Appendix B

Selection of Temporary Soil Stabilization Controls

Temporary Soil Stabilization BMPs (SS BMPs) are designed to eliminate or reduce the erosion of disturbed soil areas and to reduce the transport of sediment and pollutants by stormwater during construction. SS BMPs are used to bind soil particles together, or coat the disturbed soil surface area, thereby protecting the disturbed soil area from the erosive forces of water and wind.

Section 3 of this Manual provides guidance on the selection, limitations, installation, and maintenance for approved SS BMPs. This appendix provides additional details for Field Staff and Contractors on relevant factors to consider for selecting appropriate products for project specific construction sites/areas.

Caltrans has approved six types of SS BMPs (Standard Specifications Section 13-5) listed below. These BMPs are to be applied to disturbed soil areas to eliminate or reduce erosion and the potential transport and discharge of sediment and other pollutants from Caltrans right-of-way. The SS BMPs listed as sub bullets are acceptable alternatives because they have the same general function. For example, when a project requires the use of Mulch (SS-3) both Temporary Hydraulic Mulch or Temporary Bonded Fiber Matrix Hydraulic Mulch can be used to meet the requirement.

- Mulch (SS-3)
  - Temporary Hydraulic Mulch
  - Temporary Bonded Fiber Matrix Hydraulic Mulch
- Temporary Hydroseed (SS-4)
- Soil Binders (SS-5)
  - Temporary Cementitious Binder Hydraulic Mulch
  - Temporary Soil Binder
- Temporary Tacked Straw (SS-6)
  - Temporary Tacked Straw
- Temporary Rolled Erosion Control Products (SS-7)
  - Temporary Erosion Control Blanket
  - Erosion Control Blanket
  - Temporary Covers
- Temporary Wood Mulch (SS-8)
  - Temporary Mulch

Subsection B.1 includes general factors that should be considered when the SS BMPs listed above may be selected. Subsection B.2 includes a flowchart and tables that will guide the user through the site evaluation to optimize the selection of SS BMPs for the specific construction area. Subsection B.3 includes some general description of sediment control BMPs, as they should be used in conjunction with SS BMPs to optimize BMP coverage and comply with Permit requirements.

B.1 – General factors to consider for maximizing usage of Temporary Soil Stabilization BMPs

Understanding the characteristics of a construction site/area, including how it will impact stormwater and how stormwater will impact it, is important for SS BMP planning and selection. The following characteristics must be considered before selecting a SS BMP(s).

- Preparing soil to optimize SS BMP effectiveness
  - The proper application of SS BMPs can be improved by ensuring that the area(s) that will receive SS BMPs have adequate soil preparation, whether it is track walking the slope, imprinting, or using soil amendments, or to ensure long-term vegetation sustainability having seed testing done prior to seeding the area. These techniques, in conjunction with the selection of correct SS BMP, can prevent sediment-laden discharges, reduce the need for continuous maintenance, and increase establishment of permanent vegetative cover.
- Proper Timing for application of SS BMPs
  - Consider the timing of construction as it relates to the seasonal distribution of erosive rainfall and the climate regime that the construction site/area is located in. Large areas of California are located in a Mediterranean climate regime where summers are hot and dry and winters are cool and rainy. Simply timing the application of stabilization measures prior to the beginning of the rainy season in late fall makes a significant difference in erosion and sediment delivery rates. Construction during a period of high erosive potential requires a much shorter bare soil period and will influence the choice of sediment controls. Those sediment controls that provide instant protection will be preferred over those requiring germination and establishment of vegetation.
- Determining the Specific Soil Erosivity Potential
  - A proper evaluation of the soil erosive potential and sediment delivery rates for the project specific construction site/area during the planned construction period is crucial to preventing both multiple applications of SS BMPs and sediment-laden discharges. Caltrans has a variety of tools available, from their refined RUSLE, which conform to Caltrans construction sites and is more user friendly, to the Caltrans Landscape Architecture Toolbox which can be accessed via http://www.dot.ca.gov/hq/LandArch/16_la_design/guidance/roadside_safety_tb/index.htm . The RUSLE assessment and the Landscape Toolbox can be used to evaluate soil conditions, erosivity potential, and proposed soil stabilization concepts for any construction sites/areas, even those that are less than an acre in size, and not subject to CGP or LTCGP.

