Diamond Pier®

Observational Evidence

Forest Lake, MN
May, 2011

Pin Foundations, Inc.
8607 58th Ave NW
Gig Harbor, WA 98332

CONTENTS

Reference:

DP-50 Evaluation Services Report, ESR-1895
Minnesota Building Code (MBC) Minnesota Rules Section 1300.0110, Subpart 13 - Alternate materials, design and methods of construction and equipment.

Site Observation Form

Brian Wald
1623 12th Avenue SE
Forest Lake,Mn55025

5/3/2011

Builder or Contracting Firm: Kevin Torgerson, Sumner Homes, Inc. 37825 Jeffery Ave., North Branch, MN 55056-5919

History of the site:

The home/building was built in: Mo/Year

Past Project General Information

The house at 1623 12th Avenue SE, Forest Lake , Mn was designed on a sloping grade and has a walkout lower level in the rear of the house. The grade drops approximately 8 feet from the front of the house to the back and continues to slope another 2' back to a channel connected to forest Lake. The channel rests approximately 100 feet behind the house. The area is known to have poor draining clay soils.
A new deck was constructed in 2010 to replace an existing deck that was damaged due to frost heave Jacking. The previous deck was supported by 8 individual concrete piers 42" inches deep which all heaved several inches. Several neighboring homes have severe frost heave issues.

Proposed Project Information:

The new deck constructed in 2010 was built utilizing the Diamond Pier DP 50 foundation system. The new deck is attached to the north side of the home above the walkout basement. A brick patio was installed under the deck surrounded by mulch landscaping which covers the Diamond Pier DP 50 system. The Diamond Pier DP 50 system was buried 6 inches below grade. The area under the deck was stripped of the soil and prepared with grade 5 compacted stone. Drainage tile was installed to capture water from the roof and the new brick patio in order to drain it away from the area.

Observational Information:

Visual signs show significant heaving is occurring in many neighboring properties along the canal which is connected to Forest Lake. The homeowner noted that heaving has been a common problem in the neighborhood over the years. Several code compliant 42 inch deep concrete piers are heaving. The new patio installed in 2010 showed signs of heaving. Observation of the Diamond Piers showed no signs of heaving over the winter of 2010-2011. All Diamond Pier DP-50s installed on this site held in frost pressures strong enough to heave previously installed concrete piers.

Summary Conclusion:

Our observational conclusions show the Diamond Pier DP 50 resisting frost heave pressures better than 42" conventional concrete piers.

IN THE STATE OF MINNESOTA WASHINGTON COUNTY

STATEMENT OF TRUTH

Petitioner: Pin Foundations, Inc.
8607 58th Ave. NW
And Gig Harbor, WA 98332

Witness: Kevin Torgerson/ Sumner Homes, Inc
37825 Jeffery Ave
North Branch, MN 55056-5919

Case File No.

STATEMENT OF TRUTH
WHERE WITHNESS TESTIFIES THE FOLLOWING TO BE TRUE

Comes now the Witness who states on oath: "I believe that the facts stated in this statement are true." The diligent research and observation has been made and the Witness verifies the following documents.

Kevin Torgerson/Sumner Homes, Inc.

Witness: *(Check all that apply)*

The Petitioner has made the following efforts to observe and document and I deem the following to be true

☑ **History of Site:**
The house at 1623 12th Avenue SE, Forest Lake, MN was designed on a sloping grade and has a walkout lower level in the rear of the house. The grade drops approximately 8 feet from the front of the house to the back and continues to slope another 2' back to a channel connected to forest Lake. The channel is approximately 100 feet behind the house. The area is known to have poor draining clay soils. A new deck was constructed in 2010 to replace an existing deck that was damaged due to frost heave Jacking. The previous deck was supported by 8 individual concrete piers 42" inches deep which all heaved several inches. Several neighboring homes have severe frost heave issues.

