

WADDELL & ASSOCIATES

Post Tension Foundation Calculations for:

HOMEFED CORPORATION
COTA VERA SWIM CLUB
CHULA VISTA, CA

Post Tension Foundation Design Summary

<u>Category</u>	<u>Ext. Beam</u>	<u>Int. Beam</u>	<u>Slab Thickness</u>
<i>Category I</i> <i>Low (E.I. = 0-50)</i>	20"	15"	5.0"
<i>Category II</i> <i>Medium (E.I.=51-90)</i>	26"	15"	5.0"
<i>Category III</i> <i>High (E.I.=91-130)</i>	32"	16"	5.0"

Allowable Bearing Capacity of: 2000 psf



Soils Report By: **AGS, INC.**
Soils Report Job #: **2202-04-B-2**
Soils Report Date: **April 8, 2022**

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 32.00 FT x 34.50 FT x 5.00 Inches

Material Properties

Concrete Strength, f'_c : 3,000 PSI
 Tendon Strength, F_{pu} : 270 KSI
 Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 26.1 Cubic Yards
 Prestressing Tendon : 739 Linear Feet
 Number of End Anchorages : 42

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		10.67 Feet O.C.
Number of Slab Tendons :		6
Slab Tendon Spacing :		5.60 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		11.50 Feet O.C.
Number of Slab Tendons :		7
Slab Tendon Spacing :		5.08 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

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Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

SOIL BEARING :

SOIL BEARING: 0.0%

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

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Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
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 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Total Applied Load	146,150 LB
Bearing Area	986 FT ²
Applied Pressure on Soil	148 PSF
Soil Pressure Safety Factor	0.00

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	7	6
Number of Beam Tendons	4	4
Spacing of Slab Tendons (Feet)	5.08	5.60
Center of Gravity of Concrete (from top of slab) (Inch)	4.28	4.39
Center of Gravity of Tendons (from top of slab) (Inch)	6.47	6.87
Eccentricity of Prestressing (Inch)	-2.20	-2.49
Minimum Effective Prestress Force (K)	254.6	228.0
Beta Distance Effective Prestress Force (K)	275.2	249.9
Minimum Effective Prestress (PSI)	97	92
Beta Distance Effective Prestress (PSI)	105	101

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 4.55 FT-K/FT
 Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 4.55 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	1.350	1.350
Actual Stress	-0.153	-0.155	0.851	0.819

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	41,380	40,576
Required Moment of Inertia (Inch ⁴)	14,470	14,470
Required Moment of Inertia controlled by	Width	Length

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction. 0.94 K/FT
 Maximum Shear, Long Direction 0.94 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	152	152
Actual Shear Stress (PSI)	41	38

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Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
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 Report Date : April 8, 2022
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Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	208.4	180.1
0.5 Moment (FT-K)	78.5	72.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction 2.91 FT-K/FT
 Maximum Moment, Long Direction 2.91 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	Allowable Stress	1.350	1.350
Actual Stress	-0.075	-0.049	Actual Stress	0.167	0.154

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	41,380	40,576
Required Moment of Inertia (Inch ⁴)	18,488	18,488
Required Moment of Inertia controlled by	Width	Length

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction 1.35 K/FT
 Maximum Shear, Long Direction 1.35 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	152	152
Actual Shear Stress (PSI)	58	54

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	118.7	118.7
0.5 Moment (FT-K)	50.2	46.5

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Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
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Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	2,631	2,481
Moment of Inertia (Inch ⁴) :	41,380	40,576
Section Modulus, Top (Inch ³) :	9,673	9,252
Section Modulus, Bottom (Inch ³) :	3,336	3,300
Center of Gravity of Concrete - from top (Inch) :	4.28	4.39
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.47	6.87
Eccentricity of Prestress (Inch) :	-2.20	-2.49
Beta Distance (Feet) :	7.40	7.36
Equivalent Beam Depth (Inches) :	16.68	16.68

Note: All Calculations above and other reported values which depend on depths use the equivalent depths as shown above.

Jacking Force : 33.05 KIPS

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
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 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

SUMMARY OF INPUT DATA

Material Properties

Concrete Strength, f'_C :	3,000.0 PSI
Concrete Creep Modulus, E_C :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Geometry :	32.00 FT x 34.50 FT x 5.00 Inches	
	<u>Short Direction</u>	<u>Long Direction</u>
Minimum Permissible Prestress :	90.00 PSI	90.00 PSI

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	2	2	2	2	
Depth :	18.0	15.0	18.0	15.0	Inches
Width :	12.0	12.0	12.0	12.0	Inches
Tendons :	1	1	1	1	
Cover :	3.00	3.00	3.00	3.00	Inches

Average beam spacing used in analysis

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
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Geotechnical Report : AGS, INC.