B.2 Site Evaluation

The following flowchart and tables are an abridged and modified summary of the *Guidance for Temporary Soil Stabilization* (July 2003) and it is intended to be used to determine the most appropriate SS BMP to be deployed. All steps shown in Figure B-1 must be completed.

Step 1 – Start.

The Construction Field Staff or Contractor should use Figure B-1, the guidance provided in this section, and the tables that follow to determine the best option to stabilize the project specific construction site/area.

Continue to the next step.

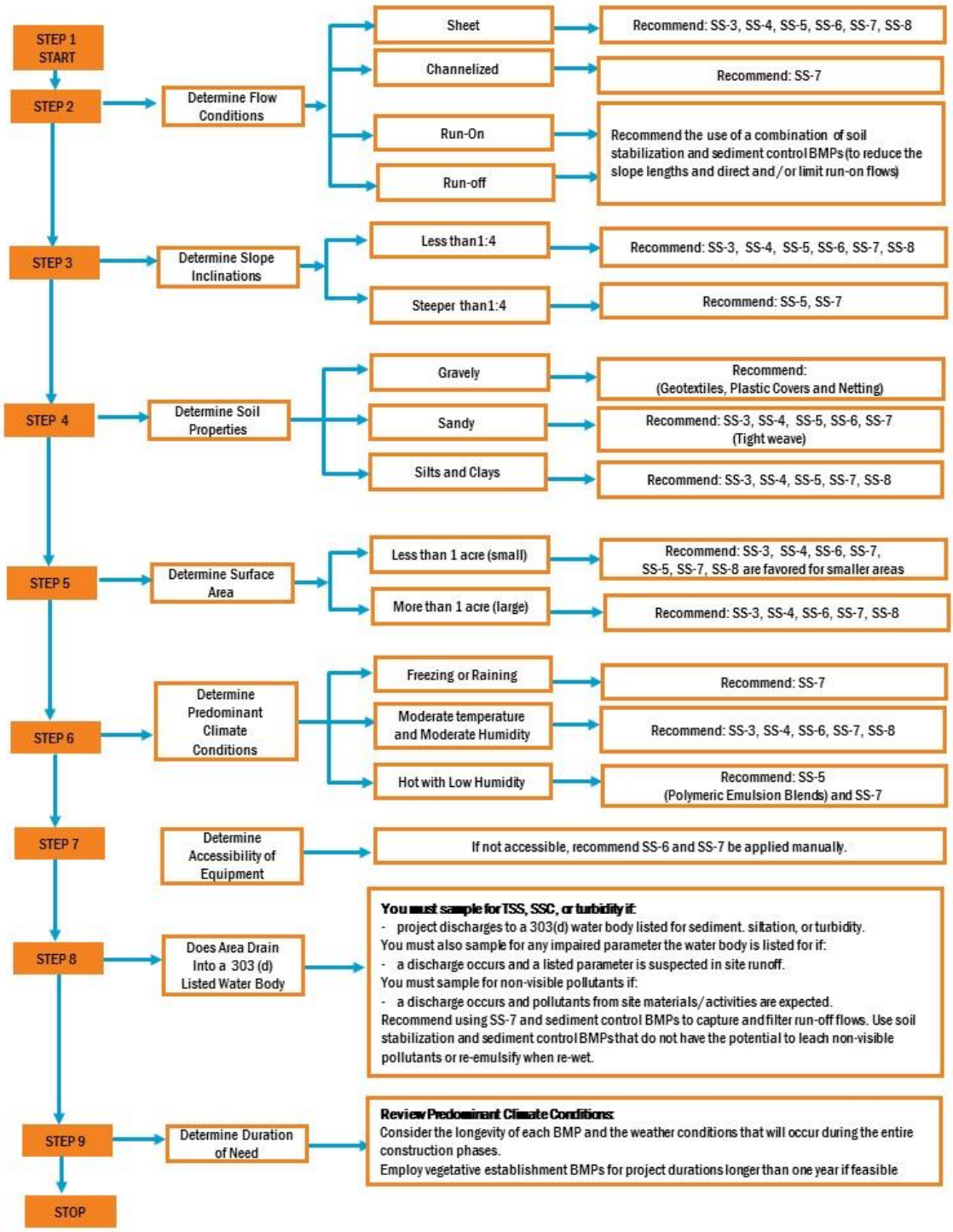

Figure B-1. Consideration of Temporary SS BMPs

Step 2-Assess the flow conditions for the area that will receive the SS BMP.

- Sheet Flow
- Channelized Flow
- Run-on Flow
- Run-off Flow

As velocities increase, the options for SS BMPs decrease. Areas that will receive direct run-on or run-off must be hydraulically evaluated to ensure there will be no additional sediment deposition. It is recommended to use a combination of SS BMPs and Temporary Sediment Control BMPs (SC BMPs) to control impacts due to run-on or run-off.

There are specific inspection requirements in the CGP or the LTCGP that must be complied with and documented by the QSP or QSD as noted in the flowchart.

Continue to the next step.

Step 3-Assess the Slope Inclination and Slope Length of area that will receive the SS BMP.

- Less than 1:4 (V:H)
- Greater than 1:2 (V:H)

The slope length is measured or calculated along the continuous inclined surface. A discrete slope can be measured between the following criteria:

- From the top of the slope to the toe of the slope (if there are no benches[1])
- From the top of the slope to the bench directly below within the slope.
- From a bench within the slope to the bench directly below within the slope.
- The lowest bench within the slope to the toe of the slope.

Continue to the next step.

Step 4-Assess the soil properties and erodibility for the area that will receive the SS BMP

