INDIANA UNIVERSITY

CAPITAL PROJECTS

Addendum #2

Project: Indiana University; BL411N N Woodlawn Chiller Addition

Bloomington, IN; IU Project Number: 20181778

Date: April 27, 2026

This Addendum, issued prior to bidding, alters, amends, corrects, or clarifies the Construction Bid Documents to the extent stated herein and does thereby become a part of the Construction Bid Documents, and will become part of the Contract Documents of the successful bidder. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

ITEMS INCLUDED IN THIS ADDENDUM

Information provided is a revised project bid date and responses to additional contractor questions.

Item 1 – Bid Date: **The bid date has been changed from 04/30/26 to 05/07/26 at 2pm eastern time.**

Item 2 - Are there any soil reports from the original plant construction and is there an indication of how deep bedrock is in the area of the cooling towers. **The information available is attached to this Addendum.**

Item 3 – Do we have an existing drawing showing how long the existing Cooling Tower Pump shafts are that go down into the cooling tower pit? **The information available is attached to this Addendum.**

END OF ADDENDUM

Service Building 2901 E. Discovery Parkway Bloomington, IN 47408 (812) 855-5032 fax (812) 855-9387 https://cpf.iu.edu
Health Sciences 1050 Wishard Blvd., Suite 4100 Indianapolis, IN 46202 (317) 274-8396 fax (317) 274-8827

SUBSURFACE INVESTIGATION & GEOTECHNICAL RECOMMENDATIONS

IU BRISCOE HALL CHILLER UPGRADE
EAST 17TH STREET & FEE LANE
BLOOMINGTON, INDIANA
PROJECT NO: 10IN0082

PREPARED BY:
ALT & WITZIG ENGINEERING, INC.
GEOTECHNICAL DIVISION

PREPARED FOR:
LYNCH, HARRISON & BRUMLEVE, INC.
INDIANAPOLIS, INDIANA

JUNE 4, 2010

Alt & Witzig Engineering, Inc.
4105 West 99th Street • Carmel, Indiana 46032
(317) 875-7000 • Fax (317) 876-3705

June 4, 2010

Lynch, Harrison & Brumleve, Inc.
550 Virginia Avenue
Indianapolis, Indiana 46203
Attn: Mr. Wes Harrison

RE: Subsurface Investigation &
Geotechnical Recommendations
IU Briscoe Hall Chiller Upgrade
E. 17th Street & Fee Lane
Bloomington, Indiana
Alt & Witzig File: 10IN0082

Dear Mr. Harrison:

In compliance with your request, we have performed a subsurface investigation at the above referenced project. It is our pleasure to transmit herewith two (2) copies of our report.

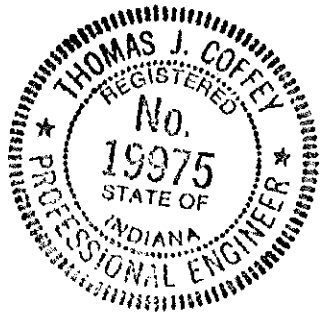
The purpose of this subsurface investigation was to determine the various soils profile components, the engineering characteristics of the subsurface materials, and to provide criteria for use by the design engineers in preparing the foundation design for the IU Briscoe Hall Chiller Upgrade to be constructed at the above referenced location.

We appreciated the opportunity to work with you on this project. Often, because of design and construction details that occur, questions arise concerning the soils conditions. If we can give further service in these matters, please contact us at your convenience.

Sincerely,
Alt & Witzig Engineering, Inc.

William Ellis

William Ellis
Project Manager



Thomas J. Coffey, P.E.

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SUBSURFACE INVESTIGATION
AND
GEOTECHNICAL RECOMMENDATIONS

INTRODUCTION

General

This report presents the results of a subsurface investigation for the IIU Briscoe Hall Chiller Upgrade to be located near the intersection of East 17th Street and North Walnut Grove Street on the northwest side of Bloomington, Indiana. The investigation was conducted for Lynch, Harrison & Brumleve, Inc. of Indianapolis, Indiana. Authorization to perform this investigation was in the form of a verbal notice to proceed from Mr. Wes Harrison of Lynch, Harrison & Brumleve, Inc.

The scope of this investigation included a review of geological maps of the area; a review of geologic and related literature and previous engineering reports from projects completed near the site; a reconnaissance of the immediate site; a subsurface investigation; field and laboratory testing; and an engineering analysis and evaluation of the materials.

The purpose of this subsurface investigation was to determine the soil profile and the engineering characteristics of the subsurface materials in order to provide criteria for use by the architects and engineers in determining the foundation design for the IU Briscoe Hall Chiller Upgrade.

The scope or purpose of this investigation did not specifically or by implication provide an environmental assessment of the site.

DESCRIPTION OF SITE

Site Location

The site of the IU Briscoe Hall Chiller Upgrade is located near the intersection of E. 17th Street and North Walnut Grove Street in Bloomington, Indiana. The Site may be located using the Bloomington, Indiana 7-½ minute quadrangle map in the northeast quadrant of Section 33, Township 9 North, and Range 1 West. The relevant portion of this map is displayed on the *Site Location Map* contained in the Appendix.

Site Topography and Drainage

The site is gently sloping from east to west with an estimated relief of five (5) to ten (10) across the site. The ground cover consisted of grass, asphalt and sparse trees.

Drainage of the site is primarily along the ground surface and into drainage ditches and storm sewers.

The surrounding area is developed with various commercial and residential structures, agricultural fields, overhead and underground utilities, and paved roadways. Areas surroundings the site are being developed.

FIELD INVESTIGATION

Scope

Field investigations to determine the engineering characteristics of the foundation materials included a reconnaissance of the project site, drilling eight (8) soil borings and fourteen (14) soundings (one sounding was omitted due to utility concerns), performing standard penetration tests, and retaining representative standard split-spoon samples for laboratory testing. The approximate boring locations are shown on the *Boring Location Plan* in the Appendix. The apparent groundwater level at each boring location was also determined.

Drilling and Sampling Procedures

The soil borings were performed with an all-terrain mounted drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. Representative samples were obtained employing split-spoon sampling procedures in accordance with ASTM Procedure D-1586.

During the sampling procedure, standard penetration tests were performed at regular intervals to obtain the standard penetration value of the soil. The standard penetration value is defined as the number of blows a 140-pound hammer, falling 30 inches, is required to advance the split-spoon sampler one (1) foot into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Water Level Measurements

Water level observations were taken during and upon completion of the boring operations. The obtained readings are noted on the *Records of Subsurface Exploration* presented in the Appendix. In relatively pervious soils such as sandy soils, the indicated elevations are considered reliable groundwater levels. In relatively impervious soils, the accurate determination of the groundwater elevation is often not possible after several days of observation.

It should be noted that the groundwater level measurements recorded on the individual *Records of Subsurface Exploration*, included in the Appendix, are accurate only for the specific dates on which the measurements were obtained. It must be understood that the groundwater levels will fluctuate throughout the year, and that the *Records of Subsurface Exploration* do not reflect these fluctuations.

Ground Surface Elevations

Ground surface elevations were taken from a survey plan provided by Lynch, Harrison and Brumleve, Inc. The ground surface elevations should be accurate within +/- 1.0 foot.

LABORATORY INVESTIGATION

In addition to the field investigations, a supplemental laboratory investigation was conducted to ascertain additional pertinent engineering characteristics of the subsurface at the site of the IU Briscoe Hall Chiller Upgrade. All phases of the laboratory investigation were conducted in general accordance with applicable ASTM Specifications. The laboratory-testing program included supplementary visual classification and water content tests on representative cohesive samples.

Samples of the cohesive soil from the split-spoon sampling device were tested in unconfined compression with a calibrated spring testing machine. A calibrated soil penetrometer was also used as an aid in determining the strength of the soil. The values of the unconfined compressive strength as determined on soil samples from the split-spoon sampling must be considered approximate, recognizing the manner in which they were obtained since the split-spoon sampling techniques provide a representative but somewhat disturbed soil sample.

SUBSURFACE CONDITIONS

General

The types of subsurface materials encountered have been visually classified and are described in detail on the *Records of Subsurface Exploration*. The results of the field penetration tests, strength tests, water level observations and laboratory water content tests are presented on the *Records of Subsurface Exploration* in numerical form. Representative samples of the soils encountered in the field were placed in sample jars and are now stored in our laboratory for further analysis if desired. Unless notified to the contrary, all samples will be disposed of after two (2) months.

General Soil Conditions

Borings typically encountered cohesive soils from beneath topsoil to depths ranging from four (4) to seven (7) feet below the existing ground surface. Beneath the cohesive soils the borings encountered gray limestone at depths ranging from five (5) to ten (10) feet beneath the existing grade. Auger refusal was encountered in all of the borings, ranging in depth from five (5) to ten (10) feet beneath the existing grade.

For a detailed description of the soil conditions at the particular boring locations, please refer to the *Records of Subsurface Exploration* in the Appendix.

According to the *Soil Survey of Monroe County, Indiana* published by the United States Department of Agriculture Soil Conservation Service, the majority of the soils covering this site are classified as **Crider Silt Loam (CtB, CtC).** The Crider series consists of deep, well-drained, moderately permeable soils. The relevant portion of the *Soil Survey of Monroe County, Indiana* has been included in the Appendix of this report.

Groundwater

Water level readings obtained during and upon completion of the boring operations did not indicate groundwater.