☑ **Current Site**
The new deck constructed in 2010 was built utilizing the Diamond Pier DP 50 foundation system. The new deck is attached to the north side of the home above the walkout basement. A brick patio was installed under the deck surrounded by mulch landscaping which covers the Diamond Pier DP 50 system. The Diamond Pier DP 50 system was buried 6 inches below grade. The area under the deck was stripped of the soil and prepared with grade 5 compacted stone. Drainage tile was installed to capture water from the roof and the new brick patio in order to drain it away from the area.

☑ **Observational Information:**
Visual signs show significant heaving is occurring in many neighboring properties along the

canal which is connected to Forest Lake. The homeowner noted that heaving has been a common problem in the neighborhood over the years. Several code compliant 42 inch deep concrete piers are heaving. The new patio installed in 2010 showed signs of heaving. Observation of the Diamond Piers showed no signs of heaving over the winter of 2010-2011.

All Diamond Pier DP-50s installed on this site held in frost pressures strong enough to heave all previously installed concrete piers. Our observational conclusions show the Diamond Pier DP 50 resisting frost heave pressures better than 42" conventional concrete piers.

☐ **Other**

Sonder Homes, Inc.

Signature

Sworn to and subscribed before me,
This [illegible] of [illegible], [illegible].

Soil Type Aerial Map

1623 12th Avenue SE, Forest Lake, MN

860C - Urban land-Hayden-Kingsley complex

Washington County, Minnesota

860C—Urban land-Hayden-Kingsley complex, 3 to 15 percent slopes

Map Unit Setting

Elevation: 700 to 1,600 feet
Mean annual precipitation: 27 to 33 inches
Mean annual air temperature: 39 to 46 degrees F
Frost-free period: 135 to 180 days

Map Unit Composition

Urban land: 55 percent
Hayden and similar soils: 25 percent
Kingsley and similar soils: 15 percent

Description of Urban Land

Setting

Landform: Moraines
Landform position (two-dimensional): Shoulder
Down-slope shape: Linear
Across-slope shape: Linear

Description of Hayden

Setting

Landform: Moraines
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Till

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: High (about 10.0 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 15 inches: Fine sandy loam
15 to 50 inches: Clay loam
50 to 60 inches: Loam

Description of Kingsley

Setting

Landform: Moraines
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Till

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 8 inches: Sandy loam
8 to 39 inches: Sandy loam
39 to 60 inches: Sandy loam

Data Source Information

Soil Survey Area: Washington County, Minnesota
Survey Area Data: Version 6, Aug 2, 2010

Topographical Contour Map

1632 12th Avenue SE, forest Lake, MN

Washington County

PUBLIC WORKS DEPARTMENT
SURVEY AND LAND MANAGEMENT DIVISION

14948 62nd Street North, P.O. Box 6
Stillwater, Minnesota 55082-0006
(651) 430-6875
surveyor@co.washington.mn.us
www.co.washington.mn.us

LEGEND

- DNR PROTECTED WATERS
- DNR PROTECTED WETLAND
- DNR PROTECTED WATERCOURSE
- MUNICIPAL BOUNDARY
- PARK BOUNDARY

CONTOUR LEGEND

- 10 FOOT INTERVAL CONTOUR
- 2 FOOT INTERVAL CONTOUR
- DEPRESSION
- DASHED CONTOURS INDICATE QUESTIONABLE ACCURACY DUE TO GROUND VEGETATION
- +907.5 SPOT ELEVATION

NORTH

SCALE: 1 inch = 50 feet

SECTION TOWNSHIP RANGE INDEX

0803221	0903221	1003221
1703221	1803221	1503221
2003221	2103221	2203221

COUNTY VICINITY MAP

* = LOCATION OF THIS MAP

SECTION VICINITY MAP

PROPERTY IDENTIFICATION NUMBER FORMAT (GEOCODE)

