

Memorandum

*Serious drought.
Help save water!*

To: DIRECTOR
CHIEF DEPUTY DIRECTOR
DEPUTY DIRECTORS
DISTRICT DIRECTORS
DIVISION CHIEFS

Date: July 15, 2016

From: 
TIMOTHY CRAGGS
Chief
Division of Design

Subject: **IMPLEMENTATION OF ROCK SLOPE PROTECTION (RSP) DESIGN**

Following an audit by FHWA, the Caltrans Bank and Shore Protection Committee formally adopted new RSP guidelines with a modified version of Hydraulic Engineering Circular (HEC) 23 gradations. New RSP guidelines are available in Chapter 870 and Chapter 880 (new Chapter) of the Highway Design Manual (HDM). In addition, Headquarters Office Engineer has posted a Revised Standard Specification (RSS) and new BEES item codes for Section 72-2 "Rock Slope Protection". A new Chapter 880 published simultaneously with this update covers coastal and inland lakes locations with the primary focus on quantifying exposure of these locations to sea level rise, storm surge, and wave action.

Benefits include:

- Consistency between comprehensive FHWA guidance documents (i.e., HEC 23 & HEC 25), NCHRP's for bio-technical methods, Caltrans guidance documents (HDM & Design Information Bulletin No. 87 for Hybrid RSP) and Caltrans specifications
- Smaller cross section in some cases minimizing impacts to streams
- Nationwide consistency between states and federal contracts

All new projects that include RSP starting August 1st, 2016 shall be designed using the new guidelines and gradations. Additionally, current projects not already at the 30 percent PS&E stage shall be designed using the new guidelines and gradations. All other current projects may continue to use the California Bank and Shore (CaBS) RSP layered design methodology and existing Standard Specifications and BEES item codes.

If you have any questions, please contact Steve Thorne (Acting) Chief, Office of Highway Drainage and Stormwater Design at (916) 653-1302, or Paul Davies at (916) 653-3718.

Attachments

c: JBenton
SThorne
PDavies

PROPOSED REVISION TO THE HIGHWAY DESIGN MANUAL

[Submit Completed Form & Attachments to: Chief of the Office of Standards and Procedures, HQ Division of Design; Mail Station (MS) 28 or via E-mail.]

PROPOSED BY: Paul Davies

May, 2016

Headquarters/Design

916-653-3718

CHAPTER NUMBER(S): 870

SUBJECT/TOPIC: **Bank Protection**

PROPOSED CHANGE/REVISION:

Major Chapter update to incorporate following changes/revisions:

- Chapter renamed and shore and coastal references removed
- New discussions on geomorphology, stream processes, bio-diversity and sustainability
- California Bank and Shore (CaBS) rock slope protection design methodology replaced by HEC No 23 guidance: FHWA Hydraulic Engineering Circular No. 23 (HEC No. 23) presents guidelines for RSP for a range of applications, including: RSP on streams and river banks, bridge piers and abutments, and bridge scour countermeasures such as guide banks and spurs.

REASON(S):

- To shift focus entirely on riverine streams and natural channels because roadside channels are covered in Chapter 860.
- A new Chapter 880 published simultaneously with this update covers coastal and inland lakes locations with the primary focus on quantifying exposure of these locations to sea level rise, storm surge, and wave action.
- Following an audit by FHWA, new RSP guidelines were formally adopted by the Caltrans Bank and Shore Protection Committee with a modified version of HEC No. 23 gradations. See Tables 873.3A and 873.3B and HEC No. 23, Volume 1, Chapter 5 and Design Guideline 4, 5, 11, 12, 15 and 16 from Volume 2.

If additional space is needed, please attach additional sheets.

Please attach any documentation that would support the proposal and edited HDM pages as appropriate

(For internal office use only)

RECOMMENDED ACTION: _____ PROCEED WITH PREPARATION OF DRAFT REVISION
(Initials)

_____ Yes [Attach edited HDM pages per "Guidance & Protocols for Editing the HDM."]

_____ No [Attach explanation and preliminary proposal.]

_____ DESIGN REVIEW & COMMENT OF DRAFT

_____ REVIEWED & COMMENTED ON BY OTHERS CIRCLED BELOW:

• Legal • Traffic Ops • FHWA

• Maintenance • Environmental

• Others: _____

Memorandum

*Serious Drought!
Help Save Water!*

To: **CORY BINNS**
Interim Deputy Division Chief
Office Engineer
Division of Engineering Services
Attn: Mohsen Sultan, Chief – Office of Construction Contract Standards

