	24	0.5	28				
70															1.2	11	1	13	0.8	19	0.7	24	0.6	29	0.5	33				
80													1.3	11	1.1	13	1	15	0.8	22	0.7	28	0.6	33	0.5	38				
90											1.5	10	1.3	13	1.1	16	1	18	0.8	26	0.7	32	0.6	38	0.5	43				
100											1.4	12	1.2	15	1.1	18	1	20	0.8	29	0.7	36	0.6	42	0.5	48				
110									1.7	10	1.4	14	1.2	17	1.1	20	1	23	0.8	32	0.7	39	0.6	46	0.5	53				
120									1.7	11	1.4	15	1.2	19	1.1	22	1	25	0.8	35	0.7	43	0.6	51	0.5	57				
130									1.7	13	1.4	17	1.2	21	1.1	24	1	27	0.8	38	0.6	47	0.6	55	0.5	62				
140									1.6	14	1.4	19	1.2	23	1.1	26	1	29	0.8	41	0.6	51	0.6	59	0.5	67				
150							2.1	10	1.6	16	1.4	20	1.2	25	1.1	28	1	32	0.8	44	0.6	54	0.6	64	0.5	72				
160							2.1	11	1.6	17	1.4	22	1.2	26	1.1	30	1	34	0.8	47	0.6	58	0.6	68	0.5	77				
170							2	12	1.6	19	1.3	24	1.2	28	1.1	33	1	36	0.8	50	0.6	62	0.6	72	0.5	82				
180							2	13	1.6	20	1.3	25	1.2	30	1.1	35	1	39	0.8	53	0.6	66	0.6	77	0.5	87				
190							2	15	1.6	21	1.3	27	1.2	32	1.1	37	1	41	0.8	56	0.6	69	0.6	81	0.5	92				
200							2	16	1.6	23	1.3	29	1.2	34	1.1	39	1	43	0.8	59	0.6	73	0.6	86	0.5	97				
210							2	17	1.6	24	1.3	30	1.2	36	1.1	41	1	46	0.8	62	0.6	77	0.6	90						
220							2	18	1.6	26	1.3	32	1.2	38	1.1	43	1	48	0.8	66	0.6	81	0.6	94						
230							2	19	1.6	27	1.3	34	1.2	40	1.1	45	1	50	0.8	69	0.6	84	0.6	98						
240					2.8	10	1.9	20	1.6	28	1.3	35	1.2	42	1.1	47	1	53	0.8	72	0.6	88								
250					2.8	11	1.9	21	1.5	30	1.3	37	1.2	43	1.1	49	1	55	0.8	75	0.6	92								
260					2.8	11	1.9	23	1.5	31	1.3	38	1.2	45	1.1	51	1	57	0.8	78	0.6	96								
270					2.7	12	1.9	24	1.5	32	1.3	40	1.2	47	1.1	53	1	60	0.8	81	0.6	99								
280					2.7	13	1.9	25	1.5	34	1.3	42	1.2	49	1.1	56	1	62	0.8	84										
290					2.7	14	1.9	26	1.5	35	1.3	43	1.2	51	1	58	1	64	0.8	87										
300					2.7	15	1.9	27	1.5	37	1.3	45	1.2	53	1	60	1	66	0.8	90										
310					2.7	16	1.9	28	1.5	38	1.3	47	1.2	55	1	62	1	69	0.8	93										
320					2.7	17	1.9	29	1.5	39	1.3	48	1.2	56	1	64	1	71	0.8	96										
330					2.7	17	1.9	30	1.5	41	1.3	50	1.2	58	1	66	1	73	0.8	99										
340					2.6	18	1.9	31	1.5	42	1.3	51	1.2	60	1	68	1	76												
350					2.6	19	1.9	32	1.5	43	1.3	53	1.2	62	1	70	1	78												
360					2.6	20	1.9	34	1.5	45	1.3	55	1.2	64	1	72	1	80												
370					2.6	21	1.9	35	1.5	46	1.3	56	1.2	66	1	74	1	82												
380					2.6	22	1.9	36	1.5	47	1.3	58	1.2	67	1	76	1	85												
390					2.6	22	1.9	37	1.5	49	1.3	59	1.2	69	1	78	1	87												
400					2.6	23	1.9	38	1.5	50	1.3	61	1.2	71	1	81	1	89												
410					2.6	24	1.9	39	1.5	52	1.3	63	1.2	73	1	83	1	92												
420					2.6	25	1.9	40	1.5	53	1.3	64	1.2	75	1	85	1	94												
430					2.6	26	1.9	41	1.5	54	1.3	66	1.1	77	1	87	1	96												
440					2.6	26	1.9	42	1.5	56	1.3	68	1.1	79	1	89	1	99												
450					2.6	27	1.9	43	1.5	57	1.3	69	1.1	81	1	91														
460					2.6	28	1.9	44	1.5	58	1.3	71	1.1	82	1	93														
470					2.6	29	1.9	45	1.5	60	1.3	72	1.1	84	1	95														
480					2.6	29	1.9	47	1.5	61	1.3	74	1.1	86	1	97														
490					2.6	30	1.9	48	1.5	62	1.3	76	1.1	88	1	99														
500					2.5	31	1.9	49	1.5	64	1.3	77	1.1	90																

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																							0.6	10	0.6	12				
40																					0.7	12	0.6	15	0.5	17				
50																			0.8	12	0.7	16	0.6	19	0.5	22				
60																			0.8	15	0.7	20	0.6	24	0.5	27				
70																	1.1	11	0.8	18	0.7	24	0.6	28	0.5	32				
80															1.2	12	1	14	0.8	21	0.7	27	0.6	33	0.5	37				
90													1.3	11	1.1	14	1	16	0.8	25	0.7	31	0.6	37	0.5	42				
100													1.3	13	1.1	16	1	19	0.8	28	0.7	35	0.6	41	0.5	47				
110											1.5	11	1.3	15	1.1	18	1	21	0.8	31	0.7	39	0.6	46	0.5	52				
120											1.4	13	1.2	17	1.1	21	1	24	0.8	34	0.7	43	0.6	50	0.5	57				
130									1.7	10	1.4	15	1.2	19	1.1	23	1	26	0.8	37	0.7	46	0.6	54	0.5	62				
140									1.7	11	1.4	17	1.2	21	1.1	25	1	28	0.8	40	0.6	50	0.6	59	0.5	67				
150									1.7	13	1.4	19	1.2	23	1.1	27	1	31	0.8	43	0.6	54	0.6	63	0.5	72				
160									1.7	15	1.4	20	1.2	25	1.1	29	1	33	0.8	46	0.6	58	0.6	68	0.5	77				
170									1.6	16	1.4	22	1.2	27	1.1	31	1	35	0.8	49	0.6	61	0.6	72	0.5	81				
180									1.6	18	1.4	24	1.2	29	1.1	34	1	38	0.8	53	0.6	65	0.6	76	0.5	86				
190							2.1	11	1.6	19	1.4	25	1.2	31	1.1	36	1	40	0.8	56	0.6	69	0.6	81	0.5	91				
200							2.1	12	1.6	21	1.3	27	1.2	33	1.1	38	1	42	0.8	59	0.6	73	0.6	85	0.5	96				
210							2	14	1.6	22	1.3	29	1.2	35	1.1	40	1	45	0.8	62	0.6	76	0.6	89						
220							2	15	1.6	24	1.3	30	1.2	36	1.1	42	1	47	0.8	65	0.6	80	0.6	94						
230							2	16	1.6	25	1.3	32	1.2	38	1.1	44	1	49	0.8	68	0.6	84	0.6	98						
240							2	17	1.6	26	1.3	34	1.2	40	1.1	46	1	52	0.8	71	0.6	88								
250							2	19	1.6	28	1.3	35	1.2	42	1.1	48	1	54	0.8	74	0.6	91								
260							2	20	1.6	29	1.3	37	1.2	44	1.1	50	1	56	0.8	77	0.6	95								
270							2	21	1.6	31	1.3	39	1.2	46	1.1	52	1	59	0.8	80	0.6	99								
280							2	22	1.6	32	1.3	40	1.2	48	1.1	55	1	61	0.8	83										
290							1.9	23	1.5	33	1.3	42	1.2	50	1.1	57	1	63	0.8	86										
300					2.9	10	1.9	24	1.5	35	1.3	44	1.2	52	1.1	59	1	66	0.8	90										
310					2.8	11	1.9	26	1.5	36	1.3	45	1.2	53	1.1	61	1	68	0.8	93										
320					2.8	12	1.9	27	1.5	38	1.3	47	1.2	55	1	63	1	70	0.8	96										
330					2.8	13	1.9	28	1.5	39	1.3	49	1.2	57	1	65	1	72	0.8	99										
340					2.8	14	1.9	29	1.5	40	1.3	50	1.2	59	1	67	1	75												
350					2.7	15	1.9	30	1.5	42	1.3	52	1.2	61	1	69	1	77												
360					2.7	16	1.9	31	1.5	43	1.3	53	1.2	63	1	71	1	80												
370					2.7	16	1.9	32	1.5	45	1.3	55	1.2	65	1	73	1	82												
380					2.7	17	1.9	34	1.5	46	1.3	57	1.2	67	1	76	1	84												
390					2.7	18	1.9	35	1.5	47	1.3	58	1.2	68	1	78	1	86												
400					2.7	19	1.9	36	1.5	49	1.3	60	1.2	70	1	80	1	89												
410					2.7	20	1.9	37	1.5	50	1.3	62	1.2	72	1	82	1	91												
420					2.6	21	1.9	38	1.5	51	1.3	63	1.2	74	1	84	1	93												
430					2.6	22	1.9	39	1.5	53	1.3	65	1.2	76	1	86	1	96												
440					2.6	23	1.9	40	1.5	54	1.3	66	1.2	78	1	88	1	98												
450					2.6	24	1.9	41	1.5	56	1.3	68	1.2	80	1	90	1	100												
460					2.6	24	1.9	42	1.5	57	1.3	70	1.2	81	1	92														
470					2.6	25	1.9	44	1.5	58	1.3	71	1.1	83	1	94														
480					2.6	26	1.9	45	1.5	60	1.3	73	1.1	85	1	96														
490					2.6	27	1.9	46	1.5	61	1.3	75	1.1	87	1	98														
500					2.6	28	1.9	47	1.5	62	1.3	76	1.1	89	1	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																									0.6	12				
40																					0.7	11	0.6	14	0.5	17				
50																			0.9	10	0.7	15	0.6	19	0.5	22				
60																			0.8	14	0.7	19	0.6	23	0.5	27				
70																			0.8	17	0.7	23	0.6	28	0.5	32				
80																	1.1	12	0.8	21	0.7	27	0.6	32	0.5	37				
90															1.2	12	1.1	15	0.8	24	0.7	31	0.6	36	0.5	42				
100													1.3	11	1.2	14	1	17	0.8	27	0.7	34	0.6	41	0.5	47				
110													1.3	13	1.1	17	1	20	0.8	30	0.7	38	0.6	45	0.5	52				
120											1.5	10	1.3	15	1.1	19	1	22	0.8	33	0.7	42	0.6	50	0.5	56				
130											1.5	12	1.3	17	1.1	21	1	25	0.8	36	0.7	46	0.6	54	0.5	61				
140											1.4	14	1.2	19	1.1	24	1	27	0.8	39	0.7	49	0.6	58	0.5	66				
150											1.4	16	1.2	21	1.1	26	1	30	0.8	43	0.7	53	0.6	63	0.5	71				
160									1.7	11	1.4	18	1.2	23	1.1	28	1	32	0.8	46	0.6	57	0.6	67	0.5	76				
170									1.7	13	1.4	20	1.2	25	1.1	30	1	34	0.8	49	0.6	61	0.6	71	0.5	81				
180									1.7	15	1.4	22	1.2	27	1.1	32	1	37	0.8	52	0.6	65	0.6	76	0.5	86				
190									1.7	16	1.4	24	1.2	29	1.1	34	1	39	0.8	55	0.6	68	0.6	80	0.5	91				
200									1.6	18	1.4	25	1.2	31	1.1	37	1	41	0.8	58	0.6	72	0.6	85	0.5	96				
210									1.6	20	1.4	27	1.2	33	1.1	39	1	44	0.8	61	0.6	76	0.6	89						
220							2.1	10	1.6	21	1.4	29	1.2	35	1.1	41	1	46	0.8	64	0.6	80	0.6	93						
230							2.1	12	1.6	23	1.3	30	1.2	37	1.1	43	1	48	0.8	67	0.6	83	0.6	98						
240							2.1	13	1.6	24	1.3	32	1.2	39	1.1	45	1	51	0.8	70	0.6	87								
250							2.1	15	1.6	26	1.3	34	1.2	41	1.1	47	1	53	0.8	73	0.6	91								
260							2	16	1.6	27	1.3	36	1.2	43	1.1	49	1	55	0.8	77	0.6	95								
270							2	18	1.6	29	1.3	37	1.2	45	1.1	52	1	58	0.8	80	0.6	98								
280							2	19	1.6	30	1.3	39	1.2	47	1.1	54	1	60	0.8	83										
290							2	20	1.6	31	1.3	41	1.2	48	1.1	56	1	62	0.8	86										
300							2	21	1.6	33	1.3	42	1.2	50	1.1	58	1	65	0.8	89										
310							2	23	1.6	34	1.3	44	1.2	52	1.1	60	1	67	0.8	92										
320							2	24	1.6	36	1.3	46	1.2	54	1.1	62	1	69	0.8	95										
330							2	25	1.5	37	1.3	47	1.2	56	1.1	64	1	72	0.8	98										
340							1.9	26	1.5	39	1.3	49	1.2	58	1.1	66	1	74												
350							1.9	27	1.5	40	1.3	50	1.2	60	1.1	68	1	76												
360							1.9	29	1.5	41	1.3	52	1.2	62	1	70	1	79												
370					2.9	11	1.9	30	1.5	43	1.3	54	1.2	63	1	73	1	81												
380					2.8	12	1.9	31	1.5	44	1.3	55	1.2	65	1	75	1	83												
390					2.8	13	1.9	32	1.5	46	1.3	57	1.2	67	1	77	1	85												
400					2.8	14	1.9	33	1.5	47	1.3	59	1.2	69	1	79	1	88												
410					2.8	15	1.9	34	1.5	48	1.3	60	1.2	71	1	81	1	90												
420					2.8	16	1.9	36	1.5	50	1.3	62	1.2	73	1	83	1	92												
430					2.7	17	1.9	37	1.5	51	1.3	64	1.2	75	1	85	1	95												
440					2.7	18	1.9	38	1.5	53	1.3	65	1.2	77	1	87	1	97												
450					2.7	19	1.9	39	1.5	54	1.3	67	1.2	78	1	89	1	99												
460					2.7	20	1.9	40	1.5	55	1.3	69	1.2	80	1	91														
470					2.7	21	1.9	41	1.5	57	1.3	70	1.2	82	1	93														
480					2.7	22	1.9	42	1.5	58	1.3	72	1.2	84	1	95														
490					2.7	23	1.9	44	1.5	60	1.3	73	1.2	86	1	98														
500					2.6	23	1.9	45	1.5	61	1.3	75	1.2	88	1	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.5	11		
40																							0.7	11	0.6	12	0.5	16		
50																					0.8	11	0.7	14	0.6	16	0.5	20		
60																			1	10	0.8	14	0.7	17	0.6	20	0.5	25		
70																			0.9	13	0.8	17	0.7	20	0.6	23	0.5	29		
80																			0.9	15	0.8	19	0.7	23	0.6	27	0.5	33		
90																	1.2	11	0.9	17	0.8	22	0.7	26	0.6	30	0.5	38		
100															1.4	10	1.2	12	0.9	19	0.8	25	0.7	30	0.6	34				
110															1.3	12	1.2	14	0.9	21	0.7	27	0.7	33	0.6	38				
120													1.5	11	1.3	13	1.2	16	0.9	24	0.7	30	0.7	36	0.6	41				
130													1.5	12	1.3	15	1.2	17	0.9	26	0.7	33	0.7	39	0.6	45				
140											1.7	10	1.5	14	1.3	17	1.2	19	0.9	28	0.7	36	0.6	42	0.6	48				
150											1.7	11	1.5	15	1.3	18	1.2	21	0.9	30	0.7	38	0.6	45	0.6	52				
160											1.7	13	1.5	16	1.3	20	1.2	22	0.9	32	0.7	41	0.6	49	0.6	55				
170											1.7	14	1.4	18	1.3	21	1.2	24	0.9	35	0.7	44	0.6	52	0.6	59				
180									2	10	1.7	15	1.4	19	1.3	22	1.2	26	0.9	37	0.7	46	0.6	55	0.6	63				
190									2	11	1.7	16	1.4	20	1.3	24	1.2	27	0.9	39	0.7	49	0.6	58	0.6	66				
200									2	12	1.6	17	1.4	22	1.3	25	1.2	29	0.9	41	0.7	52	0.6	61	0.6	70				
210									2	13	1.6	19	1.4	23	1.3	27	1.2	31	0.9	43	0.7	54	0.6	64	0.6	73				
220									2	14	1.6	20	1.4	24	1.3	28	1.1	32	0.9	46	0.7	57	0.6	67	0.6	77				
230									2	15	1.6	21	1.4	26	1.3	30	1.1	34	0.9	48	0.7	60	0.6	70	0.6	80				
240									1.9	16	1.6	22	1.4	27	1.3	31	1.1	35	0.9	50	0.7	62	0.6	74	0.6	84				
250							2.5	10	1.9	17	1.6	23	1.4	28	1.3	33	1.1	37	0.9	52	0.7	65	0.6	77	0.6	87				
260							2.5	11	1.9	18	1.6	24	1.4	29	1.3	34	1.1	39	0.9	54	0.7	68	0.6	80	0.6	91				
270							2.5	12	1.9	19	1.6	25	1.4	31	1.3	36	1.1	40	0.9	56	0.7	70	0.6	83	0.6	95				
280							2.5	13	1.9	20	1.6	26	1.4	32	1.3	37	1.1	42	0.9	59	0.7	73	0.6	86	0.6	98				
290							2.5	13	1.9	21	1.6	28	1.4	33	1.2	39	1.1	43	0.9	61	0.7	76	0.6	89						
300							2.5	14	1.9	22	1.6	29	1.4	35	1.2	40	1.1	45	0.9	63	0.7	79	0.6	92						
310							2.4	15	1.9	23	1.6	30	1.4	36	1.2	41	1.1	47	0.9	65	0.7	81	0.6	96						
320							2.4	16	1.9	24	1.6	31	1.4	37	1.2	43	1.1	48	0.9	67	0.7	84	0.6	99						
330							2.4	17	1.9	25	1.6	32	1.4	38	1.2	44	1.1	50	0.9	70	0.7	86								
340							2.4	17	1.9	26	1.6	33	1.4	40	1.2	46	1.1	51	0.9	72	0.7	89								
350							2.4	18	1.9	27	1.6	34	1.4	41	1.2	47	1.1	53	0.9	74	0.7	92								
360							2.4	19	1.9	28	1.6	35	1.4	42	1.2	49	1.1	55	0.9	76	0.7	95								
370							2.4	20	1.9	29	1.6	36	1.4	44	1.2	50	1.1	56	0.9	78	0.7	97								
380							2.4	20	1.9	30	1.6	38	1.4	45	1.2	51	1.1	58	0.9	80	0.7	100								
390							2.4	21	1.9	31	1.6	39	1.4	46	1.2	53	1.1	59	0.9	83										
400							2.4	22	1.9	31	1.6	40	1.4	47	1.2	54	1.1	61	0.9	85										
410					3.5	10	2.4	23	1.9	32	1.6	41	1.4	49	1.2	56	1.1	63	0.9	87										
420					3.5	10	2.4	23	1.9	33	1.6	42	1.4	50	1.2	57	1.1	64	0.9	89										
430					3.4	11	2.4	24	1.9	34	1.6	43	1.4	51	1.2	59	1.1	66	0.9	91										
440					3.4	12	2.4	25	1.9	35	1.6	44	1.4	52	1.2	60	1.1	67	0.9	93										
450					3.4	12	2.3	26	1.9	36	1.6	45	1.4	54	1.2	62	1.1	69	0.9	96										
460					3.4	13	2.3	26	1.9	37	1.6	46	1.4	55	1.2	63	1.1	71	0.9	98										
470					3.4	13	2.3	27	1.9	38	1.6	47	1.4	56	1.2	65	1.1	72	0.9	100										
480					3.4	14	2.3	28	1.8	39	1.6	49	1.4	58	1.2	66	1.1	74												
490					3.4	14	2.3	28	1.8	40	1.6	50	1.4	59	1.2	67	1.1	75												
500					3.4	15	2.3	29	1.8	41	1.6	51	1.4	60	1.2	69	1.1	77												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.5	11		
40																							0.7	10	0.6	12	0.5	15		
50																					0.8	10	0.7	13	0.6	15	0.5	20		
60																					0.8	13	0.7	16	0.6	19	0.5	24		
70																			1	11	0.8	16	0.7	19	0.6	23	0.5	28		
80																			0.9	13	0.8	18	0.7	23	0.6	26	0.5	33		
90																			0.9	16	0.8	21	0.7	26	0.6	30	0.5	37		
100																	1.3	10	0.9	18	0.8	24	0.7	29	0.6	33	0.5	41		
110															1.4	10	1.2	12	0.9	20	0.8	27	0.7	32	0.6	37				
120															1.4	11	1.2	14	0.9	23	0.8	29	0.7	35	0.6	41				
130													1.6	10	1.4	13	1.2	16	0.9	25	0.7	32	0.7	38	0.6	44				
140													1.5	11	1.3	15	1.2	18	0.9	27	0.7	35	0.7	42	0.6	48				
150													1.5	13	1.3	16	1.2	19	0.9	29	0.7	38	0.7	45	0.6	51				
160											1.8	10	1.5	14	1.3	18	1.2	21	0.9	32	0.7	40	0.6	48	0.6	55				
170											1.7	11	1.5	16	1.3	19	1.2	23	0.9	34	0.7	43	0.6	51	0.6	58				
180											1.7	12	1.5	17	1.3	21	1.2	24	0.9	36	0.7	46	0.6	54	0.6	62				
190											1.7	14	1.5	18	1.3	22	1.2	26	0.9	38	0.7	48	0.6	57	0.6	66				
200											1.7	15	1.4	20	1.3	24	1.2	28	0.9	40	0.7	51	0.6	61	0.6	69				
210									2.1	10	1.7	16	1.4	21	1.3	25	1.2	29	0.9	43	0.7	54	0.6	64	0.6	73				
220									2.1	11	1.7	17	1.4	22	1.3	27	1.2	31	0.9	45	0.7	56	0.6	67	0.6	76				
230									2	12	1.7	19	1.4	24	1.3	28	1.2	33	0.9	47	0.7	59	0.6	70	0.6	80				
240									2	13	1.6	20	1.4	25	1.3	30	1.2	34	0.9	49	0.7	62	0.6	73	0.6	83				
250									2	14	1.6	21	1.4	26	1.3	31	1.1	36	0.9	51	0.7	64	0.6	76	0.6	87				
260									2	15	1.6	22	1.4	28	1.3	33	1.1	37	0.9	53	0.7	67	0.6	79	0.6	91				
270									2	16	1.6	23	1.4	29	1.3	34	1.1	39	0.9	56	0.7	70	0.6	82	0.6	94				
280									2	17	1.6	24	1.4	30	1.3	36	1.1	41	0.9	58	0.7	73	0.6	86	0.6	98				
290									2	18	1.6	26	1.4	32	1.3	37	1.1	42	0.9	60	0.7	75	0.6	89						
300							2.6	10	1.9	19	1.6	27	1.4	33	1.3	39	1.1	44	0.9	62	0.7	78	0.6	92						
310							2.6	11	1.9	20	1.6	28	1.4	34	1.3	40	1.1	46	0.9	64	0.7	81	0.6	95						
320							2.5	12	1.9	21	1.6	29	1.4	36	1.2	42	1.1	47	0.9	67	0.7	83	0.6	98						
330							2.5	12	1.9	22	1.6	30	1.4	37	1.2	43	1.1	49	0.9	69	0.7	86								
340							2.5	13	1.9	24	1.6	31	1.4	38	1.2	45	1.1	50	0.9	71	0.7	89								
350							2.5	14	1.9	24	1.6	33	1.4	40	1.2	46	1.1	52	0.9	73	0.7	91								
360							2.5	15	1.9	25	1.6	34	1.4	41	1.2	48	1.1	54	0.9	75	0.7	94								
370							2.5	16	1.9	26	1.6	35	1.4	42	1.2	49	1.1	55	0.9	77	0.7	97								
380							2.4	17	1.9	27	1.6	36	1.4	43	1.2	50	1.1	57	0.9	80	0.7	99								
390							2.4	18	1.9	28	1.6	37	1.4	45	1.2	52	1.1	58	0.9	82										
400							2.4	18	1.9	29	1.6	38	1.4	46	1.2	53	1.1	60	0.9	84										
410							2.4	19	1.9	30	1.6	39	1.4	47	1.2	55	1.1	62	0.9	86										
420							2.4	20	1.9	31	1.6	40	1.4	49	1.2	56	1.1	63	0.9	88										
430							2.4	21	1.9	32	1.6	42	1.4	50	1.2	58	1.1	65	0.9	90										
440							2.4	22	1.9	33	1.6	43	1.4	51	1.2	59	1.1	66	0.9	93										
450							2.4	22	1.9	34	1.6	44	1.4	53	1.2	60	1.1	68	0.9	95										
460							2.4	23	1.9	35	1.6	45	1.4	54	1.2	62	1.1	70	0.9	97										
470							2.4	24	1.9	36	1.6	46	1.4	55	1.2	63	1.1	71	0.9	99										
480							2.4	25	1.9	37	1.6	47	1.4	56	1.2	65	1.1	73												
490							2.4	25	1.9	38	1.6	48	1.4	58	1.2	66	1.1	74												
500							2.4	26	1.9	39	1.6	49	1.4	59	1.2	68	1.1	76												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.75
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.5	10		
40																									0.6	11	0.5	15		
50																							0.7	12	0.6	15	0.5	19		
60																					0.8	12	0.7	15	0.6	18	0.5	23		
70																					0.8	15	0.7	19	0.6	22	0.5	28		
80																			1	12	0.8	17	0.7	22	0.6	26	0.5	32		
90																			1	14	0.8	20	0.7	25	0.6	29	0.5	37		
100																			0.9	17	0.8	23	0.7	28	0.6	33	0.5	41		
110																	1.3	10	0.9	19	0.8	26	0.7	31	0.6	36	0.5	45		
120																	1.3	12	0.9	21	0.8	29	0.7	35	0.6	40	0.5	50		
130															1.4	10	1.2	14	0.9	24	0.8	31	0.7	38	0.6	44				
140															1.4	12	1.2	16	0.9	26	0.8	34	0.7	41	0.6	47				
150															1.4	14	1.2	17	0.9	28	0.7	37	0.7	44	0.6	51				
160													1.6	11	1.3	16	1.2	19	0.9	31	0.7	40	0.7	47	0.6	54				
170													1.5	13	1.3	17	1.2	21	0.9	33	0.7	42	0.7	50	0.6	58				
180													1.5	14	1.3	19	1.2	23	0.9	35	0.7	45	0.6	54	0.6	62				
190											1.8	10	1.5	16	1.3	21	1.2	25	0.9	37	0.7	48	0.6	57	0.6	65				
200											1.8	12	1.5	17	1.3	22	1.2	26	0.9	39	0.7	50	0.6	60	0.6	69				
210											1.7	13	1.5	19	1.3	24	1.2	28	0.9	42	0.7	53	0.6	63	0.6	72				
220											1.7	14	1.5	20	1.3	25	1.2	30	0.9	44	0.7	56	0.6	66	0.6	76				
230											1.7	16	1.5	22	1.3	27	1.2	31	0.9	46	0.7	58	0.6	69	0.6	79				
240											1.7	17	1.4	23	1.3	28	1.2	33	0.9	48	0.7	61	0.6	73	0.6	83				
250									2.1	10	1.7	18	1.4	25	1.3	30	1.2	34	0.9	50	0.7	64	0.6	76	0.6	86				
260									2.1	11	1.7	20	1.4	26	1.3	31	1.2	36	0.9	53	0.7	67	0.6	79	0.6	90				
270									2.1	13	1.7	21	1.4	27	1.3	33	1.2	38	0.9	55	0.7	69	0.6	82	0.6	94				
280									2	14	1.6	22	1.4	29	1.3	34	1.1	40	0.9	57	0.7	72	0.6	85	0.6	97				
290									2	15	1.6	23	1.4	30	1.3	36	1.1	41	0.9	59	0.7	75	0.6	88						
300									2	16	1.6	25	1.4	31	1.3	37	1.1	43	0.9	61	0.7	77	0.6	91						
310									2	17	1.6	26	1.4	33	1.3	39	1.1	44	0.9	64	0.7	80	0.6	95						
320									2	18	1.6	27	1.4	34	1.3	40	1.1	46	0.9	66	0.7	83	0.6	98						
330									2	19	1.6	28	1.4	35	1.3	42	1.1	48	0.9	68	0.7	85								
340									2	21	1.6	29	1.4	37	1.3	43	1.1	49	0.9	70	0.7	88								
350									1.9	22	1.6	31	1.4	38	1.2	45	1.1	51	0.9	72	0.7	91								
360							2.6	10	1.9	23	1.6	32	1.4	39	1.2	46	1.1	52	0.9	75	0.7	93								
370							2.6	11	1.9	24	1.6	33	1.4	41	1.2	48	1.1	54	0.9	77	0.7	96								
380							2.6	12	1.9	25	1.6	34	1.4	42	1.2	49	1.1	56	0.9	79	0.7	99								
390							2.5	13	1.9	26	1.6	35	1.4	43	1.2	51	1.1	57	0.9	81										
400							2.5	14	1.9	27	1.6	36	1.4	45	1.2	52	1.1	59	0.9	83										
410							2.5	15	1.9	28	1.6	38	1.4	46	1.2	54	1.1	61	0.9	85										
420							2.5	16	1.9	29	1.6	39	1.4	47	1.2	55	1.1	62	0.9	88										
430							2.5	16	1.9	30	1.6	40	1.4	48	1.2	56	1.1	64	0.9	90										
440							2.5	17	1.9	31	1.6	41	1.4	50	1.2	58	1.1	65	0.9	92										
450							2.5	18	1.9	32	1.6	42	1.4	51	1.2	59	1.1	67	0.9	94										
460							2.4	19	1.9	33	1.6	43	1.4	52	1.2	61	1.1	69	0.9	96										
470							2.4	20	1.9	34	1.6	44	1.4	54	1.2	62	1.1	70	0.9	98										
480							2.4	21	1.9	35	1.6	45	1.4	55	1.2	64	1.1	72												
490							2.4	22	1.9	36	1.6	47	1.4	56	1.2	65	1.1	73												
500							2.4	23	1.9	37	1.6	48	1.4	58	1.2	67	1.1	75												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																									0.5	11				
30																			0.8	10	0.6	13	0.5	15						
40																			0.7	14	0.6	17	0.5	21						
50															1	11	0.9	12	0.7	18	0.6	22	0.5	26						
60													1.1	11	1	13	0.9	15	0.7	22	0.6	27	0.5	32						
70											1.3	11	1.1	14	1	16	0.9	18	0.7	26	0.6	32	0.5	37						
80									1.5	10	1.2	13	1.1	16	1	19	0.9	22	0.7	30	0.6	37	0.5	43						
90									1.5	12	1.2	16	1.1	19	1	22	0.9	25	0.7	34	0.6	42	0.5	48						
100									1.4	14	1.2	18	1.1	22	1	25	0.9	28	0.7	38	0.6	46	0.5	54						
110							1.8	10	1.4	16	1.2	20	1.1	24	1	27	0.9	31	0.7	42	0.6	51	0.5	60						
120							1.8	12	1.4	18	1.2	22	1.1	27	1	30	0.9	34	0.7	46	0.6	56	0.5	65						
130							1.7	14	1.4	20	1.2	25	1.1	29	1	33	0.9	37	0.7	50	0.6	61	0.5	71						
140							1.7	15	1.4	22	1.2	27	1	31	1	36	0.9	40	0.7	54	0.6	66	0.5	76						
150							1.7	17	1.4	23	1.2	29	1	34	0.9	39	0.9	43	0.7	58	0.6	70	0.5	82						
160							1.7	18	1.4	25	1.2	31	1	36	0.9	41	0.9	46	0.7	62	0.6	75	0.5	87						
170					2.4	10	1.7	20	1.4	27	1.2	33	1	39	0.9	44	0.9	49	0.7	66	0.6	80	0.5	93						
180					2.4	12	1.7	21	1.4	29	1.2	36	1	41	0.9	47	0.9	52	0.7	70	0.6	85	0.5	98						
190					2.3	13	1.7	23	1.4	31	1.2	38	1	44	0.9	50	0.9	55	0.7	74	0.6	90								
200					2.3	14	1.7	24	1.4	33	1.2	40	1	46	0.9	52	0.9	58	0.7	78	0.6	94								
210					2.3	15	1.7	26	1.3	34	1.2	42	1	49	0.9	55	0.9	61	0.7	82	0.6	99								
220					2.3	16	1.7	27	1.3	36	1.2	44	1	51	0.9	58	0.9	64	0.7	86										
230					2.3	17	1.6	29	1.3	38	1.2	46	1	54	0.9	60	0.9	67	0.7	89										
240					2.3	19	1.6	30	1.3	40	1.2	48	1	56	0.9	63	0.9	70	0.7	93										
250					2.2	20	1.6	32	1.3	42	1.2	51	1	59	0.9	66	0.9	73	0.7	97										
260					2.2	21	1.6	33	1.3	44	1.2	53	1	61	0.9	69	0.9	76												
270					2.2	22	1.6	35	1.3	45	1.2	55	1	63	0.9	71	0.9	79												
280					2.2	23	1.6	36	1.3	47	1.1	57	1	66	0.9	74	0.9	82												
290					2.2	24	1.6	38	1.3	49	1.1	59	1	68	0.9	77	0.9	85												
300					2.2	25	1.6	39	1.3	51	1.1	61	1	71	0.9	80	0.9	88												
310					2.2	26	1.6	41	1.3	53	1.1	63	1	73	0.9	82	0.9	91												
320					2.2	27	1.6	42	1.3	55	1.1	66	1	76	0.9	85	0.9	94												
330					2.2	29	1.6	44	1.3	56	1.1	68	1	78	0.9	88	0.9	97												
340					2.2	30	1.6	45	1.3	58	1.1	70	1	81	0.9	91	0.9	100												
350					2.2	31	1.6	47	1.3	60	1.1	72	1	83	0.9	93														
360					2.2	32	1.6	48	1.3	62	1.1	74	1	85	0.9	96														
370					2.2	33	1.6	49	1.3	64	1.1	76	1	88	0.9	99														
380					2.2	34	1.6	51	1.3	65	1.1	78	1	90																
390			4	10	2.2	35	1.6	52	1.3	67	1.1	81	1	93																
400			4	11	2.2	36	1.6	54	1.3	69	1.1	83	1	95																
410			4	11	2.2	37	1.6	55	1.3	71	1.1	85	1	98																
420			4	12	2.1	38	1.6	57	1.3	73	1.1	87	1	100																
430			3.9	13	2.1	39	1.6	58	1.3	74	1.1	89																		
440			3.9	14	2.1	40	1.6	60	1.3	76	1.1	91																		
450			3.9	14	2.1	41	1.6	61	1.3	78	1.1	93																		
460			3.9	15	2.1	42	1.6	63	1.3	80	1.1	96																		
470			3.9	15	2.1	43	1.6	64	1.3	82	1.1	98																		
480			3.9	16	2.1	44	1.6	65	1.3	83	1.1	100																		
490			3.9	17	2.1	46	1.6	67	1.3	85																				
500			3.8	17	2.1	47	1.6	68	1.3	87																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																									0.5	10				
30																					0.6	12	0.6	14						
40																			0.8	13	0.6	17	0.5	20						
50																	1	11	0.7	17	0.6	22	0.5	26						
60															1	12	0.9	14	0.7	21	0.6	27	0.5	31						
70													1.1	12	1	15	0.9	17	0.7	25	0.6	31	0.5	37						
80											1.3	11	1.1	15	1	18	0.9	20	0.7	29	0.6	36	0.5	42						
90											1.3	14	1.1	18	1	21	0.9	24	0.7	33	0.6	41	0.5	48						
100									1.5	11	1.2	16	1.1	20	1	24	0.9	27	0.7	37	0.6	46	0.5	54						
110									1.5	14	1.2	19	1.1	23	1	26	0.9	30	0.7	41	0.6	51	0.5	59						
120									1.4	16	1.2	21	1.1	25	1	29	0.9	33	0.7	45	0.6	56	0.5	65						
130							1.8	10	1.4	18	1.2	23	1.1	28	1	32	0.9	36	0.7	49	0.6	60	0.5	70						
140							1.8	12	1.4	20	1.2	25	1.1	30	1	35	0.9	39	0.7	53	0.6	65	0.5	76						
150							1.8	14	1.4	22	1.2	28	1.1	33	1	38	0.9	42	0.7	57	0.6	70	0.5	81						
160							1.8	16	1.4	23	1.2	30	1.1	35	1	40	0.9	45	0.7	61	0.6	75	0.5	87						
170							1.7	17	1.4	25	1.2	32	1	38	1	43	0.9	48	0.7	65	0.6	80	0.5	93						
180							1.7	19	1.4	27	1.2	34	1	40	0.9	46	0.9	51	0.7	69	0.6	84	0.5	98						
190							1.7	21	1.4	29	1.2	36	1	43	0.9	49	0.9	54	0.7	73	0.6	89								
200							1.7	22	1.4	31	1.2	39	1	45	0.9	51	0.9	57	0.7	77	0.6	94								
210					2.4	11	1.7	24	1.4	33	1.2	41	1	48	0.9	54	0.9	60	0.7	81	0.6	99								
220					2.4	12	1.7	25	1.4	35	1.2	43	1	50	0.9	57	0.9	63	0.7	85										
230					2.4	13	1.7	27	1.4	37	1.2	45	1	53	0.9	60	0.9	66	0.7	89										
240					2.4	15	1.7	28	1.3	39	1.2	47	1	55	0.9	62	0.9	69	0.7	93										
250					2.3	16	1.7	30	1.3	40	1.2	49	1	58	0.9	65	0.9	72	0.7	97										
260					2.3	17	1.6	31	1.3	42	1.2	52	1	60	0.9	68	0.9	75												
270					2.3	18	1.6	33	1.3	44	1.2	54	1	62	0.9	71	0.9	78												
280					2.3	20	1.6	34	1.3	46	1.2	56	1	65	0.9	73	0.9	81												
290					2.3	21	1.6	36	1.3	48	1.2	58	1	67	0.9	76	0.9	84												
300					2.3	22	1.6	37	1.3	50	1.2	60	1	70	0.9	79	0.9	87												
310					2.2	23	1.6	39	1.3	51	1.2	62	1	72	0.9	82	0.9	90												
320					2.2	24	1.6	40	1.3	53	1.2	64	1	75	0.9	84	0.9	93												
330					2.2	26	1.6	42	1.3	55	1.1	67	1	77	0.9	87	0.9	96												
340					2.2	27	1.6	43	1.3	57	1.1	69	1	80	0.9	90	0.9	99												
350					2.2	28	1.6	45	1.3	59	1.1	71	1	82	0.9	93														
360					2.2	29	1.6	46	1.3	61	1.1	73	1	85	0.9	95														
370					2.2	30	1.6	48	1.3	62	1.1	75	1	87	0.9	98														
380					2.2	31	1.6	49	1.3	64	1.1	77	1	89																
390					2.2	32	1.6	51	1.3	66	1.1	80	1	92																
400					2.2	33	1.6	52	1.3	68	1.1	82	1	94																
410					2.2	34	1.6	54	1.3	70	1.1	84	1	97																
420					2.2	36	1.6	55	1.3	71	1.1	86	1	99																
430					2.2	37	1.6	57	1.3	73	1.1	88																		
440					2.2	38	1.6	58	1.3	75	1.1	90																		
450					2.2	39	1.6	60	1.3	77	1.1	92																		
460					2.2	40	1.6	61	1.3	79	1.1	95																		
470					2.2	41	1.6	63	1.3	81	1.1	97																		
480					2.1	42	1.6	64	1.3	82	1.1	99																		
490					2.1	43	1.6	65	1.3	84																				
500			4.1	10	2.1	44	1.6	67	1.3	86																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																					0.7	11	0.6	14	0.5	16				
40																			0.8	12	0.6	16	0.5	19						
50																			0.7	16	0.6	21	0.5	25						
60															1.1	10	1	13	0.7	20	0.6	26	0.5	31						
70													1.2	10	1	13	0.9	16	0.7	24	0.6	31	0.5	36						
80													1.2	13	1	16	0.9	19	0.7	28	0.6	36	0.5	42						
90											1.3	11	1.1	16	1	19	0.9	22	0.7	32	0.6	40	0.5	47						
100											1.3	14	1.1	18	1	22	0.9	26	0.7	36	0.6	45	0.5	53						
110									1.5	11	1.3	17	1.1	21	1	25	0.9	29	0.7	40	0.6	50	0.5	59						
120									1.5	13	1.2	19	1.1	24	1	28	0.9	32	0.7	44	0.6	55	0.5	64						
130									1.5	15	1.2	21	1.1	26	1	31	0.9	35	0.7	48	0.6	60	0.5	70						
140									1.5	17	1.2	24	1.1	29	1	34	0.9	38	0.7	52	0.6	65	0.5	75						
150							1.9	10	1.4	19	1.2	26	1.1	32	1	36	0.9	41	0.7	56	0.6	69	0.5	81						
160							1.8	12	1.4	21	1.2	28	1.1	34	1	39	0.9	44	0.7	60	0.6	74	0.5	86						
170							1.8	14	1.4	23	1.2	31	1.1	37	1	42	0.9	47	0.7	64	0.6	79	0.5	92						
180							1.8	16	1.4	25	1.2	33	1.1	39	1	45	0.9	50	0.7	68	0.6	84	0.5	98						
190							1.8	18	1.4	27	1.2	35	1	42	1	48	0.9	53	0.7	72	0.6	89								
200							1.7	19	1.4	29	1.2	37	1	44	0.9	50	0.9	56	0.7	76	0.6	94								
210							1.7	21	1.4	31	1.2	39	1	47	0.9	53	0.9	59	0.7	80	0.6	98								
220							1.7	23	1.4	33	1.2	42	1	49	0.9	56	0.9	62	0.7	84										
230							1.7	24	1.4	35	1.2	44	1	52	0.9	59	0.9	65	0.7	88										
240							1.7	26	1.4	37	1.2	46	1	54	0.9	62	0.9	68	0.7	92										
250					2.5	11	1.7	28	1.4	39	1.2	48	1	57	0.9	64	0.9	71	0.7	96										
260					2.4	12	1.7	29	1.4	41	1.2	50	1	59	0.9	67	0.9	74	0.7	100										
270					2.4	14	1.7	31	1.4	43	1.2	53	1	62	0.9	70	0.9	77												
280					2.4	15	1.7	32	1.3	44	1.2	55	1	64	0.9	72	0.9	80												
290					2.4	17	1.7	34	1.3	46	1.2	57	1	66	0.9	75	0.9	84												
300					2.3	18	1.7	35	1.3	48	1.2	59	1	69	0.9	78	0.9	86												
310					2.3	19	1.6	37	1.3	50	1.2	61	1	71	0.9	81	0.9	90												
320					2.3	21	1.6	38	1.3	52	1.2	63	1	74	0.9	83	0.9	92												
330					2.3	22	1.6	40	1.3	54	1.2	66	1	76	0.9	86	0.9	96												
340					2.3	23	1.6	42	1.3	56	1.2	68	1	79	0.9	89	0.9	99												
350					2.3	24	1.6	43	1.3	57	1.2	70	1	81	0.9	92														
360					2.3	26	1.6	45	1.3	59	1.1	72	1	84	0.9	94														
370					2.2	27	1.6	46	1.3	61	1.1	74	1	86	0.9	97														
380					2.2	28	1.6	48	1.3	63	1.1	76	1	89	0.9	100														
390					2.2	29	1.6	49	1.3	65	1.1	79	1	91																
400					2.2	30	1.6	50	1.3	67	1.1	81	1	93																
410					2.2	31	1.6	52	1.3	68	1.1	83	1	96																
420					2.2	33	1.6	54	1.3	70	1.1	85	1	99																
430					2.2	34	1.6	55	1.3	72	1.1	87																		
440					2.2	35	1.6	57	1.3	74	1.1	89																		
450					2.2	36	1.6	58	1.3	76	1.1	91																		
460					2.2	37	1.6	59	1.3	78	1.1	94																		
470					2.2	38	1.6	61	1.3	79	1.1	96																		
480					2.2	39	1.6	62	1.3	81	1.1	98																		
490					2.2	41	1.6	64	1.3	83	1.1	100																		
500					2.2	42	1.6	65	1.3	85																				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																									0.6	11				
40																					0.7	11	0.6	13	0.6	16				
50																			0.9	11	0.7	14	0.6	17	0.6	20				
60																			0.9	13	0.7	18	0.6	21	0.6	24				
70																	1.1	10	0.8	16	0.7	21	0.6	25	0.6	28				
80															1.2	11	1.1	13	0.8	19	0.7	24	0.6	29	0.5	33				
90													1.4	10	1.2	13	1.1	15	0.8	22	0.7	27	0.6	33	0.5	37				
100													1.4	12	1.2	14	1.1	17	0.8	24	0.7	31	0.6	36	0.5	41				
110											1.6	10	1.3	14	1.2	16	1.1	19	0.8	27	0.7	34	0.6	40	0.5	46				
120											1.5	12	1.3	15	1.2	18	1.1	21	0.8	30	0.7	37	0.6	44	0.5	50				
130											1.5	13	1.3	17	1.2	20	1.1	23	0.8	32	0.7	41	0.6	48	0.5	54				
140									1.8	11	1.5	15	1.3	19	1.2	22	1.1	25	0.8	35	0.7	44	0.6	52	0.5	59				
150									1.8	12	1.5	16	1.3	20	1.2	24	1.1	27	0.8	38	0.7	47	0.6	55	0.5	63				
160									1.8	13	1.5	18	1.3	22	1.2	25	1.1	29	0.8	40	0.7	50	0.6	59	0.5	67				
170									1.8	14	1.5	19	1.3	23	1.2	27	1.1	31	0.8	43	0.7	54	0.6	63	0.5	71				
180									1.7	16	1.5	21	1.3	25	1.1	29	1	33	0.8	46	0.7	57	0.6	67	0.5	76				
190							2.2	10	1.7	17	1.5	22	1.3	27	1.1	31	1	35	0.8	48	0.7	60	0.6	71	0.5	80				
200							2.2	11	1.7	18	1.5	24	1.3	28	1.1	33	1	37	0.8	51	0.7	63	0.6	74	0.5	84				
210							2.2	12	1.7	19	1.4	25	1.3	30	1.1	35	1	39	0.8	54	0.7	67	0.6	78	0.5	89				
220							2.2	14	1.7	21	1.4	26	1.3	32	1.1	36	1	41	0.8	56	0.7	70	0.6	82	0.5	93				
230							2.2	14	1.7	22	1.4	28	1.3	33	1.1	38	1	43	0.8	59	0.7	73	0.6	86	0.5	97				
240							2.2	15	1.7	23	1.4	29	1.3	35	1.1	40	1	45	0.8	62	0.7	76	0.6	89						
250							2.1	16	1.7	24	1.4	31	1.3	36	1.1	42	1	47	0.8	64	0.7	80	0.6	93						
260							2.1	17	1.7	25	1.4	32	1.3	38	1.1	43	1	49	0.8	67	0.7	83	0.6	97						
270							2.1	18	1.7	26	1.4	33	1.3	40	1.1	45	1	51	0.8	70	0.7	86								
280							2.1	19	1.7	28	1.4	35	1.3	41	1.1	47	1	53	0.8	72	0.7	89								
290							2.1	20	1.7	29	1.4	36	1.2	43	1.1	49	1	55	0.8	75	0.7	93								
300					3.1	10	2.1	21	1.7	30	1.4	37	1.2	44	1.1	51	1	57	0.8	78	0.7	96								
310					3	11	2.1	22	1.7	31	1.4	39	1.2	46	1.1	52	1	59	0.8	80	0.7	99								
320					3	11	2.1	23	1.7	32	1.4	40	1.2	47	1.1	54	1	60	0.8	83										
330					3	12	2.1	24	1.7	33	1.4	42	1.2	49	1.1	56	1	62	0.8	86										
340					3	13	2.1	25	1.7	35	1.4	43	1.2	51	1.1	58	1	64	0.8	88										
350					3	13	2.1	26	1.7	36	1.4	44	1.2	52	1.1	60	1	66	0.8	91										
360					3	14	2.1	27	1.7	37	1.4	46	1.2	54	1.1	61	1	68	0.8	94										
370					3	15	2.1	28	1.7	38	1.4	47	1.2	55	1.1	63	1	70	0.8	96										
380					2.9	16	2.1	29	1.7	39	1.4	49	1.2	57	1.1	65	1	72	0.8	99										
390					2.9	16	2.1	30	1.6	40	1.4	50	1.2	59	1.1	67	1	74												
400					2.9	17	2.1	31	1.6	42	1.4	51	1.2	60	1.1	69	1	76												
410					2.9	18	2.1	31	1.6	43	1.4	53	1.2	62	1.1	70	1	78												
420					2.9	18	2	32	1.6	44	1.4	54	1.2	63	1.1	72	1	80												
430					2.9	19	2	33	1.6	45	1.4	55	1.2	65	1.1	74	1	82												
440					2.9	20	2	34	1.6	46	1.4	57	1.2	66	1.1	76	1	84												
450					2.9	20	2	35	1.6	47	1.4	58	1.2	68	1.1	77	1	86												
460					2.9	21	2	36	1.6	48	1.4	59	1.2	70	1.1	79	1	88												
470					2.9	22	2	37	1.6	50	1.4	61	1.2	71	1.1	81	1	90												
480					2.9	22	2	38	1.6	51	1.4	62	1.2	73	1.1	83	1	92												
490					2.9	23	2	39	1.6	52	1.4	64	1.2	74	1.1	85	1	94												
500					2.8	24	2	40	1.6	53	1.4	65	1.2	76	1.1	86	1	96												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																									0.6	10				
40																					0.8	10	0.6	13	0.6	15				
50																					0.7	13	0.6	16	0.6	19				
60																			0.9	12	0.7	17	0.6	20	0.6	24				
70																			0.9	15	0.7	20	0.6	24	0.6	28				
80																	1.2	11	0.8	18	0.7	23	0.6	28	0.6	32				
90															1.3	10	1.1	13	0.8	21	0.7	27	0.6	32	0.6	37				
100															1.2	13	1.1	15	0.8	23	0.7	30	0.6	36	0.5	41				
110													1.4	11	1.2	15	1.1	17	0.8	26	0.7	33	0.6	40	0.5	45				
120													1.4	13	1.2	17	1.1	19	0.8	29	0.7	37	0.6	43	0.5	50				
130											1.6	11	1.3	15	1.2	18	1.1	21	0.8	32	0.7	40	0.6	47	0.5	54				
140											1.6	12	1.3	17	1.2	20	1.1	24	0.8	34	0.7	43	0.6	51	0.5	58				
150											1.5	14	1.3	18	1.2	22	1.1	26	0.8	37	0.7	46	0.6	55	0.5	62				
160									1.9	10	1.5	16	1.3	20	1.2	24	1.1	28	0.8	40	0.7	50	0.6	59	0.5	67				
170									1.8	11	1.5	17	1.3	22	1.2	26	1.1	30	0.8	42	0.7	53	0.6	62	0.5	71				
180									1.8	13	1.5	19	1.3	24	1.2	28	1.1	32	0.8	45	0.7	56	0.6	66	0.5	75				
190									1.8	14	1.5	20	1.3	25	1.2	30	1.1	34	0.8	48	0.7	59	0.6	70	0.5	80				
200									1.8	15	1.5	22	1.3	27	1.1	31	1	36	0.8	50	0.7	63	0.6	74	0.5	84				
210									1.8	17	1.5	23	1.3	29	1.1	33	1	38	0.8	53	0.7	66	0.6	78	0.5	88				
220									1.7	18	1.5	25	1.3	30	1.1	35	1	40	0.8	56	0.7	69	0.6	81	0.5	92				
230							2.3	10	1.7	19	1.5	26	1.3	32	1.1	37	1	42	0.8	58	0.7	73	0.6	85	0.5	97				
240							2.3	12	1.7	21	1.4	27	1.3	33	1.1	39	1	44	0.8	61	0.7	76	0.6	89						
250							2.2	13	1.7	22	1.4	29	1.3	35	1.1	41	1	46	0.8	64	0.7	79	0.6	93						
260							2.2	14	1.7	23	1.4	30	1.3	37	1.1	42	1	48	0.8	66	0.7	82	0.6	97						
270							2.2	15	1.7	24	1.4	32	1.3	38	1.1	44	1	50	0.8	69	0.7	85	0.6	100						
280							2.2	16	1.7	25	1.4	33	1.3	40	1.1	46	1	52	0.8	72	0.7	89								
290							2.2	17	1.7	27	1.4	35	1.3	41	1.1	48	1	54	0.8	74	0.7	92								
300							2.2	18	1.7	28	1.4	36	1.3	43	1.1	50	1	56	0.8	77	0.7	95								
310							2.1	19	1.7	29	1.4	37	1.3	45	1.1	51	1	58	0.8	80	0.7	99								
320							2.1	20	1.7	30	1.4	39	1.3	46	1.1	53	1	60	0.8	82										
330							2.1	21	1.7	32	1.4	40	1.2	48	1.1	55	1	62	0.8	85										
340							2.1	22	1.7	33	1.4	42	1.2	50	1.1	57	1	64	0.8	88										
350							2.1	23	1.7	34	1.4	43	1.2	51	1.1	59	1	66	0.8	90										
360							2.1	24	1.7	35	1.4	44	1.2	53	1.1	60	1	68	0.8	93										
370							2.1	25	1.7	36	1.4	46	1.2	54	1.1	62	1	70	0.8	96										
380					3.1	10	2.1	26	1.7	37	1.4	47	1.2	56	1.1	64	1	71	0.8	98										
390					3.1	11	2.1	27	1.7	39	1.4	49	1.2	57	1.1	66	1	73												
400					3.1	12	2.1	28	1.7	40	1.4	50	1.2	59	1.1	68	1	76												
410					3	12	2.1	29	1.7	41	1.4	51	1.2	61	1.1	69	1	77												
420					3	13	2.1	30	1.7	42	1.4	53	1.2	62	1.1	71	1	79												
430					3	14	2.1	31	1.6	43	1.4	54	1.2	64	1.1	73	1	81												
440					3	15	2.1	32	1.6	45	1.4	56	1.2	65	1.1	75	1	83												
450					3	16	2.1	33	1.6	46	1.4	57	1.2	67	1.1	76	1	85												
460					3	16	2.1	34	1.6	47	1.4	58	1.2	69	1.1	78	1	87												
470					3	17	2.1	35	1.6	48	1.4	60	1.2	70	1.1	80	1	89												
480					2.9	18	2	36	1.6	49	1.4	61	1.2	72	1.1	82	1	91												
490					2.9	19	2	37	1.6	50	1.4	62	1.2	73	1.1	84	1	93												
500					2.9	19	2	38	1.6	51	1.4	64	1.2	75	1.1	85	1	95												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																							0.7	12	0.6	14				
50																					0.7	12	0.6	16	0.6	19				
60																			0.9	11	0.7	16	0.6	20	0.6	23				
70																			0.9	14	0.7	19	0.6	23	0.6	27				
80																			0.9	17	0.7	23	0.6	27	0.6	32				
90																	1.2	11	0.9	20	0.7	26	0.6	31	0.6	36				
100															1.3	10	1.1	13	0.8	22	0.7	29	0.6	35	0.6	40				
110															1.3	12	1.1	16	0.8	25	0.7	33	0.6	39	0.5	45				
120													1.4	11	1.2	15	1.1	18	0.8	28	0.7	36	0.6	43	0.5	49				
130													1.4	13	1.2	17	1.1	20	0.8	31	0.7	39	0.6	47	0.5	53				
140													1.4	14	1.2	19	1.1	22	0.8	33	0.7	42	0.6	50	0.5	58				
150											1.6	11	1.4	16	1.2	21	1.1	24	0.8	36	0.7	46	0.6	54	0.5	62				
160											1.6	13	1.3	18	1.2	23	1.1	26	0.8	39	0.7	49	0.6	58	0.5	66				
170											1.6	14	1.3	20	1.2	24	1.1	28	0.8	41	0.7	52	0.6	62	0.5	70				
180											1.5	16	1.3	22	1.2	26	1.1	30	0.8	44	0.7	56	0.6	66	0.5	75				
190									1.9	10	1.5	18	1.3	23	1.2	28	1.1	32	0.8	47	0.7	59	0.6	69	0.5	79				
200									1.9	12	1.5	19	1.3	25	1.2	30	1.1	35	0.8	50	0.7	62	0.6	73	0.5	83				
210									1.8	13	1.5	21	1.3	27	1.2	32	1.1	37	0.8	52	0.7	65	0.6	77	0.5	88				
220									1.8	15	1.5	22	1.3	28	1.2	34	1.1	39	0.8	55	0.7	69	0.6	81	0.5	92				
230									1.8	16	1.5	24	1.3	30	1.1	36	1	41	0.8	58	0.7	72	0.6	85	0.5	96				
240									1.8	18	1.5	26	1.3	32	1.1	37	1	43	0.8	60	0.7	75	0.6	88	0.5	100				
250									1.8	19	1.5	27	1.3	34	1.1	39	1	45	0.8	63	0.7	78	0.6	92						
260									1.8	20	1.5	28	1.3	35	1.1	41	1	47	0.8	66	0.7	82	0.6	96						
270							2.3	10	1.7	22	1.5	30	1.3	37	1.1	43	1	49	0.8	68	0.7	85	0.6	100						
280							2.3	11	1.7	23	1.4	31	1.3	38	1.1	45	1	51	0.8	71	0.7	88								
290							2.3	13	1.7	24	1.4	33	1.3	40	1.1	47	1	53	0.8	74	0.7	92								
300							2.2	14	1.7	26	1.4	34	1.3	42	1.1	48	1	55	0.8	76	0.7	95								
310							2.2	15	1.7	27	1.4	36	1.3	43	1.1	50	1	57	0.8	79	0.7	98								
320							2.2	16	1.7	28	1.4	37	1.3	45	1.1	52	1	59	0.8	82										
330							2.2	17	1.7	29	1.4	39	1.3	47	1.1	54	1	61	0.8	84										
340							2.2	19	1.7	31	1.4	40	1.3	48	1.1	56	1	63	0.8	87										
350							2.2	20	1.7	32	1.4	41	1.3	50	1.1	57	1	65	0.8	90										
360							2.2	21	1.7	33	1.4	43	1.2	52	1.1	59	1	67	0.8	92										
370							2.1	22	1.7	34	1.4	44	1.2	53	1.1	61	1	69	0.8	95										
380							2.1	23	1.7	35	1.4	46	1.2	55	1.1	63	1	71	0.8	98										
390							2.1	24	1.7	37	1.4	47	1.2	56	1.1	65	1	73	0.8	100										
400							2.1	25	1.7	38	1.4	49	1.2	58	1.1	67	1	74												
410							2.1	26	1.7	39	1.4	50	1.2	60	1.1	68	1	77												
420							2.1	27	1.7	40	1.4	51	1.2	61	1.1	70	1	79												
430							2.1	28	1.7	41	1.4	53	1.2	63	1.1	72	1	80												
440							2.1	29	1.7	43	1.4	54	1.2	64	1.1	74	1	83												
450							2.1	30	1.7	44	1.4	56	1.2	66	1.1	76	1	84												
460					3.1	10	2.1	31	1.7	45	1.4	57	1.2	68	1.1	77	1	86												
470					3.1	11	2.1	32	1.7	46	1.4	58	1.2	69	1.1	79	1	88												
480					3.1	12	2.1	33	1.6	47	1.4	60	1.2	71	1.1	81	1	90												
490					3.1	13	2.1	34	1.6	49	1.4	61	1.2	72	1.1	83	1	92												
500					3.1	14	2.1	35	1.6	50	1.4	62	1.2	74	1.1	85	1	94												