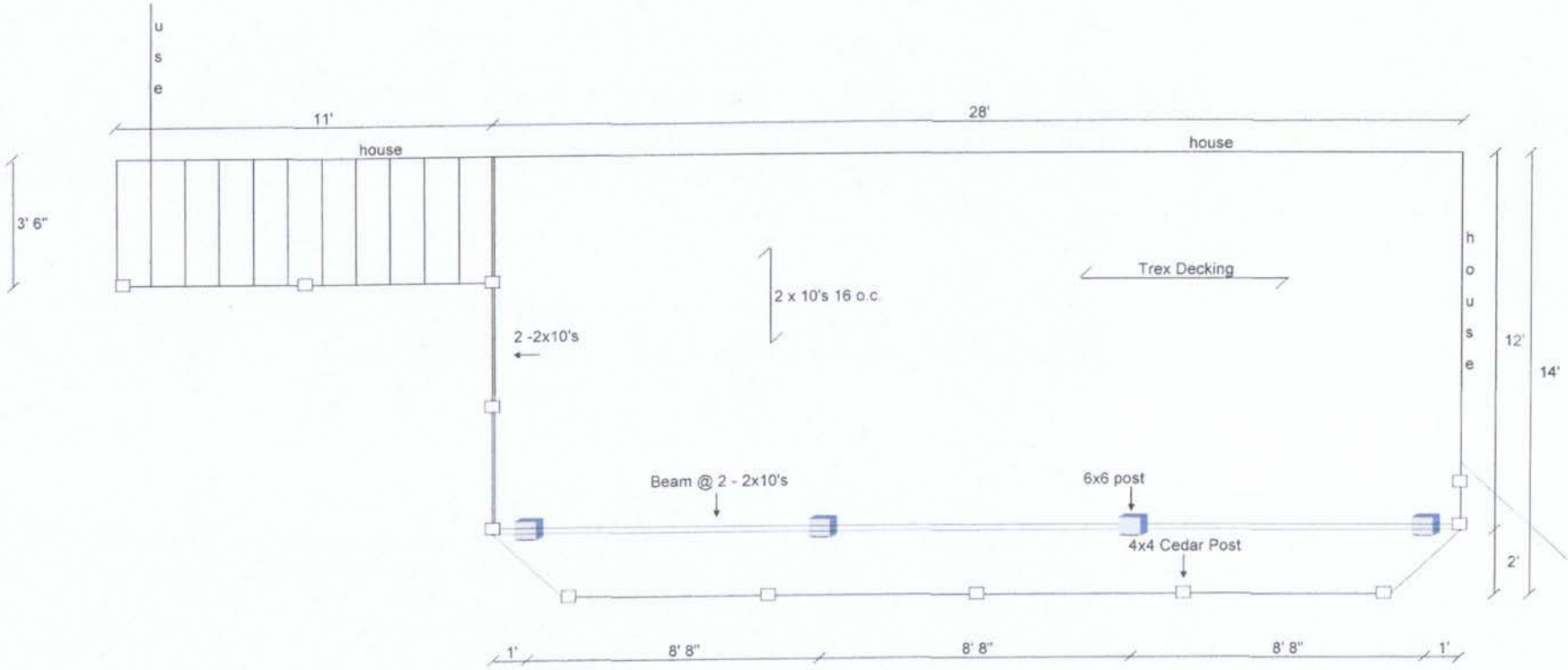
THIS DRAWING IS THE RESULT OF A COMPILATION AND REPRODUCTION OF LAND RECORDS AS THEY APPEAR IN VARIOUS WASHINGTON COUNTY OFFICES. WASHINGTON COUNTY IS NOT RESPONSIBLE FOR ANY INACCURACIES.

PROPERTY LINES AS SHOWN ARE FOR REFERENCE PURPOSES AND MAY NOT REPRESENT ACTUAL LOCATIONS.