Date: June 28, 2016

File: RSS Section 72

From: **Bruce D. Swanger**
Section 72 Owner
Office of Highway Drainage and Stormwater Design

Subject: **SPECIFICATION PUBLICATION REQUEST FOR THE 2010 & 2015 STANDARDS OF RSS SECTION 72 "SLOPE PROTECTION".**

I request the publication of the documents shown in the following table:

Document	Description
2010 RSS 72	Standard specifications for subsection 72, "Slope Protection"
2015 RSS 72	Standard specifications for subsection 72, "Slope Protection"

Concurrence for the referenced documents was provided from these mandatory stakeholders:

1. Jean Mazur, FHWA
2. Denise E. Zuniga, Legal
3. Chuck Suszko, Construction
4. Mohsen Sultan, Office Engineer (OCCS)

As a Section 72, "Slope Protection", specification owner, I certify that for the subject specifications meets with the following:

1. Technical content is complete and accurate.
2. Mandatory stakeholders have concurred with the attached version.
3. Comments from non-mandatory stakeholders and Department and external experts have been carefully examined and incorporated as appropriate.
4. A proprietary product is not specified.

Background:

Following an audit by FHWA, the Caltrans Bank and Shore Protection Committee formally adopted new RSP guidelines with a modified version of HEC No. 23 gradations.

Guidance:

New RSP guidelines are available in Chapter 870 and Chapter 880 (new Chapter) of the Highway Design Manual.

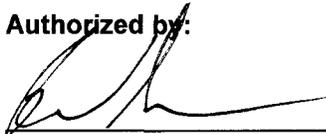
Priority:

We would appreciate it if they could be published in the next quarterly cycle for July 2016.

Additional Comments:

Office Engineer – Office of Construction Contract Standards contact for development of subject specifications is Dwight Manlulu, 916/227-6237. If you have any questions regarding this request, please contact Paul Davies, of my staff at 916/653-3718 or via e-mail.

Authorized by:



Bruce D. Swanger

6/28/2016

Date

Attachments:

2010 & 2015 RSS 72
Mandatory concurrences referenced above
Specification Seal for 2010 & 2015 RSS 72

Specification Owner's Seal:

2010 & 2015 RSS 72 meets with Caltrans Departmental Standards.


Registered Civil Engineer

6/28/2016
Date



Replace the 1st and 2nd paragraphs of section 72-2.02A with:

For method A and B placement and the class of RSP described, comply with the rock gradation shown in the following table:

Rock Gradation

Nominal RSP class by median particle diameter ^b		Nominal median particle weight W ₅₀ ^{c,d}	d ₁₅ ^c (inches)		d ₅₀ ^c (inches)		d ₁₀₀ ^c (inches)	Placement
Class ^a	Diameter (inches)		Min	Max	Min	Max	Max	Method
I	6	20 lb	3.7	5.2	5.7	6.9	12.0	B
II	9	60 lb	5.5	7.8	8.5	10.5	18.0	B
III	12	150 lb	7.3	10.5	11.5	14.0	24.0	B
IV	15	300 lb	9.2	13.0	14.5	17.5	30.0	B
V	18	1/4 ton	11.0	15.5	17.0	20.5	36.0	B
VI	21	3/8 ton	13.0	18.5	20.0	24.0	42.0	A or B
VII	24	1/2 ton	14.5	21.0	23.0	27.5	48.0	A or B
VIII	30	1 ton	18.5	26.0	28.5	34.5	48.0	A or B
IX	36	2 ton	22.0	31.5	34.0	41.5	52.8	A
X	42	3 ton	25.5	36.5	40.0	48.5	60.5	A
XI	46	4 ton	28.0	39.4	43.7	53.1	66.6	A

^aFor RSP Classes I–VIII, use Class 8 RSP fabric. For RSP Classes IX–XI, use Class 10 RSP fabric.

^bIntermediate or B dimension (i.e., width) where A dimension is length and C dimension is thickness.

^cd%, where % denotes the percentage of the total weight of the graded material.

^dValues shown are based on the minimum and maximum particle diameters shown and an average specific gravity of 2.65. Weight will vary based on specific gravity of rock available for the project.