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																													0.5	10
40																											0.6	11	0.5	13
50																									0.7	11	0.6	14	0.5	17
60																							0.8	11	0.7	14	0.6	17	0.5	21
70																					0.9	11	0.8	14	0.7	16	0.6	21	0.5	25
80																					0.9	13	0.8	16	0.7	19	0.6	24		
90																			1.1	11	0.9	15	0.8	18	0.7	21	0.6	27		
100																			1.1	12	0.9	17	0.8	21	0.7	24	0.6	30		
110																			1.1	14	0.9	19	0.8	23	0.7	27	0.6	33		
120																			1.1	16	0.9	21	0.8	25	0.7	29	0.6	37		
130																	1.5	10	1.1	17	0.9	23	0.7	28	0.7	32	0.6	40		
140																	1.5	11	1.1	19	0.9	25	0.7	30	0.7	35	0.6	43		
150															1.6	10	1.4	13	1.1	20	0.9	27	0.7	32	0.7	37	0.6	46		
160															1.6	11	1.4	14	1	22	0.9	29	0.7	34	0.7	40	0.6	49		
170															1.6	12	1.4	15	1	23	0.9	30	0.7	37	0.7	42	0.6	53		
180													1.8	10	1.6	13	1.4	16	1	25	0.9	32	0.7	39	0.7	45	0.6	56		
190													1.8	11	1.6	15	1.4	17	1	27	0.9	34	0.7	41	0.7	48	0.6	59		
200													1.8	12	1.6	16	1.4	18	1	28	0.9	36	0.7	43	0.7	50	0.6	62		
210													1.8	13	1.6	17	1.4	20	1	30	0.9	38	0.7	46	0.7	53	0.6	65		
220											2.1	10	1.8	14	1.5	18	1.4	21	1	31	0.9	40	0.7	48	0.7	55	0.6	68		
230											2.1	11	1.8	15	1.5	19	1.4	22	1	33	0.8	42	0.7	50	0.7	58	0.6	72		
240											2.1	12	1.7	16	1.5	20	1.4	23	1	34	0.8	44	0.7	52	0.7	60	0.6	75		
250											2	13	1.7	17	1.5	21	1.4	24	1	36	0.8	46	0.7	55	0.7	63	0.6	78		
260											2	14	1.7	18	1.5	22	1.4	25	1	37	0.8	48	0.7	57	0.7	66	0.6	81		
270											2	14	1.7	19	1.5	23	1.4	26	1	39	0.8	50	0.7	59	0.7	68	0.6	84		
280									2.5	10	2	15	1.7	20	1.5	24	1.4	28	1	40	0.8	52	0.7	62	0.7	71	0.6	87		
290									2.5	11	2	16	1.7	21	1.5	25	1.4	29	1	42	0.8	54	0.7	64	0.7	73	0.6	91		
300									2.5	11	2	17	1.7	22	1.5	26	1.4	30	1	44	0.8	55	0.7	66	0.7	76	0.6	94		
310									2.4	12	2	18	1.7	23	1.5	27	1.4	31	1	45	0.8	57	0.7	68	0.7	79	0.6	97		
320									2.4	13	2	18	1.7	23	1.5	28	1.4	32	1	47	0.8	59	0.7	71	0.7	81	0.6	100		
330									2.4	13	2	19	1.7	24	1.5	29	1.4	33	1	48	0.8	61	0.7	73	0.7	84				
340									2.4	14	2	20	1.7	25	1.5	30	1.4	34	1	50	0.8	63	0.7	75	0.7	86				
350									2.4	15	2	21	1.7	26	1.5	31	1.4	35	1	51	0.8	65	0.7	77	0.7	89				
360									2.4	15	2	22	1.7	27	1.5	32	1.4	37	1	53	0.8	67	0.7	80	0.7	92				
370									2.4	16	2	22	1.7	28	1.5	33	1.4	38	1	54	0.8	69	0.7	82	0.7	94				
380									2.4	17	2	23	1.7	29	1.5	34	1.4	39	1	56	0.8	71	0.7	84	0.7	97				
390									2.4	17	2	24	1.7	30	1.5	35	1.4	40	1	57	0.8	73	0.7	87	0.7	99				
400							3.1	10	2.4	18	1.9	25	1.7	31	1.5	36	1.3	41	1	59	0.8	75	0.7	89						
410							3.1	10	2.4	19	1.9	25	1.7	31	1.5	37	1.3	42	1	61	0.8	77	0.7	91						
420							3.1	11	2.4	19	1.9	26	1.7	32	1.5	38	1.3	43	1	62	0.8	78	0.7	93						
430							3.1	11	2.3	20	1.9	27	1.7	33	1.5	39	1.3	44	1	64	0.8	80	0.7	96						
440							3.1	12	2.3	21	1.9	28	1.7	34	1.5	40	1.3	45	1	65	0.8	82	0.7	98						
450							3.1	12	2.3	21	1.9	28	1.7	35	1.5	41	1.3	47	1	67	0.8	84	0.7	100						
460							3.1	13	2.3	22	1.9	29	1.7	36	1.5	42	1.3	48	1	68	0.8	86								
470							3.1	13	2.3	22	1.9	30	1.7	37	1.5	43	1.3	49	1	70	0.8	88								
480							3	14	2.3	23	1.9	31	1.7	38	1.5	44	1.3	50	1	71	0.8	90								
490							3	14	2.3	24	1.9	31	1.7	38	1.5	45	1.3	51	1	73	0.8	92								
500							3	15	2.3	24	1.9	32	1.7	39	1.5	46	1.3	52	1	74	0.8	94								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																											0.6	10	0.5	13
50																									0.7	10	0.6	14	0.5	17
60																							0.8	10	0.7	13	0.6	17	0.5	20
70																							0.8	13	0.7	15	0.6	20	0.5	24
80																					0.9	12	0.8	15	0.7	18	0.6	23	0.5	28
90																					0.9	14	0.8	17	0.7	21	0.6	26		
100																			1.1	11	0.9	16	0.8	20	0.7	23	0.6	30		
110																			1.1	12	0.9	18	0.8	22	0.7	26	0.6	33		
120																			1.1	14	0.9	20	0.8	24	0.7	29	0.6	36		
130																			1.1	16	0.9	22	0.8	27	0.7	31	0.6	39		
140																			1.1	17	0.9	24	0.8	29	0.7	34	0.6	42		
150																	1.5	10	1.1	19	0.9	26	0.7	31	0.7	36	0.6	46		
160																	1.5	11	1.1	21	0.9	28	0.7	34	0.7	39	0.6	49		
170															1.7	10	1.5	13	1.1	22	0.9	30	0.7	36	0.7	42	0.6	52		
180															1.6	11	1.4	14	1	24	0.9	32	0.7	38	0.7	44	0.6	55		
190															1.6	12	1.4	15	1	25	0.9	33	0.7	40	0.7	47	0.6	58		
200															1.6	13	1.4	17	1	27	0.9	35	0.7	43	0.7	50	0.6	62		
210													1.8	10	1.6	14	1.4	18	1	29	0.9	37	0.7	45	0.7	52	0.6	65		
220													1.8	11	1.6	15	1.4	19	1	30	0.9	39	0.7	47	0.7	55	0.6	68		
230													1.8	12	1.6	17	1.4	20	1	32	0.9	41	0.7	50	0.7	57	0.6	71		
240													1.8	13	1.6	18	1.4	21	1	33	0.9	43	0.7	52	0.7	60	0.6	74		
250													1.8	14	1.6	19	1.4	22	1	35	0.8	45	0.7	54	0.7	62	0.6	77		
260											2.1	10	1.8	15	1.5	20	1.4	24	1	36	0.8	47	0.7	56	0.7	65	0.6	81		
270											2.1	11	1.8	16	1.5	21	1.4	25	1	38	0.8	49	0.7	59	0.7	68	0.6	84		
280											2.1	12	1.8	17	1.5	22	1.4	26	1	39	0.8	51	0.7	61	0.7	70	0.6	87		
290											2.1	13	1.7	18	1.5	23	1.4	27	1	41	0.8	53	0.7	63	0.7	73	0.6	90		
300											2.1	14	1.7	19	1.5	24	1.4	28	1	43	0.8	55	0.7	65	0.7	75	0.6	93		
310											2	15	1.7	20	1.5	25	1.4	29	1	44	0.8	57	0.7	68	0.7	78	0.6	96		
320											2	15	1.7	21	1.5	26	1.4	31	1	46	0.8	59	0.7	70	0.7	81	0.6	100		
330											2	16	1.7	22	1.5	27	1.4	32	1	47	0.8	60	0.7	72	0.7	83				
340									2.5	10	2	17	1.7	23	1.5	28	1.4	33	1	49	0.8	62	0.7	75	0.7	86				
350									2.5	10	2	18	1.7	24	1.5	29	1.4	34	1	50	0.8	64	0.7	77	0.7	88				
360									2.5	11	2	19	1.7	25	1.5	30	1.4	35	1	52	0.8	66	0.7	79	0.7	91				
370									2.5	12	2	20	1.7	26	1.5	31	1.4	36	1	53	0.8	68	0.7	81	0.7	94				
380									2.5	13	2	20	1.7	27	1.5	32	1.4	37	1	55	0.8	70	0.7	84	0.7	96				
390									2.4	13	2	21	1.7	28	1.5	33	1.4	39	1	57	0.8	72	0.7	86	0.7	99				
400									2.4	14	2	22	1.7	29	1.5	34	1.4	40	1	58	0.8	74	0.7	88						
410									2.4	15	2	23	1.7	30	1.5	35	1.4	41	1	60	0.8	76	0.7	91						
420									2.4	16	2	24	1.7	30	1.5	36	1.4	42	1	61	0.8	78	0.7	93						
430									2.4	16	2	25	1.7	31	1.5	37	1.3	43	1	63	0.8	80	0.7	95						
440									2.4	17	2	25	1.7	32	1.5	39	1.3	44	1	64	0.8	82	0.7	97						
450									2.4	18	1.9	26	1.7	33	1.5	39	1.3	45	1	66	0.8	84	0.7	100						
460									2.4	18	1.9	27	1.7	34	1.5	41	1.3	46	1	67	0.8	85								
470									2.4	19	1.9	28	1.7	35	1.5	42	1.3	48	1	69	0.8	87								
480									2.4	20	1.9	28	1.7	36	1.5	42	1.3	49	1	70	0.8	89								
490									2.4	20	1.9	29	1.7	37	1.5	44	1.3	50	1	72	0.8	91								
500									2.4	21	1.9	30	1.7	38	1.5	44	1.3	51	1	74	0.8	93								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																													0.5	12
50																											0.6	13	0.5	16
60																									0.7	12	0.6	16	0.5	20
70																							0.8	11	0.7	14	0.6	19	0.5	23
80																					0.9	10	0.8	14	0.7	17	0.6	23	0.5	27
90																					0.9	12	0.8	16	0.7	20	0.6	26	0.5	31
100																					0.9	14	0.8	19	0.7	23	0.6	29		
110																			1.1	10	0.9	16	0.8	21	0.7	25	0.6	32		
120																			1.1	12	0.9	19	0.8	24	0.7	28	0.6	35		
130																			1.1	14	0.9	21	0.8	26	0.7	31	0.6	39		
140																			1.1	16	0.9	23	0.8	28	0.7	33	0.6	42		
150																			1.1	17	0.9	25	0.8	31	0.7	36	0.6	45		
160																			1.1	19	0.9	27	0.7	33	0.7	38	0.6	48		
170																	1.5	10	1.1	21	0.9	29	0.7	35	0.7	41	0.6	52		
180																	1.5	11	1.1	22	0.9	31	0.7	37	0.7	44	0.6	55		
190																	1.5	13	1.1	24	0.9	33	0.7	40	0.7	46	0.6	58		
200															1.7	10	1.5	14	1.1	26	0.9	34	0.7	42	0.7	49	0.6	61		
210															1.7	11	1.5	15	1	27	0.9	36	0.7	44	0.7	51	0.6	64		
220															1.6	13	1.4	17	1	29	0.9	38	0.7	47	0.7	54	0.6	67		
230															1.6	14	1.4	18	1	31	0.9	40	0.7	49	0.7	57	0.6	71		
240													1.9	10	1.6	15	1.4	19	1	32	0.9	42	0.7	51	0.7	59	0.6	74		
250													1.9	11	1.6	16	1.4	20	1	34	0.9	44	0.7	53	0.7	62	0.6	77		
260													1.8	12	1.6	17	1.4	22	1	35	0.9	46	0.7	56	0.7	65	0.6	80		
270													1.8	13	1.6	19	1.4	23	1	37	0.9	48	0.7	58	0.7	67	0.6	83		
280													1.8	14	1.6	20	1.4	24	1	38	0.8	50	0.7	60	0.7	70	0.6	86		
290													1.8	15	1.6	21	1.4	25	1	40	0.8	52	0.7	63	0.7	72	0.6	90		
300													1.8	16	1.5	22	1.4	27	1	42	0.8	54	0.7	65	0.7	75	0.6	93		
310											2.1	11	1.8	18	1.5	23	1.4	28	1	43	0.8	56	0.7	67	0.7	78	0.6	96		
320											2.1	11	1.8	19	1.5	24	1.4	29	1	45	0.8	58	0.7	69	0.7	80	0.6	99		
330											2.1	13	1.8	20	1.5	25	1.4	30	1	46	0.8	60	0.7	72	0.7	83				
340											2.1	13	1.7	21	1.5	26	1.4	31	1	48	0.8	62	0.7	74	0.7	85				
350											2.1	14	1.7	22	1.5	27	1.4	32	1	49	0.8	64	0.7	76	0.7	88				
360											2.1	15	1.7	23	1.5	28	1.4	34	1	51	0.8	66	0.7	79	0.7	90				
370											2	16	1.7	23	1.5	29	1.4	35	1	53	0.8	67	0.7	81	0.7	93				
380											2	17	1.7	24	1.5	31	1.4	36	1	54	0.8	69	0.7	83	0.7	96				
390											2	18	1.7	25	1.5	32	1.4	37	1	56	0.8	71	0.7	85	0.7	98				
400											2	19	1.7	26	1.5	33	1.4	38	1	57	0.8	73	0.7	88						
410									2.5	10	2	20	1.7	27	1.5	34	1.4	39	1	59	0.8	75	0.7	90						
420									2.5	11	2	21	1.7	28	1.5	35	1.4	41	1	60	0.8	77	0.7	92						
430									2.5	12	2	22	1.7	29	1.5	36	1.4	42	1	62	0.8	79	0.7	94						
440									2.5	12	2	22	1.7	30	1.5	37	1.4	43	1	63	0.8	81	0.7	97						
450									2.5	13	2	23	1.7	31	1.5	38	1.4	44	1	65	0.8	83	0.7	99						
460									2.5	14	2	24	1.7	32	1.5	39	1.3	45	1	67	0.8	85								
470									2.5	15	2	25	1.7	33	1.5	40	1.3	46	1	68	0.8	87								
480									2.4	16	2	26	1.7	34	1.5	41	1.3	47	1	70	0.8	89								
490									2.4	16	2	27	1.7	35	1.5	42	1.3	48	1	71	0.8	91								
500									2.4	17	2	28	1.7	36	1.5	43	1.3	50	1	73	0.8	92								

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.6	12
60																											0.7	12	0.6	14
70																									0.8	10	0.7	14	0.6	17
80																							0.9	10	0.8	12	0.7	16	0.6	20
90																							0.9	12	0.8	14	0.7	18	0.6	22
100																					1.1	10	0.9	13	0.8	16	0.7	21	0.6	25
110																					1.1	12	0.9	15	0.8	18	0.7	23	0.6	28
120																					1.1	13	0.9	17	0.8	20	0.7	25	0.6	30
130																			1.3	10	1.1	14	0.9	18	0.8	22	0.6	28	0.6	33
140																			1.3	11	1	16	0.9	20	0.8	23	0.6	30	0.6	36
150																			1.3	12	1	17	0.9	21	0.8	25	0.6	32	0.6	38
160																			1.3	13	1	18	0.9	23	0.8	27	0.6	34	0.6	41
170																			1.3	14	1	20	0.9	25	0.8	29	0.6	37	0.6	44
180																			1.3	15	1	21	0.9	26	0.8	31	0.6	39	0.6	46
190																			1.3	16	1	22	0.9	28	0.8	32	0.6	41	0.6	49
200																	1.8	10	1.3	17	1	24	0.9	29	0.8	34	0.6	43	0.6	51
210																	1.8	10	1.3	19	1	25	0.9	31	0.8	36	0.6	46	0.6	54
220																	1.8	11	1.3	20	1	26	0.9	32	0.8	38	0.6	48	0.6	57
230																	1.8	12	1.3	21	1	28	0.9	34	0.8	40	0.6	50	0.6	59
240															2	10	1.8	13	1.3	22	1	29	0.9	36	0.8	42	0.6	52	0.6	62
250															2	11	1.8	14	1.3	23	1	30	0.9	37	0.8	43	0.6	55	0.6	65
260															2	11	1.7	14	1.2	24	1	32	0.9	39	0.8	45	0.6	57	0.6	67
270															2	12	1.7	15	1.2	25	1	33	0.9	40	0.8	47	0.6	59	0.6	70
280															2	13	1.7	16	1.2	26	1	34	0.9	42	0.8	49	0.6	61	0.6	73
290													2.2	10	1.9	14	1.7	17	1.2	27	1	36	0.9	43	0.8	51	0.6	64	0.6	75
300													2.2	11	1.9	14	1.7	17	1.2	28	1	37	0.9	45	0.8	52	0.6	66	0.6	78
310													2.2	11	1.9	15	1.7	18	1.2	29	1	38	0.9	47	0.8	54	0.6	68	0.6	80
320													2.2	12	1.9	16	1.7	19	1.2	30	1	40	0.9	48	0.8	56	0.6	70	0.6	83
330													2.2	13	1.9	16	1.7	20	1.2	31	1	41	0.9	50	0.8	58	0.6	73	0.6	86
340													2.2	13	1.9	17	1.7	21	1.2	32	1	42	0.9	51	0.8	60	0.6	75	0.6	88
350													2.2	14	1.9	18	1.7	21	1.2	33	1	44	0.9	53	0.8	61	0.6	77	0.6	91
360											2.6	10	2.2	14	1.9	18	1.7	22	1.2	34	1	45	0.9	55	0.8	63	0.6	79	0.6	94
370											2.6	10	2.2	15	1.9	19	1.7	23	1.2	35	1	46	0.9	56	0.8	65	0.6	82	0.6	96
380											2.6	11	2.2	16	1.9	20	1.7	24	1.2	36	1	48	0.9	58	0.8	67	0.6	84	0.6	99
390											2.6	11	2.2	16	1.9	20	1.7	24	1.2	38	1	49	0.9	59	0.8	69	0.6	86		
400											2.6	12	2.2	17	1.9	21	1.7	25	1.2	39	1	50	0.9	61	0.8	71	0.6	88		
410											2.6	13	2.2	17	1.9	22	1.7	26	1.2	40	1	52	0.9	62	0.8	72	0.6	91		
420											2.6	13	2.2	18	1.9	23	1.7	27	1.2	41	1	53	0.9	64	0.8	74	0.6	93		
430											2.5	14	2.1	19	1.9	23	1.7	27	1.2	42	1	54	0.9	66	0.8	76	0.6	95		
440											2.5	14	2.1	19	1.9	24	1.7	28	1.2	43	1	56	0.9	67	0.8	78	0.6	97		
450											2.5	15	2.1	20	1.9	25	1.7	29	1.2	44	1	57	0.9	69	0.8	80	0.6	99		
460											2.5	15	2.1	20	1.9	25	1.7	30	1.2	45	1	58	0.9	70	0.8	81				
470											2.5	16	2.1	21	1.9	26	1.7	30	1.2	46	1	59	0.9	72	0.8	83				
480									3.1	10	2.5	16	2.1	22	1.9	27	1.7	31	1.2	47	1	61	0.9	73	0.8	85				
490									3.1	10	2.5	17	2.1	22	1.9	27	1.7	32	1.2	48	1	62	0.9	75	0.8	87				
500									3.1	11	2.5	17	2.1	23	1.9	28	1.7	33	1.2	49	1	63	0.9	76	0.8	89				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.6	11
60																											0.7	11	0.6	14
70																											0.7	13	0.6	16
80																									0.8	11	0.7	15	0.6	19
90																							0.9	10	0.8	13	0.7	18	0.6	22
100																							0.9	12	0.8	15	0.7	20	0.6	24
110																					1.1	10	0.9	14	0.8	17	0.7	22	0.6	27
120																					1.1	11	0.9	15	0.8	19	0.7	25	0.6	30
130																					1.1	13	0.9	17	0.8	21	0.7	27	0.6	32
140																					1.1	14	0.9	19	0.8	22	0.7	29	0.6	35
150																			1.4	10	1.1	16	0.9	20	0.8	24	0.6	31	0.6	38
160																			1.3	11	1	17	0.9	22	0.8	26	0.6	34	0.6	40
170																			1.3	12	1	18	0.9	24	0.8	28	0.6	36	0.6	43
180																			1.3	14	1	20	0.9	25	0.8	30	0.6	38	0.6	46
190																			1.3	15	1	21	0.9	27	0.8	32	0.6	40	0.6	48
200																			1.3	16	1	23	0.9	28	0.8	34	0.6	43	0.6	51
210																			1.3	17	1	24	0.9	30	0.8	35	0.6	45	0.6	54
220																			1.3	18	1	25	0.9	32	0.8	37	0.6	47	0.6	56
230																			1.3	19	1	27	0.9	33	0.8	39	0.6	50	0.6	59
240																	1.8	10	1.3	20	1	28	0.9	35	0.8	41	0.6	52	0.6	62
250																	1.8	11	1.3	21	1	29	0.9	36	0.8	43	0.6	54	0.6	64
260																	1.8	12	1.3	22	1	31	0.9	38	0.8	45	0.6	56	0.6	67
270																	1.8	12	1.3	24	1	32	0.9	40	0.8	46	0.6	59	0.6	70
280																	1.8	13	1.3	25	1	33	0.9	41	0.8	48	0.6	61	0.6	72
290															2	10	1.8	14	1.3	26	1	35	0.9	43	0.8	50	0.6	63	0.6	75
300															2	11	1.8	15	1.2	27	1	36	0.9	44	0.8	52	0.6	65	0.6	77
310															2	12	1.7	16	1.2	28	1	37	0.9	46	0.8	54	0.6	68	0.6	80
320															2	13	1.7	17	1.2	29	1	39	0.9	48	0.8	55	0.6	70	0.6	83
330															2	13	1.7	18	1.2	30	1	40	0.9	49	0.8	57	0.6	72	0.6	85
340															2	14	1.7	18	1.2	31	1	41	0.9	51	0.8	59	0.6	74	0.6	88
350													2.3	10	1.9	15	1.7	19	1.2	32	1	43	0.9	52	0.8	61	0.6	77	0.6	91
360													2.3	11	1.9	16	1.7	20	1.2	33	1	44	0.9	54	0.8	63	0.6	79	0.6	93
370													2.2	12	1.9	16	1.7	21	1.2	34	1	45	0.9	55	0.8	64	0.6	81	0.6	96
380													2.2	12	1.9	17	1.7	22	1.2	35	1	47	0.9	57	0.8	66	0.6	83	0.6	99
390													2.2	13	1.9	18	1.7	22	1.2	36	1	48	0.9	59	0.8	68	0.6	86		
400													2.2	14	1.9	19	1.7	23	1.2	37	1	49	0.9	60	0.8	70	0.6	88		
410													2.2	14	1.9	19	1.7	24	1.2	38	1	51	0.9	62	0.8	72	0.6	90		
420													2.2	15	1.9	20	1.7	25	1.2	40	1	52	0.9	63	0.8	74	0.6	92		
430													2.2	16	1.9	21	1.7	25	1.2	41	1	53	0.9	65	0.8	75	0.6	95		
440											2.6	10	2.2	16	1.9	22	1.7	26	1.2	42	1	55	0.9	66	0.8	77	0.6	97		
450											2.6	10	2.2	17	1.9	22	1.7	27	1.2	43	1	56	0.9	68	0.8	79	0.6	99		
460											2.6	11	2.2	17	1.9	23	1.7	28	1.2	44	1	57	0.9	70	0.8	81				
470											2.6	11	2.2	18	1.9	24	1.7	28	1.2	45	1	59	0.9	71	0.8	83				
480											2.6	12	2.2	19	1.9	24	1.7	29	1.2	46	1	60	0.9	73	0.8	84				
490											2.6	13	2.2	19	1.9	25	1.7	30	1.2	47	1	61	0.9	74	0.8	86				
500											2.6	13	2.1	20	1.9	26	1.7	31	1.2	48	1	63	0.9	76	0.8	88				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.87
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.6	10
60																											0.7	10	0.6	13
70																											0.7	12	0.6	16
80																									0.9	10	0.7	15	0.6	18
90																									0.8	12	0.7	17	0.6	21
100																							1	10	0.8	14	0.7	19	0.6	24
110																							0.9	12	0.8	16	0.7	22	0.6	26
120																							0.9	14	0.8	18	0.7	24	0.6	29
130																					1.1	11	0.9	16	0.8	20	0.7	26	0.6	32
140																					1.1	13	0.9	17	0.8	22	0.7	29	0.6	34
150																					1.1	14	0.9	19	0.8	23	0.7	31	0.6	37
160																					1.1	16	0.9	21	0.8	25	0.6	33	0.6	40
170																			1.4	10	1.1	17	0.9	22	0.8	27	0.6	35	0.6	42
180																			1.4	11	1.1	19	0.9	24	0.8	29	0.6	38	0.6	45
190																			1.3	12	1	20	0.9	26	0.8	31	0.6	40	0.6	48
200																			1.3	14	1	21	0.9	27	0.8	33	0.6	42	0.6	51
210																			1.3	15	1	23	0.9	29	0.8	35	0.6	44	0.6	53
220																			1.3	16	1	24	0.9	31	0.8	36	0.6	47	0.6	56
230																			1.3	17	1	25	0.9	32	0.8	38	0.6	49	0.6	58
240																			1.3	18	1	27	0.9	34	0.8	40	0.6	51	0.6	61
250																			1.3	20	1	28	0.9	36	0.8	42	0.6	54	0.6	64
260																			1.3	21	1	30	0.9	37	0.8	44	0.6	56	0.6	66
270																			1.3	22	1	31	0.9	39	0.8	46	0.6	58	0.6	69
280																	1.9	10	1.3	23	1	32	0.9	40	0.8	47	0.6	60	0.6	72
290																	1.8	11	1.3	24	1	34	0.9	42	0.8	49	0.6	63	0.6	74
300																	1.8	12	1.3	25	1	35	0.9	43	0.8	51	0.6	65	0.6	77
310																	1.8	13	1.3	26	1	36	0.9	45	0.8	53	0.6	67	0.6	80
320																	1.8	14	1.3	27	1	38	0.9	47	0.8	55	0.6	69	0.6	82
330															2.1	10	1.8	15	1.3	29	1	39	0.9	48	0.8	57	0.6	72	0.6	85
340															2	10	1.8	15	1.2	30	1	41	0.9	50	0.8	58	0.6	74	0.6	88
350															2	11	1.8	16	1.2	31	1	42	0.9	51	0.8	60	0.6	76	0.6	90
360															2	12	1.8	17	1.2	32	1	43	0.9	53	0.8	62	0.6	78	0.6	93
370															2	13	1.7	18	1.2	33	1	44	0.9	55	0.8	64	0.6	81	0.6	96
380															2	14	1.7	19	1.2	34	1	46	0.9	56	0.8	66	0.6	83	0.6	98
390															2	15	1.7	20	1.2	35	1	47	0.9	58	0.8	68	0.6	85		
400															2	16	1.7	21	1.2	36	1	48	0.9	59	0.8	69	0.6	87		
410													2.3	10	2	16	1.7	21	1.2	37	1	50	0.9	61	0.8	71	0.6	90		
420													2.3	11	1.9	17	1.7	22	1.2	38	1	51	0.9	63	0.8	73	0.6	92		
430													2.3	11	1.9	18	1.7	23	1.2	39	1	52	0.9	64	0.8	75	0.6	94		
440													2.3	12	1.9	19	1.7	24	1.2	40	1	54	0.9	66	0.8	77	0.6	96		
450													2.3	13	1.9	19	1.7	25	1.2	42	1	55	0.9	67	0.8	79	0.6	99		
460													2.2	14	1.9	20	1.7	26	1.2	43	1	56	0.9	69	0.8	80				
470													2.2	14	1.9	21	1.7	26	1.2	44	1	58	0.9	70	0.8	82				
480													2.2	15	1.9	22	1.7	27	1.2	45	1	59	0.9	72	0.8	84				
490													2.2	16	1.9	22	1.7	28	1.2	46	1	60	0.9	74	0.8	86				
500													2.2	16	1.9	23	1.7	29	1.2	47	1	62	0.9	75	0.8	88				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																							0.6	11	0.5	13				
40																			0.8	10	0.7	13	0.6	16	0.5	18				
50																			0.8	13	0.7	17	0.6	20	0.5	23				
60																	1.1	11	0.8	16	0.7	21	0.6	24	0.5	28				
70															1.2	11	1	13	0.8	19	0.7	24	0.6	29	0.5	33				
80													1.3	11	1.1	13	1	15	0.8	22	0.7	28	0.6	33	0.5	38				
90											1.5	10	1.3	13	1.1	16	1	18	0.8	26	0.7	32	0.6	38	0.5	43				
100											1.4	12	1.2	15	1.1	18	1	20	0.8	29	0.7	36	0.6	42	0.5	48				
110									1.7	10	1.4	14	1.2	17	1.1	20	1	23	0.8	32	0.7	39	0.6	46	0.5	53				
120									1.7	11	1.4	15	1.2	19	1.1	22	1	25	0.8	35	0.7	43	0.6	51	0.5	57				
130									1.7	13	1.4	17	1.2	21	1.1	24	1	27	0.8	38	0.6	47	0.6	55	0.5	62				
140									1.6	14	1.4	19	1.2	23	1.1	26	1	29	0.8	41	0.6	51	0.6	59	0.5	67				
150							2.1	10	1.6	16	1.4	20	1.2	25	1.1	28	1	32	0.8	44	0.6	54	0.6	64	0.5	72				
160							2.1	11	1.6	17	1.4	22	1.2	26	1.1	30	1	34	0.8	47	0.6	58	0.6	68	0.5	77				
170							2	12	1.6	19	1.3	24	1.2	28	1.1	33	1	36	0.8	50	0.6	62	0.6	72	0.5	82				
180							2	13	1.6	20	1.3	25	1.2	30	1.1	35	1	39	0.8	53	0.6	66	0.6	77	0.5	87				
190							2	15	1.6	21	1.3	27	1.2	32	1.1	37	1	41	0.8	56	0.6	69	0.6	81	0.5	92				
200							2	16	1.6	23	1.3	29	1.2	34	1.1	39	1	43	0.8	59	0.6	73	0.6	86	0.5	97				
210							2	17	1.6	24	1.3	30	1.2	36	1.1	41	1	46	0.8	62	0.6	77	0.6	90						
220							2	18	1.6	26	1.3	32	1.2	38	1.1	43	1	48	0.8	66	0.6	81	0.6	94						
230							2	19	1.6	27	1.3	34	1.2	40	1.1	45	1	50	0.8	69	0.6	84	0.6	98						
240					2.8	10	1.9	20	1.6	28	1.3	35	1.2	42	1.1	47	1	53	0.8	72	0.6	88								
250					2.8	11	1.9	21	1.5	30	1.3	37	1.2	43	1.1	49	1	55	0.8	75	0.6	92								
260					2.8	11	1.9	23	1.5	31	1.3	38	1.2	45	1.1	51	1	57	0.8	78	0.6	96								
270					2.7	12	1.9	24	1.5	32	1.3	40	1.2	47	1.1	53	1	60	0.8	81	0.6	99								
280					2.7	13	1.9	25	1.5	34	1.3	42	1.2	49	1.1	56	1	62	0.8	84										
290					2.7	14	1.9	26	1.5	35	1.3	43	1.2	51	1	58	1	64	0.8	87										
300					2.7	15	1.9	27	1.5	37	1.3	45	1.2	53	1	60	1	66	0.8	90										
310					2.7	16	1.9	28	1.5	38	1.3	47	1.2	55	1	62	1	69	0.8	93										
320					2.7	17	1.9	29	1.5	39	1.3	48	1.2	56	1	64	1	71	0.8	96										
330					2.7	17	1.9	30	1.5	41	1.3	50	1.2	58	1	66	1	73	0.8	99										
340					2.6	18	1.9	31	1.5	42	1.3	51	1.2	60	1	68	1	76												
350					2.6	19	1.9	32	1.5	43	1.3	53	1.2	62	1	70	1	78												
360					2.6	20	1.9	34	1.5	45	1.3	55	1.2	64	1	72	1	80												
370					2.6	21	1.9	35	1.5	46	1.3	56	1.2	66	1	74	1	82												
380					2.6	22	1.9	36	1.5	47	1.3	58	1.2	67	1	76	1	85												
390					2.6	22	1.9	37	1.5	49	1.3	59	1.2	69	1	78	1	87												
400					2.6	23	1.9	38	1.5	50	1.3	61	1.2	71	1	81	1	89												
410					2.6	24	1.9	39	1.5	52	1.3	63	1.2	73	1	83	1	92												
420					2.6	25	1.9	40	1.5	53	1.3	64	1.2	75	1	85	1	94												
430					2.6	26	1.9	41	1.5	54	1.3	66	1.1	77	1	87	1	96												
440					2.6	26	1.9	42	1.5	56	1.3	68	1.1	79	1	89	1	99												
450					2.6	27	1.9	43	1.5	57	1.3	69	1.1	81	1	91														
460					2.6	28	1.9	44	1.5	58	1.3	71	1.1	82	1	93														
470					2.6	29	1.9	45	1.5	60	1.3	72	1.1	84	1	95														
480					2.6	29	1.9	47	1.5	61	1.3	74	1.1	86	1	97														
490					2.6	30	1.9	48	1.5	62	1.3	76	1.1	88	1	99														
500					2.5	31	1.9	49	1.5	64	1.3	77	1.1	90																