The exact location of the water table should be anticipated to fluctuate somewhat depending upon normal seasonal variations in precipitation and surface runoff.

The *Soil Survey of Monroe County, Indiana* indicates a seasonal high groundwater level greater than six (6) feet beneath the natural grade. Again, it should be noted that the groundwater level measurements recorded on the individual *Records of Subsurface Exploration* included in the Appendix of this report, are accurate only for the dates on which the measurements were performed. The exact location of the water table should be anticipated to fluctuate somewhat depending upon normal seasonal variations in precipitation and surface runoff. Due to the permeability difference between the shallow cohesive soils and underlying bedrock, some groundwater should be expected at the soil/rock interface.

Seismic Site Classification

In accordance with the 2008 Indiana Building Code Guidelines, this site should be considered a Site Class C for seismic design calculations. This Seismic Site Class was determined using information obtained from information obtained from borings as well as data obtained from the Indiana GIS.

PROJECT DISCUSSION & RECOMMENDATIONS

Project Description

It is anticipated that the site will consist of a one-story steel frame and pre-cast concrete load-bearing wall structure without a basement. The location of the soil borings in relation to the size and preliminary configuration of the site is shown on the enclosed *Boring Location Plan.*

At the time of this report the finished floor elevations were not known. When this information is available it is recommended that they be submitted to Alt & Witzig Engineering, Inc. for review. After the completion of this review, it will be determined if changes to these recommendations are needed.

The anticipated column and wall loads are not expected to exceed 75 kips and 3.5 klf respectively.

Geotechnical Recommendations

Various foundation types have been considered for support of the IU Briscoe Hall Chiller Upgrade. Due to the soil conditions encountered at the boring locations, the anticipated loads of the structure, and the relative economics of the available foundation systems, the foundation types considered included conventional spread and continuous wall footings, extended spread footings, and footings on compacted fill.

A net allowable bearing pressure of **2,500 psf** and **2,000 psf** are recommended for dimensioning conventional spread and continuous wall footings, respectively. It is recommended that a representative of Alt & Witzig Engineering, Inc. inspect all foundation excavations prior to the placement of concrete. At the time of this inspection, Housel penetrometer or other approved tests may be performed in order to verify the presence of suitable soil materials.

Using the above mentioned bearing pressures and recommendations, total settlements of less than one (1) inch and differential settlements of one half (½) inch or less can be anticipated.

In utilizing the above-mentioned net allowable pressures for dimensioning footings, it is necessary to consider only those loads applied above the finished floor elevation.

In order to alleviate the effects of seasonal variations in moisture content on the behavior of the footings and eliminate the effects of frost action, all foundations should be founded a minimum of two and one-half (2½) feet below the final grade. If foundations are extended to rock a significantly higher bearing capacity may be used. However, based on the anticipated loading conditions it does not appear necessary to extend the foundations to bedrock.

Floor Slab Recommendations

It is typically desirable to place the floor slab as a slab-on-grade supported by the soil. In the areas where the existing grade is above the final floor elevation, the building area should be undercut and a free draining granular material placed beneath the slab. In those areas where the existing grade is below the final floor elevation, a well-compacted structural fill will be necessary to raise the site to the desired grade. After the building area has been raised to the proper elevation, a free draining granular fill should be placed immediately beneath all floor slabs.

Prior to elevating the site, the existing subgrade soils must be proofrolled with approved equipment. It is recommended that a representative of Alt & Witzig Engineering, Inc. be present to determine the exact depth of undercutting and to monitor backfilling operations.

Utility Corridor

The following table indicates at each sounding location were rock was encountered. Sounding S-15 was not completed due to utility conflicts. Sounding S-9 was skipped in the numbering process.

Table 1

Sounding	Sounding Elevation	Auger Refusal Depth (ft)	Auger Refusal Elevation (ft)
1	796.5	6.0	790.5
2	799.0	7.0	792.0
3	802.0	9.0	793.0
4	806.5	8.5	798.0
5	810.0	8.0	802.0
6	812.5	7.5	805.0
7	816.0	7.0	809.0
8	819.5	16.5	803.0
9	821.0	19.0	802.0
10	821.0	11.5	809.5
12	818.0	20.0	798.0
13	814.5	12.0	802.5
14	814.5	5.5	809.0

CONSTRUCTION CONSIDERATIONS

Site Preparation

Excessively organic topsoil and loose dumped fill materials will generally undergo high volume changes that are detrimental to the behavior of pavements, floor slabs, structural fills, and foundations placed upon them. Therefore, it is recommended that these materials be stripped from the construction areas and wasted or stockpiled for later use.

It should be noted that the soil borings only indicate the apparent topsoil thickness at their specific locations. Borings do not represent potential variations in the soil strata between selected locations. Thus, borings only provide a general indication of the amount of stripping. The depth of stripping will also be influenced by the condition of the subgrade during earthmoving. A representative of Alt & Witzig Engineering, Inc. should determine the exact depth of stripping, in the field, at the time of the stripping operations.

It is recommended that after the above-mentioned stripping has been performed, the exposed subgrade be proof-rolled with approved equipment. This proof-rolling will help determine where soft unsuitable materials are encountered. Where soft unsuitable materials are encountered, they should be managed as previously mentioned. It is recommended that a representative of Alt & Witzig Engineering, Inc. be present during the proof-rolling phase of this project.

After the existing subgrade soils are excavated to design grade, proper control of subgrade compaction and fill, and structural fill replacement should be maintained by a representative of the soils engineer as per the *Recommended Specifications for Compacted Fills and Backfills*, presented in the Appendix; thus minimizing volume changes and differential settlements which are detrimental to behavior of shallow foundations, floor slabs and pavements.

Foundation Excavations

Due to the plasticity of the shallow soils, it is important that foundation excavations not be allowed to get excessively wet or dry during construction. It is recommended that footing concrete be placed the same day as excavations are made. It footing excavations are to be open for greater than 24 hours, or are going to be subjected to extreme weather conditions, a mud mat or other protection of the foundation soil is recommended.

Groundwater

Water level readings obtained during and upon completion of the boring operations were dry. The exact location of the water table should be anticipated to fluctuate somewhat depending upon normal seasonal variations in precipitation and surface runoff.

Also, depending upon the time of the year that the excavations are made, seepage from surface runoff may also occur into excavations. Therefore, moderate difficulty associated with groundwater intrusion during shallow excavations should be anticipated at this site.

Since these foundation materials tend to loosen/soften when exposed to free water, every effort should be made to keep the excavations dry should groundwater be encountered. A gravity drainage system, sump pumps, or other conventional minor dewatering procedures should be sufficient for this purpose in the shallow cohesive materials. It is also recommended that all concrete for footings be placed the same day as excavations are made.

SUMMARY

A subsurface exploration and engineering evaluation of the foundation conditions has been conducted for the IU Briscoe Hall Chiller Upgrade to be located on the northwest side of Bloomington, Indiana. Foundation design criteria have been suggested and possible design and construction problems have been discussed.

The exploration and analysis of the foundation conditions reported herein is considered in sufficient detail and scope to form a reasonable basis for final design. The recommendations submitted are based on the available soil information and assumed as well as furnished design details by the developer of this property. Any revision in the plans for the proposed structure from those enumerated in this report should be brought to the attention of Alt & Witzig Engineering, Inc. so it may be determined if changes in the recommendations are warranted.