SUMMARY OF INPUT DATA - Continued

Soil Properties

Allowable Bearing Pressure :		2,000.0 PSF
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.40 Feet
Differential Soil Movement, y_m :	0.230 Inches	0.540 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	40.00 PSF
Total Perimeter Load :	1,000.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

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Geostructural Tool Kit, Inc.

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Project Engineer : IRW

Project Number : 23-01
Project Date : January 13, 2023
Report Date : April 8, 2022
Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	2,000.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	40 PCI
Slab Thickness :	5.00 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment : 1.47 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.329	1.350
Applied Stress :	-0.262	0.445
Prestress at Line Load :	91.9 PSI	

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 32.00 FT x 34.50 FT x 5.00 Inches

Material Properties

Concrete Strength, f'_c :	3,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	26.1 Cubic Yards
Prestressing Tendon :	739 Linear Feet
Number of End Anchorages :	42

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		10.67 Feet O.C.
Number of Slab Tendons :		6
Slab Tendon Spacing :		5.60 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		11.50 Feet O.C.
Number of Slab Tendons :		7
Slab Tendon Spacing :		5.08 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

SOIL BEARING :

SOIL BEARING: 0.0%

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II
 Project Engineer : IRW

Project Number : 23-01
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Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Total Applied Load	146,150 LB
Bearing Area	986 FT ²
Applied Pressure on Soil	148 PSF
Soil Pressure Safety Factor	0.00

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	7	6
Number of Beam Tendons	4	4
Spacing of Slab Tendons (Feet)	5.08	5.60
Center of Gravity of Concrete (from top of slab) (Inch)	4.28	4.39
Center of Gravity of Tendons (from top of slab) (Inch)	6.47	6.87
Eccentricity of Prestressing (Inch)	-2.20	-2.49
Minimum Effective Prestress Force (K)	254.6	228.0
Beta Distance Effective Prestress Force (K)	275.2	249.9
Minimum Effective Prestress (PSI)	97	92
Beta Distance Effective Prestress (PSI)	105	101

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 5.01 FT-K/FT
 Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 5.01 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	1.350	1.350
Actual Stress	-0.172	-0.175	0.908	0.873

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	41,380	40,576
Required Moment of Inertia (Inch ⁴)	15,942	15,942
Required Moment of Inertia controlled by	Width	Length

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction. 1.02 K/FT
 Maximum Shear, Long Direction 1.02 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	152	152
Actual Shear Stress (PSI)	44	41

PTISlab 3.5

Geostructural Tool Kit, Inc.

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 Project Engineer : IRW

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Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	208.4	180.1
0.5 Moment (FT-K)	86.5	80.2

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction 3.59 FT-K/FT
 Maximum Moment, Long Direction 3.59 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	Allowable Stress	1.350	1.350
Actual Stress	-0.160	-0.129	Actual Stress	0.196	0.183

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	41,380	40,576
Required Moment of Inertia (Inch ⁴)	22,855	22,855
Required Moment of Inertia controlled by	Width	Length

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction 1.85 K/FT
 Maximum Shear, Long Direction 1.86 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	152	152
Actual Shear Stress (PSI)	80	74

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	118.7	118.7
0.5 Moment (FT-K)	62.0	57.5

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	2,631	2,481
Moment of Inertia (Inch ⁴) :	41,380	40,576
Section Modulus, Top (Inch ³) :	9,673	9,252
Section Modulus, Bottom (Inch ³) :	3,336	3,300
Center of Gravity of Concrete - from top (Inch) :	4.28	4.39
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.47	6.87
Eccentricity of Prestress (Inch) :	-2.20	-2.49
Beta Distance (Feet) :	7.40	7.36
Equivalent Beam Depth (Inches) :	16.68	16.68

Note: All Calculations above and other reported values which depend on depths use the equivalent depths as shown above.