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																							0.6	10	0.6	12				
40																					0.7	12	0.6	15	0.5	17				
50																			0.8	12	0.7	16	0.6	19	0.5	22				
60																			0.8	15	0.7	20	0.6	24	0.5	27				
70																	1.1	11	0.8	18	0.7	24	0.6	28	0.5	32				
80															1.2	12	1	14	0.8	21	0.7	27	0.6	33	0.5	37				
90													1.3	11	1.1	14	1	16	0.8	25	0.7	31	0.6	37	0.5	42				
100													1.3	13	1.1	16	1	19	0.8	28	0.7	35	0.6	41	0.5	47				
110											1.5	11	1.3	15	1.1	18	1	21	0.8	31	0.7	39	0.6	46	0.5	52				
120											1.4	13	1.2	17	1.1	21	1	24	0.8	34	0.7	43	0.6	50	0.5	57				
130									1.7	10	1.4	15	1.2	19	1.1	23	1	26	0.8	37	0.7	46	0.6	54	0.5	62				
140									1.7	11	1.4	17	1.2	21	1.1	25	1	28	0.8	40	0.6	50	0.6	59	0.5	67				
150									1.7	13	1.4	19	1.2	23	1.1	27	1	31	0.8	43	0.6	54	0.6	63	0.5	72				
160									1.7	15	1.4	20	1.2	25	1.1	29	1	33	0.8	46	0.6	58	0.6	68	0.5	77				
170									1.6	16	1.4	22	1.2	27	1.1	31	1	35	0.8	49	0.6	61	0.6	72	0.5	81				
180									1.6	18	1.4	24	1.2	29	1.1	34	1	38	0.8	53	0.6	65	0.6	76	0.5	86				
190							2.1	11	1.6	19	1.4	25	1.2	31	1.1	36	1	40	0.8	56	0.6	69	0.6	81	0.5	91				
200							2.1	12	1.6	21	1.3	27	1.2	33	1.1	38	1	42	0.8	59	0.6	73	0.6	85	0.5	96				
210							2	14	1.6	22	1.3	29	1.2	35	1.1	40	1	45	0.8	62	0.6	76	0.6	89						
220							2	15	1.6	24	1.3	30	1.2	36	1.1	42	1	47	0.8	65	0.6	80	0.6	94						
230							2	16	1.6	25	1.3	32	1.2	38	1.1	44	1	49	0.8	68	0.6	84	0.6	98						
240							2	17	1.6	26	1.3	34	1.2	40	1.1	46	1	52	0.8	71	0.6	88								
250							2	19	1.6	28	1.3	35	1.2	42	1.1	48	1	54	0.8	74	0.6	91								
260							2	20	1.6	29	1.3	37	1.2	44	1.1	50	1	56	0.8	77	0.6	95								
270							2	21	1.6	31	1.3	39	1.2	46	1.1	52	1	59	0.8	80	0.6	99								
280							2	22	1.6	32	1.3	40	1.2	48	1.1	55	1	61	0.8	83										
290							1.9	23	1.5	33	1.3	42	1.2	50	1.1	57	1	63	0.8	86										
300					2.9	10	1.9	24	1.5	35	1.3	44	1.2	52	1.1	59	1	66	0.8	90										
310					2.8	11	1.9	26	1.5	36	1.3	45	1.2	53	1.1	61	1	68	0.8	93										
320					2.8	12	1.9	27	1.5	38	1.3	47	1.2	55	1	63	1	70	0.8	96										
330					2.8	13	1.9	28	1.5	39	1.3	49	1.2	57	1	65	1	72	0.8	99										
340					2.8	14	1.9	29	1.5	40	1.3	50	1.2	59	1	67	1	75												
350					2.7	15	1.9	30	1.5	42	1.3	52	1.2	61	1	69	1	77												
360					2.7	16	1.9	31	1.5	43	1.3	53	1.2	63	1	71	1	80												
370					2.7	16	1.9	32	1.5	45	1.3	55	1.2	65	1	73	1	82												
380					2.7	17	1.9	34	1.5	46	1.3	57	1.2	67	1	76	1	84												
390					2.7	18	1.9	35	1.5	47	1.3	58	1.2	68	1	78	1	86												
400					2.7	19	1.9	36	1.5	49	1.3	60	1.2	70	1	80	1	89												
410					2.7	20	1.9	37	1.5	50	1.3	62	1.2	72	1	82	1	91												
420					2.6	21	1.9	38	1.5	51	1.3	63	1.2	74	1	84	1	93												
430					2.6	22	1.9	39	1.5	53	1.3	65	1.2	76	1	86	1	96												
440					2.6	23	1.9	40	1.5	54	1.3	66	1.2	78	1	88	1	98												
450					2.6	24	1.9	41	1.5	56	1.3	68	1.2	80	1	90	1	100												
460					2.6	24	1.9	42	1.5	57	1.3	70	1.2	81	1	92														
470					2.6	25	1.9	44	1.5	58	1.3	71	1.1	83	1	94														
480					2.6	26	1.9	45	1.5	60	1.3	73	1.1	85	1	96														
490					2.6	27	1.9	46	1.5	61	1.3	75	1.1	87	1	98														
500					2.6	28	1.9	47	1.5	62	1.3	76	1.1	89	1	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.02
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																									0.6	12				
40																					0.7	11	0.6	14	0.5	17				
50																			0.9	10	0.7	15	0.6	19	0.5	22				
60																			0.8	14	0.7	19	0.6	23	0.5	27				
70																			0.8	17	0.7	23	0.6	28	0.5	32				
80																	1.1	12	0.8	21	0.7	27	0.6	32	0.5	37				
90															1.2	12	1.1	15	0.8	24	0.7	31	0.6	36	0.5	42				
100													1.3	11	1.2	14	1	17	0.8	27	0.7	34	0.6	41	0.5	47				
110													1.3	13	1.1	17	1	20	0.8	30	0.7	38	0.6	45	0.5	52				
120											1.5	10	1.3	15	1.1	19	1	22	0.8	33	0.7	42	0.6	50	0.5	56				
130											1.5	12	1.3	17	1.1	21	1	25	0.8	36	0.7	46	0.6	54	0.5	61				
140											1.4	14	1.2	19	1.1	24	1	27	0.8	39	0.7	49	0.6	58	0.5	66				
150											1.4	16	1.2	21	1.1	26	1	30	0.8	43	0.7	53	0.6	63	0.5	71				
160									1.7	11	1.4	18	1.2	23	1.1	28	1	32	0.8	46	0.6	57	0.6	67	0.5	76				
170									1.7	13	1.4	20	1.2	25	1.1	30	1	34	0.8	49	0.6	61	0.6	71	0.5	81				
180									1.7	15	1.4	22	1.2	27	1.1	32	1	37	0.8	52	0.6	65	0.6	76	0.5	86				
190									1.7	16	1.4	24	1.2	29	1.1	34	1	39	0.8	55	0.6	68	0.6	80	0.5	91				
200									1.6	18	1.4	25	1.2	31	1.1	37	1	41	0.8	58	0.6	72	0.6	85	0.5	96				
210									1.6	20	1.4	27	1.2	33	1.1	39	1	44	0.8	61	0.6	76	0.6	89						
220							2.1	10	1.6	21	1.4	29	1.2	35	1.1	41	1	46	0.8	64	0.6	80	0.6	93						
230							2.1	12	1.6	23	1.3	30	1.2	37	1.1	43	1	48	0.8	67	0.6	83	0.6	98						
240							2.1	13	1.6	24	1.3	32	1.2	39	1.1	45	1	51	0.8	70	0.6	87								
250							2.1	15	1.6	26	1.3	34	1.2	41	1.1	47	1	53	0.8	73	0.6	91								
260							2	16	1.6	27	1.3	36	1.2	43	1.1	49	1	55	0.8	77	0.6	95								
270							2	18	1.6	29	1.3	37	1.2	45	1.1	52	1	58	0.8	80	0.6	98								
280							2	19	1.6	30	1.3	39	1.2	47	1.1	54	1	60	0.8	83										
290							2	20	1.6	31	1.3	41	1.2	48	1.1	56	1	62	0.8	86										
300							2	21	1.6	33	1.3	42	1.2	50	1.1	58	1	65	0.8	89										
310							2	23	1.6	34	1.3	44	1.2	52	1.1	60	1	67	0.8	92										
320							2	24	1.6	36	1.3	46	1.2	54	1.1	62	1	69	0.8	95										
330							2	25	1.5	37	1.3	47	1.2	56	1.1	64	1	72	0.8	98										
340							1.9	26	1.5	39	1.3	49	1.2	58	1.1	66	1	74												
350							1.9	27	1.5	40	1.3	50	1.2	60	1.1	68	1	76												
360							1.9	29	1.5	41	1.3	52	1.2	62	1	70	1	79												
370					2.9	11	1.9	30	1.5	43	1.3	54	1.2	63	1	73	1	81												
380					2.8	12	1.9	31	1.5	44	1.3	55	1.2	65	1	75	1	83												
390					2.8	13	1.9	32	1.5	46	1.3	57	1.2	67	1	77	1	85												
400					2.8	14	1.9	33	1.5	47	1.3	59	1.2	69	1	79	1	88												
410					2.8	15	1.9	34	1.5	48	1.3	60	1.2	71	1	81	1	90												
420					2.8	16	1.9	36	1.5	50	1.3	62	1.2	73	1	83	1	92												
430					2.7	17	1.9	37	1.5	51	1.3	64	1.2	75	1	85	1	95												
440					2.7	18	1.9	38	1.5	53	1.3	65	1.2	77	1	87	1	97												
450					2.7	19	1.9	39	1.5	54	1.3	67	1.2	78	1	89	1	99												
460					2.7	20	1.9	40	1.5	55	1.3	69	1.2	80	1	91														
470					2.7	21	1.9	41	1.5	57	1.3	70	1.2	82	1	93														
480					2.7	22	1.9	42	1.5	58	1.3	72	1.2	84	1	95														
490					2.7	23	1.9	44	1.5	60	1.3	73	1.2	86	1	98														
500					2.6	23	1.9	45	1.5	61	1.3	75	1.2	88	1	100														

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.5	11		
40																							0.7	10	0.6	11	0.5	15		
50																					0.8	10	0.7	13	0.6	15	0.5	19		
60																					0.8	13	0.7	16	0.6	18	0.5	23		
70																			1	11	0.8	15	0.7	19	0.6	22	0.5	27		
80																			1	13	0.8	18	0.7	22	0.6	25	0.5	31		
90																			1	16	0.8	20	0.7	25	0.6	28	0.5	35		
100																	1.3	11	0.9	18	0.8	23	0.7	27	0.6	32	0.5	39		
110															1.4	10	1.3	13	0.9	20	0.8	25	0.7	30	0.6	35	0.5	43		
120															1.4	12	1.3	14	0.9	22	0.8	28	0.7	33	0.6	38	0.5	47		
130													1.6	11	1.4	13	1.2	16	0.9	24	0.8	30	0.7	36	0.6	42	0.5	51		
140													1.6	12	1.4	15	1.2	17	0.9	26	0.8	33	0.7	39	0.6	45	0.5	55		
150											1.8	10	1.5	13	1.4	16	1.2	19	0.9	28	0.8	35	0.7	42	0.6	48	0.5	59		
160											1.8	11	1.5	15	1.3	18	1.2	20	0.9	30	0.8	38	0.7	45	0.6	52	0.5	63		
170											1.8	12	1.5	16	1.3	19	1.2	22	0.9	32	0.8	40	0.7	48	0.6	55	0.5	67		
180											1.8	13	1.5	17	1.3	20	1.2	23	0.9	34	0.8	43	0.7	51	0.6	58	0.5	71		
190									2.1	10	1.7	14	1.5	18	1.3	22	1.2	25	0.9	36	0.8	45	0.7	54	0.6	62	0.5	76		
200									2.1	10	1.7	15	1.5	19	1.3	23	1.2	26	0.9	38	0.8	48	0.7	57	0.6	65	0.5	80		
210									2.1	11	1.7	16	1.5	21	1.3	24	1.2	28	0.9	40	0.8	50	0.7	60	0.6	68	0.5	84		
220									2.1	12	1.7	17	1.5	22	1.3	26	1.2	29	0.9	42	0.8	53	0.7	63	0.6	72	0.5	88		
230									2.1	13	1.7	19	1.5	23	1.3	27	1.2	31	0.9	44	0.8	55	0.7	66	0.6	75	0.5	92		
240									2.1	14	1.7	20	1.5	24	1.3	29	1.2	32	0.9	46	0.8	58	0.7	69	0.6	78	0.5	96		
250									2	15	1.7	21	1.5	26	1.3	30	1.2	34	0.9	48	0.8	60	0.7	71	0.6	82	0.5	100		
260									2	16	1.7	22	1.5	27	1.3	31	1.2	35	0.9	50	0.8	63	0.7	74	0.6	85				
270							2.6	10	2	17	1.7	23	1.5	28	1.3	33	1.2	37	0.9	52	0.8	65	0.7	77	0.6	88				
280							2.6	10	2	18	1.7	24	1.5	29	1.3	34	1.2	38	0.9	54	0.8	68	0.7	80	0.6	92				
290							2.6	11	2	19	1.7	25	1.5	30	1.3	35	1.2	40	0.9	56	0.8	70	0.7	83	0.6	95				
300							2.6	12	2	20	1.7	26	1.5	31	1.3	37	1.2	41	0.9	58	0.8	73	0.7	86	0.6	98				
310							2.6	13	2	21	1.7	27	1.4	33	1.3	38	1.2	43	0.9	60	0.8	75	0.7	89						
320							2.6	13	2	21	1.7	28	1.4	34	1.3	39	1.2	44	0.9	62	0.8	78	0.7	92						
330							2.6	14	2	22	1.7	29	1.4	35	1.3	41	1.2	46	0.9	64	0.8	80	0.7	95						
340							2.6	15	2	23	1.7	30	1.4	36	1.3	42	1.2	47	0.9	66	0.8	83	0.7	98						
350							2.5	16	2	24	1.7	31	1.4	37	1.3	43	1.2	49	0.9	68	0.8	85								
360							2.5	16	2	25	1.7	32	1.4	39	1.3	45	1.2	50	0.9	70	0.8	88								
370							2.5	17	2	26	1.6	33	1.4	40	1.3	46	1.2	52	0.9	72	0.8	90								
380							2.5	18	2	27	1.6	34	1.4	41	1.3	47	1.2	53	0.9	74	0.8	93								
390							2.5	18	2	27	1.6	35	1.4	42	1.3	49	1.2	55	0.9	76	0.8	95								
400							2.5	19	2	28	1.6	36	1.4	43	1.3	50	1.2	56	0.9	79	0.8	98								
410							2.5	20	2	29	1.6	37	1.4	44	1.3	51	1.2	58	0.9	80	0.8	100								
420							2.5	20	1.9	30	1.6	38	1.4	46	1.3	53	1.2	59	0.9	82										
430							2.5	21	1.9	31	1.6	39	1.4	47	1.3	54	1.2	61	0.9	85										
440							2.5	22	1.9	32	1.6	40	1.4	48	1.3	55	1.2	62	0.9	87										
450							2.5	22	1.9	33	1.6	41	1.4	49	1.3	57	1.2	64	0.9	89										
460					3.6	10	2.5	23	1.9	33	1.6	42	1.4	50	1.3	58	1.2	65	0.9	91										
470					3.6	10	2.5	24	1.9	34	1.6	43	1.4	51	1.3	59	1.2	66	0.9	92										
480					3.6	11	2.5	24	1.9	35	1.6	44	1.4	53	1.3	61	1.2	68	0.9	95										
490					3.6	11	2.5	25	1.9	36	1.6	45	1.4	54	1.3	62	1.2	69	0.9	97										
500					3.6	12	2.5	26	1.9	37	1.6	46	1.4	55	1.3	63	1.2	71	0.9	99										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																											0.6	10		
40																									0.6	11	0.5	14		
50																							0.7	12	0.6	14	0.5	18		
60																					0.8	12	0.7	15	0.6	18	0.5	22		
70																			1	10	0.8	14	0.7	18	0.6	21	0.5	26		
80																			1	12	0.8	17	0.7	21	0.6	24	0.5	30		
90																			1	14	0.8	19	0.7	24	0.6	28	0.5	35		
100																			1	16	0.8	22	0.7	27	0.6	31	0.5	39		
110																	1.3	11	0.9	19	0.8	25	0.7	30	0.6	34	0.5	43		
120																	1.3	12	0.9	21	0.8	27	0.7	33	0.6	38	0.5	47		
130															1.4	11	1.3	14	0.9	23	0.8	30	0.7	36	0.6	41	0.5	51		
140															1.4	13	1.3	16	0.9	25	0.8	32	0.7	39	0.6	44	0.5	55		
150													1.6	11	1.4	14	1.2	17	0.9	27	0.8	35	0.7	42	0.6	48	0.5	59		
160													1.6	12	1.4	16	1.2	19	0.9	29	0.8	37	0.7	44	0.6	51	0.5	63		
170													1.6	13	1.4	17	1.2	20	0.9	31	0.8	40	0.7	47	0.6	54	0.5	67		
180											1.8	10	1.5	15	1.4	19	1.2	22	0.9	33	0.8	42	0.7	50	0.6	58	0.5	71		
190											1.8	11	1.5	16	1.3	20	1.2	24	0.9	35	0.8	45	0.7	53	0.6	61	0.5	75		
200											1.8	12	1.5	17	1.3	21	1.2	25	0.9	37	0.8	47	0.7	56	0.6	64	0.5	79		
210											1.8	14	1.5	19	1.3	23	1.2	27	0.9	39	0.8	50	0.7	59	0.6	68	0.5	83		
220											1.8	15	1.5	20	1.3	24	1.2	28	0.9	41	0.8	52	0.7	62	0.6	71	0.5	87		
230											1.7	16	1.5	21	1.3	26	1.2	30	0.9	43	0.8	55	0.7	65	0.6	74	0.5	91		
240									2.1	11	1.7	17	1.5	22	1.3	27	1.2	31	0.9	45	0.8	57	0.7	68	0.6	78	0.5	95		
250									2.1	12	1.7	18	1.5	24	1.3	28	1.2	33	0.9	47	0.8	60	0.7	71	0.6	81	0.5	99		
260									2.1	13	1.7	19	1.5	25	1.3	30	1.2	34	0.9	49	0.8	62	0.7	74	0.6	84				
270									2.1	14	1.7	21	1.5	26	1.3	31	1.2	36	0.9	51	0.8	65	0.7	77	0.6	88				
280									2.1	15	1.7	22	1.5	27	1.3	33	1.2	37	0.9	53	0.8	67	0.7	80	0.6	91				
290									2.1	16	1.7	23	1.5	29	1.3	34	1.2	39	0.9	55	0.8	70	0.7	83	0.6	94				
300									2.1	17	1.7	24	1.5	30	1.3	35	1.2	40	0.9	57	0.8	72	0.7	85	0.6	98				
310									2	18	1.7	25	1.5	31	1.3	37	1.2	42	0.9	60	0.8	75	0.7	88						
320									2	18	1.7	26	1.5	32	1.3	38	1.2	43	0.9	62	0.8	77	0.7	91						
330									2	19	1.7	27	1.5	34	1.3	39	1.2	45	0.9	64	0.8	80	0.7	94						
340							2.7	10	2	20	1.7	28	1.5	35	1.3	41	1.2	46	0.9	66	0.8	82	0.7	97						
350							2.7	11	2	21	1.7	29	1.4	36	1.3	42	1.2	48	0.9	68	0.8	85	0.7	100						
360							2.6	12	2	22	1.7	30	1.4	37	1.3	43	1.2	49	0.9	70	0.8	87								
370							2.6	13	2	23	1.7	31	1.4	38	1.3	45	1.2	51	0.9	72	0.8	90								
380							2.6	13	2	24	1.7	32	1.4	39	1.3	46	1.2	52	0.9	74	0.8	92								
390							2.6	14	2	25	1.7	33	1.4	41	1.3	47	1.2	54	0.9	76	0.8	95								
400							2.6	15	2	26	1.7	34	1.4	42	1.3	49	1.2	55	0.9	78	0.8	97								
410							2.6	16	2	27	1.6	35	1.4	43	1.3	50	1.2	57	0.9	80	0.8	100								
420							2.6	17	2	28	1.6	37	1.4	44	1.3	51	1.2	58	0.9	82										
430							2.5	17	2	28	1.6	37	1.4	46	1.3	53	1.2	60	0.9	84										
440							2.5	18	2	29	1.6	39	1.4	47	1.3	54	1.2	61	0.9	86										
450							2.5	19	2	30	1.6	40	1.4	48	1.3	55	1.2	63	0.9	88										
460							2.5	20	2	31	1.6	41	1.4	49	1.3	57	1.2	64	0.9	90										
470							2.5	20	2	32	1.6	42	1.4	50	1.3	58	1.2	66	0.9	92										
480							2.5	21	1.9	33	1.6	43	1.4	51	1.3	59	1.2	67	0.9	94										
490							2.5	22	1.9	34	1.6	44	1.4	53	1.3	61	1.2	68	0.9	96										
500							2.5	22	1.9	35	1.6	45	1.4	54	1.3	62	1.2	70	0.9	98										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.03
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																									0.7	10	0.5	13		
50																							0.7	11	0.6	13	0.5	18		
60																					0.8	10	0.7	14	0.6	17	0.5	22		
70																					0.8	13	0.7	17	0.6	20	0.5	26		
80																			1	10	0.8	16	0.7	20	0.6	24	0.5	30		
90																			1	13	0.8	18	0.7	23	0.6	27	0.5	34		
100																			1	15	0.8	21	0.7	26	0.6	30	0.5	38		
110																			1	17	0.8	24	0.7	29	0.6	34	0.5	42		
120																	1.3	10	1	19	0.8	26	0.7	32	0.6	37	0.5	46		
130																	1.3	12	0.9	22	0.8	29	0.7	35	0.6	40	0.5	50		
140															1.5	10	1.3	13	0.9	24	0.8	31	0.7	38	0.6	44	0.5	54		
150															1.4	12	1.3	15	0.9	26	0.8	34	0.7	41	0.6	47	0.5	58		
160															1.4	13	1.3	17	0.9	28	0.8	36	0.7	44	0.6	51	0.5	63		
170													1.6	10	1.4	15	1.3	19	0.9	30	0.8	39	0.7	47	0.6	54	0.5	67		
180													1.6	12	1.4	16	1.2	20	0.9	32	0.8	41	0.7	50	0.6	57	0.5	71		
190													1.6	13	1.4	18	1.2	22	0.9	34	0.8	44	0.7	53	0.6	61	0.5	75		
200													1.6	15	1.4	19	1.2	23	0.9	36	0.8	47	0.7	56	0.6	64	0.5	79		
210											1.9	10	1.6	16	1.4	21	1.2	25	0.9	38	0.8	49	0.7	59	0.6	67	0.5	83		
220											1.8	11	1.5	18	1.3	22	1.2	27	0.9	40	0.8	52	0.7	62	0.6	71	0.5	87		
230											1.8	13	1.5	19	1.3	24	1.2	28	0.9	42	0.8	54	0.7	65	0.6	74	0.5	91		
240											1.8	14	1.5	20	1.3	25	1.2	30	0.9	44	0.8	57	0.7	67	0.6	77	0.5	95		
250											1.8	15	1.5	22	1.3	27	1.2	31	0.9	46	0.8	59	0.7	70	0.6	81	0.5	99		
260											1.8	17	1.5	23	1.3	28	1.2	33	0.9	49	0.8	62	0.7	73	0.6	84				
270											1.8	18	1.5	24	1.3	30	1.2	34	0.9	51	0.8	64	0.7	76	0.6	87				
280									2.2	10	1.7	19	1.5	25	1.3	31	1.2	36	0.9	53	0.8	67	0.7	79	0.6	91				
290									2.2	11	1.7	20	1.5	27	1.3	32	1.2	37	0.9	55	0.8	69	0.7	82	0.6	94				
300									2.1	13	1.7	21	1.5	28	1.3	34	1.2	39	0.9	57	0.8	72	0.7	85	0.6	97				
310									2.1	14	1.7	22	1.5	29	1.3	35	1.2	40	0.9	59	0.8	74	0.7	88						
320									2.1	15	1.7	24	1.5	30	1.3	37	1.2	42	0.9	61	0.8	77	0.7	91						
330									2.1	16	1.7	25	1.5	32	1.3	38	1.2	44	0.9	63	0.8	79	0.7	94						
340									2.1	17	1.7	26	1.5	33	1.3	39	1.2	45	0.9	65	0.8	82	0.7	97						
350									2.1	18	1.7	27	1.5	34	1.3	41	1.2	47	0.9	67	0.8	84	0.7	100						
360									2	19	1.7	28	1.5	35	1.3	42	1.2	48	0.9	69	0.8	87								
370									2	20	1.7	29	1.5	37	1.3	43	1.2	50	0.9	71	0.8	89								
380									2	21	1.7	30	1.5	38	1.3	45	1.2	51	0.9	73	0.8	92								
390									2	22	1.7	31	1.4	39	1.3	46	1.2	52	0.9	75	0.8	94								
400									2	23	1.7	32	1.4	40	1.3	47	1.2	54	0.9	77	0.8	97								
410							2.7	10	2	24	1.7	33	1.4	41	1.3	49	1.2	56	0.9	79	0.8	99								
420							2.7	11	2	25	1.7	35	1.4	43	1.3	50	1.2	57	0.9	81										
430							2.7	12	2	26	1.7	36	1.4	44	1.3	52	1.2	59	0.9	83										
440							2.6	13	2	27	1.7	37	1.4	45	1.3	53	1.2	60	0.9	85										
450							2.6	14	2	28	1.7	38	1.4	46	1.3	54	1.2	61	0.9	87										
460							2.6	15	2	29	1.6	39	1.4	48	1.3	56	1.2	63	0.9	89										
470							2.6	16	2	29	1.6	40	1.4	49	1.3	57	1.2	65	0.9	91										
480							2.6	17	2	30	1.6	41	1.4	50	1.3	58	1.2	66	0.9	93										
490							2.6	17	2	31	1.6	42	1.4	51	1.3	60	1.2	67	0.9	95										
500							2.6	18	2	32	1.6	43	1.4	52	1.3	61	1.2	69	0.9	97										

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																													0.6	10
50																											0.7	10	0.6	13
60																											0.7	13	0.6	16
70																									0.8	12	0.6	15	0.6	18
80																							0.9	11	0.8	14	0.6	18	0.6	21
90																					1	10	0.9	13	0.8	16	0.6	20	0.6	24
100																					1	11	0.9	15	0.8	18	0.6	23	0.6	27
110																					1	13	0.9	16	0.8	20	0.6	25	0.5	30
120																			1.3	10	1	14	0.9	18	0.8	22	0.6	28	0.5	33
130																			1.3	11	1	16	0.9	20	0.8	24	0.6	30	0.5	36
140																			1.3	12	1	17	0.9	22	0.8	26	0.6	32	0.5	39
150																			1.2	14	1	19	0.8	23	0.8	28	0.6	35	0.5	41
160																			1.2	15	1	20	0.8	25	0.7	30	0.6	37	0.5	44
170																			1.2	16	1	22	0.8	27	0.7	31	0.6	40	0.5	47
180																	1.7	10	1.2	17	1	23	0.8	29	0.7	33	0.6	42	0.5	50
190																	1.7	10	1.2	18	1	25	0.8	30	0.7	35	0.6	45	0.5	53
200																	1.7	11	1.2	20	1	26	0.8	32	0.7	37	0.6	47	0.5	56
210															1.9	10	1.7	12	1.2	21	1	28	0.8	34	0.7	39	0.6	49	0.5	58
220															1.9	10	1.7	13	1.2	22	1	29	0.8	35	0.7	41	0.6	52	0.5	61
230															1.9	11	1.7	14	1.2	23	1	31	0.8	37	0.7	43	0.6	54	0.5	64
240															1.9	12	1.7	15	1.2	24	1	32	0.8	39	0.7	45	0.6	57	0.5	67
250															1.9	13	1.7	16	1.2	25	1	33	0.8	41	0.7	47	0.6	59	0.5	70
260													2.1	10	1.9	14	1.6	17	1.2	27	1	35	0.8	42	0.7	49	0.6	62	0.5	73
270													2.1	11	1.8	14	1.6	17	1.2	28	1	36	0.8	44	0.7	51	0.6	64	0.5	76
280													2.1	12	1.8	15	1.6	18	1.2	29	1	38	0.8	46	0.7	53	0.6	66	0.5	78
290													2.1	12	1.8	16	1.6	19	1.2	30	1	39	0.8	48	0.7	55	0.6	69	0.5	81
300													2.1	13	1.8	17	1.6	20	1.2	31	1	41	0.8	49	0.7	57	0.6	71	0.5	84
310													2.1	14	1.8	17	1.6	21	1.2	32	1	42	0.8	51	0.7	59	0.6	74	0.5	87
320											2.5	10	2.1	14	1.8	18	1.6	22	1.2	33	1	44	0.8	53	0.7	61	0.6	76	0.5	90
330											2.5	10	2.1	15	1.8	19	1.6	22	1.2	35	1	45	0.8	54	0.7	63	0.6	79	0.5	93
340											2.5	11	2.1	16	1.8	20	1.6	23	1.2	36	1	46	0.8	56	0.7	65	0.6	81	0.5	96
350											2.4	12	2.1	16	1.8	20	1.6	24	1.2	37	1	48	0.8	58	0.7	67	0.6	83	0.5	99
360											2.4	12	2.1	17	1.8	21	1.6	25	1.2	38	1	49	0.8	59	0.7	69	0.6	86		
370											2.4	13	2.1	18	1.8	22	1.6	26	1.2	39	1	51	0.8	61	0.7	71	0.6	88		
380											2.4	13	2	18	1.8	23	1.6	27	1.2	40	1	52	0.8	63	0.7	73	0.6	91		
390											2.4	14	2	19	1.8	23	1.6	27	1.2	41	1	54	0.8	65	0.7	75	0.6	93		
400											2.4	15	2	20	1.8	24	1.6	28	1.2	43	1	55	0.8	66	0.7	77	0.6	96		
410											2.4	15	2	20	1.8	25	1.6	29	1.2	44	1	56	0.8	68	0.7	79	0.6	98		
420											2.4	16	2	21	1.8	26	1.6	30	1.2	45	1	58	0.8	70	0.7	81	0.6	100		
430									3	10	2.4	16	2	22	1.8	26	1.6	31	1.2	46	1	59	0.8	71	0.7	83				
440									3	10	2.4	17	2	22	1.8	27	1.6	31	1.2	47	1	61	0.8	73	0.7	85				
450									2.9	11	2.4	17	2	23	1.8	28	1.6	32	1.2	48	1	62	0.8	75	0.7	87				
460									2.9	11	2.4	18	2	24	1.8	28	1.6	33	1.2	49	1	64	0.8	77	0.7	88				
470									2.9	12	2.4	18	2	24	1.8	29	1.6	34	1.2	51	1	65	0.8	78	0.7	90				
480									2.9	12	2.4	19	2	25	1.8	30	1.6	35	1.2	52	1	67	0.8	80	0.7	92				
490									2.9	13	2.4	20	2	25	1.8	31	1.6	35	1.2	53	1	68	0.8	82	0.7	94				
500									2.9	13	2.4	20	2	26	1.8	31	1.6	36	1.2	54	1	69	0.8	83	0.7	96				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.6	12
60																											0.7	12	0.6	15
70																									0.8	10	0.7	14	0.6	18
80																							0.9	10	0.8	13	0.6	17	0.6	21
90																							0.9	12	0.8	15	0.6	19	0.6	24
100																					1.1	10	0.9	14	0.8	17	0.6	22	0.6	27
110																					1	12	0.9	15	0.8	19	0.6	24	0.6	29
120																					1	13	0.9	17	0.8	21	0.6	27	0.5	32
130																					1	15	0.9	19	0.8	23	0.6	29	0.5	35
140																			1.3	10	1	16	0.9	21	0.8	25	0.6	32	0.5	38
150																			1.3	12	1	18	0.9	23	0.8	27	0.6	34	0.5	41
160																			1.3	13	1	19	0.9	24	0.8	29	0.6	37	0.5	44
170																			1.3	14	1	21	0.8	26	0.8	31	0.6	39	0.5	47
180																			1.2	16	1	22	0.8	28	0.7	33	0.6	42	0.5	49
190																			1.2	17	1	24	0.8	29	0.7	35	0.6	44	0.5	52
200																			1.2	18	1	25	0.8	31	0.7	37	0.6	46	0.5	55
210																			1.2	19	1	27	0.8	33	0.7	39	0.6	49	0.5	58
220																	1.7	10	1.2	20	1	28	0.8	35	0.7	41	0.6	51	0.5	61
230																	1.7	11	1.2	22	1	30	0.8	36	0.7	43	0.6	54	0.5	64
240																	1.7	12	1.2	23	1	31	0.8	38	0.7	45	0.6	56	0.5	67
250															1.9	10	1.7	13	1.2	24	1	32	0.8	40	0.7	47	0.6	59	0.5	69
260															1.9	10	1.7	14	1.2	25	1	34	0.8	42	0.7	49	0.6	61	0.5	72
270															1.9	11	1.7	15	1.2	26	1	35	0.8	43	0.7	50	0.6	64	0.5	75
280															1.9	12	1.7	16	1.2	28	1	37	0.8	45	0.7	53	0.6	66	0.5	78
290															1.9	13	1.7	17	1.2	29	1	38	0.8	47	0.7	55	0.6	68	0.5	81
300															1.9	14	1.7	18	1.2	30	1	40	0.8	48	0.7	56	0.6	71	0.5	84
310													2.2	10	1.9	15	1.6	19	1.2	31	1	41	0.8	50	0.7	58	0.6	73	0.5	87
320													2.2	11	1.9	16	1.6	20	1.2	32	1	43	0.8	52	0.7	60	0.6	76	0.5	89
330													2.1	12	1.8	16	1.6	20	1.2	33	1	44	0.8	54	0.7	62	0.6	78	0.5	92
340													2.1	12	1.8	17	1.6	21	1.2	35	1	46	0.8	55	0.7	64	0.6	81	0.5	95
350													2.1	13	1.8	18	1.6	22	1.2	36	1	47	0.8	57	0.7	66	0.6	83	0.5	98
360													2.1	14	1.8	19	1.6	23	1.2	37	1	48	0.8	59	0.7	68	0.6	85		
370													2.1	15	1.8	20	1.6	24	1.2	38	1	50	0.8	60	0.7	70	0.6	88		
380													2.1	15	1.8	20	1.6	25	1.2	39	1	51	0.8	62	0.7	72	0.6	90		
390											2.5	10	2.1	16	1.8	21	1.6	26	1.2	40	1	53	0.8	64	0.7	74	0.6	93		
400											2.5	10	2.1	17	1.8	22	1.6	26	1.2	42	1	54	0.8	66	0.7	76	0.6	95		
410											2.5	11	2.1	17	1.8	23	1.6	27	1.2	43	1	56	0.8	67	0.7	78	0.6	98		
420											2.5	12	2.1	18	1.8	23	1.6	28	1.2	44	1	57	0.8	69	0.7	80	0.6	100		
430											2.5	12	2.1	19	1.8	24	1.6	29	1.2	45	1	59	0.8	71	0.7	82				
440											2.4	13	2	20	1.8	25	1.6	30	1.2	46	1	60	0.8	72	0.7	84				
450											2.4	14	2	20	1.8	26	1.6	31	1.2	47	1	61	0.8	74	0.7	86				
460											2.4	14	2	21	1.8	26	1.6	31	1.2	48	1	63	0.8	76	0.7	88				
470											2.4	15	2	22	1.8	27	1.6	32	1.2	50	1	64	0.8	78	0.7	90				
480											2.4	16	2	22	1.8	28	1.6	33	1.2	51	1	66	0.8	79	0.7	92				
490											2.4	16	2	23	1.8	29	1.6	34	1.2	52	1	67	0.8	81	0.7	94				
500											2.4	17	2	24	1.8	29	1.6	35	1.2	53	1	69	0.8	83	0.7	96				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.05
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.6	11
60																											0.7	11	0.6	14
70																											0.7	14	0.6	17
80																									0.8	11	0.7	16	0.6	20
90																							0.9	10	0.8	14	0.6	19	0.6	23
100																							0.9	12	0.8	16	0.6	21	0.6	26
110																					1.1	10	0.9	14	0.8	18	0.6	24	0.6	29
120																					1.1	11	0.9	16	0.8	20	0.6	26	0.6	32
130																					1	13	0.9	18	0.8	22	0.6	29	0.6	35
140																					1	15	0.9	20	0.8	24	0.6	31	0.5	37
150																					1	16	0.9	21	0.8	26	0.6	34	0.5	40
160																			1.3	11	1	18	0.9	23	0.8	28	0.6	36	0.5	43
170																			1.3	12	1	19	0.9	25	0.8	30	0.6	39	0.5	46
180																			1.3	14	1	21	0.9	27	0.8	32	0.6	41	0.5	49
190																			1.3	15	1	22	0.9	29	0.8	34	0.6	43	0.5	52
200																			1.3	16	1	24	0.8	30	0.7	36	0.6	46	0.5	55
210																			1.2	18	1	25	0.8	32	0.7	38	0.6	48	0.5	58
220																			1.2	19	1	27	0.8	34	0.7	40	0.6	51	0.5	60
230																			1.2	20	1	28	0.8	36	0.7	42	0.6	53	0.5	63
240																			1.2	21	1	30	0.8	37	0.7	44	0.6	56	0.5	66
250																	1.8	10	1.2	23	1	31	0.8	39	0.7	46	0.6	58	0.5	69
260																	1.8	11	1.2	24	1	33	0.8	41	0.7	48	0.6	61	0.5	72
270																	1.7	12	1.2	25	1	34	0.8	43	0.7	50	0.6	63	0.5	75
280																	1.7	13	1.2	26	1	36	0.8	44	0.7	52	0.6	65	0.5	78
290																	1.7	14	1.2	27	1	37	0.8	46	0.7	54	0.6	68	0.5	80
300															2	10	1.7	15	1.2	29	1	39	0.8	48	0.7	56	0.6	70	0.5	83
310															1.9	11	1.7	16	1.2	30	1	40	0.8	49	0.7	58	0.6	73	0.5	86
320															1.9	12	1.7	17	1.2	31	1	42	0.8	51	0.7	60	0.6	75	0.5	89
330															1.9	13	1.7	18	1.2	32	1	43	0.8	53	0.7	62	0.6	78	0.5	92
340															1.9	14	1.7	19	1.2	33	1	45	0.8	55	0.7	64	0.6	80	0.5	95
350															1.9	15	1.7	20	1.2	35	1	46	0.8	56	0.7	66	0.6	83	0.5	98
360													2.2	10	1.9	16	1.6	21	1.2	36	1	48	0.8	58	0.7	68	0.6	85	0.5	100
370													2.2	10	1.9	17	1.6	22	1.2	37	1	49	0.8	60	0.7	70	0.6	87		
380													2.2	11	1.9	17	1.6	23	1.2	38	1	50	0.8	61	0.7	72	0.6	90		
390													2.2	12	1.8	18	1.6	23	1.2	39	1	52	0.8	63	0.7	74	0.6	92		
400													2.1	13	1.8	19	1.6	24	1.2	40	1	53	0.8	65	0.7	76	0.6	95		
410													2.1	14	1.8	20	1.6	25	1.2	41	1	55	0.8	67	0.7	77	0.6	97		
420													2.1	15	1.8	21	1.6	26	1.2	43	1	56	0.8	68	0.7	79	0.6	100		
430													2.1	15	1.8	22	1.6	27	1.2	44	1	58	0.8	70	0.7	81				
440													2.1	16	1.8	22	1.6	28	1.2	45	1	59	0.8	72	0.7	83				
450													2.1	17	1.8	23	1.6	29	1.2	46	1	61	0.8	73	0.7	85				
460													2.1	18	1.8	24	1.6	29	1.2	47	1	62	0.8	75	0.7	87				
470											2.5	10	2.1	18	1.8	25	1.6	30	1.2	48	1	64	0.8	77	0.7	89				
480											2.5	11	2.1	19	1.8	26	1.6	31	1.2	50	1	65	0.8	79	0.7	91				
490											2.5	12	2.1	20	1.8	26	1.6	32	1.2	51	1	66	0.8	80	0.7	93				
500											2.5	12	2.1	21	1.8	27	1.6	33	1.2	52	1	68	0.8	82	0.7	95				