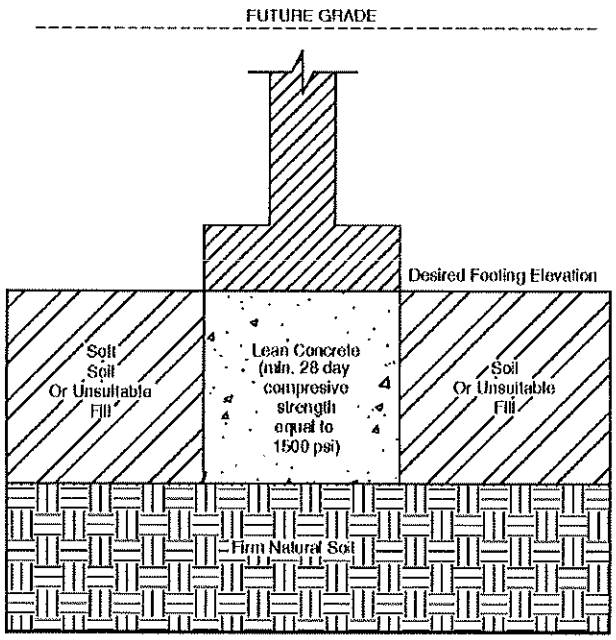
APPENDIX

RECOMMENDED SPECIFICATIONS FOR COMPACTED FILLS AND BACKFILLS

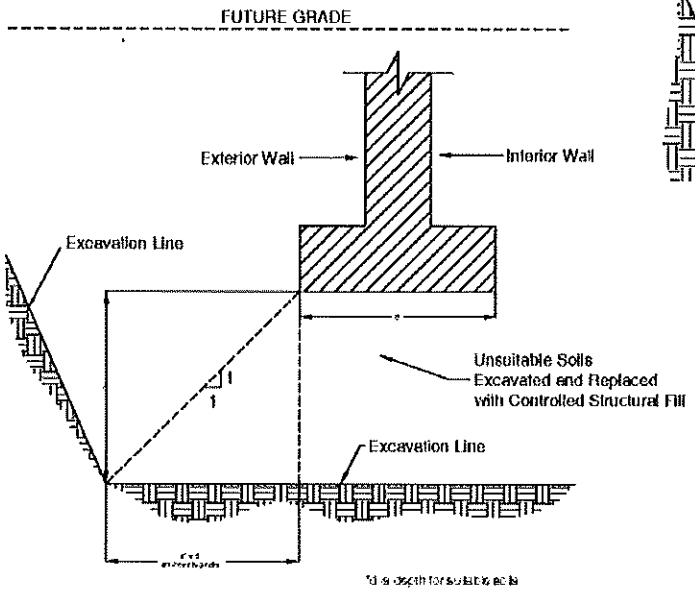
All fill shall be formed from material free of vegetable matter, rubbish, large rock, and other deleterious material. Prior to placement of fill, a sample of the proposed fill material should be submitted to the soils engineer for his approval. The fill material should be placed in layers not to exceed eight (8) inches in loose thickness and should be sprinkled with water as required to secure specified compactions. Each layer should be uniformly compacted by means of suitable equipment of the type required by the materials composing the fill. Under no circumstances should a bulldozer or similar tracked vehicles be used as compacting equipment. Material containing an excess of water so the specified compaction limits cannot be attained should be spread and dried to a moisture content which will permit proper compaction. All fill should be compacted to the specified percent of the maximum density obtained in accordance with ASTM D-698. Moisture contents ranging between minus one (-1) to plus two (+2) percent of optimum moisture should be used when compacting fill. Should the results of the in-place density tests indicate that the specified compaction limits are not obtained, the areas represented by such tests should be reworked and retested as required until the specified limits are reached.

Excavation Details in Unstable Material

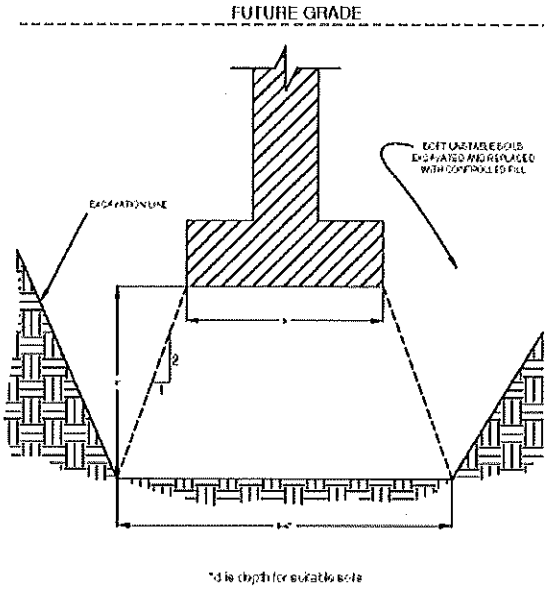
UNDERCUT EXCAVATION FOR FOOTINGS
IN UNSTABLE MATERIALS REPLACED WITH
LEAN CONCRETE



MASS EXCAVATION FOR FOOTINGS
IN UNSTABLE MATERIALS

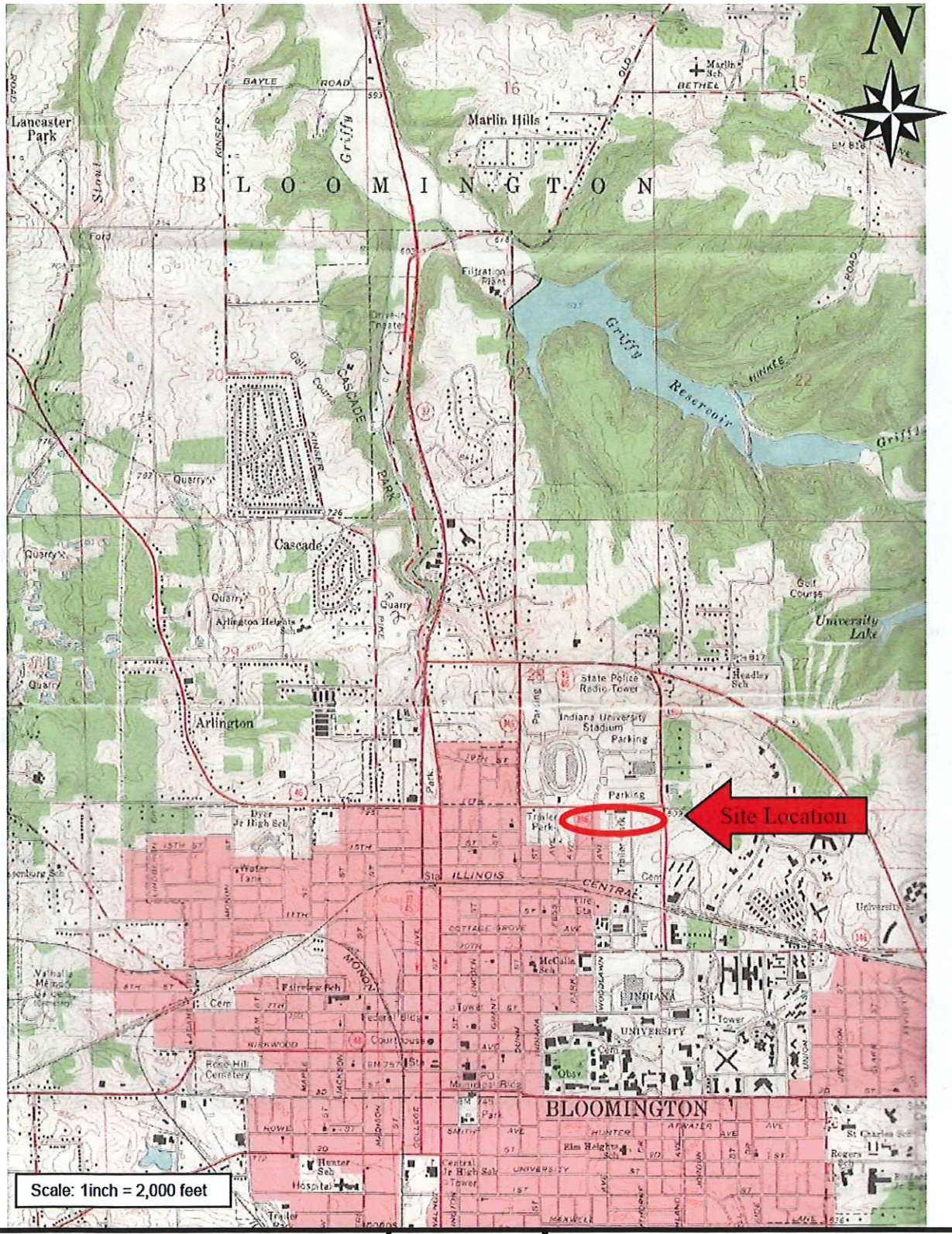


UNDERCUT EXCAVATION FOR FOOTINGS
IN UNSTABLE MATERIALS REPLACED WITH
COMPACTED STRUCTURAL FILL



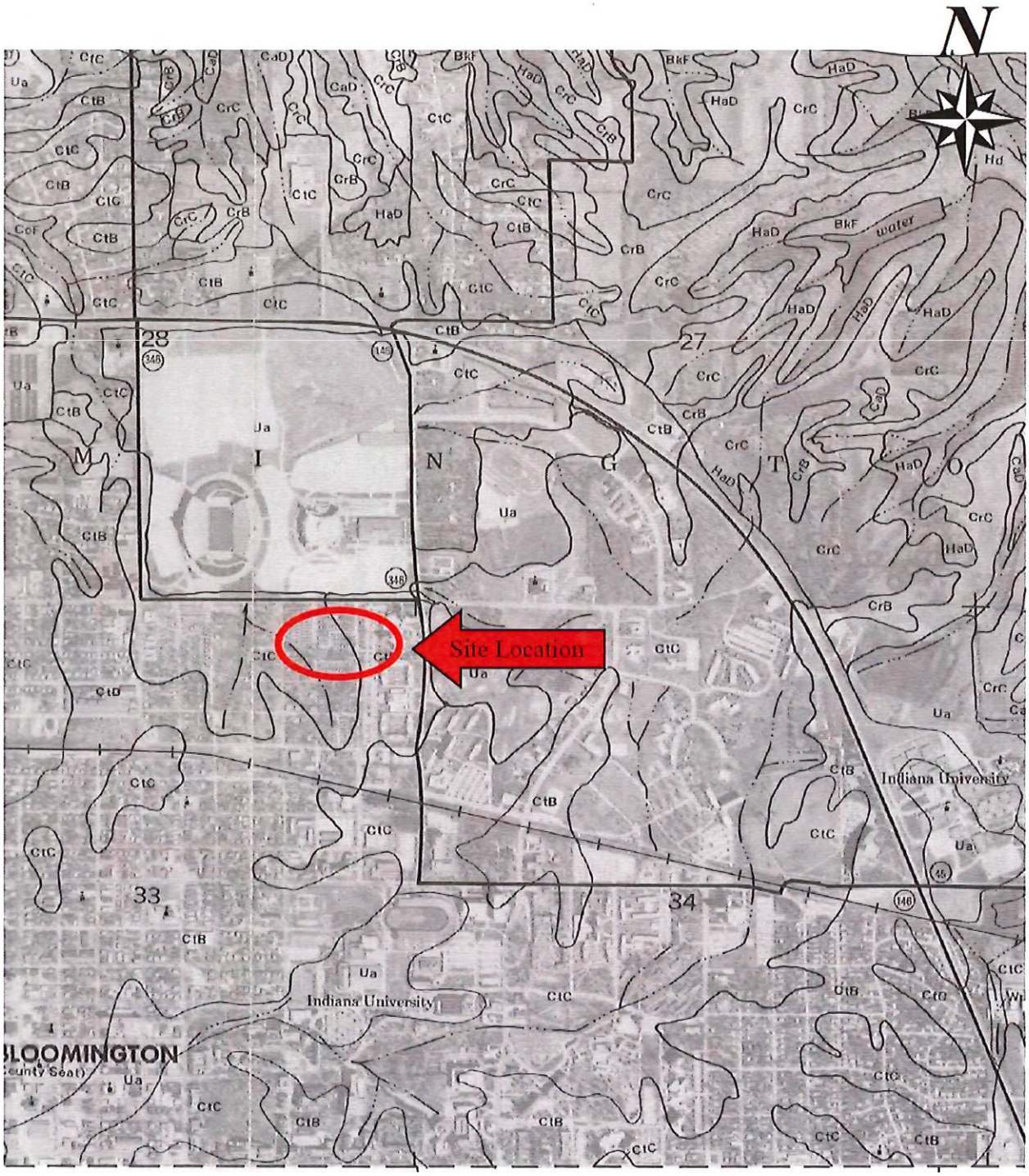
Prepared For: Lynch, Harrison & Brumleve, Inc.		**Prepared By:** Alt & Witzig Engineering, Inc.	
Project Name: IU Brisco Hall Chiller Upgrade		**Project No:** 10IN0082	**Date:** 5-10