Jacking Force : 33.05 KIPS

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

SUMMARY OF INPUT DATA

Material Properties

Concrete Strength, f'_C :	3,000.0 PSI
Concrete Creep Modulus, E_C :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Geometry : 32.00 FT x 34.50 FT x 5.00 Inches

	Short Direction	Long Direction
Minimum Permissible Prestress :	90.00 PSI	90.00 PSI

Beam Properties

	Short Direction		Long Direction	
	Type I	Type II	Type I	Type II
Quantity :	2	2	2	2
Depth :	18.0	15.0	18.0	15.0 Inches
Width :	12.0	12.0	12.0	12.0 Inches
Tendons :	1	1	1	1
Cover :	3.00	3.00	3.00	3.00 Inches

Average beam spacing used in analysis

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

SUMMARY OF INPUT DATA - Continued

Soil Properties

Allowable Bearing Pressure :		2,000.0 PSF
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	4.60 Feet
Differential Soil Movement, y_m :	0.380 Inches	0.900 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	40.00 PSF
Total Perimeter Load :	1,000.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II
Project Engineer : IRW

Project Number : 23-01
Project Date : January 13, 2023
Report Date : April 8, 2022
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Geotechnical Report : AGS, INC.

PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

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Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. II
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	2,000.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_S :	40 PCI
Slab Thickness :	5.00 Inch
Concrete Creep Modulus, E_C :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment : 1.47 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.329	1.350
Applied Stress :	-0.262	0.445
Prestress at Line Load :	91.9 PSI	

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 32.00 FT x 34.50 FT x 5.00 Inches

Material Properties

Concrete Strength, f'_c : 3,000 PSI
 Tendon Strength, F_{pu} : 270 KSI
 Tendon Diameter : 1 / 2 Inch

Material Quantities

Concrete Volume : 26.8 Cubic Yards
 Prestressing Tendon : 776 Linear Feet
 Number of End Anchorages : 44

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	19.0 Inches	16.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		10.67 Feet O.C.
Number of Slab Tendons :		7
Slab Tendon Spacing :		4.67 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	19.0 Inches	16.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		11.50 Feet O.C.
Number of Slab Tendons :		7
Slab Tendon Spacing :		5.08 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
Project Engineer : IRW

Project Number : 23-01
Project Date : January 13, 2023
Report Date : April 8, 2022
Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

SOIL BEARING :

SOIL BEARING: 0.0%

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Total Applied Load	149,139 LB
Bearing Area	986 FT ²
Applied Pressure on Soil	151 PSF
Soil Pressure Safety Factor	0.00

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	7	7
Number of Beam Tendons	4	4
Spacing of Slab Tendons (Feet)	5.08	4.67
Center of Gravity of Concrete (from top of slab) (Inch)	4.51	4.63
Center of Gravity of Tendons (from top of slab) (Inch)	6.83	6.84
Eccentricity of Prestressing (Inch)	-2.33	-2.21
Minimum Effective Prestress Force (K)	253.5	253.5
Beta Distance Effective Prestress Force (K)	273.8	275.3
Minimum Effective Prestress (PSI)	95	100
Beta Distance Effective Prestress (PSI)	102	109

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 5.52 FT-K/FT
 Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 5.52 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	1.350	1.350
Actual Stress	-0.166	-0.153	0.885	0.847

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	49,146	48,206
Required Moment of Inertia (Inch ⁴)	17,556	17,556
Required Moment of Inertia controlled by	Width	Length

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction. 1.10 K/FT
 Maximum Shear, Long Direction 1.10 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	152	153
Actual Shear Stress (PSI)	45	41

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	223.8	223.8
0.5 Moment (FT-K)	95.2	88.3

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction 4.13 FT-K/FT
 Maximum Moment, Long Direction 4.13 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	Allowable Stress	1.350	1.350
Actual Stress	-0.185	-0.155	Actual Stress	0.20	0.203

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	49,146	48,206
Required Moment of Inertia (Inch ⁴)	26,244	26,244
Required Moment of Inertia controlled by	Width	Length

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction 2.31 K/FT
 Maximum Shear, Long Direction 2.32 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	152	153
Actual Shear Stress (PSI)	94	88

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	127.5	127.5
0.5 Moment (FT-K)	71.2	66.0

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	2,678	2,528
Moment of Inertia (Inch ⁴) :	49,146	48,206
Section Modulus, Top (Inch ³) :	10,906	10,421
Section Modulus, Bottom (Inch ³) :	3,733	3,695
Center of Gravity of Concrete - from top (Inch) :	4.51	4.63
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.83	6.84
Eccentricity of Prestress (Inch) :	-2.33	-2.21
Beta Distance (Feet) :	7.72	7.68
Equivalent Beam Depth (Inches) :	17.67	17.67

Note: All Calculations above and other reported values which depend on depths use the equivalent depths as shown above.

