APPENDIX B

GEOTECHNICAL ANALYSIS AND DESIGN
OF GROUND ANCHORS
FOR SLOPE STABILIZATION
APPENDIX B

GEOTECHNICAL ANALYSIS AND DESIGN
OF GROUND ANCHORS
FOR SLOPE STABILIZATION

TABLE OF CONTENTS

FIGURES

Calculation Summary (Sheets 1 thru 30)
CALCULATION SUMMARY

PROJECT: White Point Landslide Repair, San Pedro, Los Angeles, CA

CLIENT: City of Los Angeles

SHELLS: 30

Problem:
Geotechnical analysis and design of ground anchors for slope stabilization.

General Approach / Assumptions:
1. Review site topographic and boring location plan, boring logs, and lab test data develop at engineering strength parameters for use in analysis.
2. Analyze and design ground anchors for slope stabilization using slope stability analysis program "SLOPE-W".
3. Calculate required bonded length of ground anchors using the Post-Tensioning Institute (PTI) procedure.
4. Calculate allowable soil bearing pressure for concrete bearing elements for ground anchors using Brinch Hansen's bearing capacity formula for inclined ground surface.

Sources of Data and Equations:
1. Post-Tensioning Institute (PTI) (1996), "Recommendations for Prestressed Rock and Soil Anchor".

Summary and Conclusions:

<table>
<thead>
<tr>
<th>Page</th>
<th>Description</th>
<th>No. of sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cover Sheet</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Summary of Results of Slope Stability Analysis</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Conceptual Design - Rock Anchors</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Summary Table - Ultimate Bond Strength between Rock and Grout</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Estimate Anchor Bonded Lengths</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Material Strength Summary</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Slope Stability Analysis using SLOPE-W</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>Anchor Bearing Element Design</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>Seismic Slope Displacement Analysis</td>
<td>3</td>
</tr>
<tr>
<td>23</td>
<td>Strand Anchor Structural System (Catalog Cut)</td>
<td>8</td>
</tr>
</tbody>
</table>

Preliminary Calc.: X  Draft 100% Submission

Final Calc.: ______ Supercedes Calc. No: ______
## SUMMARY OF RESULTS OF SLOPE STABILITY ANALYSIS

### TABLE 2

<table>
<thead>
<tr>
<th>Section</th>
<th>Case Description</th>
<th>Inclination</th>
<th>Rock Anchor</th>
<th>Slope Stability Analysis&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Seismic&lt;sup&gt;b&lt;/sup&gt;</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td>H:V Angle</td>
<td>Number of Rows</td>
<td>Post-tensioning Load per Anchor&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>Yield Acceleration of Slope, (k_y)</td>
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<td>L - L'</td>
<td>No slope dewatering/drain pipes&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>- - - - - -</td>
<td>1.3</td>
<td>0.043</td>
<td>0.162</td>
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<td></td>
<td>Slope dewatering/drain pipes @ 20 ft</td>
<td>- - - - - -</td>
<td>1.48</td>
<td>0.055</td>
<td>0.162</td>
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<tr>
<td></td>
<td>6 - 0.6&quot; dia. seven-wire strands, ASTM A416, 270 ksi (w/ dewatering/drain pipes @ 20 ft)</td>
<td>1 : 1 45 2 20 20 210</td>
<td>1.58</td>
<td>0.063</td>
<td>0.162</td>
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<tr>
<td></td>
<td></td>
<td>3 20 20 210</td>
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<tr>
<td></td>
<td></td>
<td>4 20 20 210</td>
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<td>13 - 0.6&quot; dia. seven-wire strands, ASTM A416, 270 ksi (w/ dewatering/drain pipes @ 20 ft)</td>
<td>1 : 1 45 2 20 20 458</td>
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<td>M - M'</td>
<td>No slope dewatering/drain pipes&lt;sup&gt;(2)&lt;/sup&gt;</td>
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<td>0.042</td>
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<td></td>
<td>Slope dewatering/drain pipes @ 20 ft</td>
<td>- - - - - -</td>
<td>1.66</td>
<td>0.068&lt;sup&gt;(10)&lt;/sup&gt;</td>
<td>0.162</td>
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<tr>
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<td>6 - 0.6&quot; dia. seven-wire strands, ASTM A416, 270 ksi (w/ dewatering/drain pipes @ 20 ft)</td>
<td>1 : 1 45 2 20 20 211</td>
<td>1.75</td>
<td>0.078&lt;sup&gt;(10)&lt;/sup&gt;</td>
<td>0.162</td>
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</tbody>
</table>

### Notes

1. Load is assumed to be less than or equal to 60% of the anchor ultimate capacity.
2. "Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California" by the Southern California Earthquake Center (2002) is used for the seismic analysis.
3. The ground acceleration that causes the slope to yield or have a factor of safety of unity against slope failure.
4. Ground acceleration demand
5. Allowable displacement recommended from DMG Special Publication 117.
6. 1 cm = 0.4 inch; 1 inch = 2.54 cm.
8. Hydrostatic pressure is at 30 percent of the height of the near-vertical tension cracks.
9. GLE method is used to compute the factor of safety against slope failure unless noted.
10. Janbu method is used in lieu of GLE method due to non-convergent solution.

4/16/2013
## Ultimate Bond Strength between Rock and Grout (psi)

<table>
<thead>
<tr>
<th></th>
<th>PTI&lt;sup&gt;(1)&lt;/sup&gt;</th>
<th></th>
<th>PTI&lt;sup&gt;(2)&lt;/sup&gt;</th>
<th></th>
<th>Littlejohn (1970)</th>
<th></th>
<th>Brawner (1973)</th>
<th></th>
<th>Jones (1974)</th>
<th></th>
<th>Mean</th>
<th></th>
<th>Standard Deviation</th>
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<th>Range</th>
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<tr>
<td>Min</td>
<td>30</td>
<td></td>
<td>Max</td>
<td>120</td>
<td>Average</td>
<td>75</td>
<td>Min</td>
<td>38</td>
<td>Max</td>
<td>297</td>
<td>Average</td>
<td>206</td>
<td>25</td>
<td>36</td>
<td>30</td>
<td>83</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td>SD</td>
<td>50</td>
<td>Mean</td>
<td>55</td>
<td>Mean - SD</td>
<td></td>
<td>Mean + SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Notes:
2. Post-Tensioning Institute (1996), "Recommendations for Prestressed Rock and Soil Anchors", Commentary 6.7.1., based on 10% of Uniaxial Compressive Strengths from laboratory testing.