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 4

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.6	10
60																													0.6	12
70																											0.8	10	0.6	14
80																											0.8	11	0.6	16
90																									0.9	10	0.8	13	0.6	18
100																									0.9	11	0.8	15	0.6	20
110																							1.1	10	0.9	12	0.7	17	0.6	22
120																							1.1	11	0.9	14	0.7	18	0.6	24
130																							1	12	0.9	15	0.7	20	0.6	26
140																					1.3	10	1	14	0.9	17	0.7	22	0.6	28
150																					1.2	11	1	15	0.9	18	0.7	24	0.6	30
160																					1.2	12	1	16	0.9	19	0.7	25	0.6	32
170																					1.2	13	1	17	0.9	21	0.7	27	0.6	34
180																					1.2	14	1	18	0.9	22	0.7	29	0.6	36
190																			1.6	10	1.2	15	1	20	0.9	23	0.7	30	0.6	38
200																			1.5	11	1.2	16	1	21	0.9	25	0.7	32	0.6	40
210																			1.5	12	1.2	17	1	22	0.9	26	0.7	34	0.6	42
220																			1.5	12	1.2	18	1	23	0.9	27	0.7	35	0.6	44
230																			1.5	13	1.2	19	1	24	0.9	29	0.7	37	0.6	46
240																			1.5	14	1.2	20	1	25	0.9	30	0.7	39	0.6	48
250																			1.5	15	1.2	21	1	27	0.9	32	0.7	41	0.6	50
260																			1.5	16	1.2	22	1	28	0.9	33	0.7	42	0.6	52
270																			1.5	16	1.2	23	1	29	0.9	34	0.7	44	0.6	54
280																			1.5	17	1.2	24	1	30	0.9	36	0.7	46	0.6	56
290																			1.5	18	1.2	25	1	31	0.9	37	0.7	47	0.6	58
300																	2.1	10	1.5	19	1.2	26	1	32	0.9	38	0.7	49	0.6	60
310																	2.1	10	1.5	20	1.2	27	1	34	0.9	40	0.7	51	0.6	62
320																	2.1	11	1.5	20	1.2	28	1	35	0.9	41	0.7	52	0.6	64
330																	2.1	11	1.5	21	1.2	29	1	36	0.9	42	0.7	54	0.6	66
340																	2.1	12	1.5	22	1.2	30	1	37	0.9	44	0.7	56	0.6	69
350																	2.1	13	1.5	23	1.2	31	1	38	0.9	45	0.7	58	0.6	70
360															2.4	10	2.1	13	1.5	23	1.2	32	1	39	0.9	46	0.7	59	0.6	72
370															2.4	10	2.1	14	1.5	24	1.2	33	1	41	0.9	48	0.7	61	0.6	74
380															2.4	11	2.1	14	1.5	25	1.2	34	1	42	0.9	49	0.7	63	0.6	76
390															2.4	11	2.1	15	1.5	26	1.2	35	1	43	0.9	51	0.7	64	0.6	78
400															2.4	12	2.1	15	1.5	26	1.2	36	1	44	0.9	52	0.7	66	0.6	80
410															2.3	12	2.1	16	1.5	27	1.2	37	1	45	0.9	53	0.7	68	0.6	82
420															2.3	13	2.1	16	1.5	28	1.2	38	1	46	0.9	55	0.7	69	0.6	84
430															2.3	13	2.1	17	1.5	29	1.2	39	1	48	0.9	56	0.7	71	0.6	86
440													2.7	10	2.3	14	2.1	18	1.5	30	1.2	40	1	49	0.9	57	0.7	73	0.6	89
450													2.7	10	2.3	14	2.1	18	1.5	30	1.2	41	1	50	0.9	59	0.7	74	0.6	91
460													2.7	11	2.3	15	2	19	1.5	31	1.2	42	1	51	0.9	60	0.7	76	0.6	93
470													2.7	11	2.3	15	2	19	1.5	32	1.2	43	1	52	0.9	61	0.7	78	0.6	95
480													2.7	12	2.3	16	2	20	1.5	33	1.2	44	1	53	0.9	63	0.7	79	0.6	97
490													2.7	12	2.3	16	2	20	1.4	33	1.2	45	1	55	0.9	64	0.7	81	0.6	99
500													2.7	13	2.3	17	2	21	1.4	34	1.2	45	1	56	0.9	65	0.7	83		

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 6

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																													0.6	10
60																													0.6	12
70																													0.6	14
80																											0.8	11	0.6	16
90																											0.8	12	0.6	18
100																									1	10	0.8	14	0.6	20
110																									0.9	11	0.8	16	0.6	22
120																									0.9	13	0.7	18	0.6	24
130																							1.1	11	0.9	14	0.7	19	0.6	26
140																							1.1	12	0.9	15	0.7	21	0.6	28
150																							1.1	13	0.9	17	0.7	23	0.6	30
160																					1.3	10	1	15	0.9	18	0.7	25	0.6	32
170																					1.3	11	1	16	0.9	20	0.7	26	0.6	34
180																					1.2	12	1	17	0.9	21	0.7	28	0.6	36
190																					1.2	14	1	18	0.9	23	0.7	30	0.6	38
200																					1.2	15	1	20	0.9	24	0.7	31	0.6	40
210																					1.2	16	1	21	0.9	25	0.7	33	0.6	42
220																			1.6	10	1.2	17	1	22	0.9	27	0.7	35	0.6	44
230																			1.6	11	1.2	18	1	23	0.9	28	0.7	37	0.6	46
240																			1.6	12	1.2	19	1	24	0.9	29	0.7	38	0.6	48
250																			1.5	13	1.2	20	1	26	0.9	31	0.7	40	0.6	50
260																			1.5	14	1.2	21	1	27	0.9	32	0.7	42	0.6	52
270																			1.5	14	1.2	22	1	28	0.9	33	0.7	43	0.6	54
280																			1.5	15	1.2	23	1	29	0.9	35	0.7	45	0.6	56
290																			1.5	16	1.2	24	1	30	0.9	36	0.7	47	0.6	58
300																			1.5	17	1.2	25	1	32	0.9	38	0.7	48	0.6	60
310																			1.5	18	1.2	26	1	33	0.9	39	0.7	50	0.6	62
320																			1.5	19	1.2	27	1	34	0.9	40	0.7	52	0.6	64
330																			1.5	19	1.2	28	1	35	0.9	42	0.7	54	0.6	66
340																			1.5	20	1.2	29	1	36	0.9	43	0.7	55	0.6	68
350																			1.5	21	1.2	30	1	37	0.9	44	0.7	57	0.6	70
360																	2.2	10	1.5	22	1.2	31	1	39	0.9	46	0.7	59	0.6	72
370																	2.2	10	1.5	23	1.2	32	1	40	0.9	47	0.7	60	0.6	74
380																	2.1	11	1.5	23	1.2	33	1	41	0.9	48	0.7	62	0.6	76
390																	2.1	12	1.5	24	1.2	34	1	42	0.9	50	0.7	64	0.6	78
400																	2.1	12	1.5	25	1.2	35	1	43	0.9	51	0.7	65	0.6	80
410																	2.1	13	1.5	26	1.2	36	1	44	0.9	53	0.7	67	0.6	82
420																	2.1	13	1.5	26	1.2	37	1	46	0.9	54	0.7	69	0.6	84
430															2.4	10	2.1	14	1.5	27	1.2	38	1	47	0.9	55	0.7	71	0.6	86
440															2.4	10	2.1	15	1.5	28	1.2	39	1	48	0.9	57	0.7	72	0.6	88
450															2.4	11	2.1	15	1.5	29	1.2	40	1	49	0.9	58	0.7	74	0.6	90
460															2.4	11	2.1	16	1.5	30	1.2	41	1	50	0.9	59	0.7	76	0.6	92
470															2.4	12	2.1	16	1.5	30	1.2	42	1	52	0.9	61	0.7	77	0.6	94
480															2.4	12	2.1	17	1.5	31	1.2	43	1	53	0.9	62	0.7	79	0.6	96
490															2.4	13	2.1	18	1.5	32	1.2	44	1	54	0.9	63	0.7	81	0.6	98
500															2.3	13	2.1	18	1.4	33	1.2	44	1	55	0.9	65	0.7	82	0.6	100

Input Parameters:
Channel Type = Trapezoidal
Cover factor = 0.9
Allowable Soil Stress = 0.07
C-D Design
Side Slope = 8

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)	D(ft)	B(ft)
10																														
20																														
30																														
40																														
50																														
60																													0.6	11
70																													0.6	13
80																											0.8	10	0.6	15
90																											0.8	12	0.6	17
100																											0.8	13	0.6	19
110																											0.8	15	0.6	21
120																									1	11	0.8	17	0.6	23
130																									0.9	13	0.8	18	0.6	25
140																							1.1	10	0.9	14	0.7	20	0.6	27
150																							1.1	12	0.9	16	0.7	22	0.6	29
160																							1.1	13	0.9	17	0.7	24	0.6	31
170																							1.1	14	0.9	19	0.7	25	0.6	33
180																					1.3	10	1	16	0.9	20	0.7	27	0.6	35
190																					1.3	11	1	17	0.9	21	0.7	29	0.6	37
200																					1.3	13	1	18	0.9	23	0.7	31	0.6	39
210																					1.2	14	1	19	0.9	24	0.7	32	0.6	41
220																					1.2	15	1	21	0.9	26	0.7	34	0.6	44
230																					1.2	16	1	22	0.9	27	0.7	36	0.6	46
240																					1.2	17	1	23	0.9	28	0.7	38	0.6	47
250																			1.6	10	1.2	18	1	24	0.9	30	0.7	39	0.6	49
260																			1.6	11	1.2	19	1	26	0.9	31	0.7	41	0.6	52
270																			1.6	12	1.2	20	1	27	0.9	33	0.7	43	0.6	54
280																			1.6	13	1.2	21	1	28	0.9	34	0.7	44	0.6	56
290																			1.5	14	1.2	22	1	29	0.9	35	0.7	46	0.6	58
300																			1.5	14	1.2	23	1	30	0.9	37	0.7	48	0.6	60
310																			1.5	15	1.2	24	1	32	0.9	38	0.7	50	0.6	62
320																			1.5	16	1.2	25	1	33	0.9	39	0.7	51	0.6	64
330																			1.5	17	1.2	26	1	34	0.9	41	0.7	53	0.6	65
340																			1.5	18	1.2	27	1	35	0.9	42	0.7	55	0.6	67
350																			1.5	19	1.2	28	1	36	0.9	44	0.7	56	0.6	70
360																			1.5	20	1.2	29	1	38	0.9	45	0.7	58	0.6	72
370																			1.5	21	1.2	31	1	39	0.9	46	0.7	60	0.6	74
380																			1.5	21	1.2	32	1	40	0.9	48	0.7	61	0.6	76
390																			1.5	22	1.2	32	1	41	0.9	49	0.7	63	0.6	78
400																			1.5	23	1.2	34	1	42	0.9	50	0.7	65	0.6	80
410																			1.5	24	1.2	34	1	44	0.9	52	0.7	67	0.6	82
420																			1.5	25	1.2	36	1	45	0.9	53	0.7	68	0.6	84
430																	2.2	10	1.5	25	1.2	36	1	46	0.9	55	0.7	70	0.6	86
440																	2.2	11	1.5	26	1.2	37	1	47	0.9	56	0.7	72	0.6	88
450																	2.2	11	1.5	27	1.2	38	1	48	0.9	57	0.7	73	0.6	90
460																	2.1	12	1.5	28	1.2	39	1	50	0.9	59	0.7	75	0.6	92
470																	2.1	13	1.5	29	1.2	40	1	51	0.9	60	0.7	77	0.6	94
480																	2.1	13	1.5	29	1.2	41	1	52	0.9	61	0.7	78	0.6	96
490																	2.1	14	1.5	30	1.2	42	1	53	0.9	63	0.7	80	0.6	98
500																	2.1	15	1.5	31	1.2	43	1	54	0.9	64	0.7	82	0.6	100

Appendix D Design Tables for Parabolic Channels

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.02
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10							1.7	10	1.5	13	1.4	14	1.3	16	1.2	18	1.1	19	1	25	0.8	29	0.7	32	0.7	34	0.6	39	0.5	43
20					2	16	1.7	21	1.5	25	1.3	29	1.3	32	1.2	36	1.1	39	1	50	0.8	57	0.7	63	0.7	69	0.6	78	0.5	86
30			2.8	15	2	24	1.6	31	1.5	37	1.3	43	1.3	49	1.2	53	1.1	58	1	75	0.8	85	0.7	95	0.7	103				
40			2.8	20	2	32	1.6	41	1.5	50	1.3	58	1.3	65	1.2	71	1.1	78	1	100	0.8	114	0.7	126						
50			2.7	24	2	39	1.6	52	1.5	62	1.3	72	1.3	81	1.2	89	1.1	97	1	124	0.8	142								
60			2.7	29	1.9	47	1.6	62	1.5	75	1.3	86	1.3	97	1.2	107	1.1	116	1	149										
70			2.7	34	1.9	55	1.6	72	1.5	87	1.3	101	1.3	113	1.2	125	1.1	136	1	174										
80			2.7	39	1.9	63	1.6	83	1.5	100	1.3	115	1.3	129	1.2	143	1.1	155												
90			2.7	44	1.9	71	1.6	93	1.5	112	1.3	130	1.3	146	1.2	160	1.1	174												
100	4.5	25	2.7	49	1.9	79	1.6	103	1.5	125	1.3	144	1.3	162	1.2	178	1.1	194												
110	4.5	27	2.7	53	1.9	87	1.6	114	1.5	137	1.3	158	1.3	178	1.2	196	1.1	213												
120	4.4	30	2.7	58	1.9	95	1.6	124	1.5	150	1.3	173	1.3	194	1.2	214														
130	4.4	32	2.7	63	1.9	102	1.6	134	1.5	162	1.3	187	1.3	210	1.2	232														
140	4.4	34	2.7	68	1.9	110	1.6	145	1.5	175	1.3	202	1.3	227																
150	4.4	37	2.7	73	1.9	118	1.6	155	1.5	187	1.3	216	1.3	243																
160	4.4	39	2.7	78	1.9	126	1.6	165	1.5	199	1.3	230																		
170	4.4	42	2.7	82	1.9	134	1.6	176	1.5	212	1.3	245																		
180	4.3	44	2.7	87	1.9	142	1.6	186	1.5	224	1.3	259																		
190	4.3	46	2.7	92	1.9	150	1.6	196	1.5	237																				
200	4.3	49	2.7	97	1.9	157	1.6	207	1.5	249																				
210	4.3	51	2.7	102	1.9	165	1.6	217	1.5	262																				
220	4.3	54	2.7	107	1.9	173	1.6	227	1.5	274																				
230	4.3	56	2.7	112	1.9	181	1.6	238	1.5	287																				
240	4.3	59	2.7	116	1.9	189	1.6	248																						
250	4.3	61	2.7	121	1.9	197	1.6	258																						
260	4.3	63	2.7	126	1.9	205	1.6	269																						
270	4.3	66	2.7	131	1.9	213	1.6	279																						
280	4.3	68	2.7	136	1.9	220	1.6	289																						
290	4.3	71	2.7	141	1.9	228	1.6	300																						
300	4.3	73	2.7	146	1.9	236	1.6	310																						
310	4.3	76	2.7	150	1.9	244	1.6	320																						
320	4.3	78	2.7	155	1.9	252																								
330	4.3	80	2.7	160	1.9	260																								
340	4.3	83	2.7	165	1.9	268																								
350	4.3	85	2.7	170	1.9	276																								
360	4.3	88	2.7	175	1.9	283																								
370	4.3	90	2.7	180	1.9	291																								
380	4.3	93	2.7	184	1.9	299																								
390	4.3	95	2.7	189	1.9	307																								
400	4.3	98	2.7	194	1.9	315																								
410	4.3	100	2.7	199	1.9	323																								
420	4.3	102	2.7	204	1.9	331																								
430	4.3	105	2.7	209	1.9	339																								
440	4.3	107	2.7	213	1.9	346																								
450	4.3	110	2.7	218	1.9	354																								
460	4.3	112	2.7	223	1.9	362																								
470	4.3	115	2.7	228	1.9	370																								
480	4.3	117	2.7	233	1.9	378																								
490	4.3	119	2.7	238	1.9	386																								
500	4.3	122	2.7	243																										

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.03
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10									1.7	9	1.5	10	1.4	11	1.3	12	1.2	13	1	17	0.9	21	0.8	24	0.8	26	0.7	30	0.6	33
20							1.8	14	1.6	17	1.4	20	1.3	22	1.2	25	1.2	27	1	35	0.9	42	0.8	48	0.8	53	0.7	60	0.6	67
30					2.2	16	1.8	21	1.6	26	1.4	30	1.3	33	1.2	37	1.2	40	1	52	0.9	62	0.8	72	0.8	79	0.7	90	0.6	100
40					2.2	21	1.8	28	1.6	34	1.4	40	1.3	45	1.2	49	1.2	54	1	70	0.9	83	0.8	95	0.8	105	0.7	120		
50			3.2	16	2.1	26	1.8	35	1.6	43	1.4	49	1.3	56	1.2	62	1.2	67	1	87	0.9	104	0.8	119	0.8	131				
60			3.1	19	2.1	32	1.8	42	1.6	51	1.4	59	1.3	67	1.2	74	1.2	81	1	104	0.9	125	0.8	143						
70			3.1	22	2.1	37	1.8	49	1.6	60	1.4	69	1.3	78	1.2	86	1.2	94	1	122	0.9	146	0.8	167						
80			3.1	25	2.1	42	1.8	56	1.6	68	1.4	79	1.3	89	1.2	99	1.2	107	1	139	0.9	166								
90			3.1	29	2.1	47	1.8	63	1.6	76	1.4	89	1.3	100	1.2	111	1.2	121	1	156										
100			3	32	2.1	53	1.8	70	1.6	85	1.4	99	1.3	111	1.2	123	1.2	134	1	174										
110			3	35	2.1	58	1.8	77	1.6	94	1.4	109	1.3	123	1.2	136	1.2	148	1	191										
120			3	38	2.1	63	1.8	84	1.6	102	1.4	119	1.3	134	1.2	148	1.2	161												
130			3	41	2.1	68	1.8	91	1.6	111	1.4	128	1.3	145	1.2	160	1.2	175												
140			3	44	2.1	74	1.8	98	1.6	119	1.4	138	1.3	156	1.2	172	1.2	188												
150			3	48	2.1	79	1.8	105	1.6	128	1.4	148	1.3	167	1.2	185	1.2	202												
160			3	51	2.1	84	1.8	112	1.6	136	1.4	158	1.3	178	1.2	197	1.2	215												
170			3	54	2.1	89	1.8	119	1.6	145	1.4	168	1.3	189	1.2	209	1.2	228												
180	5.3	28	3	57	2.1	95	1.8	126	1.6	153	1.4	178	1.3	201	1.2	222														
190	5.3	29	3	60	2.1	100	1.8	133	1.6	162	1.4	188	1.3	212	1.2	234														
200	5.3	31	3	63	2.1	105	1.8	140	1.6	170	1.4	198	1.3	223	1.2	246														
210	5.3	32	3	66	2.1	110	1.8	147	1.6	179	1.4	208	1.3	234																
220	5.2	34	3	70	2.1	116	1.8	154	1.6	187	1.4	217	1.3	245																
230	5.2	35	3	73	2.1	121	1.8	161	1.6	196	1.4	227	1.3	256																
240	5.2	37	3	76	2.1	126	1.8	168	1.6	204	1.4	237																		
250	5.2	38	3	79	2.1	132	1.8	175	1.6	213	1.4	247																		
260	5.2	40	3	82	2.1	137	1.8	182	1.6	221	1.4	257																		
270	5.2	41	3	85	2.1	142	1.8	189	1.6	230	1.4	267																		
280	5.2	43	3	89	2.1	147	1.8	196	1.6	238	1.4	277																		
290	5.2	44	3	92	2.1	153	1.8	203	1.6	247																				
300	5.2	46	3	95	2.1	158	1.8	210	1.6	255																				
310	5.2	47	3	98	2.1	163	1.8	217	1.6	264																				
320	5.2	49	3	101	2.1	168	1.8	224	1.6	272																				
330	5.2	50	3	104	2.1	174	1.8	231	1.6	281																				
340	5.2	52	3	108	2.1	179	1.8	238	1.6	289																				
350	5.2	53	3	111	2.1	184	1.8	245	1.6	298																				
360	5.2	55	3	114	2.1	189	1.8	252	1.6	306																				
370	5.1	56	3	117	2.1	195	1.8	259																						
380	5.1	58	3	120	2.1	200	1.8	266																						
390	5.1	59	3	123	2.1	205	1.8	273																						
400	5.1	61	3	127	2.1	210	1.8	280																						
410	5.1	62	3	130	2.1	216	1.8	287																						
420	5.1	64	3	133	2.1	221	1.8	294																						
430	5.1	65	3	136	2.1	226	1.8	301																						
440	5.1	67	3	139	2.1	231	1.8	308																						
450	5.1	69	3	142	2.1	237	1.8	315																						
460	5.1	70	3	146	2.1	242	1.8	322																						
470	5.1	72	3	149	2.1	247	1.8	328																						
480	5.1	73	3	152	2.1	252	1.8	335																						
490	5.1	75	3	155	2.1	258	1.8	342																						
500	5.1	76	3	158	2.1	263	1.8	349																						

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.05
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10												1.4	8	1.3	8	1.1	11	1	13	0.9	15	0.8	17	0.7	20	0.7	23			
20									1.8	10	1.6	12	1.5	14	1.4	15	1.3	17	1.1	22	1	26	0.9	30	0.8	34	0.7	41	0.7	47
30							2.1	13	1.8	15	1.6	18	1.5	20	1.4	23	1.3	25	1.1	33	1	39	0.9	45	0.8	51	0.7	61	0.7	70
40							2	17	1.8	21	1.6	24	1.4	27	1.3	30	1.3	33	1.1	44	1	52	0.9	61	0.8	68	0.7	81	0.7	93
50					2.6	16	2	21	1.7	26	1.6	30	1.4	34	1.3	38	1.3	41	1.1	54	1	66	0.9	76	0.8	85	0.7	102	0.7	117
60					2.5	19	2	25	1.7	31	1.6	36	1.4	41	1.3	45	1.3	50	1.1	65	1	79	0.9	91	0.8	102	0.7	122		
70					2.5	22	2	29	1.7	36	1.6	42	1.4	48	1.3	53	1.3	58	1.1	76	1	92	0.9	106	0.8	119	0.7	142		
80					2.5	25	2	33	1.7	41	1.6	48	1.4	55	1.3	61	1.3	66	1.1	87	1	105	0.9	121	0.8	136				
90					2.5	28	2	37	1.7	46	1.6	54	1.4	61	1.3	68	1.3	75	1.1	98	1	118	0.9	136	0.8	153				
100					2.5	31	2	42	1.7	51	1.6	60	1.4	68	1.3	76	1.3	83	1.1	109	1	131	0.9	151						
110			3.8	20	2.5	34	2	46	1.7	56	1.6	66	1.4	75	1.3	83	1.3	91	1.1	120	1	144	0.9	166						
120			3.8	22	2.5	37	2	50	1.7	62	1.6	72	1.4	82	1.3	91	1.3	99	1.1	131	1	157								
130			3.8	23	2.5	40	2	54	1.7	67	1.6	78	1.4	89	1.3	98	1.3	108	1.1	141	1	170								
140			3.8	25	2.5	43	2	58	1.7	72	1.6	84	1.4	95	1.3	106	1.3	116	1.1	152	1	183								
150			3.7	27	2.5	46	2	63	1.7	77	1.6	90	1.4	102	1.3	114	1.3	124	1.1	163										
160			3.7	29	2.5	49	2	67	1.7	82	1.6	96	1.4	109	1.3	121	1.3	133	1.1	174										
170			3.7	30	2.5	52	2	71	1.7	87	1.6	102	1.4	116	1.3	129	1.3	141	1.1	185										
180			3.7	32	2.5	55	2	75	1.7	92	1.6	108	1.4	123	1.3	136	1.3	149	1.1	196										
190			3.7	34	2.5	58	2	79	1.7	97	1.6	114	1.4	130	1.3	144	1.3	157	1.1	207										
200			3.7	36	2.5	62	2	83	1.7	102	1.6	120	1.4	136	1.3	151	1.3	166												
210			3.7	37	2.5	65	2	87	1.7	108	1.6	126	1.4	143	1.3	159	1.3	174												
220			3.7	39	2.5	68	2	92	1.7	113	1.6	132	1.4	150	1.3	167	1.3	182												
230			3.7	41	2.5	71	2	96	1.7	118	1.6	138	1.4	157	1.3	174	1.3	191												
240			3.7	43	2.5	74	2	100	1.7	123	1.6	144	1.4	164	1.3	182	1.3	199												
250			3.7	45	2.5	77	2	104	1.7	128	1.6	150	1.4	170	1.3	189	1.3	207												
260			3.7	46	2.5	80	2	108	1.7	133	1.6	156	1.4	177	1.3	197	1.3	216												
270			3.7	48	2.5	83	2	112	1.7	138	1.6	162	1.4	184	1.3	204	1.3	224												
280			3.7	50	2.5	86	2	117	1.7	143	1.6	168	1.4	191	1.3	212	1.3	232												
290			3.7	52	2.5	89	2	121	1.7	149	1.6	174	1.4	198	1.3	220	1.3	240												
300			3.7	53	2.5	92	2	125	1.7	154	1.6	180	1.4	205	1.3	227	1.3	249												
310			3.7	55	2.5	95	2	129	1.7	159	1.6	186	1.4	211	1.3	235														
320			3.7	57	2.5	98	2	133	1.7	164	1.6	192	1.4	218	1.3	242														
330			3.7	59	2.5	101	2	137	1.7	169	1.6	198	1.4	225	1.3	250														
340			3.7	61	2.5	105	2	142	1.7	174	1.6	204	1.4	232	1.3	257														
350			3.7	62	2.5	108	2	146	1.7	179	1.6	210	1.4	239	1.3	265														
360			3.7	64	2.5	111	2	150	1.7	184	1.6	216	1.4	245																
370			3.7	66	2.5	114	2	154	1.7	190	1.6	222	1.4	252																
380			3.7	68	2.5	117	2	158	1.7	195	1.6	228	1.4	259																
390			3.7	69	2.5	120	2	162	1.7	200	1.6	234	1.4	266																
400			3.7	71	2.5	123	2	167	1.7	205	1.6	240	1.4	273																
410			3.7	73	2.5	126	2	171	1.7	210	1.6	246	1.4	280																
420			3.7	75	2.5	129	2	175	1.7	215	1.6	252	1.4	286																
430	7	35	3.7	76	2.5	132	2	179	1.7	220	1.6	258																		
440	7	36	3.7	78	2.5	135	2	183	1.7	225	1.6	264																		
450	7	37	3.7	80	2.5	138	2	187	1.7	231	1.6	270																		
460	7	37	3.7	82	2.5	141	2	192	1.7	236	1.6	276																		
470	7	38	3.7	84	2.5	145	2	196	1.7	241	1.6	282																		
480	6.9	39	3.7	85	2.5	148	2	200	1.7	246	1.6	288																		
490	6.9	40	3.6	87	2.5	151	2	204	1.7	251	1.6	294																		
500	6.9	40	3.6	89	2.5	154	2	208	1.7	256	1.6	300																		

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.07
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																			1.2	8	1	10	0.9	11	0.9	13	0.8	15	0.7	17
20													1.6	10	1.5	11	1.4	12	1.1	16	1	19	0.9	22	0.9	25	0.8	30	0.7	35
30									2	11	1.8	13	1.6	15	1.5	16	1.4	18	1.1	24	1	29	0.9	33	0.9	37	0.8	45	0.7	52
40							2.3	12	2	15	1.7	17	1.6	19	1.5	22	1.4	24	1.1	32	1	38	0.9	44	0.9	50	0.8	60	0.7	69
50							2.3	15	1.9	18	1.7	21	1.6	24	1.5	27	1.4	30	1.1	39	1	48	0.9	55	0.9	62	0.8	75	0.7	87
60							2.3	18	1.9	22	1.7	26	1.6	29	1.4	33	1.4	36	1.1	47	1	57	0.9	67	0.9	75	0.8	90	0.7	104
70					2.9	15	2.3	20	1.9	25	1.7	30	1.6	34	1.4	38	1.4	42	1.1	55	1	67	0.9	78	0.9	87	0.8	105	0.7	121
80					2.9	17	2.2	23	1.9	29	1.7	34	1.6	39	1.4	43	1.4	48	1.1	63	1	76	0.9	89	0.9	100	0.8	120	0.7	138
90					2.9	19	2.2	26	1.9	33	1.7	38	1.6	44	1.4	49	1.4	54	1.1	71	1	86	0.9	100	0.9	112	0.8	135		
100					2.9	21	2.2	29	1.9	36	1.7	43	1.6	49	1.4	54	1.4	60	1.1	79	1	96	0.9	111	0.9	125	0.8	150		
110					2.8	23	2.2	32	1.9	40	1.7	47	1.6	53	1.4	60	1.4	66	1.1	87	1	105	0.9	122	0.9	137				
120					2.8	25	2.2	35	1.9	43	1.7	51	1.6	58	1.4	65	1.4	71	1.1	95	1	115	0.9	133	0.9	150				
130					2.8	28	2.2	38	1.9	47	1.7	55	1.6	63	1.4	70	1.4	77	1.1	102	1	124	0.9	144	0.9	162				
140					2.8	30	2.2	41	1.9	51	1.7	60	1.6	68	1.4	76	1.4	83	1.1	110	1	134	0.9	155						
150					2.8	32	2.2	44	1.9	54	1.7	64	1.6	73	1.4	81	1.4	89	1.1	118	1	143	0.9	166						
160					2.8	34	2.2	46	1.9	58	1.7	68	1.6	78	1.4	87	1.4	95	1.1	126	1	153	0.9	178						
170					2.8	36	2.2	49	1.9	61	1.7	72	1.6	83	1.4	92	1.4	101	1.1	134	1	163								
180					2.8	38	2.2	52	1.9	65	1.7	77	1.6	87	1.4	98	1.4	107	1.1	142	1	172								
190			4.5	23	2.8	40	2.2	55	1.9	69	1.7	81	1.6	92	1.4	103	1.4	113	1.1	150	1	182								
200			4.5	24	2.8	42	2.2	58	1.9	72	1.7	85	1.6	97	1.4	108	1.4	119	1.1	158	1	191								
210			4.4	25	2.8	44	2.2	61	1.9	76	1.7	89	1.6	102	1.4	114	1.4	125	1.1	165	1	201								
220			4.4	26	2.8	47	2.2	64	1.9	79	1.7	94	1.6	107	1.4	119	1.4	131	1.1	173										
230			4.4	28	2.8	49	2.2	67	1.9	83	1.7	98	1.6	112	1.4	125	1.4	137	1.1	181										
240			4.4	29	2.8	51	2.2	70	1.9	87	1.7	102	1.6	117	1.4	130	1.4	143	1.1	189										
250			4.4	30	2.8	53	2.2	73	1.9	90	1.7	106	1.6	121	1.4	135	1.4	149	1.1	197										
260			4.4	31	2.8	55	2.2	75	1.9	94	1.7	111	1.6	126	1.4	141	1.4	155	1.1	205										
270			4.4	32	2.8	57	2.2	78	1.9	98	1.7	115	1.6	131	1.4	146	1.4	161	1.1	213										
280			4.4	33	2.8	59	2.2	81	1.9	101	1.7	119	1.6	136	1.4	152	1.4	167	1.1	221										
290			4.4	34	2.8	61	2.2	84	1.9	105	1.7	123	1.6	141	1.4	157	1.4	173												
300			4.4	36	2.8	63	2.2	87	1.9	108	1.7	128	1.6	146	1.4	163	1.4	179												
310			4.4	37	2.8	65	2.2	90	1.9	112	1.7	132	1.6	151	1.4	168	1.4	185												
320			4.4	38	2.8	68	2.2	93	1.9	116	1.7	136	1.6	155	1.4	173	1.4	191												
330			4.4	39	2.8	70	2.2	96	1.9	119	1.7	140	1.6	160	1.4	179	1.4	197												
340			4.3	40	2.8	72	2.2	99	1.9	123	1.7	145	1.6	165	1.4	184	1.4	202												
350			4.3	41	2.8	74	2.2	102	1.9	126	1.7	149	1.6	170	1.4	190	1.4	208												
360			4.3	43	2.8	76	2.2	104	1.9	130	1.7	153	1.6	175	1.4	195	1.4	214												
370			4.3	44	2.8	78	2.2	107	1.9	134	1.7	157	1.6	180	1.4	201	1.4	220												
380			4.3	45	2.8	80	2.2	110	1.9	137	1.7	162	1.6	185	1.4	206	1.4	226												
390			4.3	46	2.8	82	2.2	113	1.9	141	1.7	166	1.6	189	1.4	211	1.4	232												
400			4.3	47	2.8	84	2.2	116	1.9	144	1.7	170	1.6	194	1.4	217	1.4	238												
410			4.3	48	2.8	87	2.2	119	1.9	148	1.7	174	1.6	199	1.4	222	1.4	244												
420			4.3	50	2.8	89	2.2	122	1.9	152	1.7	179	1.6	204	1.4	228	1.4	250												
430			4.3	51	2.8	91	2.2	125	1.9	155	1.7	183	1.6	209	1.4	233	1.4	256												
440			4.3	52	2.8	93	2.2	128	1.9	159	1.7	187	1.6	214	1.4	238	1.4	262												
450			4.3	53	2.8	95	2.2	131	1.9	162	1.7	191	1.6	218	1.4	244	1.4	268												
460			4.3	54	2.8	97	2.2	133	1.9	166	1.7	196	1.6	223	1.4	249														
470			4.3	56	2.8	99	2.2	136	1.9	170	1.7	200	1.6	228	1.4	255														
480			4.3	57	2.8	101	2.2	139	1.9	173	1.7	204	1.6	233	1.4	260														
490			4.3	58	2.8	103	2.2	142	1.9	177	1.7	208	1.6	238	1.4	266														
500			4.3	59	2.8	105	2.2	145	1.9	181	1.7	213	1.6	243	1.4	271														

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.02
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10													1.5	9	1.3	9	1.3	10	1.1	13	0.9	16	0.9	19	0.8	21	0.7	25	0.6	28
20							2	11	1.7	13	1.5	15	1.4	17	1.3	19	1.2	21	1	27	0.9	32	0.9	37	0.8	41	0.7	50	0.6	55
30							1.9	16	1.7	19	1.5	22	1.4	25	1.3	28	1.2	31	1	40	0.9	48	0.9	56	0.8	62	0.7	74	0.6	83
40					2.4	16	1.9	21	1.7	26	1.5	30	1.4	34	1.3	38	1.2	41	1	54	0.9	64	0.9	74	0.8	83	0.7	99	0.6	110
50					2.3	20	1.9	26	1.7	32	1.5	37	1.4	42	1.3	47	1.2	51	1	67	0.9	80	0.9	93	0.8	104	0.7	124		
60					2.3	23	1.9	31	1.6	39	1.5	45	1.4	51	1.3	56	1.2	62	1	80	0.9	97	0.9	111	0.8	124				
70					2.3	27	1.9	37	1.6	45	1.5	52	1.4	59	1.3	66	1.2	72	1	94	0.9	113	0.9	130	0.8	145				
80			3.5	19	2.3	31	1.9	42	1.6	51	1.5	60	1.4	68	1.3	75	1.2	82	1	107	0.9	129	0.9	148						
90			3.5	21	2.3	35	1.9	47	1.6	58	1.5	67	1.4	76	1.3	85	1.2	92	1	120	0.9	145	0.9	167						
100			3.4	23	2.3	39	1.9	52	1.6	64	1.5	75	1.4	85	1.3	94	1.2	103	1	134	0.9	161								
110			3.4	25	2.3	43	1.9	58	1.6	71	1.5	82	1.4	93	1.3	103	1.2	113	1	147	0.9	177								
120			3.4	28	2.3	47	1.9	63	1.6	77	1.5	90	1.4	102	1.3	113	1.2	123	1	161										
130			3.4	30	2.3	51	1.9	68	1.6	83	1.5	97	1.4	110	1.3	122	1.2	134	1	174										
140			3.4	32	2.3	55	1.9	73	1.6	90	1.5	105	1.4	119	1.3	132	1.2	144	1	187										
150			3.4	35	2.3	59	1.9	79	1.6	96	1.5	112	1.4	127	1.3	141	1.2	154	1	201										
160			3.4	37	2.3	63	1.9	84	1.6	103	1.5	120	1.4	136	1.3	150	1.2	164												
170			3.4	39	2.3	66	1.9	89	1.6	109	1.5	127	1.4	144	1.3	160	1.2	175												
180			3.4	42	2.3	70	1.9	94	1.6	115	1.5	135	1.4	153	1.3	169	1.2	185												
190			3.4	44	2.3	74	1.9	100	1.6	122	1.5	142	1.4	161	1.3	179	1.2	195												
200			3.3	46	2.3	78	1.9	105	1.6	128	1.5	150	1.4	170	1.3	188	1.2	205												
210			3.3	48	2.3	82	1.9	110	1.6	135	1.5	157	1.4	178	1.3	197	1.2	216												
220			3.3	51	2.3	86	1.9	115	1.6	141	1.5	165	1.4	186	1.3	207	1.2	226												
230			3.3	53	2.3	90	1.9	121	1.6	147	1.5	172	1.4	195	1.3	216	1.2	236												
240			3.3	55	2.3	94	1.9	126	1.6	154	1.5	180	1.4	203	1.3	226														
250			3.3	58	2.3	98	1.9	131	1.6	160	1.5	187	1.4	212	1.3	235														
260			3.3	60	2.3	102	1.9	136	1.6	167	1.5	195	1.4	220	1.3	244														
270			3.3	62	2.3	105	1.9	141	1.6	173	1.5	202	1.4	229	1.3	254														
280			3.3	64	2.3	109	1.9	147	1.6	180	1.5	210	1.4	237																
290	6.2	32	3.3	67	2.3	113	1.9	152	1.6	186	1.5	217	1.4	246																
300	6.1	33	3.3	69	2.3	117	1.9	157	1.6	192	1.5	225	1.4	254																
310	6.1	34	3.3	71	2.3	121	1.9	162	1.6	199	1.5	232	1.4	263																
320	6.1	35	3.3	74	2.3	125	1.9	168	1.6	205	1.5	240	1.4	271																
330	6.1	36	3.3	76	2.3	129	1.9	173	1.6	212	1.5	247																		
340	6.1	37	3.3	78	2.3	133	1.9	178	1.6	218	1.5	255																		
350	6.1	38	3.3	81	2.3	137	1.9	183	1.6	224	1.5	262																		
360	6.1	39	3.3	83	2.3	141	1.9	189	1.6	231	1.5	270																		
370	6.1	40	3.3	85	2.3	144	1.9	194	1.6	237	1.5	277																		
380	6	41	3.3	87	2.3	148	1.9	199	1.6	244	1.5	285																		
390	6	42	3.3	90	2.3	152	1.9	204	1.6	250	1.5	292																		
400	6	43	3.3	92	2.3	156	1.9	210	1.6	256																				
410	6	44	3.3	94	2.3	160	1.9	215	1.6	263																				
420	6	45	3.3	97	2.3	164	1.9	220	1.6	269																				
430	6	46	3.3	99	2.3	168	1.9	225	1.6	276																				
440	6	47	3.3	101	2.3	172	1.9	230	1.6	282																				
450	6	48	3.3	103	2.3	176	1.9	236	1.6	288																				
460	6	49	3.3	106	2.3	180	1.9	241	1.6	295																				
470	6	50	3.3	108	2.3	183	1.9	246	1.6	301																				
480	6	51	3.3	110	2.3	187	1.9	251	1.6	308																				
490	6	52	3.3	113	2.3	191	1.9	257	1.6	314																				
500	6	54	3.3	115	2.3	195	1.9	262	1.6	321																				