SITE LOCATION MAP



Prepared For: Lynch, Harrison & Brumleve, Inc.	A&W	**Prepared By:** Alt & Witzig Engineering, Inc.	
Project Name: IU Briscoe Hall Chiller Upgrade		**Project No:** 10IN0082	**Date:** 02/10

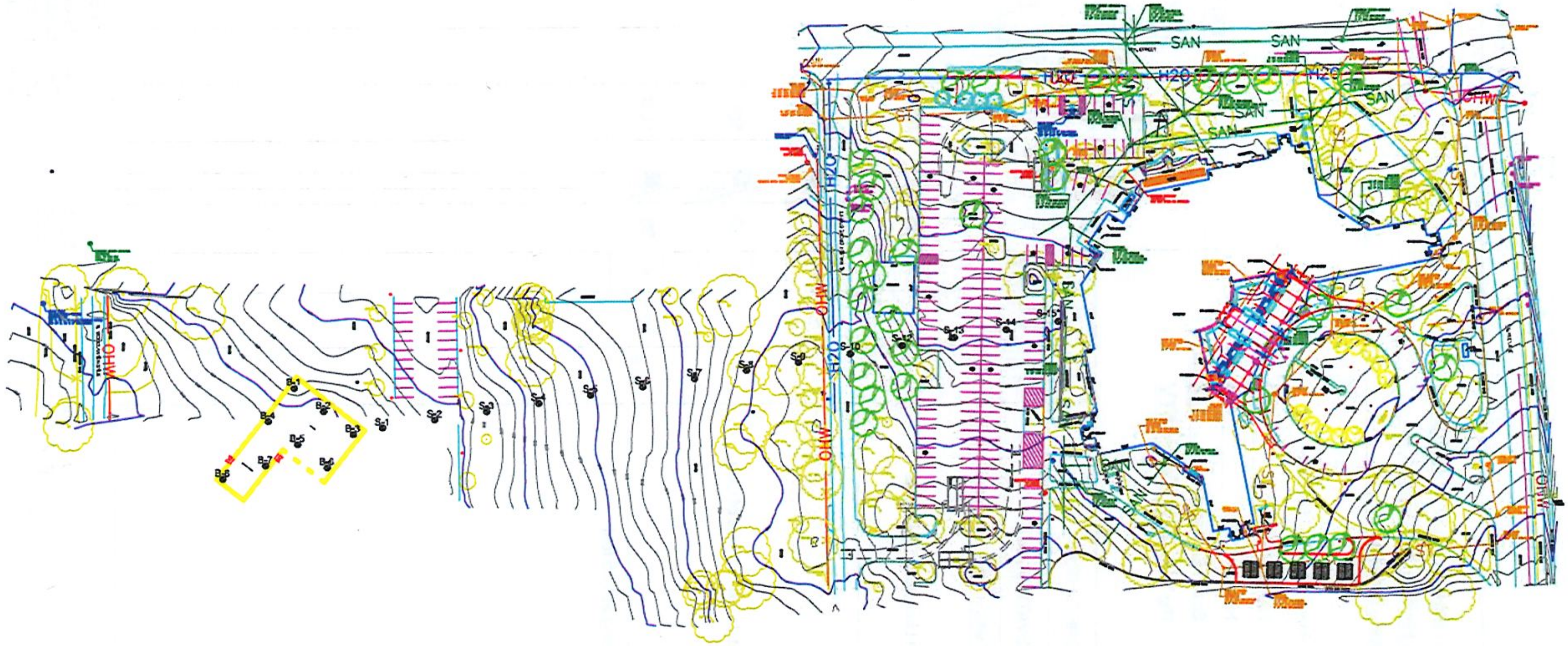
SOIL SURVEY MAP of MONROE COUNTY



Scale: 1inch = 1,320 feet

Prepared For: Lynch, Harrison & Brumleve, Inc.	A&W	**Prepared By:** Alt & Witzig Engineering, Inc.	
Project Name: IU Briscoe Hall Chiller Upgrade		**Project No:** 10IN0082	**Date:** 02/10

BORING LOCATION PLAN



NOTE:
*OMITTED DUE TO UTILITY CONFLICTS

N
Scale: 1" = 100'
0 50 100

Prepared For: Lynch, Harrison & Brumleve	Prepared By: Alt & Witzig Engineering, Inc.	
Project Name: IU Briscoe Hall Chiller Upgrade	Project No: 10IN0082	Date: 02/10

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **B-1**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION 796.5	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / Unit Weight (pcf)	Remarks
796.0	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
	Brown CLAY with Limestone Fragments			1	SS			50/3"		2.3	33.0	
792.5		4.0										
			5	2	SS			50/4"				
	Limestone Fragments with a Trace of Clay			3	SS			50/0"				
786.0		10.5	10	4	SS			50/0"				
	End of Boring at 10.5 feet											Auger Refusal @ 10.5'

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Groundwater
- ○ During Drilling *Dry ft.*
- ▽ At Completion *Dry ft.*

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **B-2**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 794.5	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / Unit Weight (pcf)	Remarks
794.0	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
	Brown Silty CLAY			1	SS			8	1.5	0.5	36.4	
			5	2	SS			11	0.8	0.8	43.4	
788.5		6.0										
787.5	Limestone	7.0										Auger Refusal @ 7.0'
	End of Boring at 7 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **B-3**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 795.0	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / Unit Weight (pcf)	Remarks
794.5	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
				1	SS			9	2.5	2.3	25.9	
	Reddish-Brown Silty CLAY		5	2	SS			10	2.7	2.3	34.1	
788.5		6.5										
788.0	Limestone End of Boring at 7 feet	7.0										Auger Refusal @ 7.0'

TEST DATA

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **B-4**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 794.0	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / Unit Weight (pcf)	Remarks
793.5	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
	Brown Sandy CLAY with Limestone Fragments			1	SS			15		2.3	27.4	
790.0		4.0										
788.5	Limestone Fragments	5.5	5	2	SS			50/1"			28.5	
	End of Boring at 5.5 feet											Auger Refusal @ 5.5'

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **B-5**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 794.0	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / Unit Weight (pcf)	Remarks
793.5	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
	Reddish-Brown CLAY with Rock Fragments			1	SS			22	2.1	1.0	29.4	
			5	2	SS			50/4"		1.0	44.0	
787.5		6.5										
787.0	Limestone End of Boring at 7 feet	7.0										Auger Refusal @ 7.0'

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Groundwater
- ○ During Drilling *Dry ft.*
- ▽ At Completion *Dry ft.*

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **B-6**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 794.0	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / Unit Weight (pcf)	Remarks
793.5	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
				1	SS			7	1.5	1.0	25.6	
	Brown CLAY with a Trace of Silt		5	2	SS			7		1.0	25.5	
787.5		6.5										
787.0	Limestone End of Boring at 7 feet	7.0										Auger Refusal @ 7.0'

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **B-7**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION 793.0	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / Unit Weight (pcf)	Remarks
792.5	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
	Brown Sandy CLAY			1	SS			6		1.8		
			5	2	SS			17		1.0		
786.5		6.5										
	Limestone			3	SS			50/0"				
784.0		9.0										
	End of Boring at 9 feet											Auger Refusal @ 9.0'

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT Lynch, Harrison & Brumleve, Inc. BORING # B-8

PROJECT NAME IU Briscoe Hall Chiller Upgrade Alt & Witzig File No. 10IN0082

PROJECT LOCATION Bloomington, Indiana

DRILLING and SAMPLING INFORMATION

Date Started 2/19/10 Hammer Wt. 140 lbs.

Date Completed 2/19/10 Hammer Drop 30 in.