Higher than other references. However, this value is from laboratory testing of rock cores from the site.

---

*Used for anchor design*
Grout hole diameter = 6" (Min)

Ultimate bond strength between grout and rock = 83 psi

\[ \text{Reqd} \ L = \frac{P \ (F.S.)}{TD \ \text{Res}} \]
\[ = \frac{(211k)(3)(1000 \ \text{lb/k})}{\pi(6")(83 \text{ psi})} \]
\[ = 405^\circ = 34' \quad \text{Say} \ 35' \]
<table>
<thead>
<tr>
<th>Unit</th>
<th>Strength Model</th>
<th>Total Weight pcf</th>
<th>Friction Angle degrees</th>
<th>Cohesion psi</th>
<th>Uniaxial Compressive Strength psi</th>
<th>Geologic Strength Index</th>
<th>Intact Rock Parameter m</th>
<th>Disturbance Factor, B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terrace Deposits (Qt)</td>
<td>Mohr-Coulomb</td>
<td>103</td>
<td>34</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Altamira Shale (Tma)</td>
<td>Hoek-Brown</td>
<td>118</td>
<td>See Note 5</td>
<td>See Note 5</td>
<td>740</td>
<td>35</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Weathered Tuff (Bentonite Clay; Tma)</td>
<td>User-Defined Nonlinear Function</td>
<td>118</td>
<td>See Note 6</td>
<td>See Note 6</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Notes:
1. pcf = Pounds per cubic foot
2. psf = Pounds per square foot
3. psi = Pounds per square inch
4. As described by Hoek and Marinos (2000).
5. The generalized Hoek and Brown (1997) model is nonlinear and does not correspond to single values of friction angle and cohesion; the full nonlinear curve is presented in Appendix 1.
6. The shear strength envelope used to model the bentonite clay is nonlinear and does not correspond to single values of friction angle and cohesion; the full nonlinear curve is presented in Appendix 1.
Residual Shear Strength of Bentonite Clay

- Curve used in SLOPE/W
- B-2 @ 38 ring shear test
- B-6 @ 76 ring shear test
- B-2 @ 38 empirical
- B-2 @ 94 empirical
- B-6 @ 76 empirical

NOTES

1. Failure geometry based on subsurface conditions at B-10 and B-11 superimposed with 2011 landslide failure mode.

2. Piezometric line 2 represents groundwater after dewatering.
NOTES
1. Failure geometry based on subsurface conditions at B-3 and B-7 superimposed with 2011 landslide failure mode.
2. Piezometric line 2 represents groundwater after dewatering.
NOTES

1. Fall line geometry based on subsurface conditions at B-10 and B-11 superimposed with 2011 landslide failure mode.

2. Piezometric line 2 represents groundwater after dewatering.

Minimum F.S. = 1.58

Name: Terrace Deposits (Qt)
Model: Mohr-Coulomb
Unit Weight: 100 psf
Cohesion: 0 psi
Poisson's Ratio: 0.34
Piezometric Line: 2

Name: Impenetrable
Model: Bedrock (Impenetrable)
Piezometric Line: 2

Name: Bentonite Clay Layer (Tma) Nonlinear from B-2@38 ring shear test
Model: Shear/Nominal Fm.
Unit Weight: 110 psf
Strength Function: Nonlinear Residual Clay Shear Strength B-2@38 ring test
Piezometric Line: 2

Name: Alluvium Shale (Tma) Hook-Brown for use with impenetrable, UCS lab tests average
Model: Shear/Nominal Fm.
Unit Weight: 115 psf
Strength Function: Hook-Brown for Composite, UCS lab tests average strength
Piezometric Line: 2

Name: Colluvium (Gd)
Model: Mohr-Coulomb
Unit Weight: 110 psf
Cohesion: 0 psi
Poisson's Ratio: 0.34
Piezometric Line: 2

White Point Landslide
San Pedro District
Los Angeles, California
RESULTS OF SLOPE STABILITY ANALYSIS
SECTION L-1
February 2013
S-1-1-0052-031
FIG. 4
NOTES

1. Failure geometry based on subsurface conditions at B-3 and B-7 superimposed with 2011 landslide failure mode.

2. Piezometric line 2 represents groundwater after dewatering.
Minmum Factor of Safety = 1.60

NOTES
1. Failure geometry based on subsurface conditions at B-10 and B-11 superimposed with 2011 landslide failure mode.
2. Piezometric line 2 represents groundwater after dewatering.
Factor of Safety = 1.70

**NOTES**

1. Failure geometry based on subsurface conditions at B-3 and B-7 superposed with 2011 landslide failure mode.

2. Piezometric line 2 represents groundwater after dewatering.
At A, $Q_u = \frac{(177)(11.8 \text{ ksf})}{5} = 3,006 \text{ ksf}$

From Fig I-1 (N-Axis - Ground Strength Criteria for Alternating Strata), $C = 2480 \text{ ksf}$

Footing parallel to ground surface, no adjustment required.

$Q_u = \frac{(2,480 \text{ ksf}) \times 15.16}{727 \text{ ksf}} = 64.4 \text{ ksf}$

for weathered shale.

For base inclination required.

$Q_u = \frac{64.4 \text{ ksf}}{F.S.} = 3.2 \text{ ksf}$
NOTE

Based on Hoek-Brown Strength Criterion as Presented in:

### Allowable Bearing Pressure of Altamira Shale (tons/ft²)

<table>
<thead>
<tr>
<th>Min</th>
<th>Max</th>
<th>Average</th>
<th>Min</th>
<th>Max</th>
<th>Average</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<tr>
<td>10</td>
<td>27</td>
<td>18</td>
<td>8</td>
<td>12</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>3.2</td>
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<table>
<thead>
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<tbody>
<tr>
<td>9.7</td>
<td>6.2</td>
<td>3.5</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Notes:*
1. Caltrans Bridge Design Specifications (2003), Figure 4.4.8.1.1A (Peck et al, 1974). Allowable bearing pressure is based on average RQD of 37% from rock core samples from Borings B-7, B-10 and B-11.
CONCRETE BEARING PANEL DESIGN

Use $P_{allow} = 9.7$ Tsf = 19.4 ksf

Design Load = 210 kips
Log-off Load = 233 kips
Max Test Load = 2.33(210 k) = 280 kips