Jacking Force : 33.05 KIPS

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

SUMMARY OF INPUT DATA

Material Properties

Concrete Strength, f'_C :	3,000.0 PSI
Concrete Creep Modulus, E_C :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Geometry :	32.00 FT x 34.50 FT x 5.00 Inches	
	<u>Short Direction</u>	<u>Long Direction</u>
Minimum Permissible Prestress :	90.00 PSI	90.00 PSI

Beam Properties

	Short Direction		Long Direction		
	Type I	Type II	Type I	Type II	
Quantity :	2	2	2	2	
Depth :	19.0	16.0	19.0	16.0	Inches
Width :	12.0	12.0	12.0	12.0	Inches
Tendons :	1	1	1	1	
Cover :	3.00	3.00	3.00	3.00	Inches

Average beam spacing used in analysis

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

SUMMARY OF INPUT DATA - Continued

Soil Properties

Allowable Bearing Pressure :		2,000.0 PSF
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	7.50 Feet	3.90 Feet
Differential Soil Movement, y_m :	0.510 Inches	1.260 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	40.00 PSF
Total Perimeter Load :	1,000.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
Project Engineer : IRW

Project Number : 23-01
Project Date : January 13, 2023
Report Date : April 8, 2022
Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Leftside) Cat. III
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	2,000.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	40 PCI
Slab Thickness :	5.00 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment : 1.47 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.329	1.350
Applied Stress :	-0.253	0.454
Prestress at Line Load :	100.3 PSI	

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 30.50 FT x 71.00 FT x 5.00 Inches

Material Properties

Concrete Strength, f'_c :	3,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	50.0 Cubic Yards
Prestressing Tendon :	1,486 Linear Feet
Number of End Anchorages :	64

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		10.17 Feet O.C.
Number of Slab Tendons :		7
Slab Tendon Spacing :		4.42 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	5
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		11.83 Feet O.C.
Number of Slab Tendons :		14
Slab Tendon Spacing :		5.15 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

SOIL BEARING :

SOIL BEARING: 0.0%

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Total Applied Load	282,236 LB
Bearing Area	1,956 FT ²
Applied Pressure on Soil	144 PSF
Soil Pressure Safety Factor	0.00

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	14	7
Number of Beam Tendons	7	4
Spacing of Slab Tendons (Feet)	5.15	4.42
Center of Gravity of Concrete (from top of slab) (Inch)	3.93	4.46
Center of Gravity of Tendons (from top of slab) (Inch)	5.92	6.48
Eccentricity of Prestressing (Inch)	-1.99	-2.02
Minimum Effective Prestress Force (K)	485.7	219.5
Beta Distance Effective Prestress Force (K)	518.9	277.7
Minimum Effective Prestress (PSI)	94	92
Beta Distance Effective Prestress (PSI)	100	116

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 4.75 FT-K/FT
 Maximum Moment, Long Dir. (controlled by $E_m=5.0$ per PTI 4.3.2) 4.53 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	1.350	1.350
Actual Stress	-0.198	-0.131	1.018	0.793

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	66,965	40,064
Required Moment of Inertia (Inch ⁴)	29,645	17,506
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction. 1.41 K/FT
 Maximum Shear, Long Direction 0.97 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	151	155
Actual Shear Stress (PSI)	74	37

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	392.7	208.4
0.5 Moment (FT-K)	168.7	69.0

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction 3.21 FT-K/FT
 Maximum Moment, Long Direction 2.88 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	Allowable Stress	1.350	1.350
Actual Stress	-0.207	-0.034	Actual Stress	0.20	0.171

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	66,965	40,064
Required Moment of Inertia (Inch ⁴)	40,067	22,274
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction 1.32 K/FT
 Maximum Shear, Long Direction 1.43 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	151	155
Actual Shear Stress (PSI)	70	54

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	197.6	118.7
0.5 Moment (FT-K)	114.0	43.9

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	5,185	2,391
Moment of Inertia (Inch ⁴) :	66,965	40,064
Section Modulus, Top (Inch ³) :	17,045	8,989
Section Modulus, Bottom (Inch ³) :	5,541	3,277
Center of Gravity of Concrete - from top (Inch) :	3.93	4.46
Center of Gravity of Prestressing Tendons - from top (Inch) :	5.92	6.48
Eccentricity of Prestress (Inch) :	-1.99	-2.02
Beta Distance (Feet) :	8.34	7.34
Equivalent Beam Depth (Inches) :	16.01	16.68

Note: All Calculations above and other reported values which depend on depths use the equivalent depths as shown above.