Soil properties relate to available soil moisture, available soil nutrients for plant growth, and depth and presence of rock fragments that hinder temporary and permanent seeding establishment. When choosing temporary measures on various soils, the larger concern is the erosion potential (erodibility) of the soil.

soil erosion rates can be predicted by RUSLE2 on construction sites/areas. RUSLE2 uses USDA Soil Survey data which contains the soil erodibility or K factor for all mineral soils. RUSLE2 requires a K factor to run so in cases where the soil has been disturbed or when no soil K factors range from 0.01 to 0.64. The higher the k the higher the potential erosion rate.

Table B.2-1 provides the soil properties in relation to the Unified Soil Classification and USDA Texture.

[1] *A bench is a drainage feature or a Temporary Sediment Control BMP that intercepts surface flow and conveys the resulting concentrated flow away from the slope.*

Table B.2-1 Soil properties						
	GC	0.17	Low	-	D	Highest
	GC	0.24	Moderately Low	-	D	Highest
	GC-GM	0.2	Low	-	C	Moderately High
	GC-GM	0.28	Moderately Low	-	C	Moderately High
	GC-GM	0.2	Low	-	A	Lowest
	GC-GM	0.05	Very Low	-	A	Lowest
	GW	0.02	Very Low	-	A	Lowest
	GP	0.05		-		
	GP-GC	0.2	Low	-	C	Moderately High
	GP-GC	0.28	Moderately Low	-	C	Moderately High
	GP-GM	0.15	Low	-	B	Moderately Low
	GP-GM	0.2	Low	-	B	Moderately Low
	GW-GM	0.24	Moderately Low	-	C	Moderately High
	GW-GM	0.32	Moderate	-	C	Moderately High
	GW-GC	0.15	Low	-	D	Highest
	GW-GC	0.2	Low	-	D	Highest
	GW-GM	0.24	Moderately Low	-	C	Moderately High
	GW-GM	0.32	Moderate	-	C	Moderately High
	CH	0.32	Moderate	0.17	D	Highest
	CH	0.32	Moderate	0.11	D	Highest
	CH	0.28	Moderate	0.16	D	Highest
	CI	0.32	Moderate	0.23	C	Moderately High
	CL	0.24	Moderate	0.18	C	Moderately High
	CL	0.37	Moderately High	0.29	D	Highest
	CL	0.28	Moderate	0.18	C	Moderately High
	CL	0.32	Moderate	0.26	D	Highest
	CL	0.37	Moderately High	0.29	C	Moderately High
	MI	0.32	Moderate	0.38	C	Moderately High
	ML	0.24	Moderate	0.29	C	Moderately High
	ML	0.37	Moderately High	0.43	D	Highest
	ML	0.28	Moderate	0.35	D	Highest
	ML	0.32	Moderate	0.4	D	Highest
	ML	0.37	Moderately High	-	D	Highest
	SM	0.17	Low	0.13	A	Lowest
	SM	0.2	Low	-	A	Lowest