$\text{Req'd (A panel)} = \frac{P}{P_{allow}} = \frac{280k}{19.4 \text{ ksf}} = 14.4 \text{ ft}^2$

Use 4' x 4' $A_{panel} = 16 \text{ ft}^2$ (OK) for bedrock

$\text{Req'd (A panel)} = \frac{P}{P_{allow}} = \frac{280k}{6.4 \text{ ksf}} = 44 \text{ ft}^2$

Use 7' x 7' $A_{panel} = 49 \text{ ft}^2$ (OK) for weathered shale
Pseudo-Static Seismic Slope Stability Analysis

Evaluated based on "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California".¹

Project: White Point Landslide
Job Number: 51-1-10052-009
Spreadsheet by: BIT
Date Printed: 12/10/2012

Notes: Slope Stabilization by Ground Anchors
☐ Check here to indicate a site-specific PSHA was performed (e.g., using E3-PHSED)
☐ Check here to indicate USGS gridded maps were used to obtain MHA, M, and r.


STEP 1) Screening Analysis: Run a pseudo-static limit equilibrium slope stability analysis including a horizontal seismic coefficient (acceleration), k_u (eqn. 1.1)

... if the factor of safety is greater than one, the slide passes the screen, and the slide fails if FS < 1.

<table>
<thead>
<tr>
<th>MHA (g)</th>
<th>NRF</th>
<th>f_u (g)</th>
</tr>
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<tbody>
<tr>
<td>0.2665</td>
<td>1.13</td>
<td>0.61</td>
</tr>
<tr>
<td>M (M_u)=7.19</td>
<td>5</td>
<td>eqn. 1.3</td>
</tr>
<tr>
<td>r (km)=6.0</td>
<td>D_50 (sec)=18.8</td>
<td>eqn. 1.2</td>
</tr>
<tr>
<td>k_u (g)=0.162</td>
<td>Screen FS=0.746 &lt; 1 = FAIL SCREEN</td>
<td></td>
</tr>
<tr>
<td>eqn. 1.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

STEP 2) Determine the setback from the slope brow for which the pseudo-static factor of safety is 1.3.

Equations:

1.1 NRF = 0.6225 + 0.9196 x exp\(-MHA / g\) / 4.449

1.2 for \(r > 10\) km

\[ \ln(D_{50}) = [\ln(0.264 + 0.355 (U_s + a))^n]^{1/2} + 0.664 + 0.005 \] (10.1a)

For \(r < 10\) km

\[ \ln(D_{50}) = [\ln(0.264 + 0.355 (U_s + a))^n] + 0.664 \] (10.1b)

1.3 \(f_u = \frac{NRF}{5.477} \left[ 1.87 - 0.196 (MHA / g) \right] \left[ (MHA / g) \times NRF \times D_{50} \right] \) (10.16)

1.4 \(k_u = f_u \times (MHA / g) \) (10.14)

Definitions:

MHA (g) = Max. horiz. accel. at the site for a soft rock condition (regardless of the actual site soil conditions) for 10% in 50yr prob of exceedence
NRF = 3 for the nonlinear response of the slide mass material
D_50 (sec) = Median duration of strong ground shaking defined by the Abrahamson and Silva² (1996) relationship:
\(f_u = \) Factor related to the seismicity of the site
k_u = Horizontal acceleration to be used for screening analysis
Screen FS = FS is the computed factor of safety using limit equilibrium stability methods (e.g., with SLOPE/W) with \(k_u = k_{eq}\)

References:


From DMG S.P. 117, Equation (11.8)

\[ \log_{10} \left( \frac{u}{k_{\text{max}} \cdot D_{5-95}} \right) = 1.87 - 3.477 \left( \frac{k_y}{k_{\text{max}}} \right) \]

where

- \( u \) = calculated slope displacement (cm)
- \( k_y \) = yield acceleration of slope
- \( k_{\text{max}} \) = MHEA/g
- MHEA = maximum horizontal equivalent acceleration
- \( D_{5-95} \) = significant duration of shaking, i.e. 5%-95% normalized Arias intensity (sec)

\[ D_{5-95} = 16.8 \quad ; \quad k_{\text{max}} = 0.162 \quad (\text{derived from formula by DMG-117, using site MHA = 0.267g}) \]

For \( k_y = 0.043 \) (No Anchor, No dewatering)

\[ u = k_{\text{max}} \cdot D_{5-95} \cdot 10 \]

\[ = (0.162)(16.8 \text{ sec})(10) \]

\[ = 24 \text{ cm} > 15 \text{ cm} \quad (N.G.) \]
From DMG S.P. 17, Eqn. (11.8)

\[
\log_{10} \left( \frac{u}{k_{\text{max}} \cdot D_{50}} \right) = 1.87 - 3.477 \left( \frac{k_y}{k_{\text{max}}} \right)
\]

Where
- \( u \) = calculated slope displacement (cm)
- \( k_y \) = yield acceleration of slope
- \( k_{\text{max}} \) = MHEA/g
- MHEA = Maximum horizontal equivalent acceleration
- \( D_{50} \) = significant duration of shaking, i.e. 5-95% normalized Arias intensity (sec)

For case 1a: ( Anchors at el. 110' and 90' )

L-L'  \( k_y = 0.065 \) (from Slope/W where FS=1.00 and deep-seated failure is mobilized)

\[
U = k_{\text{max}} \cdot D_{50} \cdot 10
\]

\[
U = (0.162) \cdot 11.8 \cdot 10
\]

\[
U = 18.0 \text{ cm}
\]

M-M'  \( k_y = 0.078 \) (*)

\[
U = 4 \text{ cm}
\]

For case 1b: ( Anchors at el. 110' and 120' )

L-L'  \( k_y = 0.064 \)

\[
U = 9 \text{ cm}
\]

M-M'  \( k_y = 0.075 \) (*)

\[
U = 5 \text{ cm}
\]

* solved using Janbu method

in lieu of GLE due to non-convergent solution in Slope/W
Strand Anchor Systems

Strand Anchor System

Williams Strand Anchors utilize a high density extruded polyethylene sheath over corrosion inhibiting compound in the unbonded zone. Williams has the most technologically advanced extrusion equipment for the manufacture of permanent and temporary anchors. The state of the art equipment allows for precise extruded lengths in the unbonded zone and high quality manufacturing.