Jacking Force : 33.05 KIPS

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

SUMMARY OF INPUT DATA

Material Properties

Concrete Strength, f'_C :	3,000.0 PSI
Concrete Creep Modulus, E_C :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Geometry : 30.50 FT x 71.00 FT x 5.00 Inches

	Short Direction	Long Direction
Minimum Permissible Prestress :	90.00 PSI	90.00 PSI

Beam Properties

	Short Direction		Long Direction	
	Type I	Type II	Type I	Type II
Quantity :	2	5	2	2
Depth :	18.0	15.0	18.0	15.0 Inches
Width :	12.0	12.0	12.0	12.0 Inches
Tendons :	1	1	1	1
Cover :	3.00	3.00	3.00	3.00 Inches

Average beam spacing used in analysis

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

SUMMARY OF INPUT DATA - Continued

Soil Properties

Allowable Bearing Pressure :		2,000.0 PSF
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	5.40 Feet
Differential Soil Movement, y_m :	0.230 Inches	0.540 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	40.00 PSF
Total Perimeter Load :	1,000.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I
Project Engineer : IRW

Project Number : 23-01
Project Date : January 13, 2023
Report Date : April 8, 2022
Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. I

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	2,000.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_s :	40 PCI
Slab Thickness :	5.00 Inch
Concrete Creep Modulus, E_c :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment : 1.47 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.329	1.350
Applied Stress :	-0.262	0.445
Prestress at Line Load :	91.8 PSI	

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. II

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 30.50 FT x 71.00 FT x 5.00 Inches

Material Properties

Concrete Strength, f'_c :	3,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	50.0 Cubic Yards
Prestressing Tendon :	1,486 Linear Feet
Number of End Anchorages :	64

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		10.17 Feet O.C.
Number of Slab Tendons :		7
Slab Tendon Spacing :		4.42 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	5
Depth of Beams :	18.0 Inches	15.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		11.83 Feet O.C.
Number of Slab Tendons :		14
Slab Tendon Spacing :		5.15 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. II

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

SOIL BEARING :

SOIL BEARING: 0.0%

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. II

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Total Applied Load	282,236 LB
Bearing Area	1,956 FT ²
Applied Pressure on Soil	144 PSF
Soil Pressure Safety Factor	0.00

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	14	7
Number of Beam Tendons	7	4
Spacing of Slab Tendons (Feet)	5.15	4.42
Center of Gravity of Concrete (from top of slab) (Inch)	3.93	4.46
Center of Gravity of Tendons (from top of slab) (Inch)	5.92	6.48
Eccentricity of Prestressing (Inch)	-1.99	-2.02
Minimum Effective Prestress Force (K)	485.7	219.5
Beta Distance Effective Prestress Force (K)	518.9	277.7
Minimum Effective Prestress (PSI)	94	92
Beta Distance Effective Prestress (PSI)	100	116

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by Em=5.0 per PTI 4.3.2)	5.24 FT-K/FT
Maximum Moment, Long Dir. (controlled by Em=5.0 per PTI 4.3.2)	4.99 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	1.350	1.350
Actual Stress	-0.222	-0.149	1.092	0.844

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	66,965	40,064
Required Moment of Inertia (Inch ⁴)	32,661	19,287
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction.

1.43 K/FT

Maximum Shear, Long Direction

1.05 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	151	155
Actual Shear Stress (PSI)	76	40

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. II
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
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Geotechnical Report : AGS, INC.

RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	392.7	208.4
0.5 Moment (FT-K)	185.9	76.1

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction 3.84 FT-K/FT
 Maximum Moment, Long Direction 3.56 FT-K/FT

	Tension in Bottom Fiber (KSI)			Compression in Top Fiber (KSI)	
	Short Direction	Long Direction		Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	Allowable Stress	1.350	1.350
Actual Stress	-0.304	-0.110	Actual Stress	0.231	0.199

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	66,965	40,064
Required Moment of Inertia (Inch ⁴)	47,909	27,536
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction 1.81 K/FT
 Maximum Shear, Long Direction 1.96 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	151	155
Actual Shear Stress (PSI)	96	75

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	197.6	118.7
0.5 Moment (FT-K)	136.4	54.3

PTISlab 3.5

Geostructural Tool Kit, Inc.

