

Client: Elliott Van Stelle  
Structures, Inc.  
4 Inverness Court East, Suite 250  
Englewood, CO 80112

## Forest Lakes Bridges

Report Date: Sep 8, 2021  
Work Order Date: Aug 26, 2021

Work Order No.: 21-8536.DrilledPiers.0001; ver: 2  
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

Drilling Contractor: LMS Drilling, Inc. Performed by: Matias Mengistu  
Concrete Contractor: Structures, Inc. Equipment: Straight Shaft Drill (Seilmeco SR-30)  
Reinforcing Contractor: Structures, Inc.  
Placement Location: Straight Shaft Drilled Pier for the Foundation Of West Bound Bridge Column at STA 15+68 (See Attached)  
Comments: Construction Plan calls out to refer the Geotechnical Report for Shear Ring requirements (Refer Note #12/B09) but it wasn't available for us at the time of Inspection. The Geotechnical Engineer Austin Nossokoff with Entecch Engineering, Inc later showed on-site and informed us that shear rings aren't required.  
  
Contractor stopped drilling hole at Location 2 after reaching 12' deep (prior to reaching bedrock depth) & Placed Casing inside hole to continue drilling on the following day.

### On-Site Notifications

Name	Company
Larry Urioste	Structures, Inc.

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

## Forest Lakes Bridges

Report Date: Sep 8, 2021

Work Order No.: 21-8536.DrilledPiers.0001; ver: 2

Work Order Date: Aug 26, 2021

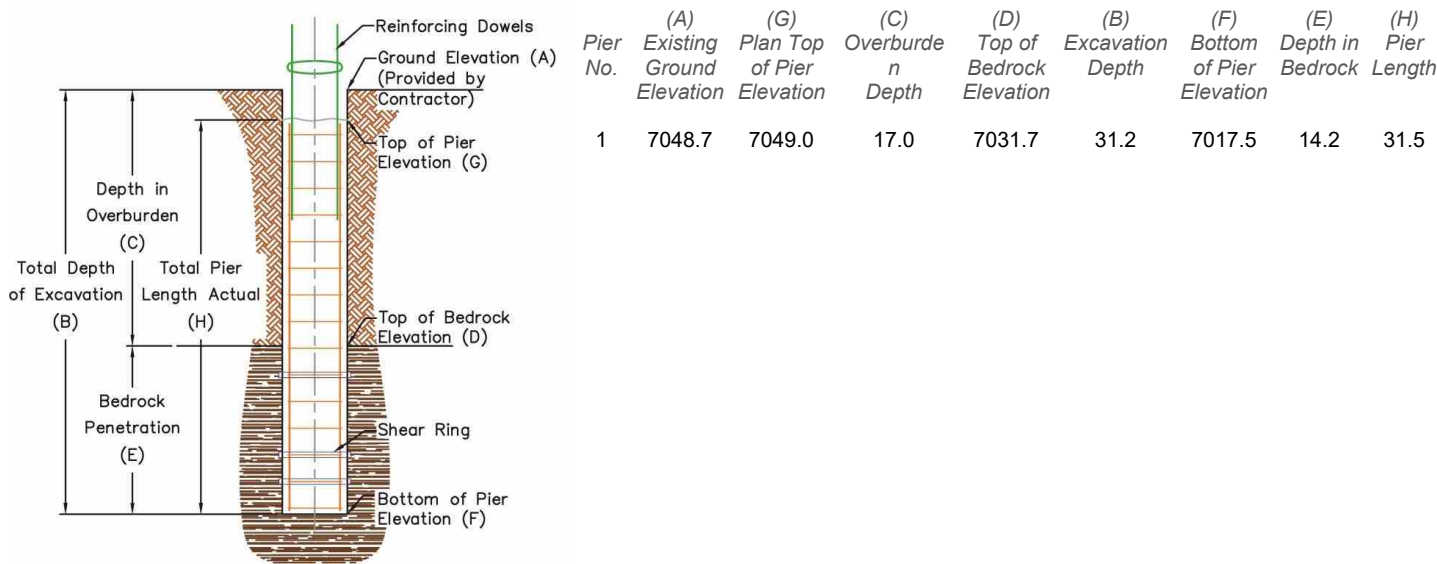
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Locations & Plan Dimensions

Pier No.	Plan/Contractor Pier No.	Pier Location	Plan Pier Type	Plan Pier Diameter (in)	Min. Pier Length (ft)	Min. Bedrock Penetration (ft)
1	WB-1	WB Pier at Location 1	DP-1	42	30.56	14