	SM	0.19	Low	-	A	Lowest
	SM	0.2	Low	-	A	Lowest
	SW-SP	0.15	Low	0.069	A	Lowest
	SW	0.11	Low	-	A	Lowest
	SW	0.11	Low	-	A	Lowest
	SW-SC, SP-SC	0.32	Moderate	0.18	C	Moderately High
	SW-SC, SP-SC	0.24	Moderate	0.13	C	Moderately High
	SW-SC, SP-SC	0.37	Moderately High	0.23	D	Highest
	SW-SC, SP-SC	0.28	Moderate	0.2	C	Moderately High
	SW-SC, SP-SC	0.32	Moderate	0.16	D	Highest
	SW-SC, SP-SC	0.37	Moderately High	-	C	Moderately High
	SW-SM, SP-SM	0.24	Moderate	0.33	B	Moderately Low
	SW-SM	0.33	Moderate	-	B	Moderately Low
	SW-SM	0.33	Moderate	-	B	Moderately Low
	SW-SM, SP-SM	0.28	Moderate	0.35	C	Moderately High
	SW-SM, SP-SM	0.2	Low	0.23	B	Moderately Low
	SW-SM, SP-SM	0.24	Moderate	0.3	C	Moderately High
	SW-SM, SP-SM	0.28	Moderate	-	B	Moderately Low
	SW-SM	0.33	Moderate	-	B	Moderately Low
	MI	0.57	Very High	0.57	C	Moderately High
	MI, CI	0.37	Moderately High	0.42	C	Moderately High
	ML, CL	0.28	Moderate	0.33	C	Moderately High
	ML, CL	0.43	Moderately High	-	C	Moderately High
	ML, CL	0.43	Moderately High	0.47	D	Highest
	ML, CL	0.37	Moderately High	0.44	D	Highest
	ML, CL	0.32	Moderate	0.39	C	Moderately High
	CI	0.28	Moderate	0.18	D	Highest
	CL	0.32	Moderate	0.18	D	Highest

	CL	0.28	Moderate	0.17	D	Highest
	CL	0.37	Moderately High	0.29	C	Moderately High
	CL	0.28	Moderate	0.2	C	Moderately High
	CI	0.43	Moderately High	-	C	Moderately High
	CL	0.43	Moderately High	0.33	D	Highest
	CL	0.32	Moderate	0.26	C	Moderately High
	CL	0.37	Moderate	0.29	D	Highest

Continue to the next step.

Step 5-What is the total surface area that will receive the SS BMP

Surface area is the amount of disturbed soil area on the construction site/area that will require protection from erosion with various SS BMPs. Surface area categories are grouped in the following way:

- Small: 1 acre or less
- Large: 1 acre or more

In order to maximize effectiveness, the field staff must ensure that the surface area to be stabilized is adequate for the stabilization crew to complete their application prior to onset of rain, and can be accessed as discussed in steps below

Continue to the next step.