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RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	5,185	2,391
Moment of Inertia (Inch ⁴) :	66,965	40,064
Section Modulus, Top (Inch ³) :	17,045	8,989
Section Modulus, Bottom (Inch ³) :	5,541	3,277
Center of Gravity of Concrete - from top (Inch) :	3.93	4.46
Center of Gravity of Prestressing Tendons - from top (Inch) :	5.92	6.48
Eccentricity of Prestress (Inch) :	-1.99	-2.02
Beta Distance (Feet) :	8.34	7.34
Equivalent Beam Depth (Inches) :	16.01	16.68

Note: All Calculations above and other reported values which depend on depths use the equivalent depths as shown above.

Jacking Force : 33.05 KIPS

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. II

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

SUMMARY OF INPUT DATA

Material Properties

Concrete Strength, f'_C :	3,000.0 PSI
Concrete Creep Modulus, E_C :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Geometry : 30.50 FT x 71.00 FT x 5.00 Inches

	<u>Short Direction</u>	<u>Long Direction</u>
Minimum Permissible Prestress :	90.00 PSI	90.00 PSI

Beam Properties

	Short Direction		Long Direction	
	Type I	Type II	Type I	Type II
Quantity :	2	5	2	2
Depth :	18.0	15.0	18.0	15.0 Inches
Width :	12.0	12.0	12.0	12.0 Inches
Tendons :	1	1	1	1
Cover :	3.00	3.00	3.00	3.00 Inches

Average beam spacing used in analysis

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. II
 Project Engineer : IRW

Project Number : 23-01
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Geotechnical Report : AGS, INC.

SUMMARY OF INPUT DATA - Continued

Soil Properties

Allowable Bearing Pressure :		2,000.0 PSF
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	9.00 Feet	4.60 Feet
Differential Soil Movement, y_m :	0.380 Inches	0.900 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	40.00 PSF
Total Perimeter Load :	1,000.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss :	15.0 KSI
Subgrade Friction Coefficient :	0.75

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Project Engineer : IRW

Project Number : 23-01
Project Date : January 13, 2023
Report Date : April 8, 2022
Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. II
 Project Engineer : IRW

Project Number : 23-01
 Project Date : January 13, 2023
 Report Date : April 8, 2022
 Report Number : 2202-04-B-2

Geotechnical Report : AGS, INC.

LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	2,000.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_S :	40 PCI
Slab Thickness :	5.00 Inch
Concrete Creep Modulus, E_C :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment : 1.47 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.329	1.350
Applied Stress :	-0.262	0.445
Prestress at Line Load :	91.8 PSI	

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. III

Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN SUMMARY

Slab Dimensions : 30.50 FT x 71.00 FT x 5.00 Inches

Material Properties

Concrete Strength, f'_c :	3,000 PSI
Tendon Strength, F_{pu} :	270 KSI
Tendon Diameter :	1 / 2 Inch

Material Quantities

Concrete Volume :	51.4 Cubic Yards
Prestressing Tendon :	1,559 Linear Feet
Number of End Anchorages :	66

In the LONG direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	2
Depth of Beams :	19.0 Inches	16.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		10.17 Feet O.C.
Number of Slab Tendons :		8
Slab Tendon Spacing :		3.79 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

In the SHORT direction ...

	<u>Type I Beam</u>	<u>Type II Beam</u>
Quantity of Beams :	2	5
Depth of Beams :	19.0 Inches	16.0 Inches
Width of Beams :	12.0 Inches	12.0 Inches
Tendons per Beam :	1	1
Beam Tendon Centroid :	3.25 Inches	3.25 Inches
Beam Spacing :		11.83 Feet O.C.
Number of Slab Tendons :		14
Slab Tendon Spacing :		5.15 Feet O.C.
Slab Tendon Centroid :		2.50 Inches from top of slab

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Project Engineer : IRW

Project Number : 23-01

Project Date : January 13, 2023

Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

RIBBED FOUNDATION - DESIGN COMPLIANCE SUMMARY

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

SOIL BEARING :

SOIL BEARING: 0.0%

CENTER LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

EDGE LIFT MODE :

ALL VALUES WITHIN ALLOWABLE LIMITS.

PTISlab 3.5

Geostructural Tool Kit, Inc.