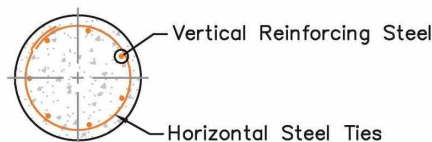
#### Excavation Measurements (ft)



#### Excavation Conditions

Pier No.	Drill Start Time	Drill Finish Time	Top of Casing Elevation (ft)	Casing Length (ft)	Casing Inside Diameter (in)	Deviation From Center	Plumbness	Shear Rings	Wall Condition	Bottom Condition
1	7:36 AM	9:24 AM				Conforms	Conforms	Not Applicable	Slightly Rough	Cleaned & Dry

#### Reinforcing Steel



Pier No.	Vertical Reinforcing Steel	Horizontal Steel Ties	Dowels, Anchors, Embeds	Wall Clearance	Bottom Clearance (in)	Splice Length (in)	Cage Length (ft)
1	Conforms	Conforms	None Placed	Conforms	5	0.0	36.1

#### Concrete Placement

Pier No.	Concrete Start Time	Concrete Finish Time	Water Depth Before Start (in)	Tremmie Length (ft)	Concrete Head During Casing Removal	Tremmie Embedded in Concrete	Top 5 Feet Vibrated After Placement	Theoretical Concrete Volume (yd³)	Estimated Concrete Volume (yd³)
1	10:08 AM	10:41 AM	0	35	Not Applicable	Not Applicable	Conforms	11.2	12

#### Comments

Pier No.	Depth Comments	Additional Comments
1		

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

## Forest Lakes Bridges

Report Date: Sep 8, 2021  
Work Order Date: Aug 26, 2021

Work Order No.: 21-8536.DrilledPiers.0001; ver: 2  
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Photos



Drilling Hole for WB Pier at Location 1



Re-bar Cage



35' Long Tremmie Pipe for Concrete Placement



Concrete After Casing removal

## Forest Lakes Bridges

Report Date: Sep 8, 2021  
Work Order Date: Aug 26, 2021

Work Order No.: 21-8536.DrilledPiers.0001; ver: 2  
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers



Vibrating Top 5' of Pier after concrete Placement



Filling CSL tubes with water



Water Level inside CSL tube



Casing Placed after Drilling Hole at Location 2

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

**41 Inverness Drive East, Englewood, Colorado**

**[www.groundeng.com](http://www.groundeng.com)**

**303-289-1989**

Englewood | Commerce City | Loveland | Granby | Gypsum | Colorado Springs

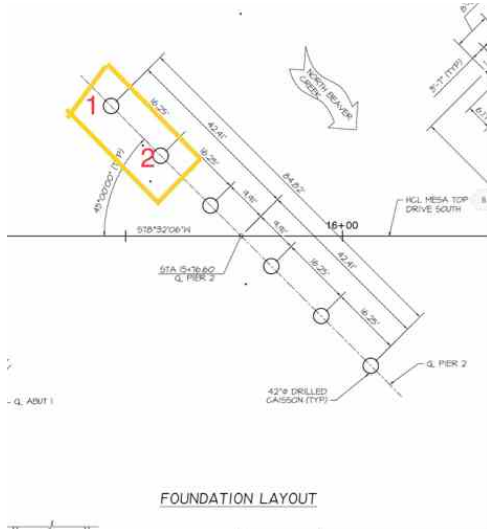
Page 4 of 5

## Forest Lakes Bridges

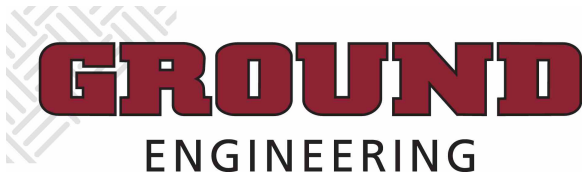
Report Date: Sep 8, 2021  
Work Order Date: Aug 26, 2021

Work Order No.: 21-8536.DrilledPiers.0001; ver: 2  
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers



Yellow Box Shows Work Location & Red Numbers Represent Pier Locations



Client: Elliott Van Stelle  
Structures, Inc.  
4 Inverness Court East, Suite 250  
Englewood, CO 80112

## Forest Lakes Bridges

Report Date: Sep 10, 2021

Work Order No.: 21-8536.DrilledPiers.0002; ver: 1

Work Order Date: Aug 27, 2021

Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

Drilling Contractor: LMS Drilling

Performed by: Greg Davies

Concrete Contractor: Structures, Inc

Equipment: Straight Shaft Drill (Seilmeco SR-30)