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.03
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																			1.1	9	1	11	0.9	13	0.8	14	0.8	17	0.7	20
20											1.7	10	1.5	11	1.4	13	1.3	14	1.1	18	1	22	0.9	26	0.8	29	0.8	35	0.7	40
30									1.9	13	1.7	15	1.5	17	1.4	19	1.3	21	1.1	27	1	33	0.9	38	0.8	43	0.8	52	0.7	60
40							2.2	14	1.9	17	1.7	20	1.5	23	1.4	25	1.3	28	1.1	37	1	44	0.9	51	0.8	58	0.8	69	0.7	79
50							2.2	17	1.8	21	1.6	25	1.5	28	1.4	32	1.3	35	1.1	46	1	55	0.9	64	0.8	72	0.8	86	0.7	99
60					2.7	15	2.1	21	1.8	26	1.6	30	1.5	34	1.4	38	1.3	42	1.1	55	1	66	0.9	77	0.8	86	0.8	104	0.7	119
70					2.7	18	2.1	24	1.8	30	1.6	35	1.5	40	1.4	44	1.3	49	1.1	64	1	78	0.9	90	0.8	101	0.8	121	0.7	139
80					2.7	20	2.1	28	1.8	34	1.6	40	1.5	45	1.4	51	1.3	56	1.1	73	1	89	0.9	102	0.8	115	0.8	138		
90					2.7	23	2.1	31	1.8	38	1.6	45	1.5	51	1.4	57	1.3	63	1.1	82	1	100	0.9	115	0.8	130				
100					2.7	25	2.1	34	1.8	42	1.6	50	1.5	57	1.4	63	1.3	69	1.1	92	1	111	0.9	128	0.8	144				
110					2.7	28	2.1	38	1.8	47	1.6	55	1.5	63	1.4	70	1.3	76	1.1	101	1	122	0.9	141	0.8	158				
120					2.6	30	2.1	41	1.8	51	1.6	60	1.5	68	1.4	76	1.3	83	1.1	110	1	133	0.9	154						
130					2.6	33	2.1	45	1.8	55	1.6	65	1.5	74	1.4	82	1.3	90	1.1	119	1	144	0.9	166						
140					2.6	35	2.1	48	1.8	59	1.6	70	1.5	80	1.4	89	1.3	97	1.1	128	1	155	0.9	179						
150			4.1	22	2.6	38	2.1	51	1.8	64	1.6	75	1.5	85	1.4	95	1.3	104	1.1	137	1	166								
160			4.1	23	2.6	40	2.1	55	1.8	68	1.6	80	1.5	91	1.4	101	1.3	111	1.1	146	1	177								
170			4.1	25	2.6	43	2.1	58	1.8	72	1.6	85	1.5	97	1.4	108	1.3	118	1.1	156	1	188								
180			4.1	26	2.6	45	2.1	62	1.8	76	1.6	90	1.5	102	1.4	114	1.3	125	1.1	165										
190			4.1	27	2.6	48	2.1	65	1.8	81	1.6	95	1.5	108	1.4	120	1.3	132	1.1	174										
200			4.1	29	2.6	50	2.1	69	1.8	85	1.6	100	1.5	114	1.4	127	1.3	139	1.1	183										
210			4.1	30	2.6	53	2.1	72	1.8	89	1.6	105	1.5	119	1.4	133	1.3	146	1.1	192										
220			4	32	2.6	55	2.1	75	1.8	93	1.6	110	1.5	125	1.4	139	1.3	153	1.1	201										
230			4	33	2.6	58	2.1	79	1.8	98	1.6	115	1.5	131	1.4	146	1.3	160	1.1	211										
240			4	34	2.6	60	2.1	82	1.8	102	1.6	120	1.5	136	1.4	152	1.3	167	1.1	220										
250			4	36	2.6	63	2.1	86	1.8	106	1.6	125	1.5	142	1.4	158	1.3	174												
260			4	37	2.6	65	2.1	89	1.8	110	1.6	130	1.5	148	1.4	165	1.3	181												
270			4	39	2.6	68	2.1	93	1.8	115	1.6	135	1.5	153	1.4	171	1.3	187												
280			4	40	2.6	70	2.1	96	1.8	119	1.6	140	1.5	159	1.4	177	1.3	194												
290			4	42	2.6	73	2.1	99	1.8	123	1.6	145	1.5	165	1.4	184	1.3	201												
300			4	43	2.6	75	2.1	103	1.8	127	1.6	150	1.5	170	1.4	190	1.3	208												
310			4	44	2.6	78	2.1	106	1.8	132	1.6	155	1.5	176	1.4	196	1.3	215												
320			4	46	2.6	80	2.1	110	1.8	136	1.6	160	1.5	182	1.4	202	1.3	222												
330			4	47	2.6	83	2.1	113	1.8	140	1.6	165	1.5	188	1.4	209	1.3	229												
340			4	49	2.6	85	2.1	117	1.8	144	1.6	170	1.5	193	1.4	215	1.3	236												
350			4	50	2.6	88	2.1	120	1.8	148	1.6	175	1.5	199	1.4	221	1.3	243												
360			4	51	2.6	90	2.1	124	1.8	153	1.6	180	1.5	205	1.4	228	1.3	250												
370			4	53	2.6	93	2.1	127	1.8	157	1.6	185	1.5	210	1.4	234	1.3	257												
380			4	54	2.6	96	2.1	130	1.8	161	1.6	190	1.5	216	1.4	240														
390			4	56	2.6	98	2.1	134	1.8	165	1.6	195	1.5	222	1.4	247														
400			4	57	2.6	101	2.1	137	1.8	170	1.6	200	1.5	227	1.4	253														
410			4	59	2.6	103	2.1	141	1.8	174	1.6	205	1.5	233	1.4	259														
420			4	60	2.6	106	2.1	144	1.8	178	1.6	210	1.5	239	1.4	266														
430			4	62	2.6	108	2.1	148	1.8	182	1.6	215	1.5	244	1.4	272														
440			4	63	2.6	111	2.1	151	1.8	187	1.6	220	1.5	250	1.4	278														
450			4	64	2.6	113	2.1	154	1.8	191	1.6	225	1.5	256																
460			4	66	2.6	116	2.1	158	1.8	195	1.6	230	1.5	261																
470			4	67	2.6	118	2.1	161	1.8	199	1.6	235	1.5	267																
480			4	69	2.6	121	2.1	165	1.8	204	1.6	240	1.5	273																
490			4	70	2.6	123	2.1	168	1.8	208	1.6	245	1.5	278																
500			4	72	2.6	126	2.1	172	1.8	212	1.6	250	1.5	284																

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.05
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																					1.1	7	1	8	0.9	9	0.8	11	0.7	13
20																	1.6	8	1.3	11	1.1	14	1	16	0.9	18	0.8	22	0.7	25
30													1.8	10	1.6	11	1.5	12	1.2	17	1.1	20	1	24	0.9	27	0.8	32	0.7	38
40											2	12	1.8	13	1.6	15	1.5	17	1.2	22	1.1	27	1	32	0.9	36	0.8	43	0.7	50
50									2.3	12	2	15	1.8	17	1.6	19	1.5	21	1.2	28	1.1	34	1	39	0.9	45	0.8	54	0.7	63
60									2.2	15	1.9	18	1.7	20	1.6	23	1.5	25	1.2	33	1.1	41	1	47	0.9	54	0.8	65	0.7	75
70							2.7	14	2.2	17	1.9	20	1.7	23	1.6	26	1.5	29	1.2	39	1.1	47	1	55	0.9	62	0.8	76	0.7	88
80							2.6	16	2.2	20	1.9	23	1.7	27	1.6	30	1.5	33	1.2	44	1.1	54	1	63	0.9	71	0.8	86	0.7	100
90							2.6	18	2.2	22	1.9	26	1.7	30	1.6	34	1.5	37	1.2	50	1.1	61	1	71	0.9	80	0.8	97	0.7	113
100							2.6	20	2.2	24	1.9	29	1.7	33	1.6	37	1.5	41	1.2	55	1.1	68	1	79	0.9	89	0.8	108	0.7	125
110							2.6	21	2.2	27	1.9	32	1.7	37	1.6	41	1.5	46	1.2	61	1.1	75	1	87	0.9	98	0.8	119	0.7	138
120							2.6	23	2.2	29	1.9	35	1.7	40	1.6	45	1.5	50	1.2	66	1.1	81	1	95	0.9	107	0.8	130		
130					3.4	18	2.6	25	2.2	32	1.9	38	1.7	43	1.6	49	1.5	54	1.2	72	1.1	88	1	103	0.9	116	0.8	141		
140					3.4	20	2.6	27	2.2	34	1.9	41	1.7	47	1.6	52	1.5	58	1.2	78	1.1	95	1	110	0.9	125	0.8	151		
150					3.4	21	2.6	29	2.2	37	1.9	44	1.7	50	1.6	56	1.5	62	1.2	83	1.1	102	1	118	0.9	134				
160					3.4	22	2.6	31	2.2	39	1.9	47	1.7	53	1.6	60	1.5	66	1.2	89	1.1	108	1	126	0.9	143				
170					3.3	24	2.6	33	2.2	42	1.9	49	1.7	57	1.6	64	1.5	70	1.2	94	1.1	115	1	134	0.9	152				
180					3.3	25	2.6	35	2.2	44	1.9	52	1.7	60	1.6	68	1.5	74	1.2	100	1.1	122	1	142	0.9	161				
190					3.3	27	2.6	37	2.2	46	1.9	55	1.7	63	1.6	71	1.5	79	1.2	105	1.1	129	1	150	0.9	169				
200					3.3	28	2.6	39	2.2	49	1.9	58	1.7	67	1.6	75	1.5	83	1.2	111	1.1	135	1	158	0.9	178				
210					3.3	29	2.5	41	2.2	51	1.9	61	1.7	70	1.6	79	1.5	87	1.2	116	1.1	142	1	166						
220					3.3	31	2.5	43	2.2	54	1.9	64	1.7	73	1.6	82	1.5	91	1.2	122	1.1	149	1	173						
230					3.3	32	2.5	45	2.2	56	1.9	67	1.7	77	1.6	86	1.5	95	1.2	127	1.1	156	1	181						
240					3.3	33	2.5	47	2.2	59	1.9	70	1.7	80	1.6	90	1.5	99	1.2	133	1.1	163	1	189						
250					3.3	35	2.5	49	2.2	61	1.9	73	1.7	83	1.6	94	1.5	103	1.2	138	1.1	169								
260					3.3	36	2.5	50	2.2	63	1.9	76	1.7	87	1.6	97	1.5	108	1.2	144	1.1	176								
270					3.3	38	2.5	52	2.1	66	1.9	78	1.7	90	1.6	101	1.5	112	1.2	149	1.1	183								
280					3.3	39	2.5	54	2.1	68	1.9	81	1.7	93	1.6	105	1.5	116	1.2	155	1.1	190								
290					3.3	40	2.5	56	2.1	71	1.9	84	1.7	97	1.6	109	1.5	120	1.2	161	1.1	196								
300					3.3	42	2.5	58	2.1	73	1.9	87	1.7	100	1.6	112	1.5	124	1.2	166	1.1	203								
310					3.3	43	2.5	60	2.1	76	1.9	90	1.7	103	1.6	116	1.5	128	1.2	172	1.1	210								
320					3.3	44	2.5	62	2.1	78	1.9	93	1.7	107	1.6	120	1.5	132	1.2	177										
330					3.3	46	2.5	64	2.1	81	1.9	96	1.7	110	1.6	124	1.5	136	1.2	183										
340					3.3	47	2.5	66	2.1	83	1.9	99	1.7	113	1.6	127	1.5	141	1.2	188										
350					3.3	49	2.5	68	2.1	86	1.9	102	1.7	117	1.6	131	1.5	145	1.2	194										
360					3.3	50	2.5	70	2.1	88	1.9	105	1.7	120	1.6	135	1.5	149	1.2	199										
370			5.5	28	3.3	51	2.5	72	2.1	90	1.9	107	1.7	123	1.6	139	1.5	153	1.2	205										
380			5.5	29	3.3	53	2.5	74	2.1	93	1.9	110	1.7	127	1.6	142	1.5	157	1.2	210										
390			5.5	30	3.3	54	2.5	76	2.1	95	1.9	113	1.7	130	1.6	146	1.5	161	1.2	216										
400			5.5	30	3.3	55	2.5	78	2.1	98	1.9	116	1.7	134	1.6	150	1.5	165	1.2	221										
410			5.4	31	3.3	57	2.5	80	2.1	100	1.9	119	1.7	137	1.6	154	1.5	170	1.2	227										
420			5.4	32	3.3	58	2.5	82	2.1	103	1.9	122	1.7	140	1.6	157	1.5	174	1.2	232										
430			5.4	32	3.3	60	2.5	84	2.1	105	1.9	125	1.7	144	1.6	161	1.5	178	1.2	238										
440			5.4	33	3.3	61	2.5	85	2.1	107	1.9	128	1.7	147	1.6	165	1.5	182	1.2	244										
450			5.4	34	3.3	62	2.5	87	2.1	110	1.9	131	1.7	150	1.6	169	1.5	186												
460			5.4	35	3.3	64	2.5	89	2.1	112	1.9	134	1.7	154	1.6	172	1.5	190												
470			5.4	35	3.3	65	2.5	91	2.1	115	1.9	137	1.7	157	1.6	176	1.5	194												
480			5.4	36	3.3	66	2.5	93	2.1	117	1.9	139	1.7	160	1.6	180	1.5	198												
490			5.4	37	3.3	68	2.5	95	2.1	120	1.9	142	1.7	164	1.6	184	1.5	203												
500			5.4	37	3.3	69	2.5	97	2.1	122	1.9	145	1.7	167	1.6	187	1.5	207												

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.07
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																							1.1	6	1	6	0.9	8	0.8	9
20																			1.4	8	1.2	10	1.1	11	1	13	0.9	16	0.8	18
30																			1.4	12	1.2	15	1.1	17	1	19	0.8	24	0.8	27
40															1.9	11	1.7	12	1.4	16	1.2	19	1	23	1	26	0.8	31	0.8	36
50													2	12	1.8	13	1.7	14	1.3	20	1.2	24	1	28	1	32	0.8	39	0.8	46
60											2.3	12	2	14	1.8	16	1.7	17	1.3	23	1.2	29	1	34	1	39	0.8	47	0.8	55
70											2.2	14	2	16	1.8	18	1.7	20	1.3	27	1.2	34	1	40	1	45	0.8	55	0.8	64
80									2.6	13	2.2	16	2	19	1.8	21	1.7	23	1.3	31	1.2	39	1	45	1	51	0.8	63	0.8	73
90									2.6	15	2.2	18	2	21	1.8	23	1.7	26	1.3	35	1.2	43	1	51	1	58	0.8	70	0.8	82
100									2.5	17	2.2	20	2	23	1.8	26	1.7	29	1.3	39	1.2	48	1	57	1	64	0.8	78	0.8	91
110									2.5	18	2.2	22	2	25	1.8	29	1.7	32	1.3	43	1.2	53	1	62	1	71	0.8	86	0.8	100
120							3.1	16	2.5	20	2.2	24	2	28	1.8	31	1.7	35	1.3	47	1.2	58	1	68	1	77	0.8	94	0.8	109
130							3.1	17	2.5	22	2.2	26	2	30	1.8	34	1.7	37	1.3	51	1.2	63	1	74	1	84	0.8	102	0.8	119
140							3.1	18	2.5	23	2.2	28	1.9	32	1.8	36	1.7	40	1.3	55	1.2	68	1	79	1	90	0.8	110	0.8	128
150							3.1	20	2.5	25	2.2	30	1.9	35	1.8	39	1.7	43	1.3	59	1.2	72	1	85	1	96	0.8	118	0.8	137
160							3	21	2.5	27	2.2	32	1.9	37	1.8	42	1.7	46	1.3	63	1.2	77	1	91	1	103	0.8	125	0.8	146
170							3	22	2.5	28	2.2	34	1.9	39	1.8	44	1.7	49	1.3	66	1.2	82	1	96	1	109	0.8	133		
180							3	24	2.5	30	2.2	36	1.9	41	1.8	47	1.7	52	1.3	70	1.2	87	1	102	1	116	0.8	141		
190							3	25	2.5	32	2.2	38	1.9	44	1.8	49	1.7	55	1.3	74	1.2	92	1	107	1	122	0.8	149		
200							3	26	2.5	33	2.2	40	1.9	46	1.8	52	1.7	58	1.3	78	1.2	97	1	113	1	128	0.8	157		
210							3	27	2.5	35	2.2	42	1.9	48	1.8	55	1.7	60	1.3	82	1.2	101	1	119	1	135	0.8	165		
220							3	29	2.5	37	2.2	44	1.9	51	1.8	57	1.7	63	1.3	86	1.2	106	1	124	1	141				
230					4.1	21	3	30	2.5	38	2.2	46	1.9	53	1.8	60	1.7	66	1.3	90	1.2	111	1	130	1	148				
240					4.1	22	3	31	2.5	40	2.2	48	1.9	55	1.8	62	1.7	69	1.3	94	1.2	116	1	136	1	154				
250					4	23	3	33	2.5	41	2.2	50	1.9	58	1.8	65	1.7	72	1.3	98	1.2	121	1	141	1	161				
260					4	24	3	34	2.5	43	2.2	52	1.9	60	1.8	68	1.7	75	1.3	102	1.2	126	1	147	1	167				
270					4	25	3	35	2.5	45	2.2	54	1.9	62	1.8	70	1.7	78	1.3	106	1.2	130	1	153	1	173				
280					4	26	3	36	2.5	46	2.2	56	1.9	64	1.8	73	1.7	81	1.3	110	1.2	135	1	158	1	180				
290					4	27	3	38	2.5	48	2.2	58	1.9	67	1.8	75	1.7	84	1.3	113	1.2	140	1	164	1	186				
300					4	27	3	39	2.5	50	2.2	60	1.9	69	1.8	78	1.7	86	1.3	117	1.2	145	1	170						
310					4	28	3	40	2.5	51	2.2	62	1.9	71	1.8	81	1.7	89	1.3	121	1.2	150	1	175						
320					4	29	3	42	2.5	53	2.2	64	1.9	74	1.8	83	1.7	92	1.3	125	1.2	155	1	181						
330					4	30	3	43	2.5	55	2.2	66	1.9	76	1.8	86	1.7	95	1.3	129	1.2	159	1	187						
340					4	31	3	44	2.5	56	2.2	68	1.9	78	1.8	88	1.7	98	1.3	133	1.2	164	1	192						
350					4	32	3	45	2.5	58	2.2	70	1.9	81	1.8	91	1.7	101	1.3	137	1.2	169	1	198						
360					4	33	3	47	2.5	60	2.2	72	1.9	83	1.8	94	1.7	104	1.3	141	1.2	174	1	204						
370					4	34	3	48	2.5	61	2.2	74	1.9	85	1.8	96	1.7	107	1.3	145	1.2	179								
380					4	35	3	49	2.5	63	2.2	76	1.9	87	1.8	99	1.7	109	1.3	149	1.2	183								
390					4	35	3	51	2.5	65	2.2	78	1.9	90	1.8	101	1.7	112	1.3	153	1.2	188								
400					4	36	3	52	2.5	66	2.2	80	1.9	92	1.8	104	1.7	115	1.3	156	1.2	193								
410					4	37	3	53	2.5	68	2.2	82	1.9	94	1.8	107	1.7	118	1.3	160	1.2	198								
420					4	38	3	54	2.5	70	2.2	84	1.9	97	1.8	109	1.7	121	1.3	164	1.2	203								
430					4	39	3	56	2.5	71	2.2	86	1.9	99	1.8	112	1.7	124	1.3	168	1.2	208								
440					4	40	3	57	2.5	73	2.2	88	1.9	101	1.8	114	1.7	127	1.3	172	1.2	212								
450					4	41	3	58	2.5	75	2.2	89	1.9	104	1.8	117	1.7	130	1.3	176	1.2	217								
460					4	42	3	60	2.5	76	2.2	91	1.9	106	1.8	120	1.7	132	1.3	180	1.2	222								
470					4	43	3	61	2.5	78	2.2	93	1.9	108	1.8	122	1.7	135	1.3	184	1.2	227								
480					4	43	3	62	2.5	79	2.2	95	1.9	110	1.8	125	1.7	138	1.3	188	1.2	232								
490					4	44	3	64	2.5	81	2.2	97	1.9	113	1.8	127	1.7	141	1.3	192										
500					4	45	3	65	2.5	83	2.2	99	1.9	115	1.8	130	1.7	144	1.3	196										

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.02
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																			1.2	7	1.1	9	0.9	10	0.9	11	0.8	14	0.7	16
20													1.7	9	1.5	10	1.4	11	1.2	14	1	18	0.9	20	0.9	23	0.8	28	0.7	32
30											1.8	12	1.6	13	1.5	15	1.4	16	1.2	22	1	26	0.9	30	0.9	34	0.8	41	0.7	48
40									2	13	1.8	15	1.6	18	1.5	20	1.4	22	1.2	29	1	35	0.9	41	0.9	46	0.8	55	0.7	64
50							2.4	13	2	16	1.8	19	1.6	22	1.5	25	1.4	27	1.2	36	1	44	0.9	51	0.9	57	0.8	69	0.7	79
60							2.4	16	2	20	1.8	23	1.6	26	1.5	30	1.4	32	1.2	43	1	52	0.9	61	0.9	69	0.8	83	0.7	95
70							2.3	18	2	23	1.8	27	1.6	31	1.5	35	1.4	38	1.2	50	1	61	0.9	71	0.9	80	0.8	96	0.7	111
80					3	15	2.3	21	2	26	1.8	31	1.6	35	1.5	39	1.4	43	1.2	57	1	70	0.9	81	0.9	92	0.8	110	0.7	127
90					3	17	2.3	24	2	29	1.8	35	1.6	40	1.5	44	1.4	49	1.2	65	1	79	0.9	91	0.9	103	0.8	124		
100					3	19	2.3	26	2	33	1.8	39	1.6	44	1.5	49	1.4	54	1.2	72	1	87	0.9	101	0.9	115	0.8	138		
110					3	21	2.3	29	2	36	1.7	42	1.6	48	1.5	54	1.4	60	1.2	79	1	96	0.9	112	0.9	126	0.8	152		
120					3	23	2.3	31	2	39	1.7	46	1.6	53	1.5	59	1.4	65	1.2	86	1	105	0.9	122	0.9	137				
130					2.9	25	2.3	34	2	42	1.7	50	1.6	57	1.5	64	1.4	70	1.2	93	1	114	0.9	132	0.9	149				
140					2.9	27	2.3	37	2	46	1.7	54	1.6	62	1.5	69	1.4	76	1.2	101	1	122	0.9	142	0.9	160				
150					2.9	29	2.3	39	2	49	1.7	58	1.6	66	1.5	74	1.4	81	1.2	108	1	131	0.9	152	0.9	172				
160					2.9	30	2.3	42	2	52	1.7	62	1.6	70	1.5	79	1.4	87	1.2	115	1	140	0.9	162						
170					2.9	32	2.3	44	2	56	1.7	66	1.6	75	1.5	84	1.4	92	1.2	122	1	149	0.9	172						
180					2.9	34	2.3	47	2	59	1.7	69	1.6	79	1.5	89	1.4	97	1.2	129	1	157	0.9	183						
190					2.9	36	2.3	50	2	62	1.7	73	1.6	84	1.5	94	1.4	103	1.2	136	1	166								
200					2.9	38	2.3	52	2	65	1.7	77	1.6	88	1.5	98	1.4	108	1.2	144	1	175								
210					2.9	40	2.3	55	2	69	1.7	81	1.6	92	1.5	103	1.4	114	1.2	151	1	184								
220					2.9	42	2.3	58	2	72	1.7	85	1.6	97	1.5	108	1.4	119	1.2	158	1	192								
230			4.7	25	2.9	44	2.3	60	2	75	1.7	89	1.6	101	1.5	113	1.4	125	1.2	165	1	201								
240			4.7	26	2.9	45	2.3	63	2	78	1.7	93	1.6	106	1.5	118	1.4	130	1.2	172										
250			4.7	27	2.9	47	2.3	65	2	82	1.7	96	1.6	110	1.5	123	1.4	135	1.2	180										
260			4.7	28	2.9	49	2.3	68	2	85	1.7	100	1.6	114	1.5	128	1.4	141	1.2	187										
270			4.6	29	2.9	51	2.3	71	2	88	1.7	104	1.6	119	1.5	133	1.4	146	1.2	194										
280			4.6	30	2.9	53	2.3	73	2	91	1.7	108	1.6	123	1.5	138	1.4	152	1.2	201										
290			4.6	31	2.9	55	2.3	76	2	95	1.7	112	1.6	128	1.5	143	1.4	157	1.2	208										
300			4.6	32	2.9	57	2.3	78	2	98	1.7	116	1.6	132	1.5	148	1.4	162	1.2	215										
310			4.6	33	2.9	59	2.3	81	2	101	1.7	119	1.6	136	1.5	153	1.4	168	1.2	223										
320			4.6	34	2.9	61	2.3	84	2	104	1.7	123	1.6	141	1.5	158	1.4	173	1.2	230										
330			4.6	35	2.9	62	2.3	86	2	108	1.7	127	1.6	145	1.5	162	1.4	179												
340			4.6	36	2.9	64	2.3	89	2	111	1.7	131	1.6	150	1.5	167	1.4	184												
350			4.6	37	2.9	66	2.3	91	2	114	1.7	135	1.6	154	1.5	172	1.4	190												
360			4.6	38	2.9	68	2.3	94	2	118	1.7	139	1.6	158	1.5	177	1.4	195												
370			4.6	39	2.9	70	2.3	97	2	121	1.7	143	1.6	163	1.5	182	1.4	200												
380			4.6	40	2.9	72	2.3	99	2	124	1.7	146	1.6	167	1.5	187	1.4	206												
390			4.6	41	2.9	74	2.3	102	2	127	1.7	150	1.6	172	1.5	192	1.4	211												
400			4.6	42	2.9	76	2.3	105	2	131	1.7	154	1.6	176	1.5	197	1.4	217												
410			4.6	43	2.9	78	2.3	107	2	134	1.7	158	1.6	181	1.5	202	1.4	222												
420			4.6	44	2.9	79	2.3	110	2	137	1.7	162	1.6	185	1.5	207	1.4	227												
430			4.6	45	2.9	81	2.3	112	2	140	1.7	166	1.6	189	1.5	212	1.4	233												
440			4.6	46	2.9	83	2.3	115	2	144	1.7	170	1.6	194	1.5	217	1.4	238												
450			4.6	47	2.9	85	2.3	118	2	147	1.7	173	1.6	198	1.5	221	1.4	244												
460			4.6	48	2.9	87	2.3	120	2	150	1.7	177	1.6	203	1.5	226	1.4	249												
470			4.6	49	2.9	89	2.3	123	2	153	1.7	181	1.6	207	1.5	231	1.4	254												
480			4.6	50	2.9	91	2.3	125	2	157	1.7	185	1.6	211	1.5	236	1.4	260												
490			4.6	51	2.9	93	2.3	128	2	160	1.7	189	1.6	216	1.5	241	1.4	265												
500			4.6	52	2.9	95	2.3	131	2	163	1.7	193	1.6	220	1.5	246	1.4	271												

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.03
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																					1.2	6	1	7	1	8	0.8	9	0.8	11
20																			1.3	10	1.1	12	1	14	0.9	16	0.8	19	0.7	22
30															1.7	10	1.6	11	1.3	14	1.1	18	1	21	0.9	23	0.8	28	0.7	33
40													1.9	12	1.7	13	1.6	14	1.3	19	1.1	23	1	27	0.9	31	0.8	38	0.7	44
50											2.1	13	1.9	14	1.7	16	1.6	18	1.3	24	1.1	29	1	34	0.9	39	0.8	47	0.7	55
60									2.4	13	2.1	15	1.8	17	1.7	19	1.6	21	1.3	29	1.1	35	1	41	0.9	47	0.8	57	0.7	66
70									2.4	15	2	17	1.8	20	1.7	23	1.6	25	1.3	34	1.1	41	1	48	0.9	54	0.8	66	0.7	77
80									2.3	17	2	20	1.8	23	1.7	26	1.6	28	1.3	38	1.1	47	1	55	0.9	62	0.8	75	0.7	87
90							2.8	15	2.3	19	2	22	1.8	26	1.7	29	1.6	32	1.3	43	1.1	53	1	62	0.9	70	0.8	85	0.7	98
100							2.8	17	2.3	21	2	25	1.8	29	1.7	32	1.6	36	1.3	48	1.1	59	1	69	0.9	78	0.8	94	0.7	109
110							2.8	18	2.3	23	2	27	1.8	31	1.7	35	1.6	39	1.3	53	1.1	65	1	75	0.9	86	0.8	104	0.7	120
120							2.8	20	2.3	25	2	30	1.8	34	1.7	39	1.6	43	1.3	57	1.1	70	1	82	0.9	93	0.8	113	0.7	131
130							2.8	21	2.3	27	2	32	1.8	37	1.7	42	1.6	46	1.3	62	1.1	76	1	89	0.9	101	0.8	123	0.7	142
140							2.8	23	2.3	29	2	35	1.8	40	1.7	45	1.6	50	1.3	67	1.1	82	1	96	0.9	109	0.8	132		
150							2.7	25	2.3	31	2	37	1.8	43	1.7	48	1.6	53	1.3	72	1.1	88	1	103	0.9	117	0.8	142		
160					3.7	19	2.7	26	2.3	33	2	40	1.8	46	1.7	51	1.6	57	1.3	77	1.1	94	1	110	0.9	124	0.8	151		
170					3.6	20	2.7	28	2.3	35	2	42	1.8	49	1.7	55	1.6	60	1.3	81	1.1	100	1	117	0.9	132	0.8	160		
180					3.6	21	2.7	30	2.3	37	2	45	1.8	51	1.7	58	1.6	64	1.3	86	1.1	106	1	123	0.9	140				
190					3.6	22	2.7	31	2.3	40	2	47	1.8	54	1.7	61	1.6	67	1.3	91	1.1	112	1	130	0.9	148				
200					3.6	23	2.7	33	2.3	42	2	50	1.8	57	1.7	64	1.6	71	1.3	96	1.1	117	1	137	0.9	155				
210					3.6	25	2.7	35	2.3	44	2	52	1.8	60	1.7	67	1.6	75	1.3	101	1.1	123	1	144	0.9	163				
220					3.6	26	2.7	36	2.3	46	2	55	1.8	63	1.7	71	1.6	78	1.3	105	1.1	129	1	151	0.9	171				
230					3.6	27	2.7	38	2.3	48	2	57	1.8	66	1.7	74	1.6	82	1.3	110	1.1	135	1	158	0.9	179				
240					3.6	28	2.7	39	2.3	50	2	60	1.8	69	1.7	77	1.6	85	1.3	115	1.1	141	1	164						
250					3.6	29	2.7	41	2.3	52	2	62	1.8	71	1.7	80	1.6	89	1.3	120	1.1	147	1	171						
260					3.6	30	2.7	43	2.3	54	2	65	1.8	74	1.7	84	1.6	92	1.3	124	1.1	153	1	178						
270					3.6	31	2.7	44	2.3	56	2	67	1.8	77	1.7	87	1.6	96	1.3	129	1.1	159	1	185						
280					3.6	33	2.7	46	2.3	58	2	69	1.8	80	1.7	90	1.6	99	1.3	134	1.1	164	1	192						
290					3.6	34	2.7	48	2.3	60	2	72	1.8	83	1.7	93	1.6	103	1.3	139	1.1	170	1	199						
300					3.6	35	2.7	49	2.3	62	2	74	1.8	86	1.7	96	1.6	107	1.3	144	1.1	176								
310					3.6	36	2.7	51	2.3	64	2	77	1.8	89	1.7	100	1.6	110	1.3	148	1.1	182								
320					3.5	37	2.7	53	2.3	66	2	79	1.8	91	1.7	103	1.6	114	1.3	153	1.1	188								
330					3.5	38	2.7	54	2.3	69	2	82	1.8	94	1.7	106	1.6	117	1.3	158	1.1	194								
340					3.5	39	2.7	56	2.3	71	2	84	1.8	97	1.7	109	1.6	121	1.3	163	1.1	200								
350					3.5	41	2.7	57	2.3	73	2	87	1.8	100	1.7	112	1.6	124	1.3	167	1.1	206								
360					3.5	42	2.7	59	2.3	75	2	89	1.8	103	1.7	116	1.6	128	1.3	172	1.1	211								
370					3.5	43	2.7	61	2.3	77	2	92	1.8	106	1.7	119	1.6	131	1.3	177	1.1	217								
380					3.5	44	2.7	62	2.3	79	2	94	1.8	109	1.7	122	1.6	135	1.3	182										
390					3.5	45	2.7	64	2.3	81	2	97	1.8	111	1.7	125	1.6	138	1.3	187										
400					3.5	46	2.7	66	2.3	83	2	99	1.8	114	1.7	128	1.6	142	1.3	191										
410					3.5	48	2.7	67	2.3	85	2	102	1.8	117	1.7	132	1.6	146	1.3	196										
420					3.5	49	2.7	69	2.3	87	2	104	1.8	120	1.7	135	1.6	149	1.3	201										
430					3.5	50	2.7	71	2.3	89	2	107	1.8	123	1.7	138	1.6	153	1.3	206										
440					3.5	51	2.7	72	2.3	91	2	109	1.8	126	1.7	141	1.6	156	1.3	211										
450					3.5	52	2.7	74	2.3	93	2	112	1.8	129	1.7	145	1.6	160	1.3	215										
460					3.5	53	2.7	75	2.3	95	2	114	1.8	131	1.7	148	1.6	163	1.3	220										
470					3.5	54	2.7	77	2.3	98	2	117	1.8	134	1.7	151	1.6	167	1.3	225										
480					3.5	56	2.7	79	2.3	100	2	119	1.8	137	1.7	154	1.6	170	1.3	230										
490			6	31	3.5	57	2.7	80	2.3	102	2	122	1.8	140	1.7	157	1.6	174	1.3	234										
500			6	31	3.5	58	2.7	82	2.3	104	2	124	1.8	143	1.7	161	1.6	178	1.3	239										

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.05
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																											0.9	6	0.8	7
20																					1.3	7	1.2	8	1.1	9	0.9	11	0.8	13
30																			1.6	8	1.3	10	1.2	12	1	14	0.9	17	0.8	20
40																			1.5	11	1.3	14	1.1	16	1	19	0.9	23	0.8	27
50																	2	10	1.5	14	1.3	17	1.1	20	1	23	0.9	29	0.8	33
60															2.1	11	1.9	12	1.5	17	1.3	21	1.1	25	1	28	0.9	34	0.8	40
70															2.1	13	1.9	14	1.5	20	1.3	24	1.1	29	1	33	0.9	40	0.8	47
80													2.3	13	2.1	15	1.9	16	1.5	22	1.3	28	1.1	33	1	37	0.9	46	0.8	54
90													2.3	15	2.1	16	1.9	18	1.5	25	1.3	31	1.1	37	1	42	0.9	51	0.8	60
100											2.6	14	2.3	16	2.1	18	1.9	20	1.5	28	1.3	35	1.1	41	1	47	0.9	57	0.8	67
110											2.6	15	2.3	18	2	20	1.9	22	1.5	31	1.3	38	1.1	45	1	51	0.9	63	0.8	74
120											2.6	17	2.3	19	2	22	1.9	24	1.5	33	1.3	42	1.1	49	1	56	0.9	69	0.8	80
130											2.6	18	2.3	21	2	24	1.9	26	1.5	36	1.3	45	1.1	53	1	61	0.9	74	0.8	87
140									3	16	2.5	19	2.3	22	2	25	1.9	28	1.5	39	1.3	48	1.1	57	1	65	0.9	80	0.8	94
150									3	17	2.5	21	2.2	24	2	27	1.9	30	1.5	42	1.3	52	1.1	61	1	70	0.9	86	0.8	100
160									3	18	2.5	22	2.2	26	2	29	1.9	32	1.5	44	1.3	55	1.1	65	1	75	0.9	92	0.8	107
170									3	19	2.5	23	2.2	27	2	31	1.9	34	1.5	47	1.3	59	1.1	69	1	79	0.9	97	0.8	114
180									3	20	2.5	25	2.2	29	2	33	1.9	36	1.5	50	1.3	62	1.1	73	1	84	0.9	103	0.8	120
190									3	22	2.5	26	2.2	30	2	34	1.9	38	1.5	53	1.3	66	1.1	77	1	89	0.9	109	0.8	127
200									2.9	23	2.5	27	2.2	32	2	36	1.9	40	1.5	55	1.3	69	1.1	82	1	93	0.9	114	0.8	134
210							3.7	19	2.9	24	2.5	29	2.2	33	2	38	1.9	42	1.5	58	1.3	73	1.1	86	1	98	0.9	120	0.8	140
220							3.7	19	2.9	25	2.5	30	2.2	35	2	40	1.9	44	1.5	61	1.3	76	1.1	90	1	102	0.9	126	0.8	147
230							3.7	20	2.9	26	2.5	31	2.2	37	2	42	1.9	46	1.5	64	1.3	80	1.1	94	1	107	0.9	132	0.8	154
240							3.6	21	2.9	27	2.5	33	2.2	38	2	43	1.9	48	1.5	67	1.3	83	1.1	98	1	112	0.9	137	0.8	160
250							3.6	22	2.9	28	2.5	34	2.2	40	2	45	1.9	50	1.5	69	1.3	86	1.1	102	1	116	0.9	143		
260							3.6	23	2.9	29	2.5	36	2.2	41	2	47	1.9	52	1.5	72	1.3	90	1.1	106	1	121	0.9	149		
270							3.6	24	2.9	30	2.5	37	2.2	43	2	49	1.9	54	1.5	75	1.3	93	1.1	110	1	126	0.9	154		
280							3.6	24	2.9	32	2.5	38	2.2	45	2	51	1.9	56	1.5	78	1.3	97	1.1	114	1	130	0.9	160		
290							3.6	25	2.9	33	2.5	40	2.2	46	2	53	1.9	58	1.5	80	1.3	100	1.1	118	1	135	0.9	166		
300							3.6	26	2.9	34	2.5	41	2.2	48	2	54	1.9	60	1.5	83	1.3	104	1.1	122	1	140	0.9	172		
310							3.6	27	2.9	35	2.5	42	2.2	49	2	56	1.9	62	1.5	86	1.3	107	1.1	126	1	144	0.9	177		
320							3.6	28	2.9	36	2.5	44	2.2	51	2	58	1.9	64	1.5	89	1.3	111	1.1	130	1	149				
330							3.6	29	2.9	37	2.5	45	2.2	53	2	60	1.9	66	1.5	92	1.3	114	1.1	135	1	154				
340							3.6	30	2.9	38	2.5	46	2.2	54	2	62	1.9	68	1.5	94	1.3	118	1.1	139	1	158				
350							3.6	30	2.9	39	2.5	48	2.2	56	2	63	1.9	71	1.5	97	1.3	121	1.1	143	1	163				
360							3.6	31	2.9	40	2.5	49	2.2	57	2	65	1.9	73	1.5	100	1.3	124	1.1	147	1	168				
370							3.6	32	2.9	42	2.5	50	2.2	59	2	67	1.9	75	1.5	103	1.3	128	1.1	151	1	172				
380							3.6	33	2.9	43	2.5	52	2.2	60	2	69	1.9	77	1.5	105	1.3	131	1.1	155	1	177				
390							3.6	34	2.9	44	2.5	53	2.2	62	2	71	1.9	79	1.5	108	1.3	135	1.1	159	1	182				
400							3.6	35	2.9	45	2.5	55	2.2	64	2	72	1.9	81	1.5	111	1.3	138	1.1	163	1	186				
410							3.6	36	2.9	46	2.5	56	2.2	65	2	74	1.9	83	1.5	114	1.3	142	1.1	167	1	191				
420					5	25	3.6	36	2.9	47	2.5	57	2.2	67	2	76	1.9	85	1.5	116	1.3	145	1.1	171	1	196				
430					5	26	3.6	37	2.9	48	2.5	59	2.2	68	2	78	1.9	87	1.5	119	1.3	149	1.1	175	1	200				
440					5	26	3.6	38	2.9	49	2.5	60	2.2	70	2	80	1.9	89	1.5	122	1.3	152	1.1	179	1	205				
450					5	27	3.6	39	2.9	50	2.5	61	2.2	72	2	81	1.9	91	1.5	125	1.3	156	1.1	183						
460					5	28	3.6	40	2.9	52	2.5	63	2.2	73	2	83	1.9	93	1.5	128	1.3	159	1.1	188						
470					5	28	3.6	41	2.9	53	2.5	64	2.2	75	2	85	1.9	95	1.5	131	1.3	163	1.1	192						
480					4.9	29	3.6	42	2.9	54	2.5	65	2.2	76	2	87	1.9	97	1.5	133	1.3	166	1.1	196						
490					4.9	29	3.6	42	2.9	55	2.5	67	2.2	78	2	89	1.9	99	1.5	136	1.3	169	1.1	200						
500					4.9	30	3.6	43	2.9	56	2.5	68	2.2	80	2	90	1.9	101	1.5	139	1.3	173	1.1	204						