Step 6-What is the Predominant Climate Atmospheric Condition on the day the soil stabilization will be installed

Atmospheric conditions on the day of installation can limit the type of BMP that can be applied to the disturbed soil area because some SS BMPs are not effective in extreme weather conditions such as snow or heat. Other BMPs may require drying times and should not be applied to slopes while it is raining. Climate variations are caused primarily by distance from the coast and elevation. When selecting SS BMPs consider the temperature ranges, frequency and intensity of rainfall, wind, and humidity.

Continue to the next step.

Step 7- Any issues with Accessibility of Equipment

The accessibility of equipment refers to whether a road or pad capable of supporting equipment for applying SS BMPs is within range of the disturbed soil area. If the construction site/area does not have vehicular access, only SS BMPs applied manually are applicable.

Continue to the next step.

Step 8-Where is the site discharging to, any 303(d) Listed Water Bodies?

Within the Clean Water Act regulations, Section 303(d) listed water bodies that are impaired by various pollutants and are designated for developing Total Maximum Daily Loads (TMDLs). If a construction site drains into a Section 303(d) listed water body, understanding and meeting the required TMDL is essential for compliance.

It is essential to understand site run-off dynamics and control needs. The limitations of the SS BMPs, with respect to their potential water quality impacts, must be clearly understood. Proper selection and installation of SS BMPs can facilitate compliance by eliminating pollutants that discharge into Section 303(d) listed water bodies.

Continue to the next step.

Step 9- What is the duration of need?

The timeframe for which SS BMPs are needed will depend on the construction schedule and has a direct correlation to the longevity of the temporary SS BMP selected. Longevity ranges are typically:

- Less than 3 months
- Between 3 and 12 months
- Greater than 12 months
  - Stop.

Construction site/area characteristics applicable to the SS BMPs are provided in Table B.2.2 while the timing and cost associated with the SS BMPs are provided in Table B.2.3.

Hydraulic Mulch	NA	Biodegradable	Sheet	1:2	large	A	B	C,D	3 to 12 months	87%	0.0039
Hydraulic Matrix	NA	Biodegradable				A	B	C,D	Less than 3 months	88%	0.0039
Bonded Fiber Matrix	NA	Biodegradable				A	B	C,D	3 to 12 months	91%	0.0039
Mechanically Bonded Fiber Matrix	NA	Biodegradable and Photodegradable				A	B	C,D	Greater than 12 months	90%	0.0058
Hydroseed (standalone)	NA	NA		1:3	small to large	A	B	D		17%	N/A
Hydroseed with Hydraulic Mulch	NA	NA		1:2		A	B	C		84%	0.0058
Hydroseed with Soil Binder	NA	NA				A	B	C		28%	0.023
Hydroseed with Straw Mulch Integrated	NA	NA				A	B	D		90%	0.008
Hydroseed - Straw Mulch and Soil Binder	NA	NA				A	B	C,D		91%	0.008
Hydroseed with Rolled Erosion Control Products	NA	NA	Channelized and Sheet	1:1	small	A	E	D		84%	0.0015
Guar	NA	Plant-Based Material (Short Lived)	Sheet	1:2	large	A	B	C,D	Less than 3 months	80%	0.046
Starch	NA					A	B	C,D		25%	0.046
Psyllium	NA					A	B	C,D	Between 3 and12 months	30%	0.023
Pitch & Rosin Emulsion	NA	Plant-Based Material (Long Lived)				A	B	C,D		70%	0.017
Liquid Polymers of Methacrylates& Acrylates	NA	Polymeric Emulsion Blends				A	B	C,D	Less than 3 months	unrated	unrated