Boring Method HSA Spoon Sampler OD 2 in.

Driller M. Winkler Rig Type D-50 Track ATV

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION 792.0	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / Unit Weight (pcf)	Remarks
791.5	Dark Brown Clayey SILT with a Trace of Sand (Topsoil)	0.5										
	Brown Silty CLAY			1	SS			10		1.3	31.9	
787.5		4.5										
787.0	Limestone	5.0	5	2	SS			50/3"				Auger Refusal @ 5.0'
	End of Boring at 5 feet											

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-1**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started	2/19/10	Hammer Wt.	140 lbs.
Date Completed	2/19/10	Hammer Drop	30 in.
Boring Method	HSA	Spoon Sampler OD	2 in.
Driller	M. Winkler	Rig Type	D-50 Track ATV

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 796.5	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / Unit Weight (pcf)	Remarks
	Reddish-Brown CLAY											
791.5		5.0	5									
790.5	Limestone	6.0										Auger Refusal @ 6.0'
	End of Boring at 6 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT Lynch, Harrison & Brumleve, Inc. BORING # S-10

PROJECT NAME IU Briscoe Hall Chiller Upgrade Alt & Witzig File No. 10IN0082

PROJECT LOCATION Bloomington, Indiana

DRILLING and SAMPLING INFORMATION

Date Started 2/19/10 Hammer Wt. 140 lbs.

Date Completed 2/19/10 Hammer Drop 30 in.

Boring Method HSA Spoon Sampler OD 2 in.

Driller M. Winkler Rig Type D-50 Track ATV

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 821.0	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / Unit Weight (pcf)	Remarks
	Reddish-Brown CLAY		5									
810.0		11.0	10									
809.5	Limestone End of Boring at 11.5 feet	11.5										Auger Refusal @ 11.5'

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-12**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 818.0	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / *Unit Weight (pcf)*	Remarks
	Reddish-Brown CLAY		5									
			10									
			15									
799.0		19.0										
798.0	Limestone	20.0	20									
	End of Boring at 20 feet											Auger Refusal @ 20.0'

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Groundwater
- ○ During Drilling ft.
- ▽ At Completion Dry ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT Lynch, Harrison & Brumleve, Inc. BORING # S-13

PROJECT NAME IU Briscoe Hall Chiller Upgrade Alt & Witzig File No. 10IN0082

PROJECT LOCATION Bloomington, Indiana

DRILLING and SAMPLING INFORMATION

Date Started 2/19/10 Hammer Wt. 140 lbs.

Date Completed 2/19/10 Hammer Drop 30 in.

Boring Method HSA Spoon Sampler OD 2 in.

Driller M. Winkler Rig Type D-50 Track ATV

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 814.5	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / Unit Weight (pcf)	Remarks
	Reddish-Brown CLAY		5									
803.5		11.0	10									
802.5	Limestone	12.0										Auger Refusal @ 12.0'
	End of Boring at 12 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-14**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 814.5	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % *Unit Weight (pcf)*	Remarks
809.5	Reddish-Brown CLAY	5.0	5									
809.0	Limestone End of Boring at 5.5 feet	5.5										Auger Refusal @ 5.5'

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-2**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 799.0	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / Unit Weight (pcf)	Remarks
	Reddish-Brown CLAY		5									
793.0		6.0										
792.0	Limestone	7.0										
	End of Boring at 7 feet											Auger Refusal @ 7.0'

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Groundwater
- ○ During Drilling ft.
- ▽ At Completion Dry ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-3**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 802.0	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / *Unit Weight (pcf)*	Remarks
794.0	Limestone	8.0	5									Auger Refusal @ 9.0'
	End of Boring at 9 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT Lynch, Harrison & Brumleve, Inc. BORING # S-4

PROJECT NAME IU Briscoe Hall Chiller Upgrade Alt & Witzig File No. 10IN0082

PROJECT LOCATION Bloomington, Indiana

DRILLING and SAMPLING INFORMATION

Date Started 2/19/10 Hammer Wt. 140 lbs.

Date Completed 2/19/10 Hammer Drop 30 in.

Boring Method HSA Spoon Sampler OD 2 in.

Driller M. Winkler Rig Type D-50 Track ATV

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 806.5	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / Unit Weight (pcf)	Remarks
	Reddish-Brown CLAY		5									
799.5		7.0										
798.0	Limestone	8.5										
	End of Boring at 8.5 feet											Auger Refusal @ 8.5'

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-5**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 810.0	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / *Unit Weight (pcf)*	Remarks
803.0	Reddish-Brown CLAY	7.0	5									
802.0	Limestone	8.0										Auger Refusal @ 8.0'
	End of Boring at 8 feet											

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Groundwater
- ○ During Drilling ft.
- ▽ At Completion Dry ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-6**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 812.5	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Unit Weight (pcf)	Remarks
	Reddish-Brown CLAY		5									
806.5		6.0										
805.0	Limestone	7.5										Auger Refusal @ 7.5'
	End of Boring at 7.5 feet											

TEST DATA

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-7**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 816.0	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % *Unit Weight (pcf)*	Remarks
810.0	Reddish-Brown CLAY	6.0	5									
809.0	Limestone End of Boring at 7 feet	7.0										Auger Refusal @ 7.0'

Sample Type
- SS - Driven Split Spoon
- ST - Pressed Shelby Tube
- CA - Continuous Flight Auger
- RC - Rock Core
- CU - Cuttings
- CT - Continuous Tube

Groundwater
- ○ During Drilling ft.
- ▽ At Completion Dry ft.

Boring Method
- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT Lynch, Harrison & Brumleve, Inc. BORING # S-8

PROJECT NAME IU Briscoe Hall Chiller Upgrade Alt & Witzig File No. 10IN0082

PROJECT LOCATION Bloomington, Indiana

DRILLING and SAMPLING INFORMATION

Date Started 2/19/10 Hammer Wt. 140 lbs.

Date Completed 2/19/10 Hammer Drop 30 in.

Boring Method HSA Spoon Sampler OD 2 in.

Driller M. Winkler Rig Type D-50 Track ATV

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 819.5	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % Unit Weight (pcf)	Remarks
	Reddish-Brown CLAY		5									
			10									
803.5		16.0	15									
803.0	Limestone End of Boring at 16.5 feet	16.5										Auger Refusal @ 16.5'

Sample Type

SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater

○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

RECORD OF SUBSURFACE EXPLORATION

Alt & Witzig Engineering, Inc.

CLIENT **Lynch, Harrison & Brumleve, Inc.** BORING # **S-9**

PROJECT NAME **IU Briscoe Hall Chiller Upgrade** Alt & Witzig File No. **10IN0082**

PROJECT LOCATION **Bloomington, Indiana**

DRILLING and SAMPLING INFORMATION

Date Started **2/19/10** Hammer Wt. **140** lbs.

Date Completed **2/19/10** Hammer Drop **30** in.

Boring Method **HSA** Spoon Sampler OD **2** in.

Driller **M. Winkler** Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION SURFACE ELEVATION 821.0	Strata Depth	Depth Scale	Sample No.	TEST DATA: Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % *Unit Weight (pcf)*	Remarks
	Reddish-Brown CLAY		5									
			10									
			15									
803.0		18.0										
802.0	Limestone	19.0										
	End of Boring at 19 feet											Auger Refusal @ 19.0'

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling ft.
▽ At Completion Dry ft.

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

MATERIAL GRAPHICS LEGEND

 INCLAY: Indiana DOT: Clay

 INLIMEST: Indiana DOT: Limestone

 INTS: Indiana DOT: Top Soil

SOIL PROPERTY SYMBOLS

N: *Standard "N" penetration value. Blows per foot of a 140-lb hammer falling 30" on a 2" O.D. split-spoon.*

Qu: *Unconfined Compressive Strength, tsf* PP: *Pocket Penetrometer, tsf*

LL: *Liquid Limit, %* PL: *Plastic Limit, %* PI: *Plasticity Index, %*

DRILLING AND SAMPLING SYMBOLS

GROUNDWATER SYMBOLS

- ○ *Apparent water level noted while drilling.*
- ⊻ *Apparent water level noted upon completion.*
- ⧩ *Apparent water level noted upon delayed time.*

SAMPLER SYMBOLS

- ⊠ SS: Split Spoon

RELATIVE DENSITY & CONSISTANCY CLASSIFICATION (NON-COHESIVE SOILS)

TERM	*BLOWS PER FOOT*
Very Loose	0 - 5
Loose	6 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>51

RELATIVE DENSITY & CONSISTANCY CLASSIFICATION (COHESIVE SOILS)

TERM	*BLOWS PER FOOT*
Very Soft	0 - 3
Soft	4 - 5
Medium Stiff	6 - 10
Stiff	11 - 15
Very Stiff	16 - 30
Hard	>31

Alt & Witzig Engineering, Inc.
4105 West 99th St.
Carmel, IN 46032
Telephone: 317-875-7000
Fax: 317-876-3705

GENERAL NOTES

Project: IU Briscoe Hall Chiller Upgrade

Location: Bloomington, Indiana

Number: 10IN0082

SHIEL SEXTON

Transmittal
Submittal for Approval

9/29/2010

Attention:
BILL STACEY
VECTOR CONSULTING LLC
1005 N. SENATE AVE.
INDIANAPOLIS IN 46202-4104

Submittal: 232123-1
Revision: 0
Date Required: IU - Briscoe Quad Renovation
SSC Project: 3804-
SSC Project #: INDIANA UNIVERSITY
Customer FOUNDATION

Please review the following submittal package:

Hydronic Pumps

Submittal Item	Status	Req'd Onsite	To Date	Copies	Date Due
1 : Product Data	Submitted For Approval		09/29/10	1	10/06/10

Return to the attention of John Miller by the Date Due.