Reinforcing Contractor: Structures, Inc

Placement Location: Caissons WB-2 and WB-3

### On-Site Notifications

Name

Company

Larry Urioste

Structures, Inc

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

41 Inverness Drive East, Englewood, Colorado

[www.groundeng.com](http://www.groundeng.com)

303-289-1989

Englewood | Commerce City | Loveland | Granby | Gypsum | Colorado Springs

Page 1 of 5

## Forest Lakes Bridges

Report Date: Sep 10, 2021

Work Order No.: 21-8536.DrilledPiers.0002; ver: 1

Work Order Date: Aug 27, 2021

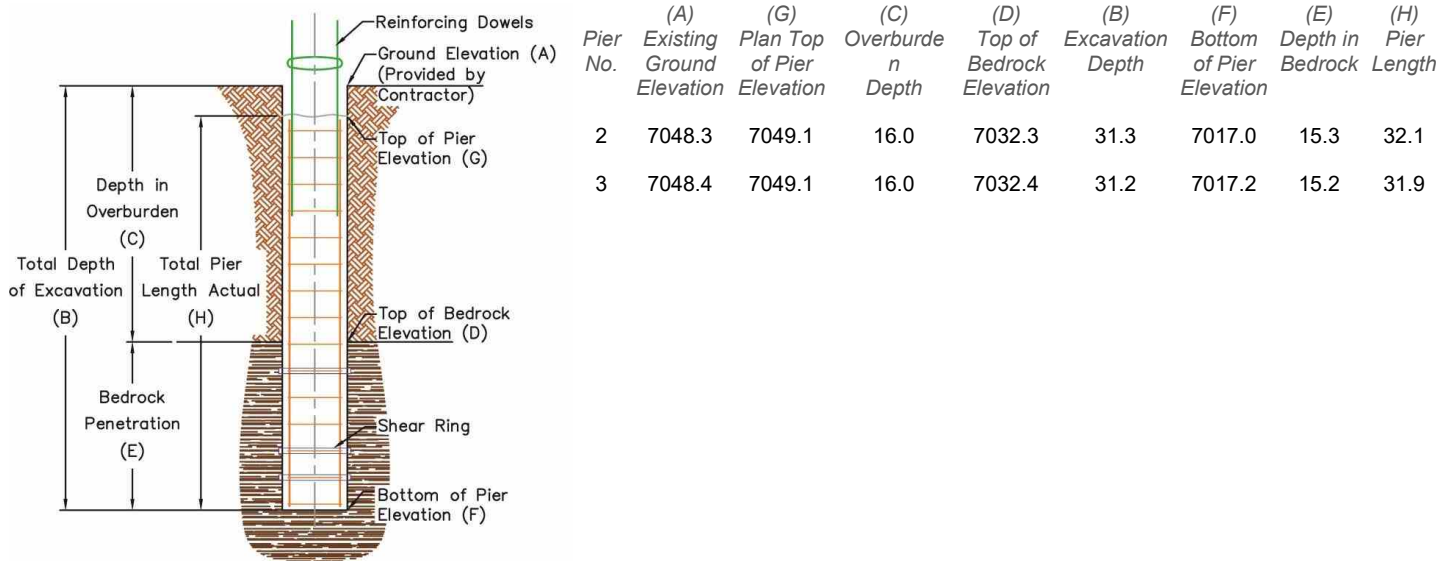
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Locations & Plan Dimensions

Pier No.	Plan/Contractor Pier No.	Pier Location	Plan Pier Type	Plan Pier Diameter (in)	Min. Pier Length (ft)	Min. Bedrock Penetration (ft)
2	WB-2	WB-2	DP-1	42	31	14
3	WB-3	WB-3	DP-1	42	31	14

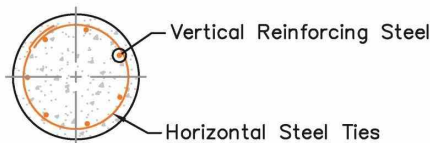
#### Excavation Measurements (ft)



#### Excavation Conditions

Pier No.	Drill Start Time	Drill Finish Time	Top of Casing Elevation (ft)	Casing Length (ft)	Casing Inside Diameter (in)	Deviation From Center	Plumbness	Shear Rings	Wall Condition	Bottom Condition
2	7:45 AM	9:40 AM				Conforms	Conforms	Not Applicable	Slightly Rough	Cleaned & Dry
3	10:46 AM	1:58 PM				Conforms	Conforms	Conforms	Slightly Rough	Cleaned & Dry