Copolymers of Sodium Acrylates & Acrylamides	NA					A	B	C,D		unrated	unrated
Poly-Acrylamides & Copolymer of Acrylamides	NA		Sheet	1:2		A	B	C,D	Between 3 and12 months	30-60%	0.017
Hydro-Colloid Polymers	NA					A	B	C,D		unrated	unrated
Acrylic Copolymers & Polymers	NA					A	B	C,D	Greater than 12 months	unrated	unrated
Gypsum	NA	Cementitious-Based Binders				A	B	C,D	Between 3 and 12 months	80%	0.017
Wheat, Rice, or Barley	Integrated	NA			small to large	A	B	D		89%	0.008
	Soil Binder	NA				A	B	C,D		89%	0.008
	RECP	NA			small	A	E	D		89%	0.008
Geotextiles[2] - Woven	NA	Non-Biodegradable	Channelized and/or Sheet	1:1		all[F]	E	D		92%	0.0013
Plastic Covers[2] - Rolled Plastic Sheeting	NA	Non-Biodegradable				all[F]	E	D		98%	0.002
Plastic Mesh	NA					all[F]	E	D	Greater than 12 months	92%	0.0013
Erosion Control Blankets - Jute	NA	Biodegradable				all[F]	E	D	Between 3 and 12 months	65%	0.0039
Erosion Control Blankets - Straw Blanket	NA					all[F]	E	D		80%	0.008
Erosion Control Blankets - Coconut Fiber Blanket	NA			1:1.5		all[F]	E	D	Greater than 12 months	85%	0.0015
Erosion Control Blankets - Coconut Fiber Mesh	NA					all[F]	E	D		70-85%	0.0015

Erosion Control Blankets - Straw Coconut Fiber Blanket	NA					all[F]	E	D		85%	0.003
Erosion Control Blankets - Wood Fiber Blanket	NA	Biodegradable and Photodegradable	Sheet	1:2		all[F]	E	D	Between 3 and 12 months	80%	0.0019
Erosion Control Blankets - Excelsior (Curled Wood Fiber)	NA		Sheet	1:2		all[F]	E	D		70%	0.0019
Erosion Control Blankets - Biodegradable Fibers with Synthetic Netting	NA			1:1.5		all[F]	E	D	Greater than 12 months	80%	0.0019
Mats[(3)] - Biodegradable Fibers with Synthetic Netting	NA	Non-Biodegradable	Channelized and/or Sheet	1:1.5		all[F]	E	D		85%	0.0039
Mats[(3)] - Synthetic Fiber with Synthetic Netting	NA			1:1		all[F]	E	D		85%	0.0013
Mats[(3)] - Bonded Synthetic Fibers	NA			1:1	Small	all[F]	E	D		85%	0.0013
Compost/Recycled Green Material	NA	NA	Sheet	1:3		A	B, E	C,D	Between 3 and 12 months	67%	0.0069
Shredded Wood/Bark	NA	NA		1:3		A	B, E	C,D		71%	0.0023

Reference: *Guidance for Temporary Soil Stabilization (Caltrans, 2003)*

NA – Not Applicable

(1): Conservative Maximum Slope Inclination (V:H) recommended by Caltrans for product applicability, manufacturer may recommend greater slope inclinations

(2): Are not applicable with hydroseeding. Plastic materials should not be used for more permanent applications, near ESAs, or where prohibited by regulatory permits.

(3): Using hydroseed with turf reinforcement mats in channelized flow situations may have limited success due to potentially turbulent flows.

(4): Source RUSLE2 database value for product or RUSLE2 run comparing product to bare soil condition.

(5): Source RUSLE2 database value for product.

A: The BMP cannot be applied during a storm event or freezing conditions. Avoid applying in strong winds and over spraying.

B: The disturbed soil area must be accessible to equipment.

C: If disturbed soil area drains to 303(d) listed water body, potential non-visible pollutant.

D: If disturbed soil area drains to 303(d) listed water body, potential pollutants if breach or malfunction occurs.

E: The product is applied manually; therefore, road or pad proximity limitations do not affect their applicability.

F: May be difficult to insert pins into frozen ground.