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.07
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																													0.8	7
20																									1.2	7	1	9	0.8	13
30																							1.3	9	1.2	10	1	13	0.8	20
40																					1.5	10	1.3	11	1.2	13	1	17	0.8	26
50																			1.8	10	1.5	12	1.3	14	1.2	16	1	21	0.8	33
60																			1.7	11	1.4	14	1.3	17	1.1	20	1	26	0.8	39
70																			1.7	13	1.4	17	1.3	20	1.1	23	1	30	0.8	46
80																			1.7	15	1.4	19	1.3	23	1.1	26	1	34	0.8	52
90																	2.3	12	1.7	17	1.4	22	1.3	26	1.1	29	1	38	0.8	59
100																	2.2	14	1.7	19	1.4	24	1.3	28	1.1	33	1	43	0.8	65
110															2.5	13	2.2	15	1.7	21	1.4	26	1.3	31	1.1	36	1	47	0.8	72
120															2.5	15	2.2	16	1.7	23	1.4	29	1.3	34	1.1	39	1	51	0.8	78
130													2.7	14	2.4	16	2.2	18	1.7	25	1.4	31	1.3	37	1.1	42	1	55	0.8	85
140													2.7	15	2.4	17	2.2	19	1.7	27	1.4	33	1.3	40	1.1	46	1	59	0.8	91
150													2.7	16	2.4	18	2.2	20	1.7	28	1.4	36	1.3	43	1.1	49	1	64	0.8	98
160													2.7	17	2.4	19	2.2	22	1.7	30	1.4	38	1.3	45	1.1	52	1	68	0.8	104
170													2.7	18	2.4	21	2.2	23	1.7	32	1.4	41	1.3	48	1.1	56	1	72	0.8	111
180											3.1	16	2.7	19	2.4	22	2.2	24	1.7	34	1.4	43	1.3	51	1.1	59	1	76	0.8	117
190											3.1	17	2.7	20	2.4	23	2.2	26	1.7	36	1.4	45	1.3	54	1.1	62	1	81	0.8	124
200											3.1	18	2.7	21	2.4	24	2.2	27	1.7	38	1.4	48	1.3	57	1.1	65	1	85	0.8	130
210											3.1	19	2.7	22	2.4	25	2.2	28	1.7	40	1.4	50	1.3	60	1.1	69	1	89	0.8	137
220											3.1	20	2.7	23	2.4	27	2.2	30	1.7	42	1.4	53	1.3	63	1.1	72	1	93	0.8	143
230											3.1	21	2.7	24	2.4	28	2.2	31	1.7	44	1.4	55	1.3	65	1.1	75	1	98	0.8	150
240											3.1	22	2.7	25	2.4	29	2.2	32	1.7	46	1.4	57	1.3	68	1.1	78	1	102	0.8	156
250									3.7	18	3.1	22	2.7	26	2.4	30	2.2	34	1.7	47	1.4	60	1.3	71	1.1	82	1	106	0.8	163
260									3.7	19	3.1	23	2.7	27	2.4	31	2.2	35	1.7	49	1.4	62	1.3	74	1.1	85	1	110		
270									3.6	20	3	24	2.7	28	2.4	33	2.2	36	1.7	51	1.4	64	1.3	77	1.1	88	1	115		
280									3.6	21	3	25	2.7	29	2.4	34	2.2	38	1.7	53	1.4	67	1.3	80	1.1	91	1	119		
290									3.6	21	3	26	2.7	31	2.4	35	2.2	39	1.7	55	1.4	69	1.3	82	1.1	95	1	123		
300									3.6	22	3	27	2.7	32	2.4	36	2.2	41	1.7	57	1.4	72	1.3	85	1.1	98	1	127		
310									3.6	23	3	28	2.7	33	2.4	37	2.2	42	1.7	59	1.4	74	1.3	88	1.1	101	1	131		
320									3.6	23	3	29	2.7	34	2.4	39	2.2	43	1.7	61	1.4	76	1.3	91	1.1	105	1	136		
330									3.6	24	3	30	2.7	35	2.4	40	2.2	45	1.7	63	1.4	79	1.3	94	1.1	108	1	140		
340									3.6	25	3	30	2.7	36	2.4	41	2.2	46	1.7	64	1.4	81	1.3	97	1.1	111	1	144		
350									3.6	26	3	31	2.6	37	2.4	42	2.2	47	1.7	66	1.4	84	1.3	99	1.1	114	1	148		
360									3.6	26	3	32	2.6	38	2.4	43	2.2	49	1.7	68	1.4	86	1.3	102	1.1	118	1	153		
370									3.6	27	3	33	2.6	39	2.4	44	2.2	50	1.7	70	1.4	88	1.3	105	1.1	121	1	157		
380									3.6	28	3	34	2.6	40	2.4	46	2.2	51	1.7	72	1.4	91	1.3	108	1.1	124	1	161		
390									3.6	28	3	35	2.6	41	2.4	47	2.2	53	1.7	74	1.4	93	1.3	111	1.1	127	1	165		
400									3.6	29	3	36	2.6	42	2.4	48	2.2	54	1.7	76	1.4	95	1.3	114	1.1	131	1	170		
410							4.6	23	3.6	30	3	37	2.6	43	2.4	49	2.2	55	1.7	78	1.4	98	1.3	116	1.1	134	1	174		
420							4.6	23	3.6	30	3	37	2.6	44	2.4	50	2.2	57	1.7	80	1.4	100	1.3	119	1.1	137	1	178		
430							4.6	24	3.6	31	3	38	2.6	45	2.4	52	2.2	58	1.7	81	1.4	103	1.3	122	1.1	140	1	182		
440							4.6	25	3.6	32	3	39	2.6	46	2.4	53	2.2	59	1.7	83	1.4	105	1.3	125	1.1	144	1	187		
450							4.6	25	3.6	33	3	40	2.6	47	2.4	54	2.2	61	1.7	85	1.4	107	1.3	128	1.1	147	1	191		
460							4.6	26	3.6	33	3	41	2.6	48	2.4	55	2.2	62	1.7	87	1.4	110	1.3	131	1.1	150				
470							4.6	26	3.6	34	3	42	2.6	49	2.4	56	2.2	63	1.7	89	1.4	112	1.3	134	1.1	154				
480							4.5	27	3.6	35	3	43	2.6	50	2.4	58	2.2	65	1.7	91	1.4	115	1.3	136	1.1	157				
490							4.5	27	3.6	35	3	44	2.6	51	2.4	59	2.2	66	1.7	93	1.4	117	1.3	139	1.1	160				
500							4.5	28	3.6	36	3	44	2.6	52	2.4	60	2.2	67	1.7	95	1.4	119	1.3	142	1.1	163				

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.02
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																					1.1	7	1	8	0.9	9	0.8	11	0.7	13
20																	1.6	8	1.3	11	1.1	14	1	16	0.9	18	0.8	22	0.7	25
30													1.8	10	1.6	11	1.5	12	1.2	17	1.1	20	1	24	0.9	27	0.8	32	0.7	38
40											2	12	1.8	13	1.6	15	1.5	17	1.2	22	1.1	27	1	32	0.9	36	0.8	43	0.7	50
50									2.3	12	2	15	1.8	17	1.6	19	1.5	21	1.2	28	1.1	34	1	39	0.9	45	0.8	54	0.7	63
60									2.2	15	1.9	18	1.7	20	1.6	23	1.5	25	1.2	33	1.1	41	1	47	0.9	54	0.8	65	0.7	75
70							2.7	14	2.2	17	1.9	20	1.7	23	1.6	26	1.5	29	1.2	39	1.1	47	1	55	0.9	62	0.8	76	0.7	88
80							2.6	16	2.2	20	1.9	23	1.7	27	1.6	30	1.5	33	1.2	44	1.1	54	1	63	0.9	71	0.8	86	0.7	100
90							2.6	18	2.2	22	1.9	26	1.7	30	1.6	34	1.5	37	1.2	50	1.1	61	1	71	0.9	80	0.8	97	0.7	113
100							2.6	20	2.2	24	1.9	29	1.7	33	1.6	37	1.5	41	1.2	55	1.1	68	1	79	0.9	89	0.8	108	0.7	125
110							2.6	21	2.2	27	1.9	32	1.7	37	1.6	41	1.5	46	1.2	61	1.1	75	1	87	0.9	98	0.8	119	0.7	138
120							2.6	23	2.2	29	1.9	35	1.7	40	1.6	45	1.5	50	1.2	66	1.1	81	1	95	0.9	107	0.8	130		
130					3.4	18	2.6	25	2.2	32	1.9	38	1.7	43	1.6	49	1.5	54	1.2	72	1.1	88	1	103	0.9	116	0.8	141		
140					3.4	20	2.6	27	2.2	34	1.9	41	1.7	47	1.6	52	1.5	58	1.2	78	1.1	95	1	110	0.9	125	0.8	151		
150					3.4	21	2.6	29	2.2	37	1.9	44	1.7	50	1.6	56	1.5	62	1.2	83	1.1	102	1	118	0.9	134				
160					3.4	22	2.6	31	2.2	39	1.9	47	1.7	53	1.6	60	1.5	66	1.2	89	1.1	108	1	126	0.9	143				
170					3.3	24	2.6	33	2.2	42	1.9	49	1.7	57	1.6	64	1.5	70	1.2	94	1.1	115	1	134	0.9	152				
180					3.3	25	2.6	35	2.2	44	1.9	52	1.7	60	1.6	68	1.5	74	1.2	100	1.1	122	1	142	0.9	161				
190					3.3	27	2.6	37	2.2	46	1.9	55	1.7	63	1.6	71	1.5	79	1.2	105	1.1	129	1	150	0.9	169				
200					3.3	28	2.6	39	2.2	49	1.9	58	1.7	67	1.6	75	1.5	83	1.2	111	1.1	135	1	158	0.9	178				
210					3.3	29	2.5	41	2.2	51	1.9	61	1.7	70	1.6	79	1.5	87	1.2	116	1.1	142	1	166						
220					3.3	31	2.5	43	2.2	54	1.9	64	1.7	73	1.6	82	1.5	91	1.2	122	1.1	149	1	173						
230					3.3	32	2.5	45	2.2	56	1.9	67	1.7	77	1.6	86	1.5	95	1.2	127	1.1	156	1	181						
240					3.3	33	2.5	47	2.2	59	1.9	70	1.7	80	1.6	90	1.5	99	1.2	133	1.1	163	1	189						
250					3.3	35	2.5	49	2.2	61	1.9	73	1.7	83	1.6	94	1.5	103	1.2	138	1.1	169								
260					3.3	36	2.5	50	2.2	63	1.9	76	1.7	87	1.6	97	1.5	108	1.2	144	1.1	176								
270					3.3	38	2.5	52	2.1	66	1.9	78	1.7	90	1.6	101	1.5	112	1.2	149	1.1	183								
280					3.3	39	2.5	54	2.1	68	1.9	81	1.7	93	1.6	105	1.5	116	1.2	155	1.1	190								
290					3.3	40	2.5	56	2.1	71	1.9	84	1.7	97	1.6	109	1.5	120	1.2	161	1.1	196								
300					3.3	42	2.5	58	2.1	73	1.9	87	1.7	100	1.6	112	1.5	124	1.2	166	1.1	203								
310					3.3	43	2.5	60	2.1	76	1.9	90	1.7	103	1.6	116	1.5	128	1.2	172	1.1	210								
320					3.3	44	2.5	62	2.1	78	1.9	93	1.7	107	1.6	120	1.5	132	1.2	177										
330					3.3	46	2.5	64	2.1	81	1.9	96	1.7	110	1.6	124	1.5	136	1.2	183										
340					3.3	47	2.5	66	2.1	83	1.9	99	1.7	113	1.6	127	1.5	141	1.2	188										
350					3.3	49	2.5	68	2.1	86	1.9	102	1.7	117	1.6	131	1.5	145	1.2	194										
360					3.3	50	2.5	70	2.1	88	1.9	105	1.7	120	1.6	135	1.5	149	1.2	199										
370			5.5	28	3.3	51	2.5	72	2.1	90	1.9	107	1.7	123	1.6	139	1.5	153	1.2	205										
380			5.5	29	3.3	53	2.5	74	2.1	93	1.9	110	1.7	127	1.6	142	1.5	157	1.2	210										
390			5.5	30	3.3	54	2.5	76	2.1	95	1.9	113	1.7	130	1.6	146	1.5	161	1.2	216										
400			5.5	30	3.3	55	2.5	78	2.1	98	1.9	116	1.7	134	1.6	150	1.5	165	1.2	221										
410			5.4	31	3.3	57	2.5	80	2.1	100	1.9	119	1.7	137	1.6	154	1.5	170	1.2	227										
420			5.4	32	3.3	58	2.5	82	2.1	103	1.9	122	1.7	140	1.6	157	1.5	174	1.2	232										
430			5.4	32	3.3	60	2.5	84	2.1	105	1.9	125	1.7	144	1.6	161	1.5	178	1.2	238										
440			5.4	33	3.3	61	2.5	85	2.1	107	1.9	128	1.7	147	1.6	165	1.5	182	1.2	244										
450			5.4	34	3.3	62	2.5	87	2.1	110	1.9	131	1.7	150	1.6	169	1.5	186												
460			5.4	35	3.3	64	2.5	89	2.1	112	1.9	134	1.7	154	1.6	172	1.5	190												
470			5.4	35	3.3	65	2.5	91	2.1	115	1.9	137	1.7	157	1.6	176	1.5	194												
480			5.4	36	3.3	66	2.5	93	2.1	117	1.9	139	1.7	160	1.6	180	1.5	198												
490			5.4	37	3.3	68	2.5	95	2.1	120	1.9	142	1.7	164	1.6	184	1.5	203												
500			5.4	37	3.3	69	2.5	97	2.1	122	1.9	145	1.7	167	1.6	187	1.5	207												

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.03
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																									1	6	0.9	7	0.8	9
20																			1.5	7	1.2	9	1.1	11	1	12	0.9	15	0.8	17
30																			1.4	11	1.2	14	1.1	16	1	18	0.9	22	0.8	26
40															1.9	10	1.8	11	1.4	15	1.2	18	1.1	21	1	24	0.9	29	0.8	34
50													2.1	11	1.9	12	1.7	13	1.4	18	1.2	22	1.1	26	1	30	0.9	37	0.8	43
60													2.1	13	1.9	15	1.7	16	1.4	22	1.2	27	1.1	32	1	36	0.9	44	0.8	51
70											2.3	13	2	15	1.9	17	1.7	19	1.4	25	1.2	31	1.1	37	1	42	0.9	51	0.8	60
80											2.3	15	2	17	1.8	19	1.7	21	1.4	29	1.2	36	1.1	42	1	48	0.9	59	0.8	68
90									2.7	14	2.3	17	2	19	1.8	22	1.7	24	1.4	33	1.2	40	1.1	47	1	54	0.9	66	0.8	77
100									2.6	15	2.3	18	2	21	1.8	24	1.7	27	1.4	36	1.2	45	1.1	53	1	60	0.9	73	0.8	85
110									2.6	17	2.3	20	2	23	1.8	27	1.7	29	1.4	40	1.2	49	1.1	58	1	66	0.9	81	0.8	94
120									2.6	18	2.3	22	2	26	1.8	29	1.7	32	1.4	44	1.2	54	1.1	63	1	72	0.9	88	0.8	102
130									2.6	20	2.2	24	2	28	1.8	31	1.7	35	1.4	47	1.2	58	1.1	69	1	78	0.9	95	0.8	111
140							3.2	17	2.6	21	2.2	26	2	30	1.8	34	1.7	37	1.4	51	1.2	63	1.1	74	1	84	0.9	103	0.8	119
150							3.2	18	2.6	23	2.2	28	2	32	1.8	36	1.7	40	1.4	55	1.2	67	1.1	79	1	90	0.9	110	0.8	128
160							3.2	19	2.6	25	2.2	29	2	34	1.8	39	1.7	43	1.4	58	1.2	72	1.1	84	1	96	0.9	117	0.8	136
170							3.2	21	2.6	26	2.2	31	2	36	1.8	41	1.7	45	1.4	62	1.2	76	1.1	90	1	102	0.9	125	0.8	145
180							3.1	22	2.6	28	2.2	33	2	38	1.8	43	1.7	48	1.4	65	1.2	81	1.1	95	1	108	0.9	132	0.8	153
190							3.1	23	2.6	29	2.2	35	2	41	1.8	46	1.7	51	1.4	69	1.2	85	1.1	100	1	114	0.9	139		
200							3.1	24	2.6	31	2.2	37	2	43	1.8	48	1.7	53	1.4	73	1.2	90	1.1	105	1	120	0.9	147		
210							3.1	25	2.6	32	2.2	39	2	45	1.8	51	1.7	56	1.4	76	1.2	94	1.1	111	1	126	0.9	154		
220							3.1	26	2.6	34	2.2	40	2	47	1.8	53	1.7	59	1.4	80	1.2	99	1.1	116	1	132	0.9	161		
230							3.1	28	2.6	35	2.2	42	2	49	1.8	55	1.7	61	1.4	84	1.2	103	1.1	121	1	138	0.9	169		
240							3.1	29	2.6	37	2.2	44	2	51	1.8	58	1.7	64	1.4	87	1.2	108	1.1	126	1	144				
250							3.1	30	2.6	38	2.2	46	2	53	1.8	60	1.7	67	1.4	91	1.2	112	1.1	132	1	150				
260					4.2	22	3.1	31	2.6	40	2.2	48	2	55	1.8	63	1.7	69	1.4	95	1.2	117	1.1	137	1	156				
270					4.2	23	3.1	32	2.6	41	2.2	50	2	58	1.8	65	1.7	72	1.4	98	1.2	121	1.1	142	1	162				
280					4.2	24	3.1	33	2.6	43	2.2	51	2	60	1.8	67	1.7	75	1.4	102	1.2	126	1.1	148	1	168				
290					4.2	24	3.1	35	2.6	44	2.2	53	2	62	1.8	70	1.7	77	1.4	105	1.2	130	1.1	153	1	174				
300					4.2	25	3.1	36	2.6	46	2.2	55	2	64	1.8	72	1.7	80	1.4	109	1.2	135	1.1	158	1	180				
310					4.2	26	3.1	37	2.6	47	2.2	57	2	66	1.8	75	1.7	83	1.4	113	1.2	139	1.1	163	1	186				
320					4.2	27	3.1	38	2.6	49	2.2	59	2	68	1.8	77	1.7	85	1.4	116	1.2	144	1.1	169	1	192				
330					4.2	28	3.1	39	2.6	50	2.2	61	2	70	1.8	79	1.7	88	1.4	120	1.2	148	1.1	174						
340					4.2	28	3.1	41	2.6	52	2.2	62	2	72	1.8	82	1.7	91	1.4	124	1.2	153	1.1	179						
350					4.2	29	3.1	42	2.6	53	2.2	64	2	75	1.8	84	1.7	93	1.4	127	1.2	157	1.1	184						
360					4.2	30	3.1	43	2.6	55	2.2	66	2	77	1.8	87	1.7	96	1.4	131	1.2	162	1.1	190						
370					4.2	31	3.1	44	2.6	56	2.2	68	2	79	1.8	89	1.7	99	1.4	135	1.2	166	1.1	195						
380					4.2	32	3.1	45	2.6	58	2.2	70	2	81	1.8	91	1.7	101	1.4	138	1.2	171	1.1	200						
390					4.2	32	3.1	46	2.6	59	2.2	72	2	83	1.8	94	1.7	104	1.4	142	1.2	175	1.1	206						
400					4.2	33	3.1	48	2.6	61	2.2	73	2	85	1.8	96	1.7	107	1.4	145	1.2	180	1.1	211						
410					4.2	34	3.1	49	2.6	62	2.2	75	2	87	1.8	99	1.7	109	1.4	149	1.2	184								
420					4.1	35	3.1	50	2.6	64	2.2	77	2	89	1.8	101	1.7	112	1.4	153	1.2	189								
430					4.1	36	3.1	51	2.6	66	2.2	79	2	92	1.8	103	1.7	115	1.4	156	1.2	193								
440					4.1	36	3.1	52	2.6	67	2.2	81	2	94	1.8	106	1.7	117	1.4	160	1.2	198								
450					4.1	37	3.1	54	2.6	69	2.2	83	2	96	1.8	108	1.7	120	1.4	164	1.2	202								
460					4.1	38	3.1	55	2.6	70	2.2	84	2	98	1.8	111	1.7	123	1.4	167	1.2	207								
470					4.1	39	3.1	56	2.6	72	2.2	86	2	100	1.8	113	1.7	125	1.4	171	1.2	211								
480					4.1	40	3.1	57	2.6	73	2.2	88	2	102	1.8	115	1.7	128	1.4	174	1.2	216								
490					4.1	41	3.1	58	2.5	75	2.2	90	2	104	1.8	118	1.7	131	1.4	178	1.2	220								
500					4.1	41	3.1	60	2.5	76	2.2	92	2	106	1.8	120	1.7	133	1.4	182	1.2	225								

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.05
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																													0.8	7
20																									1.2	7	1	9	0.8	13
30																					1.5	8	1.3	9	1.1	11	1	13	0.8	20
40																					1.4	10	1.2	12	1.1	14	1	18	0.8	26
50																			1.7	10	1.4	13	1.2	15	1.1	18	1	22	0.8	33
60																			1.7	12	1.4	16	1.2	19	1.1	21	1	26	0.8	40
70																			1.7	15	1.4	18	1.2	22	1.1	25	1	31	0.8	46
80																	2.2	12	1.7	17	1.4	21	1.2	25	1.1	28	1	35	0.8	53
90															2.4	12	2.2	13	1.7	19	1.4	23	1.2	28	1.1	32	1	39	0.8	59
100															2.4	13	2.2	15	1.7	21	1.4	26	1.2	31	1.1	35	1	44	0.8	66
110															2.4	15	2.1	16	1.6	23	1.4	29	1.2	34	1.1	39	1	48	0.8	72
120													2.6	14	2.3	16	2.1	18	1.6	25	1.4	31	1.2	37	1.1	42	1	52	0.8	79
130													2.6	15	2.3	17	2.1	19	1.6	27	1.4	34	1.2	40	1.1	46	1	57	0.8	85
140													2.6	16	2.3	19	2.1	21	1.6	29	1.4	36	1.2	43	1.1	50	1	61	0.8	92
150											3	15	2.6	18	2.3	20	2.1	22	1.6	31	1.4	39	1.2	46	1.1	53	1	66	0.8	98
160											3	16	2.6	19	2.3	21	2.1	24	1.6	33	1.4	42	1.2	49	1.1	57	1	70	0.8	105
170											3	17	2.6	20	2.3	23	2.1	25	1.6	35	1.4	44	1.2	52	1.1	60	1	74	0.8	112
180											3	18	2.6	21	2.3	24	2.1	27	1.6	37	1.4	47	1.2	55	1.1	64	1	79	0.8	118
190											2.9	19	2.6	22	2.3	25	2.1	28	1.6	39	1.4	49	1.2	59	1.1	67	1	83	0.8	125
200											2.9	20	2.6	23	2.3	26	2.1	30	1.6	41	1.4	52	1.2	62	1.1	71	1	87	0.8	131
210											2.9	21	2.6	24	2.3	28	2.1	31	1.6	43	1.4	55	1.2	65	1.1	74	1	92	0.8	138
220									3.5	18	2.9	22	2.6	25	2.3	29	2.1	33	1.6	45	1.4	57	1.2	68	1.1	78	1	96	0.8	144
230									3.5	19	2.9	23	2.6	27	2.3	30	2.1	34	1.6	48	1.4	60	1.2	71	1.1	81	1	101	0.8	151
240									3.5	20	2.9	24	2.6	28	2.3	32	2.1	35	1.6	50	1.4	62	1.2	74	1.1	85	1	105	0.8	158
250									3.5	20	2.9	25	2.6	29	2.3	33	2.1	37	1.6	52	1.4	65	1.2	77	1.1	88	1	109		
260									3.5	21	2.9	26	2.6	30	2.3	34	2.1	38	1.6	54	1.4	68	1.2	80	1.1	92	1	114		
270									3.5	22	2.9	27	2.6	31	2.3	36	2.1	40	1.6	56	1.4	70	1.2	83	1.1	95	1	118		
280									3.4	23	2.9	28	2.5	32	2.3	37	2.1	41	1.6	58	1.4	73	1.2	86	1.1	99	1	122		
290									3.4	23	2.9	29	2.5	33	2.3	38	2.1	43	1.6	60	1.4	75	1.2	89	1.1	103	1	127		
300									3.4	24	2.9	29	2.5	35	2.3	40	2.1	44	1.6	62	1.4	78	1.2	92	1.1	106	1	131		
310									3.4	25	2.9	30	2.5	36	2.3	41	2.1	46	1.6	64	1.4	80	1.2	95	1.1	110	1	135		
320									3.4	26	2.9	31	2.5	37	2.3	42	2.1	47	1.6	66	1.4	83	1.2	99	1.1	113	1	140		
330									3.4	27	2.9	32	2.5	38	2.3	43	2.1	49	1.6	68	1.4	86	1.2	102	1.1	117	1	144		
340									3.4	27	2.9	33	2.5	39	2.3	45	2.1	50	1.6	70	1.4	88	1.2	105	1.1	120	1	149		
350							4.3	22	3.4	28	2.9	34	2.5	40	2.3	46	2.1	52	1.6	72	1.4	91	1.2	108	1.1	124	1	153		
360							4.3	22	3.4	29	2.9	35	2.5	41	2.3	47	2.1	53	1.6	74	1.4	93	1.2	111	1.1	127	1	157		
370							4.3	23	3.4	30	2.9	36	2.5	43	2.3	49	2.1	55	1.6	76	1.4	96	1.2	114	1.1	131	1	162		
380							4.3	24	3.4	30	2.9	37	2.5	44	2.3	50	2.1	56	1.6	78	1.4	99	1.2	117	1.1	134	1	166		
390							4.3	24	3.4	31	2.9	38	2.5	45	2.3	51	2.1	58	1.6	81	1.4	101	1.2	120	1.1	138	1	170		
400							4.3	25	3.4	32	2.9	39	2.5	46	2.3	53	2.1	59	1.6	83	1.4	104	1.2	123	1.1	141	1	175		
410							4.3	25	3.4	33	2.9	40	2.5	47	2.3	54	2.1	61	1.6	85	1.4	106	1.2	126	1.1	145	1	179		
420							4.3	26	3.4	34	2.9	41	2.5	48	2.3	55	2.1	62	1.6	87	1.4	109	1.2	129	1.1	148	1	184		
430							4.3	26	3.4	34	2.9	42	2.5	50	2.3	57	2.1	63	1.6	89	1.4	112	1.2	132	1.1	152	1	188		
440							4.3	27	3.4	35	2.9	43	2.5	51	2.3	58	2.1	65	1.6	91	1.4	114	1.2	136	1.1	156	1	192		
450							4.3	28	3.4	36	2.9	44	2.5	52	2.3	59	2.1	66	1.6	93	1.4	117	1.2	139	1.1	159				
460							4.3	28	3.4	37	2.9	45	2.5	53	2.3	61	2.1	68	1.6	95	1.4	119	1.2	142	1.1	163				
470							4.3	29	3.4	38	2.9	46	2.5	54	2.3	62	2.1	69	1.6	97	1.4	122	1.2	145	1.1	166				
480							4.3	29	3.4	38	2.9	47	2.5	55	2.3	63	2.1	71	1.6	99	1.4	125	1.2	148	1.1	170				
490							4.3	30	3.4	39	2.9	48	2.5	56	2.3	65	2.1	72	1.6	101	1.4	127	1.2	151	1.1	173				
500							4.3	31	3.4	40	2.9	49	2.5	58	2.3	66	2.1	74	1.6	103	1.4	130	1.2	154	1.1	177				

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.07
B-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																													0.8	7
20																											1	9	0.8	13
30																									1.2	8	1	13	0.8	20
40																							1.4	9	1.2	11	1	17	0.8	26
50																					1.7	9	1.4	11	1.2	13	1	22	0.8	33
60																					1.6	11	1.4	13	1.2	16	1	26	0.8	39
70																					1.6	12	1.4	15	1.2	18	1	30	0.8	46
80																			2	11	1.6	14	1.4	17	1.2	21	1	34	0.8	52
90																			2	13	1.6	16	1.4	19	1.2	24	1	39	0.8	59
100																			2	14	1.6	18	1.4	21	1.2	26	1	43	0.8	66
110																			1.9	15	1.6	19	1.4	23	1.2	29	1	47	0.8	72
120																			1.9	17	1.6	21	1.4	25	1.2	31	1	52	0.8	79
130																			1.9	18	1.6	23	1.4	28	1.2	34	1	56	0.8	85
140																	2.6	14	1.9	20	1.6	25	1.4	30	1.2	37	1	60	0.8	92
150																	2.6	15	1.9	21	1.6	26	1.4	32	1.2	39	1	64	0.8	98
160																	2.6	16	1.9	22	1.6	28	1.4	34	1.2	42	1	69	0.8	105
170															2.9	15	2.6	17	1.9	24	1.6	30	1.4	36	1.2	44	1	73	0.8	111
180															2.8	16	2.6	18	1.9	25	1.6	32	1.4	38	1.2	47	1	77	0.8	118
190															2.8	17	2.6	19	1.9	26	1.6	34	1.4	40	1.2	50	1	82	0.8	125
200															2.8	17	2.5	20	1.9	28	1.6	35	1.4	42	1.2	52	1	86	0.8	131
210													3.2	16	2.8	18	2.5	21	1.9	29	1.6	37	1.4	44	1.2	55	1	90	0.8	138
220													3.2	17	2.8	19	2.5	22	1.9	31	1.6	39	1.4	47	1.2	57	1	94	0.8	144
230													3.2	17	2.8	20	2.5	22	1.9	32	1.6	41	1.4	49	1.2	60	1	99	0.8	151
240													3.2	18	2.8	21	2.5	23	1.9	33	1.6	42	1.4	51	1.2	63	1	103	0.8	157
250													3.2	19	2.8	22	2.5	24	1.9	35	1.6	44	1.4	53	1.2	65	1	107	0.8	164
260													3.2	20	2.8	22	2.5	25	1.9	36	1.6	46	1.4	55	1.2	68	1	112		
270													3.2	20	2.8	23	2.5	26	1.9	37	1.6	48	1.4	57	1.2	70	1	116		
280													3.2	21	2.8	24	2.5	27	1.9	39	1.6	49	1.4	59	1.2	73	1	120		
290											3.7	19	3.1	22	2.8	25	2.5	28	1.9	40	1.6	51	1.4	61	1.2	76	1	124		
300											3.7	19	3.1	22	2.8	26	2.5	29	1.9	42	1.6	53	1.4	64	1.2	78	1	129		
310											3.7	20	3.1	23	2.8	27	2.5	30	1.9	43	1.6	55	1.4	66	1.2	81	1	133		
320											3.7	20	3.1	24	2.8	28	2.5	31	1.9	44	1.6	57	1.4	68	1.2	84	1	137		
330											3.6	21	3.1	25	2.8	28	2.5	32	1.9	46	1.6	58	1.4	70	1.2	86	1	142		
340											3.6	22	3.1	25	2.8	29	2.5	33	1.9	47	1.6	60	1.4	72	1.2	89	1	146		
350											3.6	22	3.1	26	2.8	30	2.5	34	1.9	49	1.6	62	1.4	74	1.2	91	1	150		
360											3.6	23	3.1	27	2.8	31	2.5	35	1.9	50	1.6	64	1.4	76	1.2	94	1	154		
370											3.6	23	3.1	28	2.8	32	2.5	36	1.9	51	1.6	65	1.4	78	1.2	97	1	159		
380											3.6	24	3.1	28	2.8	33	2.5	37	1.9	53	1.6	67	1.4	80	1.2	99	1	163		
390											3.6	25	3.1	29	2.8	34	2.5	38	1.9	54	1.6	69	1.4	83	1.2	102	1	167		
400											3.6	25	3.1	30	2.8	34	2.5	39	1.9	55	1.6	71	1.4	85	1.2	104	1	172		
410											3.6	26	3.1	31	2.8	35	2.5	40	1.9	57	1.6	72	1.4	87	1.2	107	1	176		
420											3.6	26	3.1	31	2.8	36	2.5	41	1.9	58	1.6	74	1.4	89	1.2	110	1	180		
430									4.4	22	3.6	27	3.1	32	2.8	37	2.5	42	1.9	60	1.6	76	1.4	91	1.2	112	1	185		
440									4.4	23	3.6	28	3.1	33	2.8	38	2.5	43	1.9	61	1.6	78	1.4	93	1.2	115	1	189		
450									4.4	23	3.6	28	3.1	33	2.8	39	2.5	44	1.9	62	1.6	79	1.4	95	1.2	117	1	193		
460									4.4	23	3.6	29	3.1	34	2.8	39	2.5	45	1.9	64	1.6	81	1.4	97	1.2	120				
470									4.4	24	3.6	29	3.1	35	2.8	40	2.5	46	1.9	65	1.6	83	1.4	99	1.2	123				
480									4.4	24	3.6	30	3.1	36	2.8	41	2.5	46	1.9	67	1.6	85	1.4	102	1.2	125				
490									4.4	25	3.6	31	3.1	36	2.8	42	2.5	47	1.9	68	1.6	87	1.4	104	1.2	128				
500									4.4	25	3.6	31	3.1	37	2.8	43	2.5	48	1.9	69	1.6	88	1.4	106	1.2	130				

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.02
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10							1.2	9	1.1	10	0.9	12	0.9	13	0.8	15	0.8	16	0.6	20	0.6	23	0.5	27	0.5	29	0.4	34	0.4	39
20					1.5	14	1.2	18	1	21	0.9	24	0.9	27	0.8	29	0.8	32	0.6	40	0.6	47	0.5	53	0.5	59	0.4	68	0.4	77
30			2.2	13	1.5	20	1.2	26	1	32	0.9	36	0.9	40	0.8	44	0.8	48	0.6	60	0.6	70	0.5	80	0.5	88				
40			2.1	17	1.5	27	1.2	35	1	42	0.9	48	0.9	54	0.8	59	0.8	63	0.6	80	0.6	94								
50			2.1	21	1.5	34	1.2	44	1	52	0.9	60	0.9	67	0.8	73	0.8	79	0.6	100										
60			2.1	26	1.5	41	1.2	53	1	63	0.9	72	0.9	80	0.8	88	0.8	95	0.6	120										
70			2.1	30	1.5	48	1.2	62	1	73	0.9	84	0.9	94	0.8	103	0.8	111												
80			2.1	34	1.5	54	1.2	70	1	84	0.9	96	0.9	107	0.8	117	0.8	127												
90	3.7	20	2.1	39	1.5	61	1.2	79	1	94	0.9	108	0.9	121	0.8	132	0.8	143												
100	3.7	22	2.1	43	1.5	68	1.2	88	1	105	0.9	120	0.9	134	0.8	147														
110	3.6	24	2.1	47	1.5	75	1.2	97	1	115	0.9	132	0.9	147																
120	3.6	27	2.1	51	1.4	82	1.2	106	1	126	0.9	144	0.9	161																
130	3.6	29	2.1	56	1.4	88	1.2	114	1	136	0.9	156																		
140	3.6	31	2.1	60	1.4	95	1.2	123	1	147	0.9	168																		
150	3.6	33	2.1	64	1.4	102	1.2	132	1	157	0.9	180																		
160	3.6	35	2.1	69	1.4	109	1.2	141	1	168																				
170	3.6	38	2.1	73	1.4	116	1.2	150	1	178																				
180	3.6	40	2.1	77	1.4	122	1.2	158	1	189																				
190	3.6	42	2.1	82	1.4	129	1.2	167	1	199																				
200	3.6	44	2.1	86	1.4	136	1.2	176																						
210	3.6	47	2.1	90	1.4	143	1.2	185																						
220	3.6	49	2.1	94	1.4	150	1.2	194																						
230	3.6	51	2.1	99	1.4	156	1.2	202																						
240	3.6	53	2.1	103	1.4	163	1.2	211																						
250	3.6	55	2.1	107	1.4	170	1.2	220																						
260	3.6	58	2.1	112	1.4	177	1.2	229																						
270	3.6	60	2.1	116	1.4	184	1.2	238																						
280	3.6	62	2.1	120	1.4	190																								
290	3.6	64	2.1	125	1.4	197																								
300	3.6	66	2.1	129	1.4	204																								
310	3.6	69	2.1	133	1.4	211																								
320	3.6	71	2.1	137	1.4	218																								
330	3.5	73	2.1	142	1.4	224																								
340	3.5	75	2.1	146	1.4	231																								
350	3.5	77	2.1	150	1.4	238																								
360	3.5	80	2.1	155	1.4	245																								
370	3.5	82	2.1	159	1.4	252																								
380	3.5	84	2.1	163	1.4	259																								
390	3.5	86	2.1	167	1.4	265																								
400	3.5	89	2.1	172	1.4	272																								
410	3.5	91	2.1	176	1.4	279																								
420	3.5	93	2.1	180	1.4	286																								
430	3.5	95	2.1	185																										
440	3.5	97	2.1	189																										
450	3.5	100	2.1	193																										
460	3.5	102	2.1	197																										
470	3.5	104	2.1	202																										
480	3.5	106	2.1	206																										
490	3.5	109	2.1	210																										
500	3.5	111	2.1	215																										

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.03
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10									1.2	7	1.1	8	1	9	0.9	10	0.8	11	0.7	14	0.6	17	0.6	19	0.5	21	0.5	25	0.4	28
20					1.7	9	1.4	12	1.2	15	1	17	1	19	0.9	21	0.8	22	0.7	29	0.6	34	0.6	38	0.5	43	0.5	50	0.4	57
30					1.7	14	1.3	18	1.2	22	1	25	0.9	28	0.9	31	0.8	34	0.7	43	0.6	51	0.6	58	0.5	64	0.5	75		
40					1.7	19	1.3	24	1.2	29	1	34	0.9	38	0.9	41	0.8	45	0.7	57	0.6	68	0.6	77	0.5	85				
50			2.5	14	1.7	23	1.3	30	1.2	37	1	42	0.9	47	0.9	52	0.8	56	0.7	72	0.6	85	0.6	96						
60			2.5	17	1.7	28	1.3	36	1.2	44	1	51	0.9	57	0.9	62	0.8	68	0.7	86	0.6	102								
70			2.5	20	1.7	32	1.3	43	1.2	51	1	59	0.9	66	0.9	73	0.8	79	0.7	100	0.6	119								
80			2.5	23	1.7	37	1.3	49	1.2	59	1	67	0.9	76	0.9	83	0.8	90	0.7	115										
90			2.5	26	1.7	42	1.3	55	1.2	66	1	76	0.9	85	0.9	93	0.8	101	0.7	129										
100			2.5	29	1.6	46	1.3	61	1.2	73	1	84	0.9	94	0.9	104	0.8	113												
110			2.4	31	1.6	51	1.3	67	1.2	81	1	93	0.9	104	0.9	114	0.8	124												
120			2.4	34	1.6	56	1.3	73	1.2	88	1	101	0.9	113	0.9	125	0.8	135												
130			2.4	37	1.6	60	1.3	79	1.2	95	1	110	0.9	123	0.9	135	0.8	146												
140			2.4	40	1.6	65	1.3	85	1.2	103	1	118	0.9	132	0.9	145	0.8	158												
150			2.4	43	1.6	70	1.3	91	1.2	110	1	127	0.9	142	0.9	156														
160	4.5	23	2.4	46	1.6	74	1.3	97	1.2	117	1	135	0.9	151	0.9	166														
170	4.5	24	2.4	48	1.6	79	1.3	103	1.2	125	1	143	0.9	161																
180	4.5	26	2.4	51	1.6	83	1.3	109	1.2	132	1	152	0.9	170																
190	4.5	27	2.4	54	1.6	88	1.3	115	1.2	139	1	160	0.9	179																
200	4.4	28	2.4	57	1.6	93	1.3	122	1.2	146	1	169	0.9	189																
210	4.4	30	2.4	60	1.6	97	1.3	128	1.2	154	1	177																		
220	4.4	31	2.4	63	1.6	102	1.3	134	1.2	161	1	186																		
230	4.4	32	2.4	65	1.6	107	1.3	140	1.2	168	1	194																		
240	4.4	34	2.4	68	1.6	111	1.3	146	1.2	176	1	202																		
250	4.4	35	2.4	71	1.6	116	1.3	152	1.2	183																				
260	4.4	37	2.4	74	1.6	121	1.3	158	1.2	190																				
270	4.4	38	2.4	77	1.6	125	1.3	164	1.2	198																				
280	4.4	39	2.4	80	1.6	130	1.3	170	1.2	205																				
290	4.4	41	2.4	83	1.6	134	1.3	176	1.2	212																				
300	4.4	42	2.4	85	1.6	139	1.3	182	1.2	220																				
310	4.4	44	2.4	88	1.6	144	1.3	188	1.2	227																				
320	4.4	45	2.4	91	1.6	148	1.3	195																						
330	4.4	46	2.4	94	1.6	153	1.3	201																						
340	4.4	48	2.4	97	1.6	158	1.3	207																						
350	4.4	49	2.4	100	1.6	162	1.3	213																						
360	4.4	51	2.4	103	1.6	167	1.3	219																						
370	4.4	52	2.4	105	1.6	172	1.3	225																						
380	4.4	53	2.4	108	1.6	176	1.3	231																						
390	4.4	55	2.4	111	1.6	181	1.3	237																						
400	4.4	56	2.4	114	1.6	185	1.3	243																						
410	4.3	57	2.4	117	1.6	190	1.3	249																						
420	4.3	59	2.4	120	1.6	195	1.3	255																						
430	4.3	60	2.4	122	1.6	199	1.3	261																						
440	4.3	62	2.4	125	1.6	204																								
450	4.3	63	2.4	128	1.6	209																								
460	4.3	64	2.4	131	1.6	213																								
470	4.3	66	2.4	134	1.6	218																								
480	4.3	67	2.4	137	1.6	223																								
490	4.3	69	2.4	140	1.6	227																								
500	4.3	70	2.4	142	1.6	232																								

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.05
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10													1.2	6	1.1	7	1	7	0.8	9	0.7	11	0.6	13	0.6	14	0.5	17	0.4	19
20									1.4	9	1.2	11	1.1	12	1	13	0.9	14	0.8	18	0.7	22	0.6	25	0.6	28	0.5	33	0.4	38
30							1.6	11	1.4	14	1.2	16	1.1	18	1	20	0.9	21	0.8	28	0.7	33	0.6	38	0.6	42	0.5	50	0.4	56
40					2.1	11	1.6	15	1.4	18	1.2	21	1.1	24	1	26	0.9	29	0.8	37	0.7	44	0.6	50	0.6	56	0.5	66	0.4	75
50					2.1	14	1.6	19	1.4	23	1.2	26	1.1	30	1	33	0.9	36	0.8	46	0.7	55	0.6	63	0.6	70	0.5	83		
60					2	17	1.6	22	1.4	27	1.2	32	1.1	36	1	39	0.9	43	0.8	55	0.7	66	0.6	76	0.6	84				
70					2	19	1.6	26	1.4	32	1.2	37	1.1	41	1	46	0.9	50	0.8	65	0.7	77	0.6	88	0.6	98				
80					2	22	1.6	30	1.4	36	1.2	42	1.1	47	1	52	0.9	57	0.8	74	0.7	88	0.6	101	0.6	112				
90					2	25	1.6	33	1.4	41	1.2	47	1.1	53	1	59	0.9	64	0.8	83	0.7	99	0.6	113						
100			3.2	16	2	28	1.6	37	1.4	45	1.2	53	1.1	59	1	66	0.9	71	0.8	92	0.7	110								
110			3.2	18	2	31	1.6	41	1.4	50	1.2	58	1.1	65	1	72	0.9	79	0.8	102	0.7	121								
120			3.2	20	2	33	1.6	44	1.3	54	1.2	63	1.1	71	1	79	0.9	86	0.8	111	0.7	132								
130			3.1	21	2	36	1.6	48	1.3	59	1.2	68	1.1	77	1	85	0.9	93	0.8	120										
140			3.1	23	2	39	1.6	52	1.3	63	1.2	74	1.1	83	1	92	0.9	100	0.8	129										
150			3.1	25	2	42	1.6	56	1.3	68	1.2	79	1.1	89	1	98	0.9	107	0.8	139										
160			3.1	26	2	44	1.6	59	1.3	72	1.2	84	1.1	95	1	105	0.9	114	0.8	148										
170			3.1	28	2	47	1.6	63	1.3	77	1.2	89	1.1	101	1	111	0.9	121												
180			3.1	29	2	50	1.6	67	1.3	81	1.2	95	1.1	107	1	118	0.9	129												
190			3.1	31	2	53	1.6	70	1.3	86	1.2	100	1.1	113	1	125	0.9	136												
200			3.1	33	2	55	1.6	74	1.3	90	1.2	105	1.1	119	1	131	0.9	143												
210			3.1	34	2	58	1.6	78	1.3	95	1.2	110	1.1	125	1	138	0.9	150												
220			3.1	36	2	61	1.6	82	1.3	99	1.2	116	1.1	131	1	144	0.9	157												
230			3.1	38	2	64	1.6	85	1.3	104	1.2	121	1.1	137	1	151	0.9	164												
240			3.1	39	2	67	1.6	89	1.3	109	1.2	126	1.1	143	1	157	0.9	171												
250			3.1	41	2	69	1.6	93	1.3	113	1.2	131	1.1	148	1	164	0.9	179												
260			3.1	42	2	72	1.6	96	1.3	118	1.2	137	1.1	154	1	170	0.9	186												
270			3.1	44	2	75	1.6	100	1.3	122	1.2	142	1.1	160	1	177														
280			3.1	46	2	78	1.6	104	1.3	127	1.2	147	1.1	166	1	184														
290			3.1	47	2	80	1.6	108	1.3	131	1.2	153	1.1	172	1	190														
300			3.1	49	2	83	1.6	111	1.3	136	1.2	158	1.1	178	1	197														
310			3.1	51	2	86	1.6	115	1.3	140	1.2	163	1.1	184																
320			3.1	52	2	89	1.6	119	1.3	145	1.2	168	1.1	190																
330			3.1	54	2	91	1.6	122	1.3	149	1.2	174	1.1	196																
340			3.1	55	2	94	1.6	126	1.3	154	1.2	179	1.1	202																
350			3.1	57	2	97	1.6	130	1.3	158	1.2	184	1.1	208																
360			3.1	59	2	100	1.6	134	1.3	163	1.2	189	1.1	214																
370			3.1	60	2	103	1.6	137	1.3	167	1.2	195																		
380			3.1	62	2	105	1.6	141	1.3	172	1.2	200																		
390			3.1	64	2	108	1.6	145	1.3	176	1.2	205																		
400	6.1	30	3.1	65	2	111	1.6	148	1.3	181	1.2	210																		
410	6.1	31	3.1	67	2	114	1.6	152	1.3	185	1.2	216																		
420	6.1	32	3.1	69	2	116	1.6	156	1.3	190	1.2	221																		
430	6	33	3.1	70	2	119	1.6	159	1.3	194	1.2	226																		
440	6	33	3.1	72	2	122	1.6	163	1.3	199	1.2	231																		
450	6	34	3.1	73	2	125	1.6	167	1.3	203	1.2	237																		
460	6	35	3.1	75	2	127	1.6	171	1.3	208																				
470	6	35	3.1	77	2	130	1.6	174	1.3	213																				
480	6	36	3.1	78	2	133	1.6	178	1.3	217																				
490	6	37	3.1	80	2	136	1.6	182	1.3	222																				
500	6	38	3.1	82	2	139	1.6	185	1.3	226																				