#### Reinforcing Steel

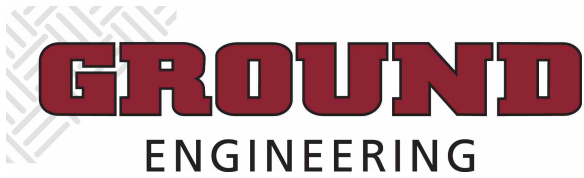


Pier No.	Vertical Reinforcing Steel	Horizontal Steel Ties	Dowels, Anchors, Embeds	Wall Clearance	Bottom Clearance (in)	Splice Length (in)	Cage Length (ft)
2	Conforms	Conforms	None Placed	Conforms	5	N/A	36.0
3	Conforms	Conforms	Conforms	Conforms	5	N/A	36.1

#### Concrete Placement

Pier No.	Concrete Start Time	Concrete Finish Time	Water Depth Before Start (in)	Tremmie Length (ft)	Concrete Head During Casing Removal	Tremmie Embedded in Concrete	Top 5 Feet Vibrated After Placement	Theoretical Concrete Volume (yd³)	Estimated Concrete Volume (yd³)
2	10:00 AM	10:35 AM	0	35	Not Applicable	Not Applicable	Conforms	11.4	14
3	3:07 PM	3:40 PM	0	35	Not Applicable	Not Applicable	Conforms	11.4	14

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.



Client: Elliott Van Stelle  
Structures, Inc.  
4 Inverness Court East, Suite 250  
Englewood, CO 80112

## Forest Lakes Bridges

Report Date: Sep 10, 2021

Work Order No.: 21-8536.DrilledPiers.0002; ver: 1

Work Order Date: Aug 27, 2021

Reviewed by: Josiah Johnson

### *Straight Shaft Drilled Piers*

#### Comments

<i>Pier No.</i>	<i>Depth Comments</i>	<i>Additional Comments</i>
2		
3		

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

**41 Inverness Drive East, Englewood, Colorado**

**[www.groundeng.com](http://www.groundeng.com)**

**303-289-1989**

Englewood | Commerce City | Loveland | Granby | Gypsum | Colorado Springs

Page 3 of 5

## Forest Lakes Bridges

Report Date: Sep 10, 2021

Work Order No.: 21-8536.DrilledPiers.0002; ver: 1

Work Order Date: Aug 27, 2021

Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Photos



Concrete finishing in WB-2



Filling of CSL tubes in WB-2



Drilling of WB-3



WB-3, CSL tubes filled and covered with duct tape

## Forest Lakes Bridges

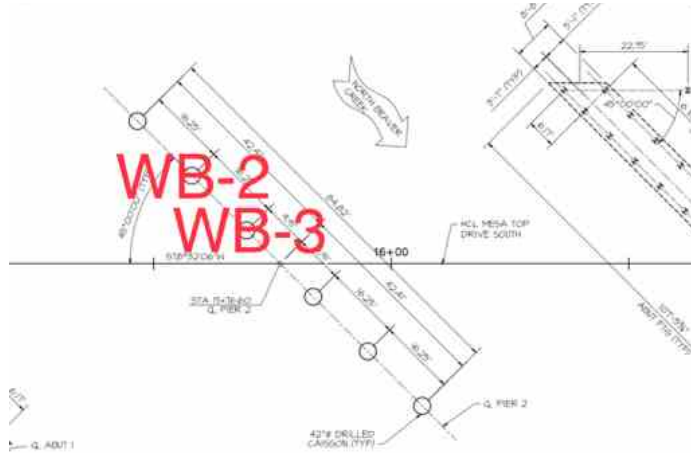
Report Date: Sep 10, 2021

Work Order No.: 21-8536.DrilledPiers.0002; ver: 1

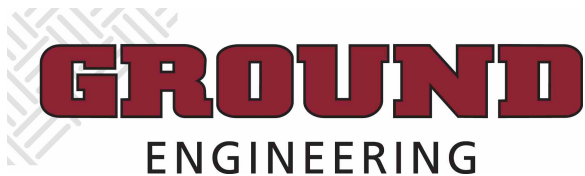
Work Order Date: Aug 27, 2021

Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers



Locations of WB-2 and WB-3



Client: Elliott Van Stelle  
Structures, Inc.  
4 Inverness Court East, Suite 250  
Englewood, CO 80112