Williams Strand Anchors are typically produced from 0.6" diameter, 7 wire strand (fpu = 270 ksi, 1862 N/mm²) meeting ASTM A416 and are manufactured in accordance with the Post-Tensioning Institute’s Recommendations for Prestressed Rock and Soil Anchors.

Advantages of Williams Grout Bonded Strand Anchors

- High capacity - Anchors utilize a 0.6" dia. 270 KSI (ultimate stress) strand. The number of strands per anchor dictate the load carrying capacity of the anchor.
- Lightweight - For a Class I protected anchor, the corrugated duct is grouted in the field, greatly reducing the weight of the anchor. There is more load carrying capacity per pound of 7-wire 270 KSI strand than solid bar.
- Anchors arrive to the jobsite fully fabricated and packaged in coils to allow for installation in areas where there are clearance issues or bench width constraints.
- Unlike bar systems, strand can be produced in any length.
- All Williams strand anchors utilize a small diameter greased filled extruded high density polyethylene sheathing, allowing for a greater number of individual strands to be contained in a given drill hole size. Manual greasing and sheathing of individual strands require a larger free stressing sheath.
- Stringent quality control of manufacturing is maintained because Williams’ engineering department provides shop drawings for each production order showing customer preference details and specific contract requirements.

Applications
- Dam Tie-Downs
- Temporary Excavation Support
- Landslide Mitigation
- Permanent Tieback Systems
- Slope Surface Stabilization
- Foundations

Corrosion Protection

The anchor system can be produced to meet the Post-Tensioning Institute’s Recommendations for Prestressed Rock and Soil Anchors. Williams Strand Anchors are supplied with the following classes of Corrosion Protection:

Class I - Encapsulated Tendon:
- Anchorage: Wedge Plate, Bearing Plate w/ Trumpet and End Cap.
- Free Stressing Length: Corrosion inhibiting compound filled HDPE/PP sheath encased in grout filled corrugated sheathing.
- Bond Length: Grout Filled encapsulated corrugated sheathing.

Class II - Encapsulated Tendon:
- Anchorage: Wedge Plate, Bearing Plate w/ optional Trumpet and optional End Cap.
- Free Stressing Length: Corrosion inhibiting compound filled HDPE/PP sheath surrounded by external grout.
- Bond Length: Externally grouted.

Design and Construction Support

Williams is committed to assisting designers and foundation engineers with prebid product information, budget pricing and anchor details. Williams’ technical staff will work with designers to ensure that the specified strand anchor system is economical and appropriate for the application.