Comments:

902 N Capitol Avenue, Indianapolis IN 46204
Phone: 317-423-6000 FAX: 317-423-6300

HYDRONIC & STEAM EQUIPMENT CO., INC.

FLUID HANDLING PRODUCTS

8950 BASH STREET INDIANAPOLIS, IN 46256
PHONE: (317) 577-8326 FAX: (317) 577-7109

TO: DEEM, LLC
6831 E. 32nd Street
Indianapolis, IN 46226

ATTN: Troy Walls

DATE: September 20, 2010
JOB NAME: I.U. Briscoe Quad Renovation
LOCATION: Bloomington, IN
JOB NO.:
P.O. NO.:

- ☐ Brochures
- ☑ Submittals
- ☐ Re-Submittals
- ☐ Schedules
- ☐ Shop Drawings
- ☐ Parts
- ☑ Approval
- ☐ Your Records
- ☐ Information
- ☐ Installation & Maintenance Instruction

COPIES	MANUFACTURER	MATERIAL
1	Bell & Gossett	1510-2BC Base Mounted Pump (P-A1-1&2; P-B1-1&2)
1	Bell & Gossett	1510-2BC Base Mounted Pump (P-A2-1&2; P-B2-1&2)
1	Bell & Gossett	1510-2BC Base Mounted Pump (P-C1 & P-C2)
1	Bell & Gossett	1510-4E Base Mounted Pump (P-H1 & P-H2)
1	Bell & Gossett	1510-6BC Base Mounted Pump (PP-1 & PP-2)
1	Bell & Gossett	1510-6G Base Mounted Pump (SP-1 SP-2)
1	Bell & Gossett	DC-3X, GF-3X, HH-3X, JH-3X Suction Diffusers
1	Bell & Gossett	14RJHC Vertical Turbine Pump (CP-1 & CP-2)
1	Flex-Hose Co.	3", 6", 8", 10", 12" Flex Connectors

REMARKS: Order is on hold for shipping pending receipt of approved submittals and release.

COPY TO FILE

SIGNED *Jeff Magers*

SOUTH BEND: 1024 SOUTH MAIN STREET, SOUTH BEND , IN 46601 PHONE: 574-234-6005 FAX: 574-234-6611
FORT WAYNE: 107 AIRPORT NORTH OFFICE PARK, FORT WAYNE, IN 46825 PHONE: 260-489-5785 FAX: 260-489-4369
EVANSVILLE: 4701 THEATER DRIVE, EVANSVILLE, IN 47715 PHONE: 812-473-0330 FAX: 812-479-7650

ITT

SUBMITTAL

B-224.8G

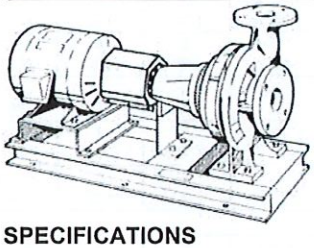
JOB: I.U. Briscoe Quad Renovation

REPRESENTATIVE: Hydronic & Steam Equipment Co.

UNIT TAG: P-A1-1; P-A1-2; P-B1-1; P-B1-2
ENGINEER: Vector Consulting
CONTRACTOR: DEEM, LLC

ORDER NO.
SUBMITTED BY: Jeff Magers
APPROVED BY:

DATE: 9/20/2010
DATE:
DATE:



2BC
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW	115 (GPM)	HEAD	75 (FT)
HP	5	RPM	1800
VOLTS	230/460		
CYCLE	60	PHASE	3
ENCLOSURE	Baldor ODP Premium Efficient, Super-E		
APPROX. WEIGHT	269		
SPECIALS			

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

☒ ANSI/OSHA Coupling Guard
☒ Center Drop Out Spacer Coupling
☒ Fabricated Heavy Duty Baseplate

MAXIMUM WORKING PRESSURE

☒ 175 psi (12 bar) W.P.
w/ 125# ANSI flange drilling

TYPE OF SEAL

☒ 1510 Standard Seal
(Buna-Carbon/Ceramic)

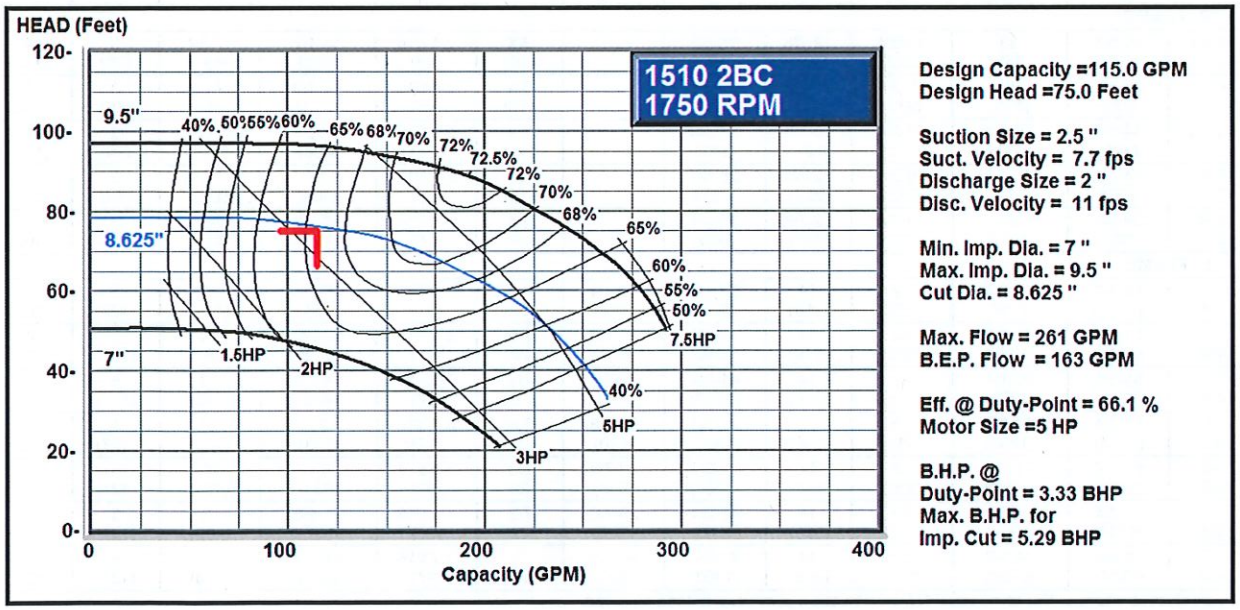
☐ 1510 -F Standard Seal w/ Flush Line
(Buna-Carbon/Ceramic)

☐ 1510 -S Stuffing Box construction w/ Flushed Mechanical Single Seal
(EPR-Tungsten Carbide/Carbon)

☐ 1510 -D Stuffing Box construction w/ Flushed Double Mechanical Seal
(EPR-Carbon/Ceramic)
Requires external water source

☐ 1510 -PF Stuffing Box Construction w/ Packing
(Graphite Impregnated Teflon)

Note: Equipped with NEOPRENE coupling



Design Capacity =115.0 GPM
Design Head =75.0 Feet

Suction Size = 2.5 "
Suct. Velocity = 7.7 fps
Discharge Size = 2 "
Disc. Velocity = 11 fps

Min. Imp. Dia. = 7 "
Max. Imp. Dia. = 9.5 "
Cut Dia. = 8.625 "

Max. Flow = 261 GPM
B.E.P. Flow = 163 GPM

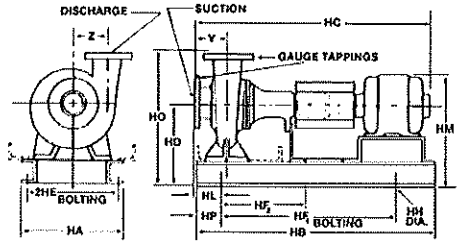
Eff. @ Duty-Point = 66.1 %
Motor Size =5 HP

B.H.P. @
Duty-Point = 3.33 BHP
Max. B.H.P. for
Imp. Cut = 5.29 BHP

Bell & Gossett

Series 1510 2BC Centrifugal Pump Submittal

B-224.8G



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	2"	7/8" (22)	6-1/4" (159)
Suction	2-1/2"	1" (25)	7-3/8" (187)

FLANGES ARE 125# ANSI - STANDARD

DIMENSIONS – Inches (mm)