G: Data obtained from the URS Greiner Woodward Clyde, Soil Stabilization for Temporary Slopes, 1999

Hydraulic Mulch	3-7	4[1]	1 to 2	900 - 1,300
Hydraulic Matrix	3-7	4[1]	1 to 2	900 - 1,300
Bonded Fiber Matrix	3-7	4[1]	1 to 2	5,000 - 6,500
Mechanically Bonded Fiber Matrix	3-7	4[1]	1 to 2	5,000 - 6,500
Stand Alone	3-14	4[1]	28[M]	870 - 2,170
Hydraulic Mulch	3-14	4[1]	28[M]	2,170 – 3,470
Soil Binder	3-14	4[1]	28[M]	1,570 – 3,670
Straw Mulch	3-14	6[2]	28[M]	2,670 – 4,270
Straw Mulch and Soil Binder	3-14	10[3]	28[M]	3,370 – 5,770
Rolled Erosion Control Products	3-14	43[4]	28[M]	6,870 – 57,170
Guar	3-7	4[1]	12 - 18[M]	700 - 900
Starch	3-7	4[1]	9 - 12[M]	700 - 900
Psyllium	3-7	4[1]	12 – 18[M]	700 - 900
Pitch & Rosin Emulsion	3-7	4[1]	19 - 24[M]	1,200 -1,500
Liquid Polymers of Methacrylates & Acrylates	7-14	4[1]	12 - 18[M]	700 - 1,500
Copolymers of Sodium Acrylates & Acrylamides	7-14	4[1]	12 - 18[M]	700 - 1,500
Poly-Acrylamides & Copolymer of Acrylamides	7-14	4[1]	4 - 8[M]	700 - 1,500
Hydro-Colloid Polymers	7-14	4[1]	0 - 4[M]	700 - 1,500
Acrylic Copolymers & Polymers	3-7	4[1]	36 - 48[M]	700 - 1,500
Gypsum	3-7	4[1]	4 – 8[M]	800 - 1,200

Table B.2-3 – Time and Cost Associated with Temporary Soil Stabilization BMPs					
Wheat, Rice, or Barley	integrated	3-5	2[1]	ASAA	1,800 - 2,100
	soil binder	3-5	6[5]	1 to 2	2,500 – 3,600
	Rolled Erosion Control Product	3-5	106[6]	ASAA	6,800 – 8,600
Woven		3-5	15[1, 7]	ASAA	12,000 - 28,000
Rolled Plastic Sheeting		3-5	15[1, 7]	ASAA	0.19 – 0.28 ($/ft2)
Plastic Netting		7-14	15[1, 7]	ASAA	5,000 - 6,500
Plastic Mesh		7-14	15[1, 7]	ASAA	3,000 -3,500
Jute		3-5	15[1, 7]	ASAA	6,000 - 7,000
Straw Blanket		3-5	15[1, 7]	ASAA	8,000 - 10,500
Coconut Fiber Blanket		3-5	15[1, 7]	ASAA	13,000 - 14,000
Coconut Fiber Mesh		3-5	15[1, 7]	ASAA	30,000 - 33,000
Straw Coconut Fiber Blanket		3-5	15[1, 7]	ASAA	10,000 - 12,000
Wood Fiber Blanket		3-5	15[1, 7]	ASAA	8,000 - 10,500
Excelsior (Curled Wood Fiber)		3-5	15[1, 7]	ASAA	8,000 - 10,500
Biodegradable Fibers with Synthetic Netting		7-14	15[1, 7]	ASAA	30,000 - 36,000
Biodegradable Fibers with Synthetic Netting		7-14	39[1, 7]	ASAA	30,000 - 36,000
Synthetic Fiber with Synthetic Netting		7-14	39[1, 7]	ASAA	34,000 - 40,000
Bonded Synthetic Fibers		7-14	39[1, 7]	ASAA	45,000 - 55,000
Compost/Recycled Green Material		3-5	130[1]	ASAA	900 - 1,200
Shredded Wood/Bark		3-5	130[1]	ASAA	4,000 - 9,000

Reference: *Guidance for Temporary Soil Stabilization (Caltrans, 2003)*

ASAA- As soon as applied

(1): Assumes a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Actual installation time may vary depending on location and field conditions.