Williams is also committed to assisting the contractor with project pricing, bearing plate calculations, quantity take-offs, anchor submittals and shop drawings. Williams’ manufacturing personnel will work with the technical staff to ensure the anchors are delivered to the jobsite, ready to install and on time. Williams also offers on-site technical assistance to the contractor.
<table>
<thead>
<tr>
<th>Number of Strands</th>
<th>Cross-Sectional Area (Aps)</th>
<th>Ultimate Load (Ibf/Aps)</th>
<th>Maximum Jacking Load (0.8&quot; Ibf/Aps)</th>
<th>Maximum Design Load (0.6&quot; Ibf/Aps)</th>
<th>HDPE Tubing</th>
<th>Anchor Heads</th>
<th>Weight per Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>140 mm²</td>
<td>58.6 kips</td>
<td>46.9 kips</td>
<td>35.2 kips</td>
<td>C4.6</td>
<td>0.74 lbs</td>
<td>0.34 kg</td>
</tr>
<tr>
<td>2</td>
<td>250 mm²</td>
<td>117 kips</td>
<td>95.8 kips</td>
<td>70.4 kips</td>
<td>C4.6</td>
<td>1.40 lbs</td>
<td>0.67 kg</td>
</tr>
<tr>
<td>3</td>
<td>783 mm²</td>
<td>176 kips</td>
<td>141 kips</td>
<td>108 kips</td>
<td>C4.6</td>
<td>2.22 lbs</td>
<td>1.01 kg</td>
</tr>
<tr>
<td>4</td>
<td>1044 mm²</td>
<td>234 kips</td>
<td>188 kips</td>
<td>141 kips</td>
<td>C4.6</td>
<td>2.96 lbs</td>
<td>1.34 kg</td>
</tr>
<tr>
<td>5</td>
<td>1304 mm²</td>
<td>293 kips</td>
<td>235 kips</td>
<td>170 kips</td>
<td>C7.6</td>
<td>3.70 lbs</td>
<td>1.69 kg</td>
</tr>
<tr>
<td>6</td>
<td>840 mm²</td>
<td>352 kips</td>
<td>281 kips</td>
<td>211 kips</td>
<td>C7.6</td>
<td>4.44 lbs</td>
<td>2.01 kg</td>
</tr>
<tr>
<td>7</td>
<td>1280 mm²</td>
<td>410 kips</td>
<td>328 kips</td>
<td>245 kips</td>
<td>C7.6</td>
<td>5.18 lbs</td>
<td>2.35 kg</td>
</tr>
<tr>
<td>8</td>
<td>1600 mm²</td>
<td>469 kips</td>
<td>375 kips</td>
<td>282 kips</td>
<td>C9.6</td>
<td>5.92 lbs</td>
<td>2.99 kg</td>
</tr>
<tr>
<td>9</td>
<td>1920 mm²</td>
<td>527 kips</td>
<td>422 kips</td>
<td>317 kips</td>
<td>C9.6</td>
<td>6.66 lbs</td>
<td>3.02 kg</td>
</tr>
<tr>
<td>10</td>
<td>2240 mm²</td>
<td>586 kips</td>
<td>469 kips</td>
<td>362 kips</td>
<td>C12.6</td>
<td>7.40 lbs</td>
<td>3.36 kg</td>
</tr>
<tr>
<td>11</td>
<td>2560 mm²</td>
<td>645 kips</td>
<td>516 kips</td>
<td>387 kips</td>
<td>C12.6</td>
<td>8.14 lbs</td>
<td>3.69 kg</td>
</tr>
<tr>
<td>12</td>
<td>2880 mm²</td>
<td>703 kips</td>
<td>563 kips</td>
<td>422 kips</td>
<td>C12.6</td>
<td>8.88 lbs</td>
<td>4.03 kg</td>
</tr>
<tr>
<td>13</td>
<td>3200 mm²</td>
<td>762 kips</td>
<td>610 kips</td>
<td>458 kips</td>
<td>C19.6</td>
<td>9.62 lbs</td>
<td>4.36 kg</td>
</tr>
<tr>
<td>14</td>
<td>3520 mm²</td>
<td>820 kips</td>
<td>667 kips</td>
<td>493 kips</td>
<td>C19.6</td>
<td>10.36 lbs</td>
<td>4.70 kg</td>
</tr>
<tr>
<td>15</td>
<td>3840 mm²</td>
<td>879 kips</td>
<td>724 kips</td>
<td>549 kips</td>
<td>C19.6</td>
<td>11.10 lbs</td>
<td>5.03 kg</td>
</tr>
<tr>
<td>16</td>
<td>4160 mm²</td>
<td>938 kips</td>
<td>780 kips</td>
<td>595 kips</td>
<td>C19.6</td>
<td>11.84 lbs</td>
<td>5.37 kg</td>
</tr>
<tr>
<td>17</td>
<td>4480 mm²</td>
<td>996 kips</td>
<td>837 kips</td>
<td>641 kips</td>
<td>C19.6</td>
<td>12.58 lbs</td>
<td>5.71 kg</td>
</tr>
<tr>
<td>18</td>
<td>4800 mm²</td>
<td>1053 kips</td>
<td>894 kips</td>
<td>687 kips</td>
<td>C19.6</td>
<td>13.32 lbs</td>
<td>6.04 kg</td>
</tr>
<tr>
<td>19</td>
<td>5120 mm²</td>
<td>1113 kips</td>
<td>951 kips</td>
<td>733 kips</td>
<td>C19.6</td>
<td>14.06 lbs</td>
<td>6.38 kg</td>
</tr>
<tr>
<td>20</td>
<td>5440 mm²</td>
<td>1172 kips</td>
<td>1009 kips</td>
<td>789 kips</td>
<td>C22.6</td>
<td>14.80 lbs</td>
<td>6.71 kg</td>
</tr>
<tr>
<td>21</td>
<td>5760 mm²</td>
<td>1231 kips</td>
<td>1067 kips</td>
<td>845 kips</td>
<td>C22.6</td>
<td>15.54 lbs</td>
<td>7.05 kg</td>
</tr>
<tr>
<td>22</td>
<td>6080 mm²</td>
<td>1290 kips</td>
<td>1125 kips</td>
<td>901 kips</td>
<td>C22.6</td>
<td>16.28 lbs</td>
<td>7.38 kg</td>
</tr>
<tr>
<td>23</td>
<td>6400 mm²</td>
<td>1349 kips</td>
<td>1183 kips</td>
<td>957 kips</td>
<td>C22.6</td>
<td>17.02 lbs</td>
<td>7.72 kg</td>
</tr>
<tr>
<td>24</td>
<td>6720 mm²</td>
<td>1408 kips</td>
<td>1241 kips</td>
<td>1013 kips</td>
<td>C22.6</td>
<td>17.76 lbs</td>
<td>8.06 kg</td>
</tr>
<tr>
<td>25</td>
<td>7040 mm²</td>
<td>1465 kips</td>
<td>1300 kips</td>
<td>1069 kips</td>
<td>C22.6</td>
<td>18.50 lbs</td>
<td>8.39 kg</td>
</tr>
<tr>
<td>26</td>
<td>7360 mm²</td>
<td>1523 kips</td>
<td>1359 kips</td>
<td>1125 kips</td>
<td>C22.6</td>
<td>19.24 lbs</td>
<td>8.73 kg</td>
</tr>
<tr>
<td>27</td>
<td>7680 mm²</td>
<td>1582 kips</td>
<td>1418 kips</td>
<td>1181 kips</td>
<td>C22.6</td>
<td>19.98 lbs</td>
<td>9.06 kg</td>
</tr>
<tr>
<td>28</td>
<td>8000 mm²</td>
<td>1640 kips</td>
<td>1477 kips</td>
<td>1237 kips</td>
<td>C22.6</td>
<td>20.72 lbs</td>
<td>9.40 kg</td>
</tr>
<tr>
<td>29</td>
<td>8320 mm²</td>
<td>1699 kips</td>
<td>1536 kips</td>
<td>1293 kips</td>
<td>C22.6</td>
<td>21.46 lbs</td>
<td>9.70 kg</td>
</tr>
<tr>
<td>30</td>
<td>8640 mm²</td>
<td>1758 kips</td>
<td>1595 kips</td>
<td>1351 kips</td>
<td>C22.6</td>
<td>22.20 lbs</td>
<td>10.07 kg</td>
</tr>
<tr>
<td>31</td>
<td>8960 mm²</td>
<td>1816 kips</td>
<td>1654 kips</td>
<td>1411 kips</td>
<td>C22.6</td>
<td>22.94 lbs</td>
<td>10.41 kg</td>
</tr>
<tr>
<td>32</td>
<td>9280 mm²</td>
<td>1875 kips</td>
<td>1713 kips</td>
<td>1471 kips</td>
<td>C31.6</td>
<td>23.68 lbs</td>
<td>10.74 kg</td>
</tr>
<tr>
<td>33</td>
<td>9600 mm²</td>
<td>1934 kips</td>
<td>1772 kips</td>
<td>1531 kips</td>
<td>C31.6</td>
<td>24.42 lbs</td>
<td>11.07 kg</td>
</tr>
<tr>
<td>34</td>
<td>9920 mm²</td>
<td>1993 kips</td>
<td>1832 kips</td>
<td>1591 kips</td>
<td>C31.6</td>
<td>25.16 lbs</td>
<td>11.39 kg</td>
</tr>
<tr>
<td>35</td>
<td>10,240 mm²</td>
<td>2052 kips</td>
<td>1892 kips</td>
<td>1651 kips</td>
<td>C31.6</td>
<td>25.90 lbs</td>
<td>11.71 kg</td>
</tr>
</tbody>
</table>

1) Mill certification provided upon request to indicate the actual tensile strength of the 7-wire strand with each shipment of Williams strand anchors.
2) Larger diameter anchors available upon request.
3) Minimum grout cover shall be 1/2" (13mm) over the OD of the encapsulation in a Class I Protected anchor and 1/2" (13mm) over the tendon bond length in a Class II protected anchor.
**Strand Anchor Systems**