Project Title : Home Fed - Cota Vera Swim Club (Rightside) Cat. III

Project Engineer : IRW

Project Number : 23-01

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Report Date : April 8, 2022

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RIBBED FOUNDATION - RESULTS OF ANALYSIS

Soil Bearing Analysis

Total Applied Load	287,851 LB
Bearing Area	1,956 FT ²
Applied Pressure on Soil	147 PSF
Soil Pressure Safety Factor	0.00

Prestress Summary

Subgrade Friction calculated by method prescribed in PTI Manual

	Short Direction	Long Direction
Number of Slab Tendons	14	8
Number of Beam Tendons	7	4
Spacing of Slab Tendons (Feet)	5.15	3.79
Center of Gravity of Concrete (from top of slab) (Inch)	4.13	4.70
Center of Gravity of Tendons (from top of slab) (Inch)	6.25	6.47
Eccentricity of Prestressing (Inch)	-2.12	-1.77
Minimum Effective Prestress Force (K)	483.6	244.0
Beta Distance Effective Prestress Force (K)	515.9	303.2
Minimum Effective Prestress (PSI)	92	100
Beta Distance Effective Prestress (PSI)	98	124

Moment Analysis - Center Lift Mode

Maximum Moment, Short Dir. (controlled by Em=5.0 per PTI 4.3.2)	5.77 FT-K/FT
Maximum Moment, Long Dir. (controlled by Em=5.0 per PTI 4.3.2)	5.49 FT-K/FT

	Tension in Top Fiber (KSI)		Compression in Bottom Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	1.350	1.350
Actual Stress	-0.212	-0.127	1.066	0.818

Stiffness Analysis - Center Lift Mode

Based on a Stiffness Coefficient of 360

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	79,926	47,605
Required Moment of Inertia (Inch ⁴)	35,967	22,175
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Center Lift Mode

Maximum Shear, Short Direction.

1.47 K/FT

Maximum Shear, Long Direction

1.13 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	151	156
Actual Shear Stress (PSI)	73	41

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Project Engineer : IRW

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RIBBED FOUNDATION - RESULTS OF ANALYSIS continued

Cracked Section Analysis - Center Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	423.5	253.9
0.5 Moment (FT-K)	204.7	83.8

Moment Analysis - Edge Lift Mode

Maximum Moment, Short Direction	4.37 FT-K/FT
Maximum Moment, Long Direction	4.09 FT-K/FT

	Tension in Bottom Fiber (KSI)		Compression in Top Fiber (KSI)	
	Short Direction	Long Direction	Short Direction	Long Direction
Allowable Stress	-0.329	-0.329	1.350	1.350
Actual Stress	-0.325	-0.137	0.234	0.219

Stiffness Analysis - Edge Lift Mode

Based on a Stiffness Coefficient of 720

	Short Direction	Long Direction
Available Moment of Inertia (Inch ⁴)	79,926	47,605
Required Moment of Inertia (Inch ⁴)	54,513	33,011
Required Moment of Inertia controlled by	Width	6*Beta

Shear Analysis - Edge Lift Mode

Maximum Shear, Short Direction	2.26 K/FT
Maximum Shear, Long Direction	2.44 K/FT

	Short Direction	Long Direction
Allowable Shear Stress (PSI)	151	156
Actual Shear Stress (PSI)	112	88

Cracked Section Analysis - Edge Lift Mode

	Short Direction	Long Direction
Cracked Section Capacity (FT-K)	212.9	127.5
0.5 Moment (FT-K)	155.1	62.3

PTISlab 3.5

Geostructural Tool Kit, Inc.

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RIBBED FOUNDATION - SELECTED VARIABLES

	Short Direction	Long Direction
Cross Sectional Area (Inch ²) :	5,268	2,438
Moment of Inertia (Inch ⁴) :	79,926	47,605
Section Modulus, Top (Inch ³) :	19,365	10,119
Section Modulus, Bottom (Inch ³) :	6,207	3,671
Center of Gravity of Concrete - from top (Inch) :	4.13	4.70
Center of Gravity of Prestressing Tendons - from top (Inch) :	6.25	6.47
Eccentricity of Prestress (Inch) :	-2.12	-1.77
Beta Distance (Feet) :	8.72	7.66
Equivalent Beam Depth (Inches) :	17.00	17.67

Note: All Calculations above and other reported values which depend on depths use the equivalent depths as shown above.

Jacking Force : 33.05 KIPS

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Project Engineer : IRW

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Geotechnical Report : AGS, INC.