STANDARD SEAL 1510, 1510-F

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
143T	14-5/8 (371)	31 (787)	29-1/2 (749)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
145T	14-5/8 (371)	31 (787)	30-1/2 (775)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
182T	14-5/8 (371)	31 (787)	33-1/8 (841)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
184T	14-5/8 (371)	31 (787)	33-7/8 (860)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
213T	14-5/8 (371)	34-5/8 (879)	36-1/2 (927)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
	"L" FRAME													
215T	14-5/8 (371)	39-3/8 (1000)	42-3/8 (1076)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
254T	16 (406)	46-1/2 (1181)	46-1/8 (1172)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
256T	16 (406)	46-1/2 (1181)	47-7/8 (1216)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
284TS	16 (406)	46-1/2 (1181)	47-1/8 (1197)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
286TS	16 (406)	46-1/2 (1181)	48-5/8 (1235)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
324TS	16 (406)	46-1/2 (1181)	50-5/8 (1286)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
326TS	16 (406)	46-1/2 (1181)	52-1/8 (1324)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
143T	14-5/8 (371)	34-5/8 (879)	33 (838)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
145T	14-5/8 (371)	34-5/8 (879)	34 (864)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
182T	14-5/8 (371)	34-5/8 (879)	36-3/4 (933)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
184T	14-5/8 (371)	34-5/8 (879)	37-1/2 (953)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
213T	14-5/8 (371)	39-3/8 (1000)	40 (1016)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
	"L" FRAME													
215T	16 (406)	46-1/2 (1181)	44-3/4 (1137)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	17-7/8 (454)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
254T	16 (406)	51-3/4 (1314)	48-1/2 (1232)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
256T	16 (406)	51-3/4 (1314)	50-1/4 (1276)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
284TS	16 (406)	51-3/4 (1314)	49-5/8 (1260)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
286TS	16 (406)	51-3/4 (1314)	51-1/8 (1299)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
324TS	16 (406)	51-3/4 (1314)	53 (1346)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
326TS	16 (406)	51-3/4 (1314)	54-1/2 (1384)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

ITT
8200 N. Austin Avenue
Morton Grove, IL 60053
Phone (847)966-3700
Facsimile (847)966-9052
www.bellgossett.com

ITT

SUBMITTAL

B-224.8G

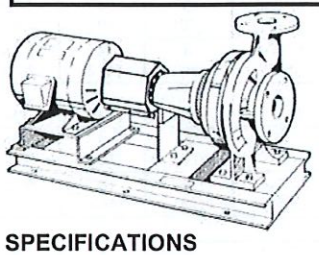
JOB: I.U. Briscoe Quad Renovation

REPRESENTATIVE: Hydronic & Steam Equipment Co.

UNIT TAG: P-A2-1; P-A2-2; P-B2-1; P-B2-2
ENGINEER: Vector Consulting
CONTRACTOR: DEEM, LLC

ORDER NO.
SUBMITTED BY: Jeff Magers
APPROVED BY:

DATE: 9/20/2010
DATE:
DATE:



2BC
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW	140 (GPM)	HEAD	75 (FT)
HP	5	RPM	1800
VOLTS	230/460		
CYCLE	60	PHASE	3
ENCLOSURE	Baldor ODP Premium Efficient, Super-E		
APPROX. WEIGHT	269		
SPECIALS			

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

☒ ANSI/OSHA Coupling Guard
☒ Center Drop Out Spacer Coupling
☒ Fabricated Heavy Duty Baseplate

MAXIMUM WORKING PRESSURE

☒ 175 psi (12 bar) W.P.
w/ 125# ANSI flange drilling

TYPE OF SEAL

☒ 1510 Standard Seal
(Buna-Carbon/Ceramic)

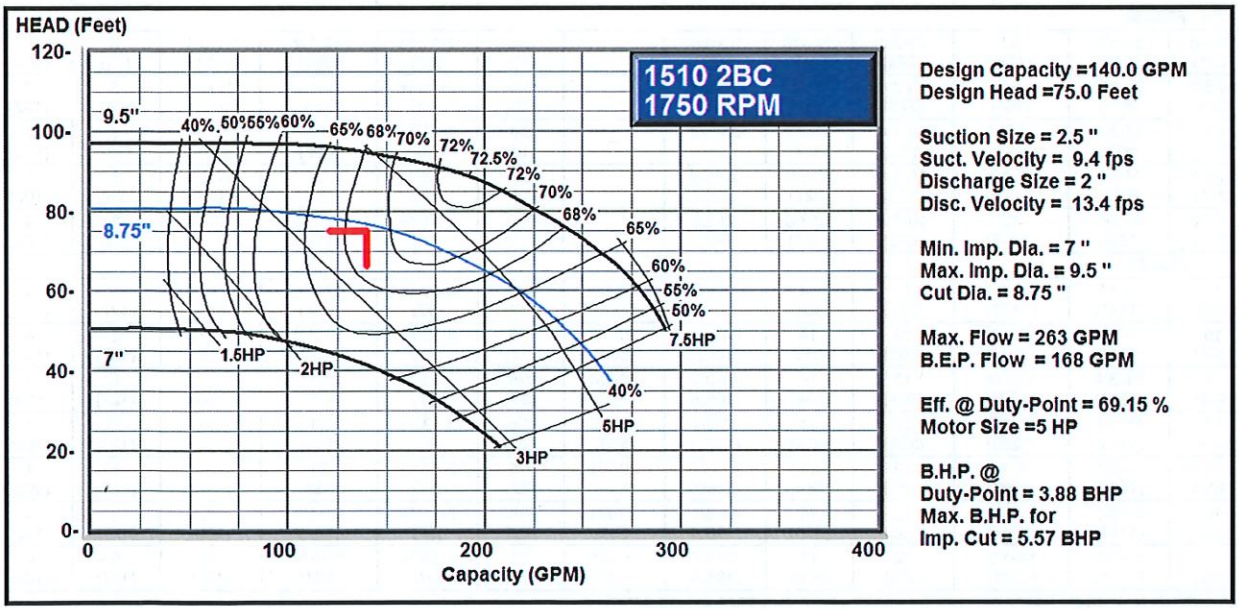
☐ 1510 -F Standard Seal w/ Flush Line
(Buna-Carbon/Ceramic)

☐ 1510 -S Stuffing Box construction w/ Flushed Mechanical Single Seal
(EPR-Tungsten Carbide/Carbon)

☐ 1510 -D Stuffing Box construction w/ Flushed Double Mechanical Seal
(EPR-Carbon/Ceramic)
Requires external water source

☐ 1510 -PF Stuffing Box Construction w/ Packing
(Graphite Impregnated Teflon)

Note: Equipped with NEOPRENE coupling



Design Capacity =140.0 GPM
Design Head =75.0 Feet

Suction Size = 2.5 "
Suct. Velocity = 9.4 fps
Discharge Size = 2 "
Disc. Velocity = 13.4 fps

Min. Imp. Dia. = 7 "
Max. Imp. Dia. = 9.5 "
Cut Dia. = 8.75 "

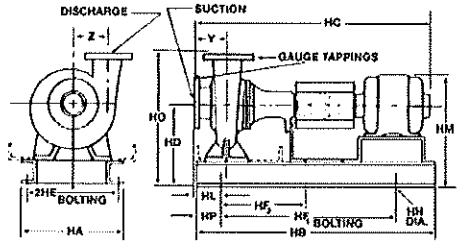
Max. Flow = 263 GPM
B.E.P. Flow = 168 GPM

Eff. @ Duty-Point = 69.15 %
Motor Size =5 HP

B.H.P. @
Duty-Point = 3.88 BHP
Max. B.H.P. for
Imp. Cut = 5.57 BHP

Bell & Gossett

Series 1510 2BC Centrifugal Pump Submittal



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	2"	7/8" (22)	6-1/4" (159)
Suction	2-1/2"	1" (25)	7-3/8" (187)

FLANGES ARE 125# ANSI - STANDARD

DIMENSIONS – Inches (mm)

STANDARD SEAL 1510, 1510-F

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
143T	14-5/8 (371)	31 (787)	29-1/2 (749)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
145T	14-5/8 (371)	31 (787)	30-1/2 (775)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
182T	14-5/8 (371)	31 (787)	33-1/8 (841)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
184T	14-5/8 (371)	31 (787)	33-7/8 (860)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
213T	14-5/8 (371)	34-5/8 (879)	36-1/2 (927)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
	"L" FRAME													
215T	14-5/8 (371)	39-3/8 (1000)	42-3/8 (1076)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
254T	16 (406)	46-1/2 (1181)	46-1/8 (1172)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
256T	16 (406)	46-1/2 (1181)	47-7/8 (1216)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
284TS	16 (406)	46-1/2 (1181)	47-1/8 (1197)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
286TS	16 (406)	46-1/2 (1181)	48-5/8 (1235)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
324TS	16 (406)	46-1/2 (1181)	50-5/8 (1286)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
326TS	16 (406)	46-1/2 (1181)	52-1/8 (1324)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
143T	14-5/8 (371)	34-5/8 (879)	33 (838)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
145T	14-5/8 (371)	34-5/8 (879)	34 (864)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
182T	14-5/8 (371)	34-5/8 (879)	36-3/4 (933)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
184T	14-5/8 (371)	34-5/8 (879)	37-1/2 (953)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
213T	14-5/8 (371)	39-3/8 (1000)	40 (1016)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
	"L" FRAME													
215T	16 (406)	46-1/2 (1181)	44-3/4 (1137)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	17-7/8 (454)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
254T	16 (406)	51-3/4 (1314)	48-1/2 (1232)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
256T	16 (406)	51-3/4 (1314)	50-1/4 (1276)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
284TS	16 (406)	51-3/4 (1314)	49-5/8 (1260)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
286TS	16 (406)	51-3/4 (1314)	51-1/8 (1299)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
324TS	16 (406)	51-3/4 (1314)	53 (1346)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
326TS	16 (406)	51-3/4 (1314)	54-1/2 (1384)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

ITT
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SUBMITTAL

B-224.8G

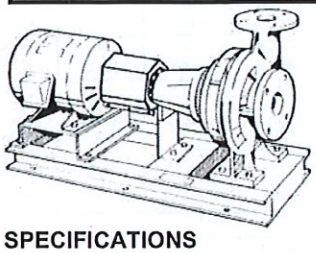
JOB: I.U. Briscoe Quad Renovation

REPRESENTATIVE: Hydronic & Steam Equipment Co.