**Strand Specifications**

**Williams Type A System**
- **Two Stage Grouting**
- **PTI Class II Anchor**

**Williams Type B System**
- **Extruded Free Stress Length**
- **PTI Class II Anchor**

**End Cap**
- Schedule 40 Pipe - ASTM A53-01 with Steel Flange Plate
- Grade 36 - ASTM A35

**Anchor Wedge**
- 3 Part
- ASTM A196-01

**Wedge Plates**
- ASTM A568 or A29

**Bearing Plate**
- Grade 50 - ASTM A572, A709

**High Density Plastic Grout Tubing**

**Strands**
- 0.8" Dia. x 7 Wire Strand
- ASTM A416

**2nd Stage Grouting**

**Free Stress Length**

**Extruded Sheath**
- 80 mil minimum
- High Density Polyethylene
- ASTM D1745 Type III-0
- Polyethylene - ASTM D4101
- with Corrosion inhibiting Compound
- ASTM B117, ASTM D1743

**Spacers**
- ASTM D1248
- Quantity and Spacing as per Anchor

**Corrugated Tubing**
- High Density Polyethylene
- ASTM D3350, ASTM F405
- ASTM D1241
- AASHTO No. M352

**1st Stage Grouting**

**PVC Centralizers**
- Schedule 40 Pipe - ASTM D1725
- Class 200 Pipe - ASTM D2041
- AASHTO No. R-6

**Wil-X-Cement Grout**
- ASTM C545

**Bond Length**

**Corrugated End Cap**
- Factory Pre-Occulded
- High Density Polyethylene
- ASTM D3350, ASTM D1245
- AASHTO No. M252

**Grout Plug**
- (Optional)
Wedge Plates (Anchor Heads)

Williams Wedge Plates are full strength permanent components. They are available galvanized.

<table>
<thead>
<tr>
<th>Type</th>
<th>A Diameter (127 mm)</th>
<th>B Thickness (51 mm)</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4.6</td>
<td>2&quot;</td>
<td>2&quot;</td>
<td>RSAH04W</td>
</tr>
<tr>
<td>C7.6</td>
<td>5&quot;</td>
<td>2&quot;</td>
<td>RSAH07W</td>
</tr>
<tr>
<td>C9.6</td>
<td>6-3/8&quot; (162 mm)</td>
<td>2-3/4&quot; (70 mm)</td>
<td>RSAH09</td>
</tr>
<tr>
<td>C12.6</td>
<td>7-1/4&quot; (184 mm)</td>
<td>3&quot;</td>
<td>RSAH12S</td>
</tr>
<tr>
<td>C19.6</td>
<td>8-3/8&quot; (213 mm)</td>
<td>3-3/4&quot; (95 mm)</td>
<td>RSAH19S</td>
</tr>
<tr>
<td>C22.6</td>
<td>9&quot;</td>
<td>3-3/4&quot; (95 mm)</td>
<td>RSAH22</td>
</tr>
<tr>
<td>C27.6</td>
<td>10&quot; (254 mm)</td>
<td>3-3/4&quot; (95 mm)</td>
<td>RSAH27</td>
</tr>
<tr>
<td>C31.6</td>
<td>10-3/4&quot; (273 mm)</td>
<td>4-7/8&quot; (122 mm)</td>
<td>RSAH31</td>
</tr>
<tr>
<td>C37.6</td>
<td>11-1/2&quot; (282 mm)</td>
<td>4-7/8&quot; (122 mm)</td>
<td>RSAH37</td>
</tr>
<tr>
<td>C55.6</td>
<td>13-1/2&quot; (343 mm)</td>
<td>6-3/8&quot; (162 mm)</td>
<td>RSAH55</td>
</tr>
<tr>
<td>C61.0</td>
<td>14-1/2&quot; (388 mm)</td>
<td>6-3/8&quot; (162 mm)</td>
<td>RSAH61</td>
</tr>
</tbody>
</table>

Bearing Plates

Williams Bearing Plates are available in sizes as required per anchor, and are designed in accordance with PTI specifications. Plate stock can be provided in Grade 36 or Grade 50.

<table>
<thead>
<tr>
<th>Type</th>
<th>O.D. (114 mm)</th>
<th>I.D. (102 mm)</th>
<th>Head Clearance (90 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4.6</td>
<td>4-1/2&quot;</td>
<td>4&quot;</td>
<td>3-1/2&quot;</td>
</tr>
<tr>
<td>C7.6</td>
<td>4-1/2&quot;</td>
<td>4&quot;</td>
<td>3-1/2&quot;</td>
</tr>
<tr>
<td>C9.6</td>
<td>5-9/16&quot;</td>
<td>5&quot;</td>
<td>4-1/2&quot;</td>
</tr>
<tr>
<td>C12.6</td>
<td>6-5/8&quot;</td>
<td>6&quot;</td>
<td>5-1/4&quot;</td>
</tr>
<tr>
<td>C19.6</td>
<td>7-7/8&quot;</td>
<td>7-1/8&quot;</td>
<td>6-1/2&quot;</td>
</tr>
<tr>
<td>C22.6</td>
<td>8-5/8&quot;</td>
<td>7-7/8&quot;</td>
<td>7-1/2&quot;</td>
</tr>
<tr>
<td>C27.6</td>
<td>8-5/8&quot;</td>
<td>7-7/8&quot;</td>
<td>7-1/2&quot;</td>
</tr>
<tr>
<td>C31.6</td>
<td>10-3/4&quot;</td>
<td>10&quot;</td>
<td>8-1/2&quot;</td>
</tr>
<tr>
<td>C37.6</td>
<td>10-3/4&quot;</td>
<td>10&quot;</td>
<td>8-1/2&quot;</td>
</tr>
<tr>
<td>C55.6</td>
<td>12-5/8&quot;</td>
<td>12&quot;</td>
<td>10-1/2&quot;</td>
</tr>
<tr>
<td>C61.0</td>
<td>12-5/8&quot;</td>
<td>12&quot;</td>
<td>10-1/2&quot;</td>
</tr>
</tbody>
</table>

Steel End Caps

Williams offers a bolt on steel end cap to provide corrosion protection for exposed anchor ends. Caps are provided with a closed cell neoprene seal. Most often the caps are packed with corrosion inhibiting wax or grease.