Replace the table in section 72-2.02B with:

Fabric Class

Class	Largest rock gradation class used in slope protection
8	Classes I–VIII
10	Classes IX–XI

Replace the 1st paragraph of section 73-3.02B with:

Rocks for concreted-rock slope protection must comply with the gradation shown in the following table:

Concreted-Rock Gradation

Nominal RSP class by median particle diameter ^b		Nominal median particle weight W ₅₀ ^{c,d}	d ₁₅ ^c		d ₅₀ ^c		d ₁₀₀ ^c
Class ^a	Size (inches)		Min	Max	Min	Max	Max
I	6	20 lb	3.7	5.2	5.7	6.9	12.0
II	9	60 lb	5.5	7.8	8.5	10.5	18.0
III	12	150 lb	7.3	10.5	11.5	14.0	24.0
V	18	1/4 ton	11.0	15.5	17.0	20.5	36.0
VII	24	1/2 ton	14.5	21.0	23.0	27.5	48.0

^aUse Class 8 RSP fabric.

^bIntermediate or B dimension (i.e., width) where A dimension is length and C dimension is thickness.

^cd%, where % denotes the percentage of the total weight of the graded material.

^dValues shown are based on the minimum and maximum particle diameters shown and an assumed specific gravity of 2.65. Weight will vary based on specific gravity of rock available for the project.

Replace the table in section 72-3.03E with:

Minimum Concrete Penetration

	Rock class				
	VII	V	III	II	I
Penetration (inches)	18	14	10	8	6

Replace the 1st and 2nd paragraphs of section 72-2.02B with:

For method A and B placement and the class of RSP described, comply with the rock gradation shown in the following table:

Rock Gradation

Nominal RSP class by median particle diameter ^b		Nominal median particle weight W ₅₀ ^{c,d}	d ₁₅ ^c (inches)		d ₅₀ ^c (inches)		d ₁₀₀ ^c (inches)	Placement
Class ^a	Diameter (inches)		Min	Max	Min	Max	Max	Method
I	6	20 lb	3.7	5.2	5.7	6.9	12.0	B
II	9	60 lb	5.5	7.8	8.5	10.5	18.0	B
III	12	150 lb	7.3	10.5	11.5	14.0	24.0	B
IV	15	300 lb	9.2	13.0	14.5	17.5	30.0	B
V	18	1/4 ton	11.0	15.5	17.0	20.5	36.0	B
VI	21	3/8 ton	13.0	18.5	20.0	24.0	42.0	A or B
VII	24	1/2 ton	14.5	21.0	23.0	27.5	48.0	A or B
VIII	30	1 ton	18.5	26.0	28.5	34.5	48.0	A or B
IX	36	2 ton	22.0	31.5	34.0	41.5	52.8	A
X	42	3 ton	25.5	36.5	40.0	48.5	60.5	A
XI	46	4 ton	28.0	39.4	43.7	53.1	66.6	A

^aFor RSP Classes I–VIII, use Class 8 RSP fabric. For RSP Classes IX–XI, use Class 10 RSP fabric.

^bIntermediate or B dimension (i.e., width) where A dimension is length and C dimension is thickness.

^cd%, where % denotes the percentage of the total weight of the graded material.

^dValues shown are based on the minimum and maximum particle diameters shown and an average specific gravity of 2.65. Weight will vary based on specific gravity of rock available for the project.

Replace the table in section 72-2.02C with:

Fabric Class

Class	Largest rock gradation class used in slope protection
8	Classes I–VIII
10	Classes IX–XI

Replace the table in the 1st paragraph of section 73-3.02C with:

Concreted-Rock Gradation

Nominal RSP class by median particle diameter ^b		Nominal median particle weight W ₅₀ ^{c,d} Weight ^a	d ₁₅ ^c		d ₅₀ ^c		d ₁₀₀ ^c
Class ^a	Size (inches)		Min	Max	Min	Max	Max
I	6	20 lb	3.7	5.2	5.7	6.9	12.0
II	9	60 lb	5.5	7.8	8.5	10.5	18.0
III	12	150 lb	7.3	10.5	11.5	14.0	24.0
V	18	1/4 ton	11.0	15.5	17.0	20.5	36.0
VII	24	1/2 ton	14.5	21.0	23.0	27.5	48.0

^aUse Class 8 RSP fabric.

^bIntermediate or B dimension (i.e., width) where A dimension is length and C dimension is thickness.

^cd%, where % denotes the percentage of the total weight of the graded material.

^dValues shown are based on the minimum and maximum particle diameters shown and an assumed specific gravity of 2.65. Weight will vary based on specific gravity of rock available for the project.

Replace the table in section 72-3.03E with:

Minimum Concrete Penetration

	Rock class				
	VII	V	III	II	I
Penetration (inches)	18	14	10	8	6