MAP LAST UPDATED: February 14, 2011

NO ADDITIONAL CHANGES HAVE BEEN REPORTED TO DATE

DATE OF CONTOURS: April, 2000 DATE OF PHOTOGRAPHY: April, 2009



Footings - Diamond Pier DP 50

Decking

Trex Tree House

Groove product for decking

Non Groove for last deck board

Non Groove for last stair tread

Hidden Fasteners

Railings:

4x4 Cedar Post & Cedar 2x4 runners

Metal Balusters 26"

Top Rail - non grooved Trex Tree House

Skirts and Risers

Trex Tree House

Tributary Load Analysis

Date: May 4, 2011

Project: Wald Residence
lake Forest, MN

Project Size:	14 x 28			
Sq. Ft.	392.00			
Total Load Req.	60	lbs per sq. ft.		
Total Load	23,520	lbs		
% of area supported by the dwelling	50%		% of area supported by single beam line	50%
Total load supported by the dwelling	11,760		Total load supported by the single beam line	11,760
# of Posts	4			
Equal weight distribution between posts	yes			
Load to each post	**2,940**	lbs.		

Weather Data

Forest Lake Minnesota

October 1, 2010 through April 30, 2011

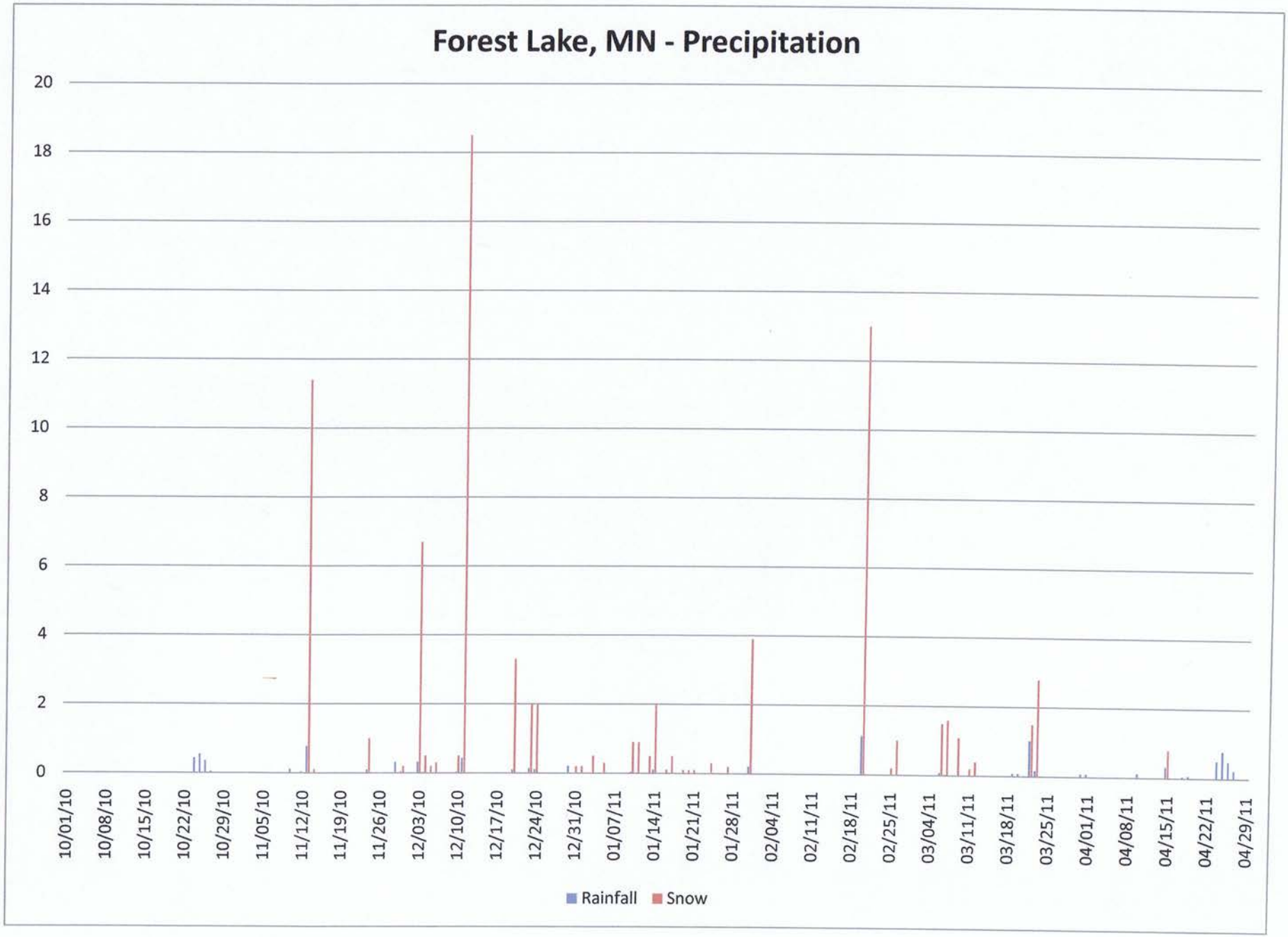
This weather summary is in reference to the observational evidence submitted regarding DP 50 Diamond Piers and their ability to resist frost heave jacking.