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.5
Allowable Soil Stress = 0.07
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																			0.9	7	0.7	8	0.7	9	0.6	11	0.5	13	0.5	14
20											1.4	8	1.3	9	1.1	10	1.1	10	0.9	14	0.7	16	0.7	19	0.6	21	0.5	25	0.5	29
30									1.6	10	1.4	11	1.2	13	1.1	14	1.1	16	0.8	20	0.7	25	0.7	28	0.6	32	0.5	38	0.5	43
40							1.9	11	1.6	13	1.4	15	1.2	17	1.1	19	1	21	0.8	27	0.7	33	0.7	38	0.6	42	0.5	50	0.5	57
50							1.9	13	1.5	16	1.4	19	1.2	21	1.1	24	1	26	0.8	34	0.7	41	0.7	47	0.6	53	0.5	63	0.5	71
60							1.8	16	1.5	19	1.4	23	1.2	26	1.1	29	1	31	0.8	41	0.7	49	0.7	56	0.6	63	0.5	75	0.5	86
70					2.4	14	1.8	18	1.5	23	1.4	26	1.2	30	1.1	33	1	37	0.8	48	0.7	57	0.7	66	0.6	74	0.5	88		
80					2.4	16	1.8	21	1.5	26	1.3	30	1.2	34	1.1	38	1	42	0.8	54	0.7	65	0.7	75	0.6	84	0.5	100		
90					2.4	17	1.8	24	1.5	29	1.3	34	1.2	39	1.1	43	1	47	0.8	61	0.7	74	0.7	85	0.6	95				
100					2.4	19	1.8	26	1.5	32	1.3	38	1.2	43	1.1	48	1	52	0.8	68	0.7	82	0.7	94	0.6	105				
110					2.4	21	1.8	29	1.5	36	1.3	42	1.2	47	1.1	52	1	57	0.8	75	0.7	90	0.7	103	0.6	116				
120					2.3	23	1.8	32	1.5	39	1.3	45	1.2	52	1.1	57	1	63	0.8	82	0.7	98	0.7	113						
130					2.3	25	1.8	34	1.5	42	1.3	49	1.2	56	1.1	62	1	68	0.8	88	0.7	106	0.7	122						
140					2.3	27	1.8	37	1.5	45	1.3	53	1.2	60	1.1	67	1	73	0.8	95	0.7	114	0.7	132						
150					2.3	29	1.8	39	1.5	49	1.3	57	1.2	64	1.1	72	1	78	0.8	102	0.7	123								
160					2.3	31	1.8	42	1.5	52	1.3	61	1.2	69	1.1	76	1	84	0.8	109	0.7	131								
170					2.3	33	1.8	45	1.5	55	1.3	64	1.2	73	1.1	81	1	89	0.8	116	0.7	139								
180			3.8	20	2.3	35	1.8	47	1.5	58	1.3	68	1.2	77	1.1	86	1	94	0.8	122										
190			3.8	21	2.3	37	1.8	50	1.5	61	1.3	72	1.2	82	1.1	91	1	99	0.8	129										
200			3.8	22	2.3	39	1.8	52	1.5	65	1.3	76	1.2	86	1.1	95	1	104	0.8	136										
210			3.8	23	2.3	40	1.8	55	1.5	68	1.3	79	1.2	90	1.1	100	1	110	0.8	143										
220			3.8	24	2.3	42	1.8	58	1.5	71	1.3	83	1.2	95	1.1	105	1	115	0.8	150										
230			3.8	25	2.3	44	1.8	60	1.5	74	1.3	87	1.2	99	1.1	110	1	120	0.8	157										
240			3.8	27	2.3	46	1.8	63	1.5	78	1.3	91	1.2	103	1.1	115	1	125	0.8	163										
250			3.8	28	2.3	48	1.8	66	1.5	81	1.3	95	1.2	107	1.1	119	1	130												
260			3.7	29	2.3	50	1.8	68	1.5	84	1.3	98	1.2	112	1.1	124	1	136												
270			3.7	30	2.3	52	1.8	71	1.5	87	1.3	102	1.2	116	1.1	129	1	141												
280			3.7	31	2.3	54	1.8	73	1.5	91	1.3	106	1.2	120	1.1	134	1	146												
290			3.7	32	2.3	56	1.8	76	1.5	94	1.3	110	1.2	125	1.1	138	1	151												
300			3.7	33	2.3	58	1.8	79	1.5	97	1.3	114	1.2	129	1.1	143	1	157												
310			3.7	34	2.3	60	1.8	81	1.5	100	1.3	117	1.2	133	1.1	148	1	162												
320			3.7	35	2.3	62	1.8	84	1.5	104	1.3	121	1.2	137	1.1	153	1	167												
330			3.7	36	2.3	64	1.8	86	1.5	107	1.3	125	1.2	142	1.1	157	1	172												
340			3.7	37	2.3	65	1.8	89	1.5	110	1.3	129	1.2	146	1.1	162	1	177												
350			3.7	38	2.3	67	1.8	92	1.5	113	1.3	132	1.2	150	1.1	167	1	183												
360			3.7	39	2.3	69	1.8	94	1.5	116	1.3	136	1.2	155	1.1	172	1	188												
370			3.7	41	2.3	71	1.8	97	1.5	120	1.3	140	1.2	159	1.1	177	1	193												
380			3.7	42	2.3	73	1.8	100	1.5	123	1.3	144	1.2	163	1.1	181	1	198												
390			3.7	43	2.3	75	1.8	102	1.5	126	1.3	148	1.2	168	1.1	186	1	204												
400			3.7	44	2.3	77	1.8	105	1.5	129	1.3	151	1.2	172	1.1	191														
410			3.7	45	2.3	79	1.8	107	1.5	133	1.3	155	1.2	176	1.1	196														
420			3.7	46	2.3	81	1.8	110	1.5	136	1.3	159	1.2	180	1.1	200														
430			3.7	47	2.3	83	1.8	113	1.5	139	1.3	163	1.2	185	1.1	205														
440			3.7	48	2.3	85	1.8	115	1.5	142	1.3	166	1.2	189	1.1	210														
450			3.7	49	2.3	87	1.8	118	1.5	146	1.3	170	1.2	193	1.1	215														
460			3.7	50	2.3	89	1.8	121	1.5	149	1.3	174	1.2	198	1.1	219														
470			3.7	51	2.3	90	1.8	123	1.5	152	1.3	178	1.2	202																
480			3.7	53	2.3	92	1.8	126	1.5	155	1.3	182	1.2	206																
490			3.7	54	2.3	94	1.8	128	1.5	158	1.3	185	1.2	210																
500			3.7	55	2.3	96	1.8	131	1.5	162	1.3	189	1.2	215																

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.02
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10											1.2	6	1.1	7	1	8	0.9	9	0.7	11	0.6	13	0.6	15	0.5	17	0.5	20	0.4	23
20							1.5	9	1.3	11	1.1	13	1	15	1	16	0.9	17	0.7	22	0.6	27	0.6	30	0.5	34	0.5	40	0.4	45
30					1.9	10	1.5	14	1.3	17	1.1	19	1	22	0.9	24	0.9	26	0.7	34	0.6	40	0.6	46	0.5	51	0.5	60	0.4	68
40					1.9	14	1.5	18	1.3	22	1.1	26	1	29	0.9	32	0.9	35	0.7	45	0.6	53	0.6	61	0.5	68	0.5	80		
50					1.9	17	1.5	23	1.3	28	1.1	32	1	36	0.9	40	0.9	44	0.7	56	0.6	67	0.6	76	0.5	84				
60					1.8	21	1.5	28	1.3	34	1.1	39	1	44	0.9	48	0.9	52	0.7	67	0.6	80	0.6	91	0.5	101				
70			2.9	15	1.8	24	1.5	32	1.3	39	1.1	45	1	51	0.9	56	0.9	61	0.7	79	0.6	93	0.6	106						
80			2.9	17	1.8	28	1.5	37	1.3	45	1.1	52	1	58	0.9	64	0.9	70	0.7	90	0.6	107								
90			2.8	19	1.8	31	1.5	42	1.3	50	1.1	58	1	66	0.9	72	0.9	79	0.7	101	0.6	120								
100			2.8	21	1.8	35	1.5	46	1.3	56	1.1	65	1	73	0.9	81	0.9	87	0.7	112										
110			2.8	23	1.8	38	1.5	51	1.3	62	1.1	71	1	80	0.9	89	0.9	96	0.7	123										
120			2.8	25	1.8	42	1.5	55	1.3	67	1.1	78	1	88	0.9	97	0.9	105	0.7	135										
130			2.8	27	1.8	45	1.5	60	1.3	73	1.1	84	1	95	0.9	105	0.9	114	0.7	146										
140			2.8	29	1.8	49	1.5	65	1.3	78	1.1	91	1	102	0.9	113	0.9	122												
150			2.8	31	1.8	52	1.5	69	1.3	84	1.1	97	1	109	0.9	121	0.9	131												
160			2.8	34	1.8	56	1.5	74	1.3	90	1.1	104	1	117	0.9	129	0.9	140												
170			2.8	36	1.8	59	1.5	79	1.3	95	1.1	110	1	124	0.9	137	0.9	149												
180			2.8	38	1.8	63	1.5	83	1.3	101	1.1	117	1	131	0.9	145	0.9	157												
190			2.8	40	1.8	66	1.5	88	1.3	106	1.1	123	1	139	0.9	153	0.9	166												
200			2.8	42	1.8	70	1.5	92	1.3	112	1.1	130	1	146	0.9	161	0.9	175												
210			2.8	44	1.8	73	1.5	97	1.3	118	1.1	136	1	153	0.9	169														
220			2.8	46	1.8	77	1.5	102	1.3	123	1.1	143	1	161	0.9	177														
230			2.8	48	1.8	80	1.5	106	1.3	129	1.1	149	1	168	0.9	185														
240			2.8	50	1.8	84	1.5	111	1.3	134	1.1	156	1	175																
250			2.8	52	1.8	87	1.5	115	1.3	140	1.1	162	1	182																
260			2.8	54	1.8	91	1.5	120	1.3	146	1.1	169	1	190																
270	5.3	27	2.8	56	1.8	94	1.5	125	1.3	151	1.1	175	1	197																
280	5.3	28	2.8	59	1.8	98	1.5	129	1.3	157	1.1	182																		
290	5.3	29	2.8	61	1.8	101	1.5	134	1.3	162	1.1	188																		
300	5.2	30	2.8	63	1.8	105	1.5	139	1.3	168	1.1	195																		
310	5.2	31	2.8	65	1.8	108	1.5	143	1.3	174	1.1	201																		
320	5.2	32	2.8	67	1.8	112	1.5	148	1.3	179	1.1	208																		
330	5.2	33	2.8	69	1.8	115	1.5	152	1.3	185	1.1	214																		
340	5.2	34	2.8	71	1.8	119	1.5	157	1.3	190	1.1	221																		
350	5.2	35	2.8	73	1.8	122	1.5	162	1.3	196																				
360	5.2	36	2.8	75	1.8	125	1.5	166	1.3	202																				
370	5.2	37	2.8	77	1.8	129	1.5	171	1.3	207																				
380	5.2	38	2.8	80	1.8	132	1.5	176	1.3	213																				
390	5.2	39	2.8	82	1.8	136	1.5	180	1.3	218																				
400	5.2	40	2.8	84	1.8	139	1.5	185	1.3	224																				
410	5.2	41	2.8	86	1.8	143	1.5	189	1.3	230																				
420	5.2	42	2.8	88	1.8	146	1.5	194	1.3	235																				
430	5.2	43	2.8	90	1.8	150	1.5	199	1.3	241																				
440	5.2	44	2.8	92	1.8	153	1.5	203	1.3	246																				
450	5.2	45	2.8	94	1.8	157	1.5	208																						
460	5.2	46	2.8	96	1.8	160	1.5	212																						
470	5.2	47	2.8	98	1.8	164	1.5	217																						
480	5.1	48	2.8	100	1.8	167	1.5	222																						
490	5.1	49	2.8	103	1.8	171	1.5	226																						
500	5.1	50	2.8	105	1.8	174	1.5	231																						

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.03
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																	1	6	0.8	8	0.7	9	0.6	11	0.6	12	0.5	14	0.5	16
20											1.3	9	1.2	10	1.1	11	1	12	0.8	16	0.7	19	0.6	22	0.6	24	0.5	28	0.5	32
30							1.8	9	1.5	11	1.3	13	1.2	15	1.1	17	1	18	0.8	24	0.7	28	0.6	32	0.6	36	0.5	43	0.5	49
40							1.7	12	1.5	15	1.3	18	1.2	20	1.1	22	1	24	0.8	31	0.7	38	0.6	43	0.6	48	0.5	57	0.5	65
50					2.3	12	1.7	15	1.5	19	1.3	22	1.2	25	1.1	28	1	30	0.8	39	0.7	47	0.6	54	0.6	60	0.5	71	0.5	81
60					2.2	14	1.7	19	1.4	23	1.3	26	1.2	30	1.1	33	1	36	0.8	47	0.7	56	0.6	65	0.6	72	0.5	85		
70					2.2	16	1.7	22	1.4	26	1.3	31	1.2	35	1.1	39	1	42	0.8	55	0.7	66	0.6	75	0.6	84	0.5	100		
80					2.2	18	1.7	25	1.4	30	1.3	35	1.2	40	1.1	44	1	48	0.8	63	0.7	75	0.6	86	0.6	96				
90					2.2	21	1.7	28	1.4	34	1.3	40	1.2	45	1.1	50	1	54	0.8	71	0.7	84	0.6	97	0.6	108				
100					2.2	23	1.7	31	1.4	38	1.3	44	1.2	50	1.1	55	1	60	0.8	78	0.7	94	0.6	108						
110					2.2	25	1.7	34	1.4	42	1.3	49	1.2	55	1.1	61	1	66	0.8	86	0.7	103	0.6	118						
120					2.2	27	1.7	37	1.4	45	1.3	53	1.2	60	1.1	66	1	72	0.8	94	0.7	113								
130					2.2	30	1.7	40	1.4	49	1.3	57	1.2	65	1.1	72	1	79	0.8	102	0.7	122								
140			3.5	19	2.2	32	1.7	43	1.4	53	1.3	62	1.2	70	1.1	77	1	85	0.8	110	0.7	131								
150			3.5	20	2.2	34	1.7	46	1.4	57	1.3	66	1.2	75	1.1	83	1	91	0.8	118	0.7	141								
160			3.5	21	2.2	37	1.7	49	1.4	60	1.3	71	1.2	80	1.1	88	1	97	0.8	126										
170			3.5	23	2.2	39	1.7	52	1.4	64	1.3	75	1.2	85	1.1	94	1	103	0.8	133										
180			3.5	24	2.2	41	1.7	55	1.4	68	1.3	79	1.2	90	1.1	100	1	109	0.8	141										
190			3.4	25	2.2	43	1.7	58	1.4	72	1.3	84	1.2	95	1.1	105	1	115	0.8	149										
200			3.4	27	2.2	46	1.7	62	1.4	76	1.3	88	1.2	100	1.1	111	1	121	0.8	157										
210			3.4	28	2.2	48	1.7	65	1.4	79	1.3	93	1.2	105	1.1	116	1	127												
220			3.4	29	2.2	50	1.7	68	1.4	83	1.3	97	1.2	110	1.1	122	1	133												
230			3.4	30	2.2	52	1.7	71	1.4	87	1.3	101	1.2	115	1.1	127	1	139												
240			3.4	32	2.2	55	1.7	74	1.4	91	1.3	106	1.2	120	1.1	133	1	145												
250			3.4	33	2.2	57	1.7	77	1.4	94	1.3	110	1.2	125	1.1	138	1	151												
260			3.4	34	2.2	59	1.7	80	1.4	98	1.3	115	1.2	130	1.1	144	1	157												
270			3.4	36	2.2	62	1.7	83	1.4	102	1.3	119	1.2	135	1.1	149	1	163												
280			3.4	37	2.2	64	1.7	86	1.4	106	1.3	124	1.2	140	1.1	155	1	169												
290			3.4	38	2.2	66	1.7	89	1.4	109	1.3	128	1.2	145	1.1	160	1	175												
300			3.4	40	2.2	68	1.7	92	1.4	113	1.3	132	1.2	150	1.1	166	1	181												
310			3.4	41	2.2	71	1.7	95	1.4	117	1.3	137	1.2	155	1.1	171	1	187												
320			3.4	42	2.2	73	1.7	98	1.4	121	1.3	141	1.2	160	1.1	177	1	193												
330			3.4	44	2.2	75	1.7	102	1.4	125	1.3	146	1.2	165	1.1	182														
340			3.4	45	2.2	78	1.7	105	1.4	128	1.3	150	1.2	170	1.1	188														
350			3.4	46	2.2	80	1.7	108	1.4	132	1.3	154	1.2	175	1.1	194														
360			3.4	47	2.2	82	1.7	111	1.4	136	1.3	159	1.2	180	1.1	199														
370			3.4	49	2.2	84	1.7	114	1.4	140	1.3	163	1.2	185	1.1	205														
380			3.4	50	2.2	87	1.7	117	1.4	143	1.3	168	1.2	190	1.1	210														
390			3.4	51	2.2	89	1.7	120	1.4	147	1.3	172	1.2	195																
400			3.4	53	2.2	91	1.7	123	1.4	151	1.3	176	1.2	200																
410			3.4	54	2.2	94	1.7	126	1.4	155	1.3	181	1.2	205																
420			3.4	55	2.2	96	1.7	129	1.4	159	1.3	185	1.2	210																
430			3.4	57	2.2	98	1.7	132	1.4	162	1.3	190	1.2	215																
440			3.4	58	2.2	100	1.7	136	1.4	166	1.3	194	1.2	220																
450			3.4	59	2.2	103	1.7	139	1.4	170	1.3	199	1.2	225																
460			3.4	61	2.2	105	1.7	142	1.4	174	1.3	203	1.2	230																
470			3.4	62	2.2	107	1.7	145	1.4	177	1.3	207																		
480			3.4	63	2.2	109	1.7	148	1.4	181	1.3	212																		
490			3.4	65	2.2	112	1.7	151	1.4	185	1.3	216																		
500			3.4	66	2.2	114	1.7	154	1.4	189	1.3	221																		

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.05
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																					0.8	6	0.7	7	0.7	8	0.6	9	0.5	11
20																	1.2	7	1	10	0.8	12	0.7	14	0.7	15	0.6	18	0.5	21
30													1.4	9	1.3	10	1.2	11	1	15	0.8	18	0.7	20	0.7	23	0.6	28	0.5	32
40											1.6	11	1.4	12	1.3	13	1.2	15	0.9	19	0.8	24	0.7	27	0.7	31	0.6	37	0.5	42
50									1.8	11	1.6	13	1.4	15	1.3	17	1.2	18	0.9	24	0.8	30	0.7	34	0.7	38	0.6	46	0.5	53
60									1.8	13	1.6	16	1.4	18	1.3	20	1.2	22	0.9	29	0.8	35	0.7	41	0.7	46	0.6	55	0.5	63
70							2.2	13	1.8	16	1.6	18	1.4	21	1.3	23	1.2	26	0.9	34	0.8	41	0.7	48	0.7	54	0.6	64	0.5	74
80							2.2	14	1.8	18	1.6	21	1.4	24	1.3	27	1.2	29	0.9	39	0.8	47	0.7	55	0.7	61	0.6	73	0.5	84
90							2.2	16	1.8	20	1.6	24	1.4	27	1.3	30	1.2	33	0.9	44	0.8	53	0.7	61	0.7	69	0.6	83	0.5	95
100							2.2	18	1.8	22	1.6	26	1.4	30	1.3	34	1.2	37	0.9	49	0.8	59	0.7	68	0.7	77	0.6	92		
110							2.2	20	1.8	24	1.6	29	1.4	33	1.3	37	1.2	41	0.9	54	0.8	65	0.7	75	0.7	84	0.6	101		
120					2.9	16	2.2	21	1.8	27	1.6	32	1.4	36	1.3	40	1.2	44	0.9	58	0.8	71	0.7	82	0.7	92	0.6	110		
130					2.9	17	2.1	23	1.8	29	1.6	34	1.4	39	1.3	44	1.2	48	0.9	63	0.8	77	0.7	89	0.7	100				
140					2.9	18	2.1	25	1.8	31	1.6	37	1.4	42	1.3	47	1.2	52	0.9	68	0.8	83	0.7	95	0.7	107				
150					2.8	19	2.1	27	1.8	33	1.6	39	1.4	45	1.3	50	1.2	55	0.9	73	0.8	89	0.7	102	0.7	115				
160					2.8	21	2.1	28	1.8	36	1.6	42	1.4	48	1.3	54	1.2	59	0.9	78	0.8	94	0.7	109	0.7	123				
170					2.8	22	2.1	30	1.8	38	1.5	45	1.4	51	1.3	57	1.2	63	0.9	83	0.8	100	0.7	116	0.7	130				
180					2.8	23	2.1	32	1.8	40	1.5	47	1.4	54	1.3	60	1.2	66	0.9	88	0.8	106	0.7	123						
190					2.8	24	2.1	34	1.8	42	1.5	50	1.4	57	1.3	64	1.2	70	0.9	93	0.8	112	0.7	129						
200					2.8	26	2.1	36	1.8	44	1.5	52	1.4	60	1.3	67	1.2	74	0.9	97	0.8	118	0.7	136						
210					2.8	27	2.1	37	1.8	47	1.5	55	1.4	63	1.3	70	1.2	77	0.9	102	0.8	124	0.7	143						
220					2.8	28	2.1	39	1.8	49	1.5	58	1.4	66	1.3	74	1.2	81	0.9	107	0.8	130								
230					2.8	30	2.1	41	1.8	51	1.5	60	1.4	69	1.3	77	1.2	85	0.9	112	0.8	136								
240					2.8	31	2.1	43	1.8	53	1.5	63	1.4	72	1.3	80	1.2	88	0.9	117	0.8	142								
250					2.8	32	2.1	44	1.8	55	1.5	66	1.4	75	1.3	84	1.2	92	0.9	122	0.8	148								
260					2.8	33	2.1	46	1.8	58	1.5	68	1.4	78	1.3	87	1.2	96	0.9	127	0.8	153								
270					2.8	35	2.1	48	1.8	60	1.5	71	1.4	81	1.3	91	1.2	99	0.9	131	0.8	159								
280					2.8	36	2.1	50	1.8	62	1.5	73	1.4	84	1.3	94	1.2	103	0.9	136										
290					2.8	37	2.1	51	1.8	64	1.5	76	1.4	87	1.3	97	1.2	107	0.9	141										
300					2.8	38	2.1	53	1.8	67	1.5	79	1.4	90	1.3	101	1.2	110	0.9	146										
310					2.8	40	2.1	55	1.8	69	1.5	81	1.4	93	1.3	104	1.2	114	0.9	151										
320					2.8	41	2.1	57	1.8	71	1.5	84	1.4	96	1.3	107	1.2	118	0.9	156										
330					2.8	42	2.1	59	1.8	73	1.5	87	1.4	99	1.3	111	1.2	122	0.9	161										
340			4.8	24	2.8	43	2.1	60	1.8	75	1.5	89	1.4	102	1.3	114	1.2	125	0.9	166										
350			4.8	25	2.8	45	2.1	62	1.8	78	1.5	92	1.4	105	1.3	117	1.2	129	0.9	170										
360			4.8	25	2.8	46	2.1	64	1.8	80	1.5	94	1.4	108	1.3	121	1.2	133	0.9	175										
370			4.7	26	2.8	47	2.1	66	1.8	82	1.5	97	1.4	111	1.3	124	1.2	136	0.9	180										
380			4.7	27	2.8	49	2.1	67	1.8	84	1.5	100	1.4	114	1.3	127	1.2	140	0.9	185										
390			4.7	28	2.8	50	2.1	69	1.8	87	1.5	102	1.4	117	1.3	131	1.2	144												
400			4.7	28	2.8	51	2.1	71	1.8	89	1.5	105	1.4	120	1.3	134	1.2	147												
410			4.7	29	2.8	52	2.1	73	1.8	91	1.5	108	1.4	123	1.3	137	1.2	151												
420			4.7	30	2.8	54	2.1	75	1.8	93	1.5	110	1.4	126	1.3	141	1.2	155												
430			4.7	30	2.8	55	2.1	76	1.8	95	1.5	113	1.4	129	1.3	144	1.2	158												
440			4.7	31	2.8	56	2.1	78	1.8	98	1.5	115	1.4	132	1.3	148	1.2	162												
450			4.7	32	2.8	58	2.1	80	1.8	100	1.5	118	1.4	135	1.3	151	1.2	166												
460			4.7	32	2.8	59	2.1	82	1.8	102	1.5	121	1.4	138	1.3	154	1.2	169												
470			4.7	33	2.8	60	2.1	83	1.8	104	1.5	123	1.4	141	1.3	158	1.2	173												
480			4.7	34	2.8	61	2.1	85	1.8	107	1.5	126	1.4	144	1.3	161	1.2	177												
490			4.7	34	2.8	63	2.1	87	1.8	109	1.5	129	1.4	147	1.3	164	1.2	180												
500			4.7	35	2.8	64	2.1	89	1.8	111	1.5	131	1.4	150	1.3	168	1.2	184												

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.75
Allowable Soil Stress = 0.07
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																							0.8	5	0.8	6	0.6	7	0.6	8
20																			1.1	7	0.9	9	0.8	10	0.7	11	0.6	14	0.6	16
30																	1.4	8	1.1	10	0.9	13	0.8	15	0.7	17	0.6	20	0.6	23
40													1.7	8	1.5	9	1.4	10	1.1	14	0.9	17	0.8	20	0.7	22	0.6	27	0.6	31
50													1.7	11	1.5	12	1.4	13	1.1	17	0.9	21	0.8	25	0.7	28	0.6	34	0.6	39
60											1.9	11	1.6	13	1.5	14	1.4	16	1.1	21	0.9	26	0.8	30	0.7	34	0.6	41	0.6	47
70											1.8	13	1.6	15	1.5	17	1.4	18	1.1	24	0.9	30	0.8	35	0.7	39	0.6	47	0.6	55
80									2.2	12	1.8	15	1.6	17	1.5	19	1.4	21	1.1	28	0.9	34	0.8	40	0.7	45	0.6	54	0.6	63
90									2.1	14	1.8	16	1.6	19	1.5	21	1.4	23	1.1	31	0.9	38	0.8	45	0.7	51	0.6	61	0.6	70
100									2.1	15	1.8	18	1.6	21	1.5	24	1.4	26	1.1	35	0.9	43	0.8	50	0.7	56	0.6	68	0.6	78
110							2.6	13	2.1	17	1.8	20	1.6	23	1.5	26	1.4	29	1.1	38	0.9	47	0.8	55	0.7	62	0.6	74	0.6	86
120							2.6	15	2.1	18	1.8	22	1.6	25	1.5	28	1.4	31	1.1	42	0.9	51	0.8	60	0.7	67	0.6	81	0.6	94
130							2.6	16	2.1	20	1.8	24	1.6	27	1.5	31	1.4	34	1.1	45	0.9	55	0.8	65	0.7	73	0.6	88	0.6	102
140							2.6	17	2.1	21	1.8	26	1.6	29	1.5	33	1.4	36	1.1	49	0.9	60	0.8	70	0.7	79	0.6	95	0.6	109
150							2.6	18	2.1	23	1.8	27	1.6	31	1.5	35	1.4	39	1.1	52	0.9	64	0.8	75	0.7	84	0.6	102		
160							2.6	19	2.1	24	1.8	29	1.6	34	1.5	38	1.4	42	1.1	56	0.9	68	0.8	80	0.7	90	0.6	108		
170							2.6	21	2.1	26	1.8	31	1.6	36	1.5	40	1.4	44	1.1	59	0.9	73	0.8	84	0.7	95	0.6	115		
180							2.6	22	2.1	27	1.8	33	1.6	38	1.5	42	1.3	47	1.1	63	0.9	77	0.8	89	0.7	101	0.6	122		
190							2.6	23	2.1	29	1.8	35	1.6	40	1.5	45	1.3	49	1.1	66	0.9	81	0.8	94	0.7	107				
200							2.6	24	2.1	31	1.8	36	1.6	42	1.5	47	1.3	52	1.1	70	0.9	85	0.8	99	0.7	112				
210					3.5	18	2.6	25	2.1	32	1.8	38	1.6	44	1.5	50	1.3	55	1.1	73	0.9	90	0.8	104	0.7	118				
220					3.5	19	2.6	26	2.1	34	1.8	40	1.6	46	1.5	52	1.3	57	1.1	77	0.9	94	0.8	109	0.7	123				
230					3.5	20	2.6	28	2.1	35	1.8	42	1.6	48	1.5	54	1.3	60	1.1	80	0.9	98	0.8	114	0.7	129				
240					3.5	21	2.6	29	2.1	37	1.8	44	1.6	50	1.5	57	1.3	62	1.1	84	0.9	103	0.8	119	0.7	135				
250					3.5	21	2.6	30	2.1	38	1.8	45	1.6	52	1.5	59	1.3	65	1.1	87	0.9	107	0.8	124	0.7	140				
260					3.5	22	2.6	31	2.1	40	1.8	47	1.6	54	1.5	61	1.3	68	1.1	91	0.9	111	0.8	129	0.7	146				
270					3.5	23	2.6	32	2.1	41	1.8	49	1.6	57	1.5	64	1.3	70	1.1	94	0.9	115	0.8	134						
280					3.5	24	2.6	34	2.1	43	1.8	51	1.6	59	1.5	66	1.3	73	1.1	98	0.9	120	0.8	139						
290					3.5	25	2.6	35	2.1	44	1.8	53	1.6	61	1.5	68	1.3	75	1.1	101	0.9	124	0.8	144						
300					3.5	26	2.5	36	2.1	46	1.8	55	1.6	63	1.5	71	1.3	78	1.1	105	0.9	128	0.8	149						
310					3.5	26	2.5	37	2.1	47	1.8	56	1.6	65	1.5	73	1.3	81	1.1	108	0.9	132	0.8	154						
320					3.5	27	2.5	38	2.1	49	1.8	58	1.6	67	1.5	75	1.3	83	1.1	112	0.9	137	0.8	159						
330					3.4	28	2.5	40	2.1	50	1.8	60	1.6	69	1.5	78	1.3	86	1.1	115	0.9	141								
340					3.4	29	2.5	41	2.1	52	1.8	62	1.6	71	1.5	80	1.3	88	1.1	119	0.9	145								
350					3.4	30	2.5	42	2.1	53	1.8	64	1.6	73	1.5	83	1.3	91	1.1	122	0.9	150								
360					3.4	31	2.5	43	2.1	55	1.8	65	1.6	75	1.5	85	1.3	94	1.1	126	0.9	154								
370					3.4	31	2.5	44	2.1	56	1.8	67	1.6	77	1.5	87	1.3	96	1.1	129	0.9	158								
380					3.4	32	2.5	46	2.1	58	1.8	69	1.6	80	1.5	90	1.3	99	1.1	133	0.9	162								
390					3.4	33	2.5	47	2.1	59	1.8	71	1.6	82	1.5	92	1.3	101	1.1	136	0.9	167								
400					3.4	34	2.5	48	2.1	61	1.8	73	1.6	84	1.5	94	1.3	104	1.1	140	0.9	171								
410					3.4	35	2.5	49	2.1	62	1.8	75	1.6	86	1.5	97	1.3	107	1.1	143	0.9	175								
420					3.4	36	2.5	50	2.1	64	1.8	76	1.6	88	1.5	99	1.3	109	1.1	147	0.9	179								
430					3.4	36	2.5	52	2.1	65	1.8	78	1.6	90	1.5	101	1.3	112	1.1	150										
440					3.4	37	2.5	53	2.1	67	1.8	80	1.6	92	1.5	104	1.3	114	1.1	154										
450					3.4	38	2.5	54	2.1	68	1.8	82	1.6	94	1.5	106	1.3	117	1.1	157										
460					3.4	39	2.5	55	2.1	70	1.8	84	1.6	96	1.5	108	1.3	120	1.1	161										
470					3.4	40	2.5	56	2.1	72	1.8	85	1.6	98	1.5	111	1.3	122	1.1	164										
480					3.4	40	2.5	58	2.1	73	1.8	87	1.6	101	1.5	113	1.3	125	1.1	168										
490					3.4	41	2.5	59	2.1	75	1.8	89	1.6	103	1.5	116	1.3	127	1.1	171										
500					3.4	42	2.5	60	2.1	76	1.8	91	1.6	105	1.5	118	1.3	130	1.1	175										

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.02
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																			0.9	6	0.8	8	0.7	9	0.6	10	0.5	12	0.5	13
20													1.3	8	1.2	9	1.1	10	0.9	12	0.8	15	0.7	17	0.6	19	0.5	23	0.5	26
30									1.7	9	1.4	10	1.3	12	1.2	13	1.1	14	0.9	19	0.8	23	0.7	26	0.6	29	0.5	35	0.5	40
40									1.6	12	1.4	14	1.3	16	1.2	17	1.1	19	0.9	25	0.8	30	0.7	35	0.6	39	0.5	46	0.5	53
50							1.9	12	1.6	15	1.4	17	1.3	20	1.2	22	1.1	24	0.9	31	0.8	38	0.7	43	0.6	48	0.5	58	0.5	66
60							1.9	14	1.6	18	1.4	21	1.3	23	1.2	26	1.1	29	0.9	37	0.8	45	0.7	52	0.6	58	0.5	69	0.5	79
70							1.9	17	1.6	21	1.4	24	1.3	27	1.2	30	1.1	33	0.9	44	0.8	53	0.7	61	0.6	68	0.5	81	0.5	92
80					2.5	14	1.9	19	1.6	23	1.4	28	1.3	31	1.2	35	1.1	38	0.9	50	0.8	60	0.7	69	0.6	78	0.5	92		
90					2.5	16	1.9	21	1.6	26	1.4	31	1.3	35	1.2	39	1.1	43	0.9	56	0.8	68	0.7	78	0.6	87	0.5	104		
100					2.5	17	1.9	24	1.6	29	1.4	34	1.3	39	1.2	44	1.1	48	0.9	62	0.8	75	0.7	86	0.6	97				
110					2.5	19	1.9	26	1.6	32	1.4	38	1.3	43	1.2	48	1.1	52	0.9	69	0.8	83	0.7	95	0.6	107				
120					2.5	21	1.9	28	1.6	35	1.4	41	1.3	47	1.2	52	1.1	57	0.9	75	0.8	90	0.7	104	0.6	116				
130					2.5	23	1.9	31	1.6	38	1.4	45	1.3	51	1.2	57	1.1	62	0.9	81	0.8	98	0.7	112						
140					2.5	24	1.9	33	1.6	41	1.4	48	1.3	55	1.2	61	1.1	67	0.9	87	0.8	105	0.7	121						
150					2.4	26	1.9	36	1.6	44	1.4	52	1.3	59	1.2	65	1.1	72	0.9	94	0.8	113	0.7	130						
160					2.4	28	1.9	38	1.6	47	1.4	55	1.3	63	1.2	70	1.1	76	0.9	100	0.8	120								
170					2.4	30	1.9	40	1.6	50	1.4	59	1.3	67	1.2	74	1.1	81	0.9	106	0.8	128								
180					2.4	31	1.9	43	1.6	53	1.4	62	1.3	70	1.2	78	1.1	86	0.9	112	0.8	135								
190					2.4	33	1.9	45	1.6	56	1.4	65	1.3	74	1.2	83	1.1	91	0.9	119	0.8	143								
200					2.4	35	1.9	47	1.6	59	1.4	69	1.3	78	1.2	87	1.1	95	0.9	125	0.8	150								
210			4	21	2.4	36	1.9	50	1.6	62	1.4	72	1.3	82	1.2	91	1.1	100	0.9	131										
220			4	22	2.4	38	1.9	52	1.6	65	1.4	76	1.3	86	1.2	96	1.1	105	0.9	137										
230			4	23	2.4	40	1.9	55	1.6	68	1.4	79	1.3	90	1.2	100	1.1	110	0.9	143										
240			4	24	2.4	42	1.9	57	1.6	70	1.4	83	1.3	94	1.2	104	1.1	114	0.9	150										
250			4	25	2.4	43	1.9	59	1.6	73	1.4	86	1.3	98	1.2	109	1.1	119	0.9	156										
260			4	26	2.4	45	1.9	62	1.6	76	1.4	90	1.3	102	1.2	113	1.1	124	0.9	162										
270			4	27	2.4	47	1.9	64	1.6	79	1.4	93	1.3	106	1.2	118	1.1	129	0.9	168										
280			4	28	2.4	49	1.9	66	1.6	82	1.4	96	1.3	110	1.2	122	1.1	133												
290			4	29	2.4	50	1.9	69	1.6	85	1.4	100	1.3	113	1.2	126	1.1	138												
300			4	29	2.4	52	1.9	71	1.6	88	1.4	103	1.3	117	1.2	131	1.1	143												
310			4	30	2.4	54	1.9	73	1.6	91	1.4	107	1.3	121	1.2	135	1.1	148												
320			4	31	2.4	55	1.9	76	1.6	94	1.4	110	1.3	125	1.2	139	1.1	153												
330			4	32	2.4	57	1.9	78	1.6	97	1.4	114	1.3	129	1.2	144	1.1	157												
340			4	33	2.4	59	1.9	81	1.6	100	1.4	117	1.3	133	1.2	148	1.1	162												
350			4	34	2.4	61	1.9	83	1.6	103	1.4	121	1.3	137	1.2	152	1.1	167												
360			3.9	35	2.4	62	1.9	85	1.6	106	1.4	124	1.3	141	1.2	157	1.1	172												
370			3.9	36	2.4	64	1.9	88	1.6	109	1.4	127	1.3	145	1.2	161	1.1	176												
380			3.9	37	2.4	66	1.9	90	1.6	112	1.4	131	1.3	149	1.2	165	1.1	181												
390			3.9	38	2.4	68	1.9	92	1.6	114	1.4	134	1.3	153	1.2	170	1.1	186												
400			3.9	39	2.4	69	1.9	95	1.6	117	1.4	138	1.3	156	1.2	174	1.1	191												
410			3.9	40	2.4	71	1.9	97	1.6	120	1.4	141	1.3	160	1.2	178	1.1	195												
420			3.9	41	2.4	73	1.9	99	1.6	123	1.4	145	1.3	164	1.2	183	1.1	200												
430			3.9	42	2.4	74	1.9	102	1.6	126	1.4	148	1.3	168	1.2	187	1.1	205												
440			3.9	43	2.4	76	1.9	104	1.6	129	1.4	152	1.3	172	1.2	191	1.1	210												
450			3.9	44	2.4	78	1.9	107	1.6	132	1.4	155	1.3	176	1.2	196	1.1	215												
460			3.9	45	2.4	80	1.9	109	1.6	135	1.4	158	1.3	180	1.2	200														
470			3.9	46	2.4	81	1.9	111	1.6	138	1.4	162	1.3	184	1.2	205														
480			3.9	47	2.4	83	1.9	114	1.6	141	1.4	165	1.3	188	1.2	209														
490			3.9	48	2.4	85	1.9	116	1.6	144	1.4	169	1.3	192	1.2	213														
500			3.9	49	2.4	87	1.9	118	1.6	147	1.4	172	1.3	196	1.2	218														

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.03
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																					0.9	5	0.8	6	0.7	7	0.6	8	0.5	9
20																			1	8	0.9	10	0.8	12	0.7	13	0.6	16	0.5	19
30													1.6	8	1.4	9	1.3	10	1	13	0.9	15	0.8	18	0.7	20	0.6	24	0.5	28
40											1.7	9	1.5	10	1.4	12	1.3	13	1	17	0.9	21	0.8	24	0.7	27	0.6	32	0.5	37
50											1.7	11	1.5	13	1.4	14	1.3	16	1	21	0.9	26	0.8	30	0.7	34	0.6	40	0.5	46
60									2	11	1.7	14	1.5	16	1.4	17	1.3	19	1	25	0.9	31	0.8	36	0.7	40	0.6	48	0.5	56
70									1.9	13	1.7	16	1.5	18	1.4	20	1.3	22	1	30	0.9	36	0.8	42	0.7	47	0.6	57	0.5	65
80							2.4	12	1.9	15	1.7	18	1.5	21	1.4	23	1.2	26	1	34	0.9	41	0.8	48	0.7	54	0.6	65	0.5	74
90							2.4	14	1.9	17	1.7	20	1.5	23	1.4	26	1.2	29	1	38	0.9	46	0.8	54	0.7	60	0.6	73	0.5	84
100							2.3	15	1.9	19	1.7	23	1.5	26	1.4	29	1.2	32	1	42	0.9	51	0.8	60	0.7	67	0.6	81	0.5	93
110							2.3	17	1.9	21	1.7	25	1.5	28	1.3	32	1.2	35	1	47	0.9	57	0.8	66	0.7	74	0.6	89	0.5	102
120							2.3	18	1.9	23	1.7	27	1.5	31	1.3	35	1.2	38	1	51	0.9	62	0.8	72	0.7	81	0.6	97		
130							2.3	20	1.9	25	1.7	29	1.5	34	1.3	38	1.2	41	1	55	0.9	67	0.8	78	0.7	87	0.6	105		
140							2.3	21	1.9	27	1.7	32	1.5	36	1.3	40	1.2	45	1	59	0.9	72	0.8	84	0.7	94	0.6	113		
150					3.1	16	2.3	23	1.9	29	1.7	34	1.5	39	1.3	43	1.2	48	1	64	0.9	77	0.8	89	0.7	101				
160					3.1	17	2.3	24	1.9	30	1.7	36	1.5	41	1.3	46	1.2	51	1	68	0.9	82	0.8	95	0.7	108				
170					3.1	19	2.3	26	1.9	32	1.7	38	1.5	44	1.3	49	1.2	54	1	72	0.9	88	0.8	101	0.7	114				
180					3.1	20	2.3	27	1.9	34	1.6	41	1.5	46	1.3	52	1.2	57	1	76	0.9	93	0.8	107	0.7	121				
190					3.1	21	2.3	29	1.9	36	1.6	43	1.5	49	1.3	55	1.2	60	1	81	0.9	98	0.8	113	0.7	128				
200					3.1	22	2.3	30	1.9	38	1.6	45	1.5	52	1.3	58	1.2	64	1	85	0.9	103	0.8	119	0.7	134				
210					3.1	23	2.3	32	1.9	40	1.6	47	1.5	54	1.3	61	1.2	67	1	89	0.9	108	0.8	125						
220					3.1	24	2.3	33	1.9	42	1.6	50	1.5	57	1.3	64	1.2	70	1	93	0.9	113	0.8	131						
230					3.1	25	2.3	35	1.9	44	1.6	52	1.5	59	1.3	66	1.2	73	1	97	0.9	118	0.8	137						
240					3.1	26	2.3	36	1.9	46	1.6	54	1.5	62	1.3	69	1.2	76	1	102	0.9	124	0.8	143						
250					3.1	27	2.3	38	1.9	47	1.6	56	1.5	65	1.3	72	1.2	80	1	106	0.9	129	0.8	149						
260					3.1	28	2.3	39	1.9	49	1.6	59	1.5	67	1.3	75	1.2	83	1	110	0.9	134								
270					3.1	29	2.3	41	1.9	51	1.6	61	1.5	70	1.3	78	1.2	86	1	114	0.9	139								
280					3.1	30	2.3	42	1.9	53	1.6	63	1.5	72	1.3	81	1.2	89	1	119	0.9	144								
290					3	31	2.3	44	1.9	55	1.6	65	1.5	75	1.3	84	1.2	92	1	123	0.9	149								
300					3	32	2.3	45	1.9	57	1.6	68	1.5	77	1.3	87	1.2	95	1	127	0.9	154								
310					3	33	2.3	47	1.9	59	1.6	70	1.5	80	1.3	90	1.2	99	1	131	0.9	160								
320					3	34	2.3	48	1.9	61	1.6	72	1.5	83	1.3	92	1.2	102	1	136	0.9	165								
330					3	36	2.3	50	1.9	63	1.6	74	1.5	85	1.3	95	1.2	105	1	140	0.9	170								
340					3	37	2.3	51	1.9	64	1.6	77	1.5	88	1.3	98	1.2	108	1	144										
350					3	38	2.3	53	1.9	66	1.6	79	1.5	90	1.3	101	1.2	111	1	148										
360					3	39	2.3	54	1.9	68	1.6	81	1.5	93	1.3	104	1.2	115	1	153										
370					3	40	2.3	56	1.9	70	1.6	83	1.5	95	1.3	107	1.2	118	1	157										
380					3	41	2.3	57	1.9	72	1.6	86	1.5	98	1.3	110	1.2	121	1	161										
390					3	42	2.3	59	1.9	74	1.6	88	1.5	101	1.3	113	1.2	124	1	165										
400					3	43	2.3	60	1.9	76	1.6	90	1.5	103	1.3	116	1.2	127	1	169										
410					3	44	2.3	62	1.9	78	1.6	92	1.5	106	1.3	118	1.2	130	1	174										
420					3	45	2.3	63	1.9	80	1.6	95	1.5	108	1.3	121	1.2	134	1	178										
430					3	46	2.3	65	1.9	82	1.6	97	1.5	111	1.3	124	1.2	137	1	182										
440					3	47	2.3	66	1.9	83	1.6	99	1.5	114	1.3	127	1.2	140	1	186										
450					3	48	2.3	68	1.9	85	1.6	101	1.5	116	1.3	130	1.2	143	1	191										
460			5.3	27	3	49	2.3	69	1.9	87	1.6	104	1.5	119	1.3	133	1.2	146	1	195										
470			5.3	27	3	50	2.3	71	1.9	89	1.6	106	1.5	121	1.3	136	1.2	150												
480			5.3	28	3	52	2.3	72	1.9	91	1.6	108	1.5	124	1.3	139	1.2	153												
490			5.3	29	3	53	2.3	74	1.9	93	1.6	110	1.5	126	1.3	142	1.2	156												
500			5.2	29	3	54	2.3	75	1.9	95	1.6	113	1.5	129	1.3	145	1.2	159												