Report Date : April 8, 2022

Report Number : 2202-04-B-2

SUMMARY OF INPUT DATA

Material Properties

Concrete Strength, f'_C :	3,000.0 PSI
Concrete Creep Modulus, E_C :	1,500,000.0 PSI
Concrete Unit Weight :	145.0 PCF
Tendon Strength, F_{pu} :	270.0 KSI
Tendon Diameter :	1 / 2 Inch

Slab Properties

Rectangle Geometry : 30.50 FT x 71.00 FT x 5.00 Inches

	<u>Short Direction</u>	<u>Long Direction</u>
Minimum Permissible Prestress :	90.00 PSI	90.00 PSI

Beam Properties

	Short Direction		Long Direction		
	<u>Type I</u>	<u>Type II</u>	<u>Type I</u>	<u>Type II</u>	
Quantity :	2	5	2	2	
Depth :	19.0	16.0	19.0	16.0	Inches
Width :	12.0	12.0	12.0	12.0	Inches
Tendons :	1	1	1	1	
Cover :	3.00	3.00	3.00	3.00	Inches

Average beam spacing used in analysis

PTISlab 3.5

Geostructural Tool Kit, Inc.

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SUMMARY OF INPUT DATA - Continued

Soil Properties

Allowable Bearing Pressure :		2,000.0 PSF
	<u>Center Lift</u>	<u>Edge Lift</u>
Edge Moisture Variation Distance, e_m :	7.50 Feet	3.90 Feet
Differential Soil Movement, y_m :	0.510 Inches	1.260 Inches

Load, Deflection and Subgrade Properties

Slab Loading

Uniform Superimposed Total Load :	40.00 PSF
Total Perimeter Load :	1,000.00 PLF

Stiffness Coefficients

Center Lift :	360
Edge Lift :	720

Prestress Calculation

Subgrade Friction calculated by method prescribed in PTI Manual

Prestress Loss : 15.0 KSI

Subgrade Friction Coefficient : 0.75

PTISlab 3.5

Geostructural Tool Kit, Inc.

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PTI EXCEPTION SUMMARY

**The following elements of the design are not in strict compliance with the
Design of Post-Tensioned Slabs-On-Ground 3rd Edition manual
published by the Post-Tensioning Institute.**

NO PTI EXCEPTIONS EXIST

PTISlab 3.5

Geostructural Tool Kit, Inc.

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Report Date : April 8, 2022

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LINE LOAD ANALYSIS

Summary of Input Data

Line Load :	2,000.0 lb/ft
Direction Of Line Load :	Parallel to Short Direction
Prestress at Line Load :	Minimum Effective Prestress
Soil Modulus, K_S :	40 PCI
Slab Thickness :	5.00 Inch
Concrete Creep Modulus, E_C :	1,500,000.0 PSI

Summary of Line Load Analysis

Applied Moment : 1.47 Ft-K/Ft

Bending Stresses (KSI)

	<u>Tension in Extreme Fiber</u>	<u>Compression in Extreme Fiber</u>
Allowable Stress :	-0.329	1.350
Applied Stress :	-0.253	0.454
Prestress at Line Load :	100.1 PSI	

Design Compliance Summary

The **BOLD** values exceed allowable or are less than minimum limits by the percentage indicated:

ALL VALUES WITHIN ALLOWABLE LIMITS.

POST-TENSION LOADING CALCULATIONS

Post Load Capacity 4x4 Post
 bo=7.5 x 4 = 30
 d=2" conservative
 f'c=2500 psi

Allowable Bearing Capacity=
 Vc = 95 psi

2000

Calculations for required pads at Point Loads

<i>Area</i>	=	$\frac{10000}{2000}$	=	5	=	2.24	<i>Then use</i>	No Pad Req'd.
<i>Area</i>	=	$\frac{12500}{2000}$	=	6.25	=	2.50	<i>Then use</i>	30"x30"x12Dp. W/3#4B.E.W.
<i>Area</i>	=	$\frac{18000}{2000}$	=	9	=	3.00	<i>Then use</i>	36"x36"x12Dp. W/4#4B.E.W.
<i>Area</i>	=	$\frac{24500}{2000}$	=	12.25	=	3.50	<i>Then use</i>	42"x42"x15Dp. W/5#4B.E.W.
<i>Area</i>	=	$\frac{32000}{2000}$	=	16	=	4.00	<i>Then use</i>	48"x48"x18"Dp. W/6#4B.E.W.
<i>Area</i>	=	$\frac{40000}{2000}$	=	20	=	4.47	<i>Then use</i>	54"x54"x18"Dp. W/6#4B.E.W.
<i>Area</i>	=	$\frac{50000}{2000}$	=	25	=	5.00	<i>Then use</i>	60"x60"x18"Dp. W/7#4B.E.W.