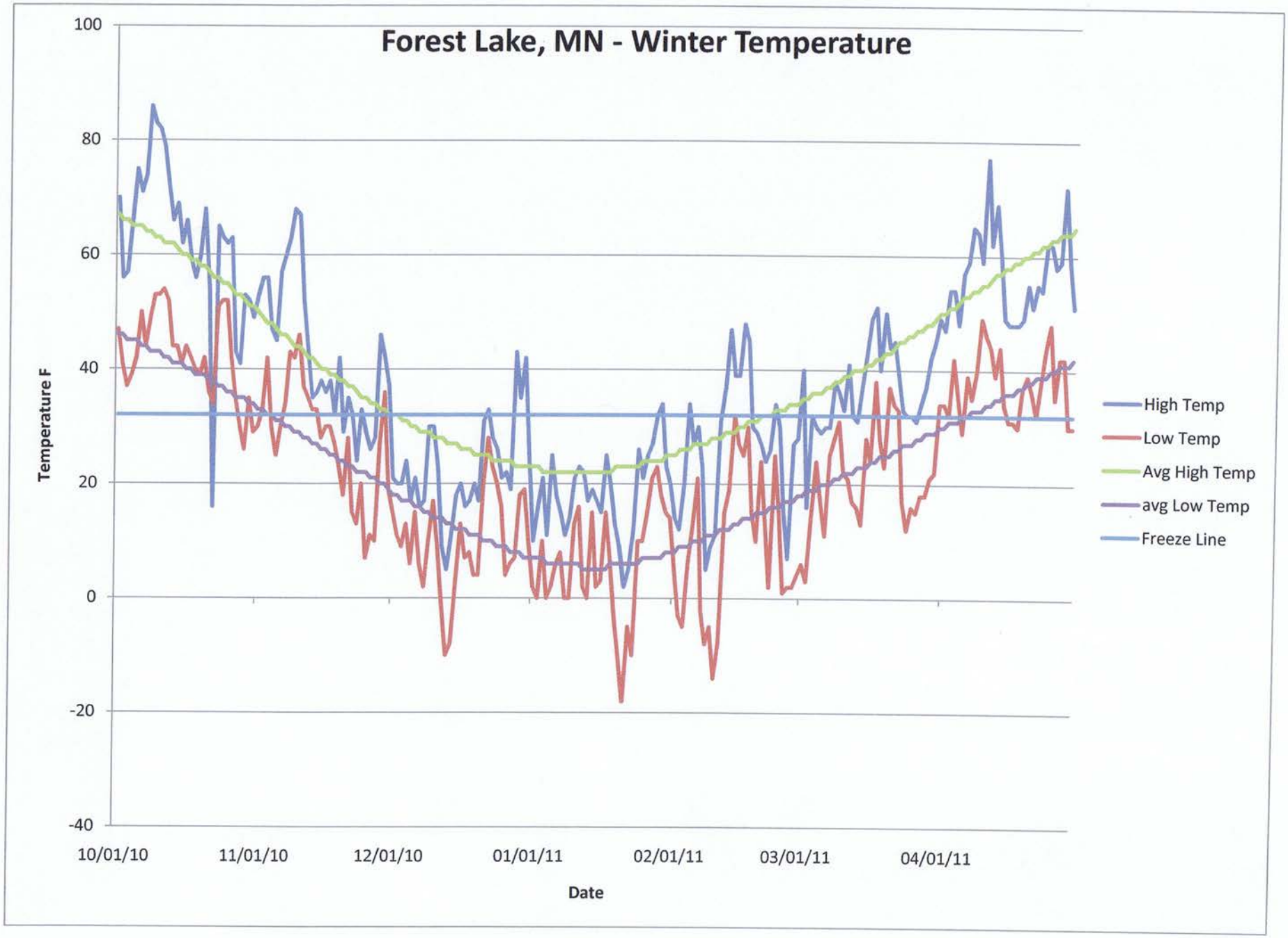
Currently frost heave forces are not measurable and hence cannot be calculated mathematically nor engineered into a product or construction methodology. Historically, observational evidence has been the basis for determining proper types of foundation systems to support structures. Frost heave is a factor of soil type, moisture content, rate of temperature drop and the amount of snow cover prior to freezing temperatures and frozen ground. Therefore, Pin Foundations, Inc. incorporates soil type, precipitation as a water equivalent, snow cover and temperature data into their observational reports.