## Forest Lakes Bridges

Report Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0003; ver: 1

Work Order Date: Aug 30, 2021

Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

Drilling Contractor: LMS Drilling

Performed by: Greg Davies

Concrete Contractor: Structures, Inc

Equipment: Straight Shaft Drill (Soilmeco SR-30)

Reinforcing Contractor: Structures, Inc

Placement Location: Eastbound caissons

Comments: Drill rig experienced fluid leakage due to break in line connection at approximately 4:00 pm. Pump truck experienced failure due to RPMs not going up sufficiently to deploy outriggers or perform other functions. Issue with pump truck was noticed by operator at approximately 2:30 following washout. Operator contacted Southwest Pumping at approximately 2:45 and was unable to fix issue on site. Replacement pump truck was dispatched by Southwest Concrete Pumping but did not reach site until 5:20 pm due to traffic issues. Concrete trucks were sent back at 5:20 by Larry Urioste because first truck had been batched at 3:26 and second truck had been batched at 3:45. Elliot Van Stelle instructed that hole be left open overnight with casing down to 12 feet below ground level and rebar cage in place. Structures, Inc covered open hole with tarp and wood board before departing.

### Discrepancies

The following discrepancies were added as a result of services performed. It is the contractor's responsibility to resolve reported discrepancies and schedule retesting. A list of open discrepancies can be provided upon request.

#### Number

#### Description

Drilled Piers 1

Caisson hole for EB-2 left open overnight. Caisson Note #9 on sheet B09 states "Concrete should be placed in the caisson immediately after drilling and must be placed the same day the holes are drilled."

### On-Site Notifications

#### Name

#### Company

Larry Urioste

Structures, Inc

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

41 Inverness Drive East, Englewood, Colorado

www.groundeng.com

303-289-1989

Englewood | Commerce City | Loveland | Granby | Gypsum | Colorado Springs

Page 1 of 5

## Forest Lakes Bridges

Report Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0003; ver: 1

Work Order Date: Aug 30, 2021

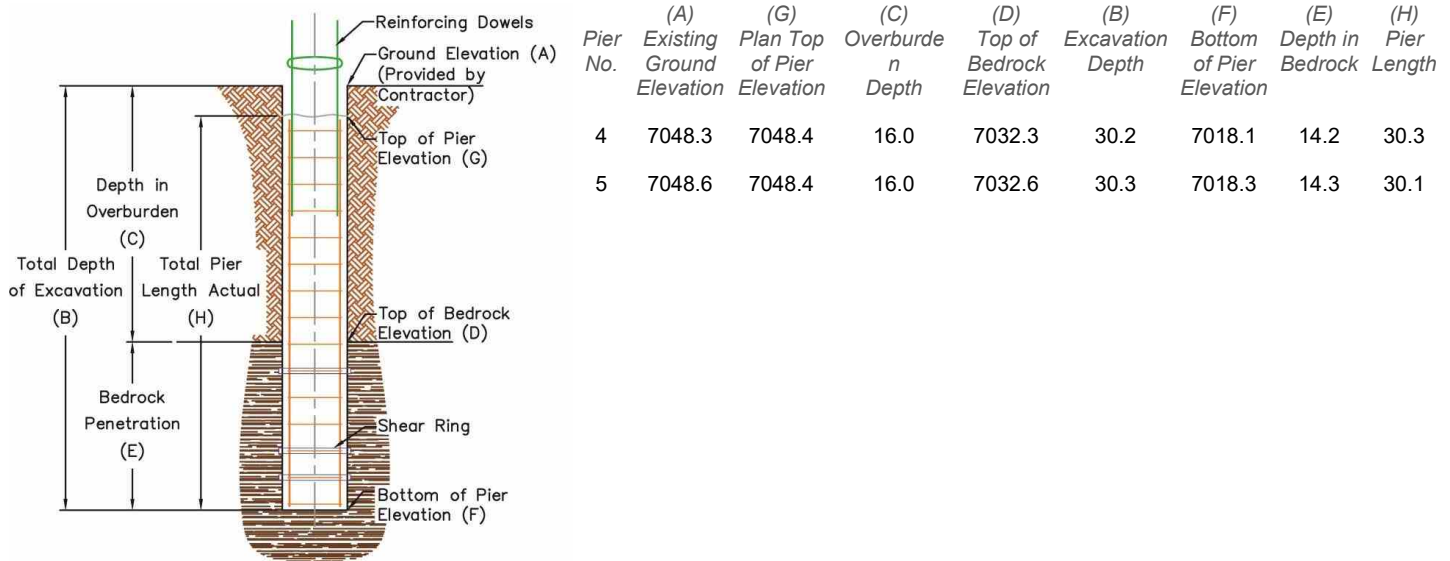
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Locations & Plan Dimensions