<table>
<thead>
<tr>
<th>Type</th>
<th>Diameter (203 mm)</th>
<th>Height (117 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4.6</td>
<td>6&quot;</td>
<td>4-5/8&quot;</td>
</tr>
<tr>
<td>C7.6</td>
<td>6&quot;</td>
<td>4-5/8&quot;</td>
</tr>
<tr>
<td>C9.6</td>
<td>10&quot; (254 mm)</td>
<td>5-3/8&quot;</td>
</tr>
<tr>
<td>C12.6</td>
<td>10&quot; (254 mm)</td>
<td>5-3/8&quot;</td>
</tr>
<tr>
<td>C19.6</td>
<td>12&quot; (305 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
<tr>
<td>C22.6</td>
<td>12&quot; (305 mm)</td>
<td>6&quot; (152 mm)</td>
</tr>
<tr>
<td>C27.6</td>
<td>14&quot; (356 mm)</td>
<td>7-7/8&quot; (200 mm)</td>
</tr>
<tr>
<td>C31.6</td>
<td>14&quot; (356 mm)</td>
<td>7-7/8&quot; (200 mm)</td>
</tr>
<tr>
<td>C37.6</td>
<td>14&quot; (356 mm)</td>
<td>8-7/8&quot; (225 mm)</td>
</tr>
<tr>
<td>C55.6</td>
<td>16&quot; (406 mm)</td>
<td>12&quot; (305 mm)</td>
</tr>
<tr>
<td>C61.0</td>
<td>16&quot; (406 mm)</td>
<td>12&quot; (305 mm)</td>
</tr>
</tbody>
</table>

Anchor Head Wedges - RSWG03

All wedges are equipped with a ring to keep the wedge attached to the tendon during elongation and/or tensioning operations.

The 3-Piece anchor wedges are PTI recommended for use on permanent anchors and/or anchors requiring incremental loading. They uniformly engage the strand with less relaxation at low loads. They are manufactured from quality steels and are case hardened for durability.

Stressing Head Wedges - RSXSHW

Stressing head wedges are necessary for prestressing all classes of strand anchors. The stressing wedges are heat treated, chrome plated and designed for multiple uses.

Anti-Seize Compound

PRO-TEC Anti-Seize reduces the frictional contact between the stressing wedges and the stressing head, to alleviate seizing under the high tensile loads required in strand anchoring. This high performance lubricant also resists water and other corrosives which can corrode the stressing head and wedges. Check and reapply Anti-Seize after every anchor installation as necessary. Pro-Tec Anti-Seize work well with anchor bolts as well. Dry graphite may also be used between the stressing wedges and stressing head pockets to break the stressing wedges after load is released.
Strand Anchor Systems

Centralizers - CEN
Centralizers are placed over the strand anchor assembly to maintain the minimum required 0.5" distance between the assembled anchor bundle and the drill hole wall. Depending on the anchor type and orientation, there are a wide variety of centralizers available for every application. State drill hole size for ordering.

Post-Grout Tube
Williams will provide post-grout tubes for anchors bonded in weak rock or soil upon request. Williams supplies flexible Post-Grout Tube with bursting strengths of 1000 psi, as well as PVC Post-Grout Tube with bursting strengths of 900 psi. The Post-Grout Tube length and valve placement are adjustable and can be specified at the time of order. Drill hole diameter should be a 1" minimum clearance to accommodate Post-Grout Tube.

Corrosion Inhibiting Grease or Wax Gel
Williams corrosion inhibiting compounds can be placed in the free stressing areas, in the end caps, and trumpet areas. Each are of an organic compound with either a grease or wax gel base. They provide the appropriate polar moisture displacement and have corrosion inhibiting additives with self-healing properties. They can be pumped or applied manually. Corrosion inhibiting compounds stay permanently viscous, chemically stable and non-reactive with the prestressing steel, duct materials or grout. Both compounds meet PTI standards for Corrosion Inhibiting Coating.

Spacers - RSPS
Strand spacers are provided in the anchor bond zone to separate the strand and provide for the minimum required grout cover around each strand for corrosion protection and bond strength development. The strand spacers are normally located 1-2 feet above the bottom of the anchor and at the top of the bond zone. The intermediate strand spacers are typically placed at a distance of 5-10 feet, center to center along the bond zone between the top and bottom spacer.

Corrugated Duct - R75
Williams utilizes corrugated duct that complies with the required wall thickness (0.060" nominal) as specified by the Post-Tensioning Institute’s Recommendations for Prestressed Rock and Soil Anchors.

Heat Shrink Tubing
Provides a corrosion protected seal when connecting or repairing smooth and corrugated segments.

Corrosion Protection Coatings
Optional coatings for steel end caps, bearing plates with trumpet and anchor heads are available for additional corrosion protection as required by the designer. Coating specifications are as follows:

- Electro Zinc Plating: ASTM B633 (wedge plates)
- Hot Dip Galvanizing: ASTM A153 (bearing plates/trumpets and steel end caps)
- Epoxy Coating: ASTM A775 (bearing plates/trumpets and steel end caps)
Open Frame Hydraulic Jack Assembly

Used for testing and pre-stressing multi-strand anchors. Available with up to 13" center hole. Unit comes with hydraulic jack, pump, gauge, hoses, stressing head assembly and chairs as required.

Vertical Strand Anchor Uncoiler

The Williams Vertical Uncoiler can be utilized to install up to a 61 strand anchor. The uncoiler is a safe and cost effective strand anchor installation solution while minimizing damage to the corrosion protection sleeves. Contact a Williams representative for a monthly rental rate.