Summary

weather data was collected from AccuWeather in the weather Channel website. See links
http://www.weather.com/weather/wxclimatology/monthly/graph/55025
http://www.accuweather.com/us/mn/forest-lake/55025/forecast-month.asp?mnyr=2-01-2011&view=table

The weather data gathered for Forest Lake, Minnesota indicates slightly below normal temperatures with slightly below precipitation as a water equivalent and above-average snowfall. The long term average high and low temperature for the period October 1, through April 30, is 40° and 23° respectively. Temperature data collected from AccuWeather shows the actual average temperature from October 1, 2010 through April 30, 2011 as 38° and 22° respectively. This represents an average high temperature 2° below normal within average low temperature 1° below normal. The long term average precipitation as a water equivalent for the period October 1 through April 30 is 11.25 inches. The actual precipitation as a water equivalent for the period October 1, 2010 through April 30, 2011 is 10.64 inches. Average annual snowfall for Forest Lake Minnesota is 45 inches. Recorded snowfall for the winter of 2010-2011 is 82".

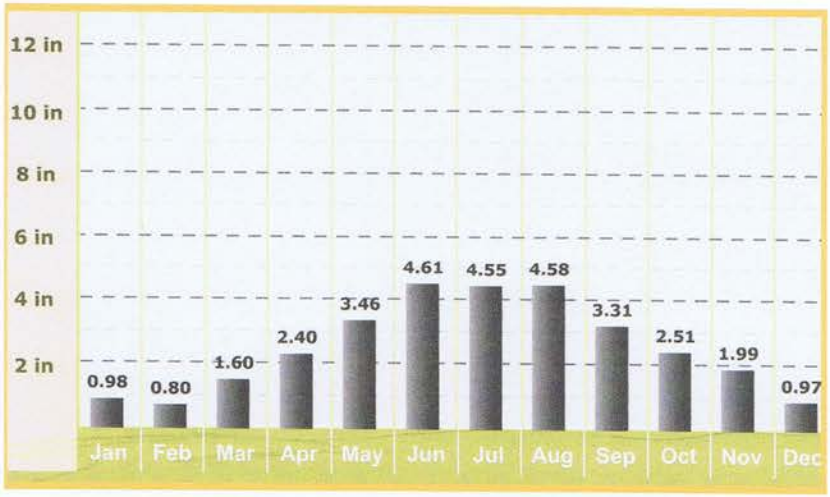

Forest Lake, MN - Precipitation
20
18
16
14
12
10
8
6
4
2
0
10/01/10
10/08/10
10/15/10
10/22/10
10/29/10
11/05/10
11/12/10
11/19/10
11/26/10
12/03/10
12/10/10
12/17/10
12/24/10
12/31/10
01/07/11
01/14/11
01/21/11
01/28/11
02/04/11
02/11/11
02/18/11
02/25/11
03/04/11
03/11/11
03/18/11
03/25/11
04/01/11
04/08/11
04/15/11
04/22/11
04/29/11
Rainfall
Snow