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.05
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																											0.7	5	0.6	6
20																					1.1	6	0.9	7	0.8	8	0.7	10	0.6	12
30																			1.3	8	1	9	0.9	11	0.8	12	0.7	15	0.6	17
40																			1.2	10	1	12	0.9	15	0.8	17	0.7	20	0.6	23
50																	1.6	9	1.2	13	1	16	0.9	18	0.8	21	0.7	25	0.6	29
60															1.8	10	1.6	11	1.2	15	1	19	0.9	22	0.8	25	0.7	30	0.6	35
70													2	10	1.7	12	1.6	13	1.2	18	1	22	0.9	25	0.8	29	0.7	35	0.6	41
80													1.9	12	1.7	13	1.6	15	1.2	20	1	25	0.9	29	0.8	33	0.7	40	0.6	47
90											2.2	12	1.9	13	1.7	15	1.6	17	1.2	23	1	28	0.9	33	0.8	37	0.7	45	0.6	52
100											2.2	13	1.9	15	1.7	17	1.6	18	1.2	25	1	31	0.9	36	0.8	41	0.7	50	0.6	58
110											2.2	14	1.9	16	1.7	18	1.6	20	1.2	28	1	34	0.9	40	0.8	45	0.7	55	0.6	64
120											2.2	15	1.9	18	1.7	20	1.6	22	1.2	30	1	37	0.9	44	0.8	50	0.7	60	0.6	70
130									2.6	14	2.2	16	1.9	19	1.7	22	1.6	24	1.2	33	1	40	0.9	47	0.8	54	0.7	65	0.6	76
140									2.6	15	2.2	18	1.9	21	1.7	23	1.6	26	1.2	35	1	43	0.9	51	0.8	58	0.7	70	0.6	82
150									2.6	16	2.2	19	1.9	22	1.7	25	1.6	28	1.2	38	1	47	0.9	55	0.8	62	0.7	75	0.6	87
160									2.5	17	2.2	20	1.9	23	1.7	27	1.6	29	1.2	40	1	50	0.9	58	0.8	66	0.7	80	0.6	93
170									2.5	18	2.2	21	1.9	25	1.7	28	1.6	31	1.2	43	1	53	0.9	62	0.8	70	0.7	85	0.6	99
180									2.5	19	2.1	23	1.9	26	1.7	30	1.6	33	1.2	45	1	56	0.9	65	0.8	74	0.7	90	0.6	105
190									2.5	20	2.1	24	1.9	28	1.7	32	1.6	35	1.2	48	1	59	0.9	69	0.8	78	0.7	95	0.6	111
200							3.2	16	2.5	21	2.1	25	1.9	29	1.7	33	1.6	37	1.2	50	1	62	0.9	73	0.8	83	0.7	100	0.6	117
210							3.2	17	2.5	22	2.1	26	1.9	31	1.7	35	1.6	39	1.2	53	1	65	0.9	76	0.8	87	0.7	105	0.6	122
220							3.2	18	2.5	23	2.1	28	1.9	32	1.7	36	1.6	41	1.2	55	1	68	0.9	80	0.8	91	0.7	111		
230							3.2	19	2.5	24	2.1	29	1.9	34	1.7	38	1.6	42	1.2	58	1	71	0.9	84	0.8	95	0.7	116		
240							3.1	20	2.5	25	2.1	30	1.9	35	1.7	40	1.6	44	1.2	60	1	74	0.9	87	0.8	99	0.7	121		
250							3.1	20	2.5	26	2.1	32	1.9	37	1.7	41	1.6	46	1.2	63	1	78	0.9	91	0.8	103	0.7	126		
260							3.1	21	2.5	27	2.1	33	1.9	38	1.7	43	1.6	48	1.2	65	1	81	0.9	94	0.8	107	0.7	131		
270							3.1	22	2.5	28	2.1	34	1.9	40	1.7	45	1.6	50	1.2	68	1	84	0.9	98	0.8	111	0.7	136		
280							3.1	23	2.5	29	2.1	35	1.9	41	1.7	46	1.6	52	1.2	70	1	87	0.9	102	0.8	116				
290							3.1	24	2.5	30	2.1	37	1.9	42	1.7	48	1.6	53	1.2	73	1	90	0.9	105	0.8	120				
300							3.1	24	2.5	31	2.1	38	1.9	44	1.7	50	1.6	55	1.2	75	1	93	0.9	109	0.8	124				
310							3.1	25	2.5	32	2.1	39	1.9	45	1.7	51	1.6	57	1.2	78	1	96	0.9	113	0.8	128				
320							3.1	26	2.5	33	2.1	40	1.9	47	1.7	53	1.6	59	1.2	80	1	99	0.9	116	0.8	132				
330							3.1	27	2.5	34	2.1	42	1.9	48	1.7	55	1.6	61	1.2	83	1	102	0.9	120	0.8	136				
340							3.1	28	2.5	35	2.1	43	1.9	50	1.7	56	1.6	63	1.2	85	1	105	0.9	124	0.8	140				
350							3.1	28	2.5	36	2.1	44	1.9	51	1.7	58	1.6	64	1.2	88	1	109	0.9	127	0.8	145				
360							3.1	29	2.5	37	2.1	45	1.9	53	1.7	60	1.6	66	1.2	90	1	112	0.9	131	0.8	149				
370							3.1	30	2.5	39	2.1	47	1.9	54	1.7	61	1.6	68	1.2	93	1	115	0.9	134	0.8	153				
380							3.1	31	2.5	40	2.1	48	1.9	56	1.7	63	1.6	70	1.2	95	1	118	0.9	138	0.8	157				
390					4.4	22	3.1	32	2.5	41	2.1	49	1.9	57	1.7	65	1.6	72	1.2	98	1	121	0.9	142	0.8	161				
400					4.4	23	3.1	32	2.5	42	2.1	50	1.9	59	1.7	66	1.6	74	1.2	100	1	124	0.9	145						
410					4.4	23	3.1	33	2.5	43	2.1	52	1.9	60	1.7	68	1.6	75	1.2	103	1	127	0.9	149						
420					4.3	24	3.1	34	2.5	44	2.1	53	1.9	61	1.7	70	1.6	77	1.2	105	1	130	0.9	153						
430					4.3	24	3.1	35	2.5	45	2.1	54	1.9	63	1.7	71	1.6	79	1.2	108	1	133	0.9	156						
440					4.3	25	3.1	36	2.5	46	2.1	55	1.9	64	1.7	73	1.6	81	1.2	111	1	137	0.9	160						
450					4.3	25	3.1	36	2.5	47	2.1	57	1.9	66	1.7	75	1.6	83	1.2	113	1	140	0.9	164						
460					4.3	26	3.1	37	2.5	48	2.1	58	1.9	67	1.7	76	1.6	85	1.2	116	1	143	0.9	167						
470					4.3	26	3.1	38	2.5	49	2.1	59	1.9	69	1.7	78	1.6	87	1.2	118	1	146	0.9	171						
480					4.3	27	3.1	39	2.5	50	2.1	60	1.9	70	1.7	80	1.6	88	1.2	121	1	149	0.9	174						
490					4.3	27	3.1	40	2.5	51	2.1	62	1.9	72	1.7	81	1.6	90	1.2	123	1	152	0.9	178						
500					4.3	28	3.1	40	2.5	52	2.1	63	1.9	73	1.7	83	1.6	92	1.2	126	1	155								

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.87
Allowable Soil Stress = 0.07
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																											0.8	4	0.6	6
20																									1	6	0.8	8	0.6	11
30																					1.2	7	1.1	8	0.9	9	0.8	12	0.6	17
40																					1.2	9	1	10	0.9	12	0.8	15	0.6	23
50																			1.5	9	1.2	11	1	13	0.9	15	0.8	19	0.6	28
60																			1.4	10	1.2	13	1	15	0.9	18	0.8	23	0.6	34
70																			1.4	12	1.2	15	1	18	0.9	21	0.8	27	0.6	40
80																	1.9	10	1.4	14	1.2	17	1	21	0.9	23	0.8	30	0.6	45
90																	1.9	11	1.4	16	1.2	20	1	23	0.9	26	0.8	34	0.6	51
100															2.1	11	1.9	13	1.4	17	1.2	22	1	26	0.9	29	0.8	38	0.6	57
110															2.1	12	1.9	14	1.4	19	1.2	24	1	28	0.9	32	0.8	42	0.6	63
120													2.4	12	2.1	14	1.9	15	1.4	21	1.2	26	1	31	0.9	35	0.8	45	0.6	68
130													2.3	13	2.1	15	1.9	16	1.4	23	1.2	28	1	33	0.9	38	0.8	49	0.6	74
140													2.3	14	2.1	16	1.9	18	1.4	24	1.2	30	1	36	0.9	41	0.8	53	0.6	80
150													2.3	15	2.1	17	1.9	19	1.4	26	1.2	33	1	39	0.9	44	0.8	57	0.6	85
160											2.7	14	2.3	16	2.1	18	1.9	20	1.4	28	1.2	35	1	41	0.9	47	0.8	60	0.6	91
170											2.7	14	2.3	17	2.1	19	1.9	21	1.4	30	1.2	37	1	44	0.9	50	0.8	64	0.6	97
180											2.7	15	2.3	18	2.1	20	1.9	23	1.4	31	1.2	39	1	46	0.9	53	0.8	68	0.6	102
190											2.7	16	2.3	19	2.1	21	1.9	24	1.4	33	1.2	41	1	49	0.9	56	0.8	72	0.6	108
200											2.7	17	2.3	20	2.1	22	1.9	25	1.4	35	1.2	43	1	51	0.9	59	0.8	75	0.6	114
210											2.7	18	2.3	21	2.1	23	1.9	26	1.4	36	1.2	46	1	54	0.9	62	0.8	79	0.6	119
220											2.7	18	2.3	22	2.1	25	1.9	27	1.4	38	1.2	48	1	57	0.9	65	0.8	83		
230											2.7	19	2.3	23	2.1	26	1.9	29	1.4	40	1.2	50	1	59	0.9	68	0.8	87		
240									3.2	17	2.6	20	2.3	23	2	27	1.9	30	1.4	42	1.2	52	1	62	0.9	70	0.8	91		
250									3.2	17	2.6	21	2.3	24	2	28	1.9	31	1.4	43	1.2	54	1	64	0.9	73	0.8	94		
260									3.2	18	2.6	22	2.3	25	2	29	1.9	32	1.4	45	1.2	56	1	67	0.9	76	0.8	98		
270									3.2	19	2.6	23	2.3	26	2	30	1.9	34	1.4	47	1.2	59	1	69	0.9	79	0.8	102		
280									3.2	19	2.6	23	2.3	27	2	31	1.9	35	1.4	49	1.2	61	1	72	0.9	82	0.8	106		
290									3.2	20	2.6	24	2.3	28	2	32	1.9	36	1.4	50	1.2	63	1	74	0.9	85	0.8	109		
300									3.2	21	2.6	25	2.3	29	2	33	1.9	37	1.4	52	1.2	65	1	77	0.9	88	0.8	113		
310									3.2	21	2.6	26	2.3	30	2	35	1.9	39	1.4	54	1.2	67	1	80	0.9	91	0.8	117		
320									3.1	22	2.6	27	2.3	31	2	36	1.9	40	1.4	56	1.2	69	1	82	0.9	94	0.8	121		
330									3.1	22	2.6	27	2.3	32	2	37	1.9	41	1.4	57	1.2	72	1	85	0.9	97	0.8	125		
340									3.1	23	2.6	28	2.3	33	2	38	1.9	42	1.4	59	1.2	74	1	87	0.9	100	0.8	128		
350									3.1	24	2.6	29	2.3	34	2	39	1.9	44	1.4	61	1.2	76	1	90	0.9	103	0.8	132		
360									3.1	25	2.6	30	2.3	35	2	40	1.9	45	1.4	62	1.2	78	1	92	0.9	106	0.8	136		
370									3.1	25	2.6	31	2.3	36	2	41	1.9	46	1.4	64	1.2	80	1	95	0.9	109	0.8	140		
380									3.1	26	2.6	32	2.3	37	2	42	1.9	47	1.4	66	1.2	82	1	98	0.9	112	0.8	143		
390							4	20	3.1	26	2.6	32	2.3	38	2	43	1.9	49	1.4	68	1.2	85	1	100	0.9	115	0.8	147		
400							4	21	3.1	27	2.6	33	2.3	39	2	45	1.9	50	1.4	69	1.2	87	1	103	0.9	117	0.8	151		
410							4	21	3.1	28	2.6	34	2.3	40	2	46	1.9	51	1.4	71	1.2	89	1	105	0.9	120				
420							4	22	3.1	28	2.6	35	2.3	41	2	47	1.9	52	1.4	73	1.2	91	1	108	0.9	123				
430							4	22	3.1	29	2.6	36	2.3	42	2	48	1.9	54	1.4	75	1.2	93	1	110	0.9	126				
440							4	23	3.1	30	2.6	36	2.3	43	2	49	1.9	55	1.4	76	1.2	95	1	113	0.9	129				
450							4	23	3.1	30	2.6	37	2.3	44	2	50	1.9	56	1.4	78	1.2	98	1	116	0.9	132				
460							4	24	3.1	31	2.6	38	2.3	45	2	51	1.9	57	1.4	80	1.2	100	1	118	0.9	135				
470							4	24	3.1	32	2.6	39	2.3	46	2	52	1.9	59	1.4	82	1.2	102	1	121	0.9	138				
480							4	25	3.1	32	2.6	40	2.3	47	2	53	1.9	60	1.4	83	1.2	104	1	123	0.9	141				
490							4	25	3.1	33	2.6	41	2.3	48	2	55	1.9	61	1.4	85	1.2	106	1	126	0.9	144				
500							4	26	3.1	34	2.6	41	2.3	49	2	56	1.9	62	1.4	87	1.2	108	1	128	0.9	147				

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.02
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																					0.8	6	0.7	7	0.7	8	0.6	9	0.5	11
20																	1.2	7	1	10	0.8	12	0.7	14	0.7	15	0.6	18	0.5	21
30													1.4	9	1.3	10	1.2	11	1	15	0.8	18	0.7	20	0.7	23	0.6	28	0.5	32
40											1.6	11	1.4	12	1.3	13	1.2	15	0.9	19	0.8	24	0.7	27	0.7	31	0.6	37	0.5	42
50									1.8	11	1.6	13	1.4	15	1.3	17	1.2	18	0.9	24	0.8	30	0.7	34	0.7	38	0.6	46	0.5	53
60									1.8	13	1.6	16	1.4	18	1.3	20	1.2	22	0.9	29	0.8	35	0.7	41	0.7	46	0.6	55	0.5	63
70							2.2	13	1.8	16	1.6	18	1.4	21	1.3	23	1.2	26	0.9	34	0.8	41	0.7	48	0.7	54	0.6	64	0.5	74
80							2.2	14	1.8	18	1.6	21	1.4	24	1.3	27	1.2	29	0.9	39	0.8	47	0.7	55	0.7	61	0.6	73	0.5	84
90							2.2	16	1.8	20	1.6	24	1.4	27	1.3	30	1.2	33	0.9	44	0.8	53	0.7	61	0.7	69	0.6	83	0.5	95
100							2.2	18	1.8	22	1.6	26	1.4	30	1.3	34	1.2	37	0.9	49	0.8	59	0.7	68	0.7	77	0.6	92		
110							2.2	20	1.8	24	1.6	29	1.4	33	1.3	37	1.2	41	0.9	54	0.8	65	0.7	75	0.7	84	0.6	101		
120					2.9	16	2.2	21	1.8	27	1.6	32	1.4	36	1.3	40	1.2	44	0.9	58	0.8	71	0.7	82	0.7	92	0.6	110		
130					2.9	17	2.1	23	1.8	29	1.6	34	1.4	39	1.3	44	1.2	48	0.9	63	0.8	77	0.7	89	0.7	100				
140					2.9	18	2.1	25	1.8	31	1.6	37	1.4	42	1.3	47	1.2	52	0.9	68	0.8	83	0.7	95	0.7	107				
150					2.8	19	2.1	27	1.8	33	1.6	39	1.4	45	1.3	50	1.2	55	0.9	73	0.8	89	0.7	102	0.7	115				
160					2.8	21	2.1	28	1.8	36	1.6	42	1.4	48	1.3	54	1.2	59	0.9	78	0.8	94	0.7	109	0.7	123				
170					2.8	22	2.1	30	1.8	38	1.5	45	1.4	51	1.3	57	1.2	63	0.9	83	0.8	100	0.7	116	0.7	130				
180					2.8	23	2.1	32	1.8	40	1.5	47	1.4	54	1.3	60	1.2	66	0.9	88	0.8	106	0.7	123						
190					2.8	24	2.1	34	1.8	42	1.5	50	1.4	57	1.3	64	1.2	70	0.9	93	0.8	112	0.7	129						
200					2.8	26	2.1	36	1.8	44	1.5	52	1.4	60	1.3	67	1.2	74	0.9	97	0.8	118	0.7	136						
210					2.8	27	2.1	37	1.8	47	1.5	55	1.4	63	1.3	70	1.2	77	0.9	102	0.8	124	0.7	143						
220					2.8	28	2.1	39	1.8	49	1.5	58	1.4	66	1.3	74	1.2	81	0.9	107	0.8	130								
230					2.8	30	2.1	41	1.8	51	1.5	60	1.4	69	1.3	77	1.2	85	0.9	112	0.8	136								
240					2.8	31	2.1	43	1.8	53	1.5	63	1.4	72	1.3	80	1.2	88	0.9	117	0.8	142								
250					2.8	32	2.1	44	1.8	55	1.5	66	1.4	75	1.3	84	1.2	92	0.9	122	0.8	148								
260					2.8	33	2.1	46	1.8	58	1.5	68	1.4	78	1.3	87	1.2	96	0.9	127	0.8	153								
270					2.8	35	2.1	48	1.8	60	1.5	71	1.4	81	1.3	91	1.2	99	0.9	131	0.8	159								
280					2.8	36	2.1	50	1.8	62	1.5	73	1.4	84	1.3	94	1.2	103	0.9	136										
290					2.8	37	2.1	51	1.8	64	1.5	76	1.4	87	1.3	97	1.2	107	0.9	141										
300					2.8	38	2.1	53	1.8	67	1.5	79	1.4	90	1.3	101	1.2	110	0.9	146										
310					2.8	40	2.1	55	1.8	69	1.5	81	1.4	93	1.3	104	1.2	114	0.9	151										
320					2.8	41	2.1	57	1.8	71	1.5	84	1.4	96	1.3	107	1.2	118	0.9	156										
330					2.8	42	2.1	59	1.8	73	1.5	87	1.4	99	1.3	111	1.2	122	0.9	161										
340			4.8	24	2.8	43	2.1	60	1.8	75	1.5	89	1.4	102	1.3	114	1.2	125	0.9	166										
350			4.8	25	2.8	45	2.1	62	1.8	78	1.5	92	1.4	105	1.3	117	1.2	129	0.9	170										
360			4.8	25	2.8	46	2.1	64	1.8	80	1.5	94	1.4	108	1.3	121	1.2	133	0.9	175										
370			4.7	26	2.8	47	2.1	66	1.8	82	1.5	97	1.4	111	1.3	124	1.2	136	0.9	180										
380			4.7	27	2.8	49	2.1	67	1.8	84	1.5	100	1.4	114	1.3	127	1.2	140	0.9	185										
390			4.7	28	2.8	50	2.1	69	1.8	87	1.5	102	1.4	117	1.3	131	1.2	144												
400			4.7	28	2.8	51	2.1	71	1.8	89	1.5	105	1.4	120	1.3	134	1.2	147												
410			4.7	29	2.8	52	2.1	73	1.8	91	1.5	108	1.4	123	1.3	137	1.2	151												
420			4.7	30	2.8	54	2.1	75	1.8	93	1.5	110	1.4	126	1.3	141	1.2	155												
430			4.7	30	2.8	55	2.1	76	1.8	95	1.5	113	1.4	129	1.3	144	1.2	158												
440			4.7	31	2.8	56	2.1	78	1.8	98	1.5	115	1.4	132	1.3	148	1.2	162												
450			4.7	32	2.8	58	2.1	80	1.8	100	1.5	118	1.4	135	1.3	151	1.2	166												
460			4.7	32	2.8	59	2.1	82	1.8	102	1.5	121	1.4	138	1.3	154	1.2	169												
470			4.7	33	2.8	60	2.1	83	1.8	104	1.5	123	1.4	141	1.3	158	1.2	173												
480			4.7	34	2.8	61	2.1	85	1.8	107	1.5	126	1.4	144	1.3	161	1.2	177												
490			4.7	34	2.8	63	2.1	87	1.8	109	1.5	129	1.4	147	1.3	164	1.2	180												
500			4.7	35	2.8	64	2.1	89	1.8	111	1.5	131	1.4	150	1.3	168	1.2	184												

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.03
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																							0.9	5	0.8	5	0.7	6	0.6	7
20																			1.1	7	1	8	0.8	9	0.8	11	0.6	13	0.6	15
30																			1.1	10	0.9	12	0.8	14	0.8	16	0.6	19	0.6	22
40															1.6	9	1.4	10	1.1	13	0.9	16	0.8	19	0.7	21	0.6	25	0.6	29
50													1.7	10	1.5	11	1.4	12	1.1	16	0.9	20	0.8	23	0.7	26	0.6	32	0.6	37
60											1.9	10	1.7	12	1.5	13	1.4	15	1.1	20	0.9	24	0.8	28	0.7	32	0.6	38	0.6	44
70											1.9	12	1.7	14	1.5	15	1.4	17	1.1	23	0.9	28	0.8	33	0.7	37	0.6	45	0.6	51
80									2.3	11	1.9	14	1.7	16	1.5	18	1.4	19	1.1	26	0.9	32	0.8	37	0.7	42	0.6	51	0.6	59
90									2.2	13	1.9	15	1.7	18	1.5	20	1.4	22	1.1	29	0.9	36	0.8	42	0.7	47	0.6	57	0.6	66
100									2.2	14	1.9	17	1.7	19	1.5	22	1.4	24	1.1	33	0.9	40	0.8	46	0.7	53	0.6	64	0.6	73
110									2.2	16	1.9	19	1.7	21	1.5	24	1.4	27	1.1	36	0.9	44	0.8	51	0.7	58	0.6	70	0.6	81
120									2.2	17	1.9	20	1.7	23	1.5	26	1.4	29	1.1	39	0.9	48	0.8	56	0.7	63	0.6	76	0.6	88
130							2.7	15	2.2	18	1.9	22	1.7	25	1.5	28	1.4	31	1.1	42	0.9	52	0.8	60	0.7	68	0.6	83	0.6	95
140							2.7	16	2.2	20	1.9	24	1.7	27	1.5	31	1.4	34	1.1	46	0.9	56	0.8	65	0.7	74	0.6	89	0.6	103
150							2.7	17	2.2	21	1.9	25	1.7	29	1.5	33	1.4	36	1.1	49	0.9	60	0.8	70	0.7	79	0.6	95	0.6	110
160							2.7	18	2.2	23	1.9	27	1.7	31	1.5	35	1.4	39	1.1	52	0.9	64	0.8	74	0.7	84	0.6	102		
170							2.7	19	2.2	24	1.9	29	1.7	33	1.5	37	1.4	41	1.1	55	0.9	68	0.8	79	0.7	89	0.6	108		
180							2.7	20	2.2	25	1.9	30	1.7	35	1.5	39	1.4	44	1.1	59	0.9	72	0.8	84	0.7	95	0.6	114		
190							2.7	21	2.2	27	1.9	32	1.7	37	1.5	42	1.4	46	1.1	62	0.9	76	0.8	88	0.7	100	0.6	121		
200							2.7	22	2.2	28	1.9	34	1.7	39	1.5	44	1.4	48	1.1	65	0.9	80	0.8	93	0.7	105	0.6	127		
210							2.7	23	2.2	30	1.9	35	1.7	41	1.5	46	1.4	51	1.1	68	0.9	84	0.8	98	0.7	110				
220							2.7	24	2.2	31	1.9	37	1.7	43	1.5	48	1.4	53	1.1	72	0.9	88	0.8	102	0.7	116				
230							2.7	25	2.2	32	1.9	39	1.7	45	1.5	50	1.4	56	1.1	75	0.9	92	0.8	107	0.7	121				
240					3.7	19	2.7	27	2.2	34	1.9	40	1.7	47	1.5	52	1.4	58	1.1	78	0.9	96	0.8	111	0.7	126				
250					3.7	20	2.7	28	2.2	35	1.9	42	1.7	49	1.5	55	1.4	60	1.1	81	0.9	100	0.8	116	0.7	131				
260					3.7	20	2.7	29	2.2	37	1.9	44	1.7	51	1.5	57	1.4	63	1.1	85	0.9	104	0.8	121	0.7	137				
270					3.7	21	2.7	30	2.2	38	1.9	45	1.7	52	1.5	59	1.4	65	1.1	88	0.9	108	0.8	125	0.7	142				
280					3.6	22	2.7	31	2.2	39	1.9	47	1.7	54	1.5	61	1.4	68	1.1	91	0.9	112	0.8	130	0.7	147				
290					3.6	23	2.7	32	2.2	41	1.9	49	1.7	56	1.5	63	1.4	70	1.1	94	0.9	116	0.8	135						
300					3.6	23	2.7	33	2.2	42	1.9	50	1.7	58	1.5	66	1.4	73	1.1	98	0.9	120	0.8	139						
310					3.6	24	2.7	34	2.2	44	1.9	52	1.7	60	1.5	68	1.4	75	1.1	101	0.9	124	0.8	144						
320					3.6	25	2.7	35	2.2	45	1.9	54	1.7	62	1.5	70	1.4	77	1.1	104	0.9	128	0.8	149						
330					3.6	26	2.7	36	2.2	46	1.9	56	1.7	64	1.5	72	1.4	80	1.1	107	0.9	132	0.8	153						
340					3.6	26	2.7	38	2.2	48	1.9	57	1.7	66	1.5	74	1.4	82	1.1	111	0.9	136	0.8	158						
350					3.6	27	2.7	39	2.2	49	1.9	59	1.7	68	1.5	77	1.4	85	1.1	114	0.9	140	0.8	163						
360					3.6	28	2.6	40	2.2	51	1.9	61	1.7	70	1.5	79	1.4	87	1.1	117	0.9	144								
370					3.6	29	2.6	41	2.2	52	1.9	62	1.7	72	1.5	81	1.4	89	1.1	120	0.9	148								
380					3.6	29	2.6	42	2.2	53	1.9	64	1.7	74	1.5	83	1.4	92	1.1	124	0.9	151								
390					3.6	30	2.6	43	2.2	55	1.9	66	1.7	76	1.5	85	1.4	94	1.1	127	0.9	155								
400					3.6	31	2.6	44	2.2	56	1.9	67	1.7	78	1.5	87	1.4	97	1.1	130	0.9	159								
410					3.6	32	2.6	45	2.2	58	1.9	69	1.7	80	1.5	90	1.4	99	1.1	133	0.9	163								
420					3.6	32	2.6	46	2.2	59	1.9	71	1.7	82	1.5	92	1.4	102	1.1	137	0.9	167								
430					3.6	33	2.6	47	2.2	60	1.9	72	1.7	84	1.5	94	1.4	104	1.1	140	0.9	171								
440					3.6	34	2.6	49	2.2	62	1.9	74	1.7	85	1.5	96	1.4	106	1.1	143	0.9	175								
450					3.6	35	2.6	50	2.2	63	1.9	76	1.7	87	1.5	98	1.4	109	1.1	146	0.9	179								
460					3.6	36	2.6	51	2.2	65	1.9	77	1.7	89	1.5	101	1.4	111	1.1	150	0.9	183								
470					3.6	36	2.6	52	2.2	66	1.9	79	1.7	91	1.5	103	1.4	114	1.1	153										
480					3.6	37	2.6	53	2.2	67	1.9	81	1.7	93	1.5	105	1.4	116	1.1	156										
490					3.6	38	2.6	54	2.2	69	1.9	82	1.7	95	1.5	107	1.4	118	1.1	160										
500					3.6	39	2.6	55	2.2	70	1.9	84	1.7	97	1.5	109	1.4	121	1.1	163										

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.05
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																											0.8	4	0.6	6
20																							1	6	0.9	6	0.8	8	0.6	12
30																					1.2	7	1	8	0.9	10	0.8	12	0.6	17
40																			1.4	8	1.2	9	1	11	0.9	13	0.8	16	0.6	23
50																			1.4	9	1.2	12	1	14	0.9	16	0.8	19	0.6	29
60																			1.4	11	1.2	14	1	17	0.9	19	0.8	23	0.6	34
70																	1.9	10	1.4	13	1.1	17	1	19	0.9	22	0.8	27	0.6	40
80																	1.8	11	1.4	15	1.1	19	1	22	0.9	25	0.8	31	0.6	46
90															2	11	1.8	12	1.4	17	1.1	21	1	25	0.9	29	0.8	35	0.6	52
100															2	12	1.8	14	1.4	19	1.1	24	1	28	0.9	32	0.8	39	0.6	57
110													2.3	12	2	14	1.8	15	1.4	21	1.1	26	1	31	0.9	35	0.8	43	0.6	63
120													2.2	13	2	15	1.8	16	1.4	23	1.1	28	1	33	0.9	38	0.8	47	0.6	69
130													2.2	14	2	16	1.8	18	1.4	25	1.1	31	1	36	0.9	41	0.8	51	0.6	74
140											2.6	13	2.2	15	2	17	1.8	19	1.4	26	1.1	33	1	39	0.9	44	0.8	54	0.6	80
150											2.6	14	2.2	16	2	18	1.8	20	1.4	28	1.1	35	1	42	0.9	48	0.8	58	0.6	86
160											2.6	15	2.2	17	2	20	1.8	22	1.4	30	1.1	38	1	44	0.9	51	0.8	62	0.6	92
170											2.5	16	2.2	18	2	21	1.8	23	1.4	32	1.1	40	1	47	0.9	54	0.8	66	0.6	97
180											2.5	17	2.2	19	2	22	1.8	25	1.4	34	1.1	42	1	50	0.9	57	0.8	70	0.6	103
190											2.5	18	2.2	20	2	23	1.8	26	1.4	36	1.1	45	1	53	0.9	60	0.8	74	0.6	109
200									3	15	2.5	18	2.2	21	2	24	1.8	27	1.4	38	1.1	47	1	56	0.9	63	0.8	78	0.6	115
210									3	16	2.5	19	2.2	23	2	26	1.8	29	1.4	40	1.1	49	1	58	0.9	67	0.8	82	0.6	120
220									3	17	2.5	20	2.2	24	2	27	1.8	30	1.4	42	1.1	52	1	61	0.9	70	0.8	85		
230									3	17	2.5	21	2.2	25	2	28	1.8	31	1.4	43	1.1	54	1	64	0.9	73	0.8	89		
240									3	18	2.5	22	2.2	26	2	29	1.8	33	1.4	45	1.1	57	1	67	0.9	76	0.8	93		
250									3	19	2.5	23	2.2	27	2	30	1.8	34	1.4	47	1.1	59	1	69	0.9	79	0.8	97		
260									3	20	2.5	24	2.2	28	2	32	1.8	35	1.4	49	1.1	61	1	72	0.9	82	0.8	101		
270									3	20	2.5	25	2.2	29	2	33	1.8	37	1.4	51	1.1	64	1	75	0.9	86	0.8	105		
280									3	21	2.5	26	2.2	30	2	34	1.8	38	1.4	53	1.1	66	1	78	0.9	89	0.8	109		
290									3	22	2.5	27	2.2	31	2	35	1.8	39	1.4	55	1.1	68	1	81	0.9	92	0.8	113		
300									3	23	2.5	27	2.2	32	2	37	1.8	41	1.4	57	1.1	71	1	83	0.9	95	0.8	117		
310									3	23	2.5	28	2.2	33	2	38	1.8	42	1.4	58	1.1	73	1	86	0.9	98	0.8	120		
320									3	24	2.5	29	2.2	34	2	39	1.8	44	1.4	60	1.1	75	1	89	0.9	101	0.8	124		
330							3.8	19	3	25	2.5	30	2.2	35	2	40	1.8	45	1.4	62	1.1	78	1	92	0.9	105	0.8	128		
340							3.8	20	3	25	2.5	31	2.2	36	2	41	1.8	46	1.4	64	1.1	80	1	94	0.9	108	0.8	132		
350							3.8	20	3	26	2.5	32	2.2	37	2	43	1.8	48	1.4	66	1.1	82	1	97	0.9	111	0.8	136		
360							3.8	21	3	27	2.5	33	2.2	38	2	44	1.8	49	1.4	68	1.1	85	1	100	0.9	114	0.8	140		
370							3.8	21	3	28	2.5	34	2.2	40	2	45	1.8	50	1.4	70	1.1	87	1	103	0.9	117	0.8	144		
380							3.8	22	3	28	2.5	35	2.2	41	2	46	1.8	52	1.4	72	1.1	89	1	105	0.9	120	0.8	148		
390							3.8	23	3	29	2.5	36	2.2	42	2	47	1.8	53	1.4	74	1.1	92	1	108	0.9	124	0.8	152		
400							3.8	23	3	30	2.5	36	2.2	43	2	49	1.8	54	1.4	75	1.1	94	1	111	0.9	127				
410							3.8	24	3	31	2.5	37	2.2	44	2	50	1.8	56	1.4	77	1.1	97	1	114	0.9	130				
420							3.8	24	3	31	2.5	38	2.2	45	2	51	1.8	57	1.4	79	1.1	99	1	117	0.9	133				
430							3.8	25	3	32	2.5	39	2.2	46	2	52	1.8	58	1.4	81	1.1	101	1	119	0.9	136				
440							3.8	25	3	33	2.5	40	2.2	47	2	54	1.8	60	1.4	83	1.1	104	1	122	0.9	139				
450							3.8	26	3	34	2.5	41	2.2	48	2	55	1.8	61	1.4	85	1.1	106	1	125	0.9	143				
460							3.8	26	3	34	2.5	42	2.2	49	2	56	1.8	63	1.4	87	1.1	108	1	128	0.9	146				
470							3.8	27	3	35	2.5	43	2.2	50	2	57	1.8	64	1.4	89	1.1	111	1	130	0.9	149				
480							3.8	28	3	36	2.5	44	2.2	51	2	58	1.8	65	1.4	91	1.1	113	1	133	0.9	152				
490							3.8	28	3	37	2.5	45	2.2	52	2	60	1.8	67	1.4	92	1.1	115	1	136	0.9	155				
500							3.8	29	3	37	2.5	46	2.2	53	2	61	1.8	68	1.4	94	1.1	118	1	139	0.9	158				

Input Parameters:
Channel Type = Parabolic
Cover factor = 0.9
Allowable Soil Stress = 0.07
C-D Design

Q	S = 0.1%		S = 0.25%		S = 0.5%		S = 0.75%		S = 1%		S = 1.25%		S = 1.5%		S = 1.75%		S = 2%		S = 3%		S = 4%		S = 5%		S = 6%		S = 8%		S = 10%	
	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)	D(ft)	T(ft)
10																													0.6	6
20																									1	5	0.8	8	0.6	12
30																									1	7	0.8	12	0.6	17
40																							1.2	8	1	10	0.8	15	0.6	23
50																					1.4	8	1.2	10	1	12	0.8	19	0.6	29
60																					1.4	10	1.2	12	1	14	0.8	23	0.6	34
70																			1.7	9	1.4	11	1.2	14	1	17	0.8	27	0.6	40
80																			1.7	10	1.4	13	1.2	15	1	19	0.8	31	0.6	46
90																			1.7	12	1.4	15	1.2	17	1	21	0.8	34	0.6	51
100																			1.7	13	1.3	16	1.2	19	1	24	0.8	38	0.6	57
110																			1.6	14	1.3	18	1.2	21	1	26	0.8	42	0.6	63
120																			1.6	15	1.3	19	1.2	23	1	28	0.8	46	0.6	69
130																	2.2	12	1.6	17	1.3	21	1.2	25	1	31	0.8	50	0.6	74
140																	2.2	13	1.6	18	1.3	23	1.2	27	1	33	0.8	53	0.6	80
150																	2.2	14	1.6	19	1.3	24	1.2	29	1	35	0.8	57	0.6	86
160															2.5	13	2.2	15	1.6	21	1.3	26	1.2	31	1	38	0.8	61	0.6	92
170															2.5	14	2.2	16	1.6	22	1.3	28	1.2	33	1	40	0.8	65	0.6	97
180															2.5	15	2.2	16	1.6	23	1.3	29	1.2	35	1	43	0.8	69	0.6	103
190															2.4	15	2.2	17	1.6	24	1.3	31	1.2	37	1	45	0.8	73	0.6	109
200													2.8	14	2.4	16	2.2	18	1.6	26	1.3	32	1.2	39	1	47	0.8	76	0.6	114
210													2.8	15	2.4	17	2.2	19	1.6	27	1.3	34	1.2	41	1	50	0.8	80	0.6	120
220													2.8	16	2.4	18	2.2	20	1.6	28	1.3	36	1.2	43	1	52	0.8	84		
230													2.8	16	2.4	19	2.2	21	1.6	29	1.3	37	1.2	44	1	54	0.8	88		
240													2.8	17	2.4	19	2.2	22	1.6	31	1.3	39	1.2	46	1	57	0.8	92		
250													2.8	18	2.4	20	2.2	23	1.6	32	1.3	41	1.2	48	1	59	0.8	95		
260													2.8	18	2.4	21	2.2	24	1.6	33	1.3	42	1.2	50	1	62	0.8	99		
270											3.2	16	2.7	19	2.4	22	2.2	24	1.6	35	1.3	44	1.2	52	1	64	0.8	103		
280											3.2	17	2.7	20	2.4	23	2.2	25	1.6	36	1.3	45	1.2	54	1	66	0.8	107		
290											3.2	17	2.7	20	2.4	23	2.2	26	1.6	37	1.3	47	1.2	56	1	69	0.8	111		
300											3.2	18	2.7	21	2.4	24	2.2	27	1.6	38	1.3	49	1.2	58	1	71	0.8	115		
310											3.2	18	2.7	22	2.4	25	2.2	28	1.6	40	1.3	50	1.2	60	1	73	0.8	118		
320											3.2	19	2.7	22	2.4	26	2.2	29	1.6	41	1.3	52	1.2	62	1	76	0.8	122		
330											3.2	20	2.7	23	2.4	26	2.2	30	1.6	42	1.3	53	1.2	64	1	78	0.8	126		
340											3.2	20	2.7	24	2.4	27	2.2	31	1.6	44	1.3	55	1.2	66	1	80	0.8	130		
350											3.2	21	2.7	24	2.4	28	2.2	32	1.6	45	1.3	57	1.2	68	1	83	0.8	134		
360											3.2	21	2.7	25	2.4	29	2.2	33	1.6	46	1.3	58	1.2	70	1	85	0.8	137		
370											3.2	22	2.7	26	2.4	30	2.2	33	1.6	47	1.3	60	1.2	71	1	88	0.8	141		
380											3.2	22	2.7	26	2.4	30	2.2	34	1.6	49	1.3	62	1.2	73	1	90	0.8	145		
390											3.2	23	2.7	27	2.4	31	2.2	35	1.6	50	1.3	63	1.2	75	1	92	0.8	149		
400											3.2	24	2.7	28	2.4	32	2.2	36	1.6	51	1.3	65	1.2	77	1	95	0.8	153		
410									3.9	20	3.2	24	2.7	29	2.4	33	2.2	37	1.6	52	1.3	66	1.2	79	1	97				
420									3.9	20	3.2	25	2.7	29	2.4	34	2.2	38	1.6	54	1.3	68	1.2	81	1	99				
430									3.8	21	3.2	25	2.7	30	2.4	34	2.2	39	1.6	55	1.3	70	1.2	83	1	102				
440									3.8	21	3.2	26	2.7	31	2.4	35	2.2	40	1.6	56	1.3	71	1.2	85	1	104				
450									3.8	22	3.2	26	2.7	31	2.4	36	2.2	41	1.6	58	1.3	73	1.2	87	1	106				
460									3.8	22	3.2	27	2.7	32	2.4	37	2.2	41	1.6	59	1.3	75	1.2	89	1	109				
470									3.8	22	3.2	28	2.7	33	2.4	38	2.2	42	1.6	60	1.3	76	1.2	91	1	111				
480									3.8	23	3.2	28	2.7	33	2.4	38	2.2	43	1.6	61	1.3	78	1.2	93	1	114				
490									3.8	23	3.2	29	2.7	34	2.4	39	2.2	44	1.6	63	1.3	79	1.2	95	1	116				
500									3.8	24	3.2	29	2.7	35	2.4	40	2.2	45	1.6	64	1.3	81	1.2	97	1	118				