(2): Assumes installation of hydroseed is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Followed by the application of straw mulch that is bound to the soil by integration (crimped or punched). Also, assumes that the straw mulch is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Actual installation time may vary depending on location and field conditions.

(3): Assumes the application (first pass) of the hydroseed is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Followed by the application of straw mulch (second pass) that will be bound together by a soil binder. Assumes the straw mulch is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Followed by the application of the soil binder (third pass). Assumes the application of the soil binder is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Actual installation time may vary depending on location and field conditions.

(4): Assumes the application of the hydroseed is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Assumes the application of the rolled erosion control product is done by a 2-man crew. Actual installation time may vary depending on location and field conditions.

(5): Assumes the straw mulch (first pass) is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Followed by the application of the soil binder (second pass). Assumes the application of the soil binder is done by a 2-man crew with one 3000-gallon water truck (or access to water) that can cover 2 acres per day. Actual installation time may vary depending on location and field conditions.

(6): Assumes the straw mulch (first pass) is applied by a 6-man crew with 2 straw blowers that can cover 4 acres per day. Assumes the application of the rolled erosion control product is done by a 2-man crew. Actual installation time may vary depending on location and field conditions.

(X): Data obtained from the Caltrans, Erosion Control Manual (Draft), Training Materials, 2003

(Y): Data obtained from the URS Greiner Woodward Clyde, Soil Stabilization for Temporary Slopes, 1999.

(Z): Data obtained from RS Means, site work and Landscape Cost Data, 22nd ed. 2003

For current cost estimates for soil stabilization methods, the Caltrans Landscape Architecture Toolbox should be reviewed at: http://www.dot.ca.gov/hq/LandArch/16_la_design/guidance/roadside_safety_tb/index.htm

B.3 Additional BMPs Used with SS BMPs

SS BMPs are more effective when used in conjunction with Temporary Sediment Control BMPs (SC BMPs) and other SS BMPs. To properly stabilize slopes and remove sediment from stormwater, other conditions must be addressed such as, directing and/or slowing concentrated flow, reducing slope lengths, and capturing sediment entrained in stormwater. Therefore, it is required that SS BMPs and SC BMPs are used in conjunction to comply with the General Construction Permit rules regarding erosion and sediment control.

Slope inclination and slope length are the most important factors affecting the installation of combined stabilizations BMPs and SC BMPs, as these factors have the largest potential impact on erosion rates. A combined increase in slope inclination and slope length will require an increase in the use of SS BMPs and SC BMPs.

To limit the erosive effects of stormwater flow the slope lengths shall be broken up with SC BMPs such as fiber rolls or gravel bags as follows:

- If the slope inclination is 1:4 (V:H) or flatter, break up the slope length with sediment control BMPs at intervals no greater than 20 feet.
- If the slope length is between 1:4 (V:H) and 1:2 (V:H), break up the slope length with sediment control BMPs at intervals no greater than 15 feet.
- If the slope inclination is 1:2 (V:H) or greater, break up the slope length with sediment control BMPs at intervals no greater than 10 feet.

Listed below are the SC BMPs applied to compliment the SS BMPs that cover or bind the soil of the disturbed soil areas (Standard Specifications 13-6 and 13-10). The information below also includes a brief explanation of their purpose and applications. Refer Section 4 of this Manual for details regarding the Limitations, Standards and Specifications, and design of SC BMPs. SC BMPs are implemented on a project-by-project basis and with other SS BMPs.

- Temporary Earthen Berm
- Temporary Silt Fences
- Temporary Reinforced Silt Fences
- Temporary Large Sediment Barrier
- Temporary Check Dams
- Temporary Straw Bale Barrier
- Temporary Drainage Inlet Protection
- Temporary Fiber Rolls
- Temporary Gravel Bag Berms
- Compost Socks
- Flexible Sediment Barriers