Pier No.	Plan/Contractor Pier No.	Pier Location	Plan Pier Type	Plan Pier Diameter (in)	Min. Pier Length (ft)	Min. Bedrock Penetration (ft)
4	EB-1	EB-1	DP-1	42	29.91	14.0
5	EB-2	EB-2	DP-1	42	29.91	14

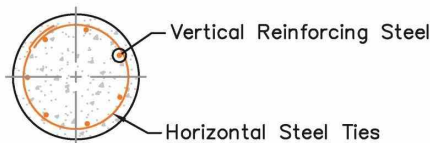
#### Excavation Measurements (ft)



#### Excavation Conditions

Pier No.	Drill Start Time	Drill Finish Time	Top of Casing Elevation (ft)	Casing Length (ft)	Casing Inside Diameter (in)	Deviation From Center	Plumbness	Shear Rings	Wall Condition	Bottom Condition
4	8:24 AM	10:35 AM				Conforms	Conforms	Not Applicable	Slightly Rough	Cleaned & Dry
5	1:45 PM	3:26 PM				Conforms	Conforms	Not Applicable	Slightly Rough	Cleaned & Dry

#### Reinforcing Steel

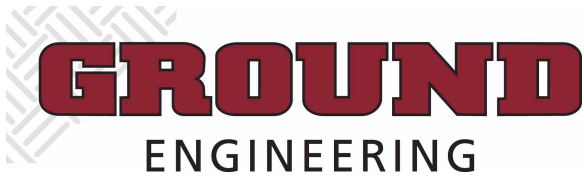


Pier No.	Vertical Reinforcing Steel	Horizontal Steel Ties	Dowels, Anchors, Embeds	Wall Clearance	Bottom Clearance (in)	Splice Length (in)	Cage Length (ft)
4	Conforms	Conforms	Conforms	Conforms	6	N/A	35.6
5	Conforms	Conforms	None Placed	Conforms	6	N/A	35.6

#### Concrete Placement

Pier No.	Concrete Start Time	Concrete Finish Time	Water Depth Before Start (in)	Tremmie Length (ft)	Concrete Head During Casing Removal	Tremmie Embedded in Concrete	Top 5 Feet Vibrated After Placement	Theoretical Concrete Volume (yd³)	Estimated Concrete Volume (yd³)
4	12:49 PM	1:36 PM	0	35	Not Applicable	Not Applicable	Conforms	10.8	14
5	12:00 AM	12:00 AM	0		Not Applicable	Not Applicable	Does Not Conform	10.7	0

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.



Client: Elliott Van Stelle  
Structures, Inc.  
4 Inverness Court East, Suite 250  
Englewood, CO 80112

## Forest Lakes Bridges

Report Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0003; ver: 1

Work Order Date: Aug 30, 2021

Reviewed by: Josiah Johnson

### ***Straight Shaft Drilled Piers***

#### **Comments**

<i>Pier No.</i>	<i>Depth Comments</i>	<i>Additional Comments</i>
4		
5		Concrete not placed, hole covered and left open with casing and rebar cage.