Forest Lake, MN - Winter Temperature
100
80
60
40
20
0
-20
-40
Temperature F
10/01/10
11/01/10
12/01/10
01/01/11
02/01/11
03/01/11
04/01/11
Date
High Temp
Low Temp
Avg High Temp
avg Low Temp
Freeze Line

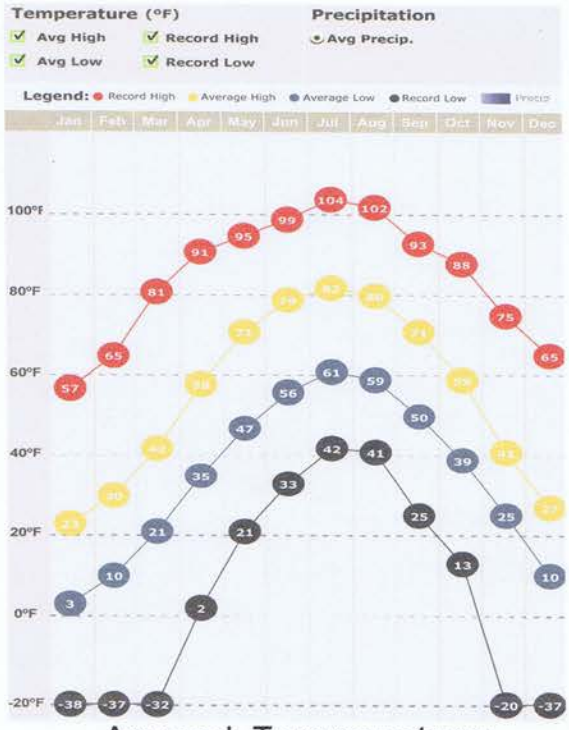
Weather Data

Forest lake, MN

Historical Averages

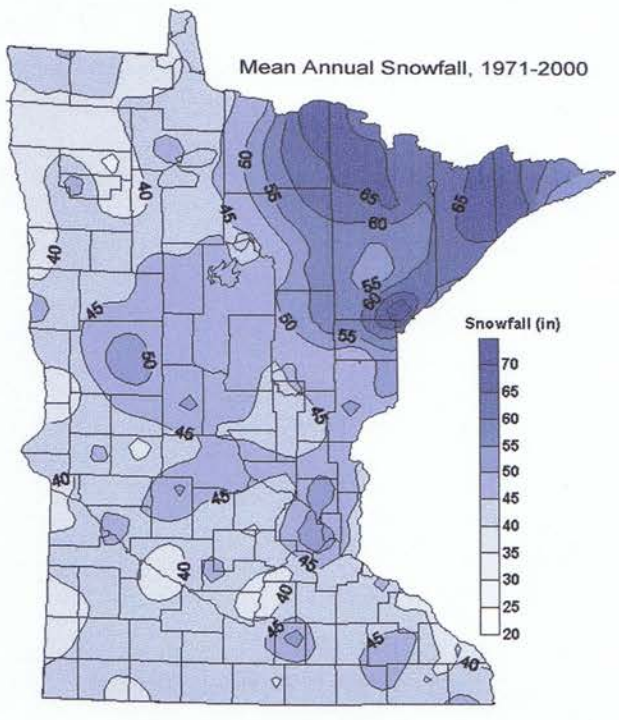


Average Annual Precipitation
Forest Lake, MN



Annual Temperature
Range by Month

Red = MonthRecord High
Orange=Avg Monthly High
Blue = Avg Monthly Low
Blk=Month Record Low



Mean Annual Snowfall

1971-2000

Site Photos

1632 12th Avenue SE, Forest Lake,MN

A new deck was constructed on DP-50 Diamond Piers to replace an existing deck where all 42" concrete piers had heaved several inches. DP-50 Diamond Piers resisted the frost heave pressures protecting the new structure from the negative effects of frost heave. The new deck remain level and sound.