<table>
<thead>
<tr>
<th>Jack Capacity</th>
<th>Number of Strands</th>
<th>Pump Method</th>
<th>Jack Height</th>
<th>Open Frame Stressing Chair Size</th>
<th>Stressing Head Size (Dia x Height)</th>
<th>Ram Travel</th>
<th>Minimum Total Jack Assy Height</th>
<th>Ram Area</th>
<th>Approx Total Jack Assy Weight</th>
<th>Jack Minimum ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 tons</td>
<td>1-4</td>
<td>Air or Electric Double Acting</td>
<td>13-1/2&quot; x 12-1/8&quot;</td>
<td>6&quot; x 4-1/4&quot;</td>
<td>6&quot;</td>
<td>31&quot;</td>
<td>20.63 in² (133 cm²)</td>
<td>255 lbs (116 kg)</td>
<td>3.13&quot; (80 mm)</td>
<td></td>
</tr>
<tr>
<td>(890 kN)</td>
<td></td>
<td>(343 mm)</td>
<td>(191 mm x 308 mm)</td>
<td>(152 mm x 108 mm)</td>
<td>(152 mm)</td>
<td>(757 mm)</td>
<td></td>
<td>(261 cm²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 tons</td>
<td>5-7</td>
<td>Air or Electric Double Acting</td>
<td>12&quot; x 15&quot;</td>
<td>6-1/4&quot; x 6-1/2&quot;</td>
<td>8&quot;</td>
<td>39&quot;</td>
<td>40.45 in² (261 cm²)</td>
<td>505 lbs (237 kg)</td>
<td>4.06&quot; (103 mm)</td>
<td></td>
</tr>
<tr>
<td>(1779 kN)</td>
<td></td>
<td>(305 mm x 361 mm)</td>
<td>(160 mm x 166 mm)</td>
<td>(159 mm x 166 mm)</td>
<td>(991 mm)</td>
<td>(911 mm)</td>
<td></td>
<td>(261 cm²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 tons</td>
<td>5-7</td>
<td>Air or Electric Double Acting</td>
<td>12&quot; x 22&quot;</td>
<td>6-1/4&quot; x 6-1/2&quot;</td>
<td>14&quot;</td>
<td>52&quot;</td>
<td>40.45 in² (261 cm²)</td>
<td>870 lbs (395 kg)</td>
<td>4.06&quot; (103 mm)</td>
<td></td>
</tr>
<tr>
<td>(1779 kN)</td>
<td></td>
<td>(305 mm x 559 mm)</td>
<td>(159 mm x 165 mm)</td>
<td>(159 mm x 165 mm)</td>
<td>(356 mm)</td>
<td>(1321 mm)</td>
<td></td>
<td>(261 cm²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 tons</td>
<td>5-7</td>
<td>Air or Electric Double Acting</td>
<td>12&quot; x 22&quot;</td>
<td>6-1/4&quot; x 6-1/2&quot;</td>
<td>14&quot;</td>
<td>52&quot;</td>
<td>40.45 in² (261 cm²)</td>
<td>870 lbs (395 kg)</td>
<td>4.06&quot; (103 mm)</td>
<td></td>
</tr>
<tr>
<td>(1779 kN)</td>
<td></td>
<td>(305 mm x 559 mm)</td>
<td>(159 mm x 165 mm)</td>
<td>(159 mm x 165 mm)</td>
<td>(356 mm)</td>
<td>(1321 mm)</td>
<td></td>
<td>(261 cm²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300 tons</td>
<td>8-12</td>
<td>Air or Electric Double Acting</td>
<td>13&quot; x 23&quot;</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>15&quot;</td>
<td>54&quot;</td>
<td>47.10 in² (304 cm²)</td>
<td>1048 lbs (474 kg)</td>
<td>4.06&quot; (103 mm)</td>
<td></td>
</tr>
<tr>
<td>(2869 kN)</td>
<td></td>
<td>(330 mm x 564 mm)</td>
<td>(191 mm x 191 mm)</td>
<td>(191 mm x 191 mm)</td>
<td>(331 mm)</td>
<td>(1372 mm)</td>
<td></td>
<td>(304 cm²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>650 tons</td>
<td>13-22</td>
<td>Electric or Gas Double Acting</td>
<td>17-1/2&quot; x 25&quot;</td>
<td>10&quot; x 8-1/2&quot;</td>
<td>15&quot;</td>
<td>62&quot;</td>
<td>78.54 in² (507 cm²)</td>
<td>1480 lbs (662 kg)</td>
<td>5.50&quot; (140 mm)</td>
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</tr>
<tr>
<td>(5978 kN)</td>
<td></td>
<td>(445 mm x 635 mm)</td>
<td>(254 mm x 216 mm)</td>
<td>(254 mm x 216 mm)</td>
<td>(331 mm)</td>
<td>(1575 mm)</td>
<td></td>
<td>(507 cm²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>750 tons</td>
<td>23-37</td>
<td>Electric or Gas Double Acting</td>
<td>22-1/4&quot; x 37&quot;</td>
<td>11-3/4&quot; x 10&quot;</td>
<td>15&quot;</td>
<td>81&quot;</td>
<td>153.0 in² (987 cm²)</td>
<td>5179 lbs (2349 kg)</td>
<td>9&quot; (229 mm)</td>
<td></td>
</tr>
<tr>
<td>(7473 kN)</td>
<td></td>
<td>(559 mm x 940 mm)</td>
<td>(298 mm x 254 mm)</td>
<td>(298 mm x 254 mm)</td>
<td>(331 mm)</td>
<td>(2057 mm)</td>
<td></td>
<td>(987 cm²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500 tons</td>
<td>39-61</td>
<td>Electric or Gas Double Acting</td>
<td>24&quot; x 57&quot;</td>
<td>20&quot; x 11&quot;</td>
<td>18&quot;</td>
<td>107&quot;</td>
<td>300.4 in² (1940 cm²)</td>
<td>9335 lbs (4230 kg)</td>
<td>13&quot; (330 mm)</td>
<td></td>
</tr>
<tr>
<td>(14946 kN)</td>
<td></td>
<td>(588 mm x 1446 mm)</td>
<td>(508 mm x 279 mm)</td>
<td>(508 mm x 279 mm)</td>
<td>(457 mm)</td>
<td>(2718 mm)</td>
<td></td>
<td>(1940 cm²)</td>
<td></td>
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</tr>
</tbody>
</table>

Stressing Heads - RSXSHPK

The stressing head applies a temporary stressing force to the tendon and maintains the load until the lock-off load is transferred to the anchor head. The stressing head assembly should be used in all applications to insure uniform strand tension. Anti-seize compound is available to assist stressing head release.

Stressing Chairs - RSXSCP

The stressing Chair utilizes a keeper plate to adjust to an applicable distance for 3-part wedge sets. The stressing chair assembly can be used for proof testing of the strand anchor assembly, incremental lock-off loading, or typical installation loading.
Strand Anchor Systems

Project Photos

Project: CPS Coal Plant
Contractor: Hayward Baker
Location: San Antonio, TX

Project: Consumer's Energy
Contractor: Hardman Construction
Location: Essexville, MI

Project: HWY 129
Engineer: Pacific Coast Drill and Blast
Location: Widening Aromas, CA

Project: Chickamauga Lock & Dam
Contractor: Judy Company
Location: Chattanooga, TN

Project: Dana-Farber Cancer Institute
Contractor: Terra Drilling
Location: Boston, MA

Project: Mill Street, Lot 7
Contractor: B&Y Drilling
Location: Aspen, CO