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

**41 Inverness Drive East, Englewood, Colorado**

**[www.groundeng.com](http://www.groundeng.com)**

**303-289-1989**

Englewood | Commerce City | Loveland | Granby | Gypsum | Colorado Springs

Page 3 of 5

## Forest Lakes Bridges

Report Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0003; ver: 1

Work Order Date: Aug 30, 2021

Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Photos



EB-1 drilling



Placing rebar cage in EB-1



Filling of CSL tubes on EB-1 prior to concrete placement



EB-2 drilling

## Forest Lakes Bridges

Report Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0003; ver: 1

Work Order Date: Aug 30, 2021

Reviewed by: Josiah Johnson

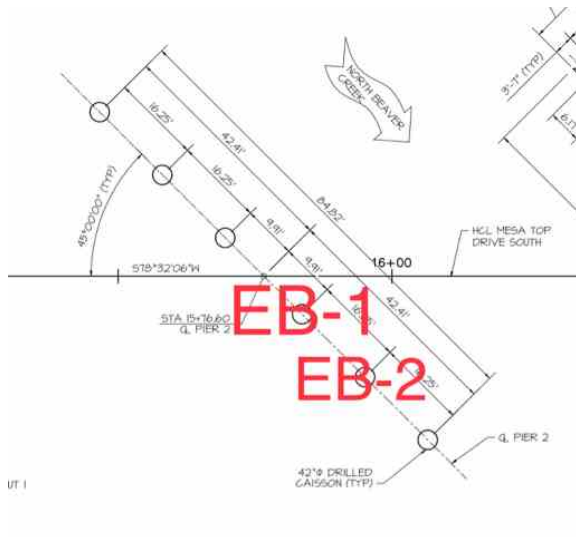
### Straight Shaft Drilled Piers



Placement of rebar cage in EB-2



Covering of EB-2 to be left overnight.



Caisson locations in red

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

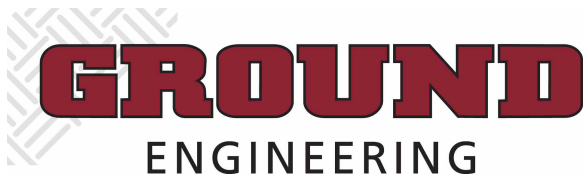
41 Inverness Drive East, Englewood, Colorado

[www.groundeng.com](http://www.groundeng.com)

303-289-1989

Englewood | Commerce City | Loveland | Granby | Gypsum | Colorado Springs

Page 5 of 5



Client: Elliott Van Stelle  
Structures, Inc.  
4 Inverness Court East, Suite 250  
Englewood, CO 80112

## Forest Lakes Bridges

Report Date: Sep 8, 2021  
Work Order Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0004; ver: 1  
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

Drilling Contractor: LMS Drilling  
Concrete Contractor: Structures, Inc  
Reinforcing Contractor: Structures, Inc  
Placement Location: Eastbound caissons  
Comments: Per Larry Urioste, drilled pier EB-2 was approved to be left overnight by engineer because it was in bedrock. As a result of the pier being left open overnight, approximately 3 feet of water was observed in the bottom of EB-2 at 7:15 am. A pump was used by Structures, Inc at 7:15 am. No water came out of hole due to insufficient pump force and pumping was aborted at 7:35. During concrete placement the tremie pipe appeared to remain in the concrete.

### On-Site Notifications

Name	Company
Larry Urioste	Structures, Inc

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

## Forest Lakes Bridges

Report Date: Sep 8, 2021

Work Order No.: 21-8536.DrilledPiers.0004; ver: 1

Work Order Date: Aug 31, 2021

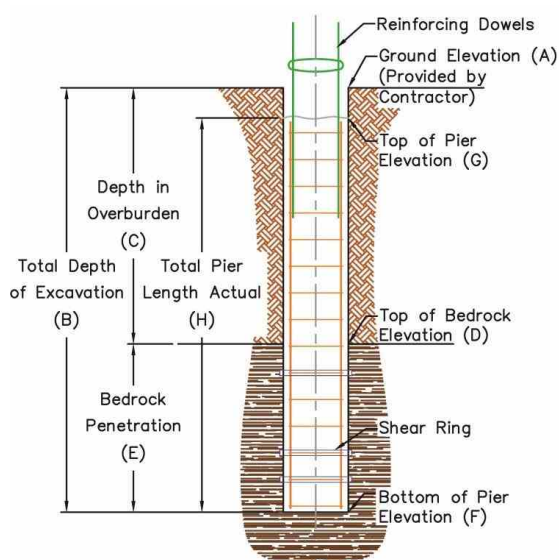
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Locations & Plan Dimensions

Pier No.	Plan/Contractor Pier No.	Pier Location	Plan Pier Type	Plan Pier Diameter (in)	Min. Pier Length (ft)	Min. Bedrock Penetration (ft)
6	EB-2	EB-2	DP-1	42	29.91	14
7	EB-3	EB-3	DP-1	42	29.91	14

#### Excavation Measurements (ft)

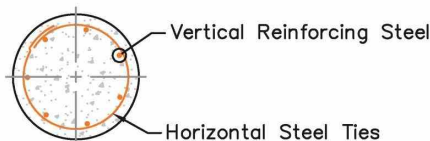


Pier No.	(A) Existing Ground Elevation	(G) Plan Top of Pier Elevation	(C) Overburden Depth	(D) Top of Bedrock Elevation	(B) Excavation Depth	(F) Bottom of Pier Elevation	(E) Depth in Bedrock	(H) Pier Length
6	7048.6	7048.4	16.0	7032.6	30.3	7018.3	14.3	30.1
7	7048.8	7048.4	16.0	7032.8	30.4	7018.4	14.4	30.0

#### Excavation Conditions

Pier No.	Drill Start Time	Drill Finish Time	Top of Casing Elevation (ft)	Casing Length (ft)	Casing Inside Diameter (in)	Deviation From Center	Plumbness	Shear Rings	Wall Condition	Bottom Condition
6	1:45 PM	3:26 PM				Conforms	Conforms	Not Applicable	Slightly Rough	Water
7	10:39 AM	12:44 PM				Conforms	Conforms	Not Applicable	Slightly Rough	Cleaned & Dry

#### Reinforcing Steel

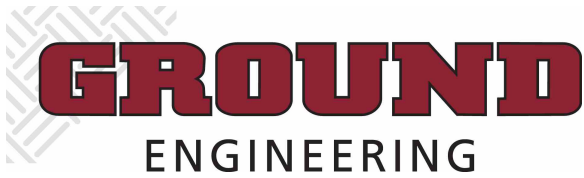


Pier No.	Vertical Reinforcing Steel	Horizontal Steel Ties	Dowels, Anchors, Embeds	Wall Clearance	Bottom Clearance (in)	Splice Length (in)	Cage Length (ft)
6	Conforms	Conforms	None Placed	Conforms	6	N/A	35.6
7	Conforms	Conforms	None Placed	Conforms	6	N/A	35.6

#### Concrete Placement

Pier No.	Concrete Start Time	Concrete Finish Time	Water Depth Before Start (in)	Tremmie Length (ft)	Concrete Head During Casing Removal	Tremmie Embedded in Concrete	Top 5 Feet Vibrated After Placement	Theoretical Concrete Volume (yd³)	Estimated Concrete Volume (yd³)
6	10:00 AM	10:41 AM	36	35	Conforms	Conforms	Conforms	10.7	12
7	1:15 PM	2:00 PM	0	35	Not Applicable	Not Applicable	Conforms	10.7	13

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.



Client: Elliott Van Stelle  
Structures, Inc.  
4 Inverness Court East, Suite 250  
Englewood, CO 80112

## Forest Lakes Bridges

Report Date: Sep 8, 2021  
Work Order Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0004; ver: 1  
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Comments

Pier No.	Depth Comments	Additional Comments
6		Hole was drilled on 8/30, see notes
7		

Results apply only to the specific items and locations referenced and at the time of testing, observations or special inspections. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

**41 Inverness Drive East, Englewood, Colorado**

**[www.groundeng.com](http://www.groundeng.com)**

**303-289-1989**

Englewood | Commerce City | Loveland | Granby | Gypsum | Colorado Springs

Page 3 of 5

## Forest Lakes Bridges

Report Date: Sep 8, 2021  
Work Order Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0004; ver: 1  
Reviewed by: Josiah Johnson

### Straight Shaft Drilled Piers

#### Photos



Pumping water out of EB-2



EB-2 cage in place



EB-3 drilling



Cage placement in EB-3

## Forest Lakes Bridges

Report Date: Sep 8, 2021  
Work Order Date: Aug 31, 2021

Work Order No.: 21-8536.DrilledPiers.0004; ver: 1  
Reviewed by: Josiah Johnson

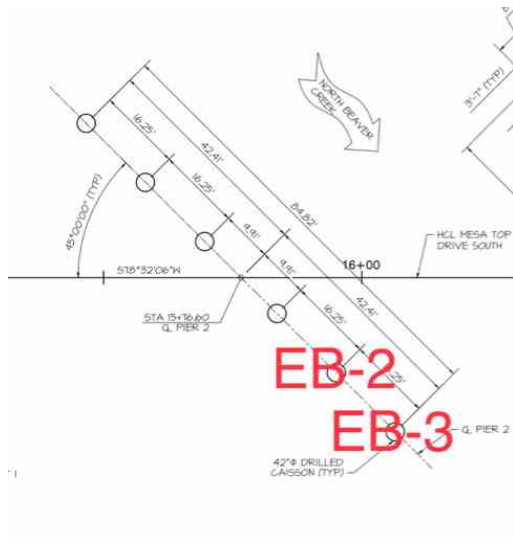
### Straight Shaft Drilled Piers



EB-2 and EB-3



Filling of EB-3 CSL tubes prior to concrete placement



Pier locations in red