UNIT TAG: P-C1 & P-C2
ENGINEER: Vector Consulting
CONTRACTOR: DEEM, LLC

ORDER NO.
SUBMITTED BY: Jeff Magers
APPROVED BY:

DATE: 9/20/2010
DATE:
DATE:



2BC
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW 125 (GPM) HEAD 75 (FT)
HP 5 RPM 1800
VOLTS 230/460
CYCLE 60 PHASE 3
ENCLOSURE Baldor ODP Premium Efficient, Super-E
APPROX. WEIGHT 269
SPECIALS

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

☒ ANSI/OSHA Coupling Guard
☒ Center Drop Out Spacer Coupling
☒ Fabricated Heavy Duty Baseplate

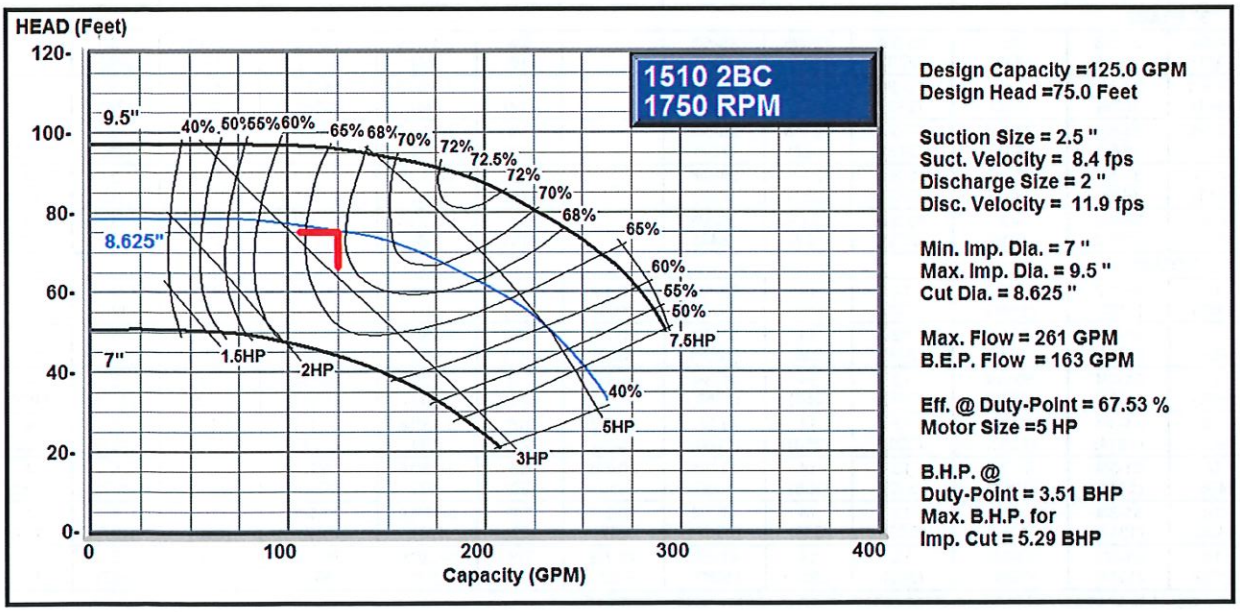
MAXIMUM WORKING PRESSURE

☒ 175 psi (12 bar) W.P.
w/ 125# ANSI flange drilling

TYPE OF SEAL

☒ 1510 Standard Seal
(Buna-Carbon/Ceramic)
☐ 1510 -F Standard Seal w/ Flush Line
(Buna-Carbon/Ceramic)
☐ 1510 -S Stuffing Box construction w/ Flushed Mechanical Single Seal
(EPR-Tungsten Carbide/Carbon)
☐ 1510 -D Stuffing Box construction w/ Flushed Double Mechanical Seal
(EPR-Carbon/Ceramic)
Requires external water source
☐ 1510 -PF Stuffing Box Construction w/ Packing
(Graphite Impregnated Teflon)

Note: Equipped with NEOPRENE coupling



Design Capacity =125.0 GPM
Design Head =75.0 Feet

Suction Size = 2.5 "
Suct. Velocity = 8.4 fps
Discharge Size = 2 "
Disc. Velocity = 11.9 fps

Min. Imp. Dia. = 7 "
Max. Imp. Dia. = 9.5 "
Cut Dia. = 8.625 "

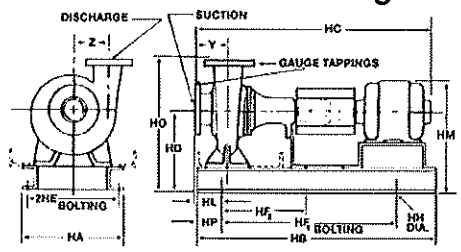
Max. Flow = 261 GPM
B.E.P. Flow = 163 GPM

Eff. @ Duty-Point = 67.53 %
Motor Size =5 HP

B.H.P. @
Duty-Point = 3.51 BHP
Max. B.H.P. for
Imp. Cut = 5.29 BHP

Bell & Gossett

Series 1510 2BC Centrifugal Pump Submittal



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	2"	7/8" (22)	6-1/4" (159)
Suction	2-1/2"	1" (25)	7-3/8" (187)

FLANGES ARE 125# ANSI - STANDARD

DIMENSIONS – Inches (mm)

STANDARD SEAL 1510, 1510-F

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
143T	14-5/8 (371)	31 (787)	29-1/2 (749)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
145T	14-5/8 (371)	31 (787)	30-1/2 (775)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
182T	14-5/8 (371)	31 (787)	33-1/8 (841)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
184T	14-5/8 (371)	31 (787)	33-7/8 (860)	10-3/4 (273)	12-7/8 (327)	25 (635)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
213T	14-5/8 (371)	34-5/8 (879)	36-1/2 (927)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
	"L" FRAME													
215T	14-5/8 (371)	39-3/8 (1000)	42-3/8 (1076)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
254T	16 (406)	46-1/2 (1181)	46-1/8 (1172)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
256T	16 (406)	46-1/2 (1181)	47-7/8 (1216)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
284TS	16 (406)	46-1/2 (1181)	47-1/8 (1197)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
286TS	16 (406)	46-1/2 (1181)	48-5/8 (1235)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
324TS	16 (406)	46-1/2 (1181)	50-5/8 (1286)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
326TS	16 (406)	46-1/2 (1181)	52-1/8 (1324)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
143T	14-5/8 (371)	34-5/8 (879)	33 (838)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
145T	14-5/8 (371)	34-5/8 (879)	34 (864)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	14-1/2 (368)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
182T	14-5/8 (371)	34-5/8 (879)	36-3/4 (933)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
184T	14-5/8 (371)	34-5/8 (879)	37-1/2 (953)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	–	3/4 (19)	2-11/16 (68)	16 (406)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
213T	14-5/8 (371)	39-3/8 (1000)	40 (1016)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	–	3/4 (19)	2-11/16 (68)	16-5/8 (422)	17-3/4 (451)	3 (76)	4 (102)	5-7/8 (149)
	"L" FRAME													
215T	16 (406)	46-1/2 (1181)	44-3/4 (1137)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	3-13/16 (97)	17-7/8 (454)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
254T	16 (406)	51-3/4 (1314)	48-1/2 (1232)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
256T	16 (406)	51-3/4 (1314)	50-1/4 (1276)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	18-7/8 (479)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
284TS	16 (406)	51-3/4 (1314)	49-5/8 (1260)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
286TS	16 (406)	51-3/4 (1314)	51-1/8 (1299)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21 (533)	20 (508)	5 (127)	4 (102)	5-7/8 (149)
324TS	16 (406)	51-3/4 (1314)	53 (1346)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)
326TS	16 (406)	51-3/4 (1314)	54-1/2 (1384)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	3-13/16 (97)	21-1/8 (537)	19 (483)	5 (127)	4 (102)	5-7/8 (149)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

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ITT

SUBMITTAL

B-225.9F

JOB: I.U. Briscoe Quad Renovation

REPRESENTATIVE: Hydronic & Steam Equipment Co.

UNIT TAG: P-H1 & P-H2
ENGINEER: Vector Consulting
CONTRACTOR: DEEM, LLC

ORDER NO.
SUBMITTED BY: Jeff Magers
APPROVED BY:

DATE: 9/20/2010
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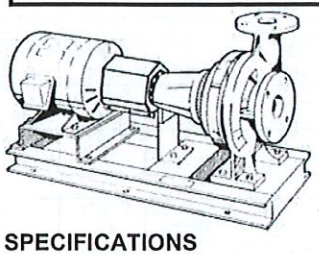


4E
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW	550 (GPM)	HEAD	100 (FT)
HP	20	RPM	1800
VOLTS	230/460		
CYCLE	60	PHASE	3
ENCLOSURE	Baldor ODP Premium Efficient, Super-E		
APPROX. WEIGHT	602		
SPECIALS			

Note: Equipped with NEOPRENE coupling

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

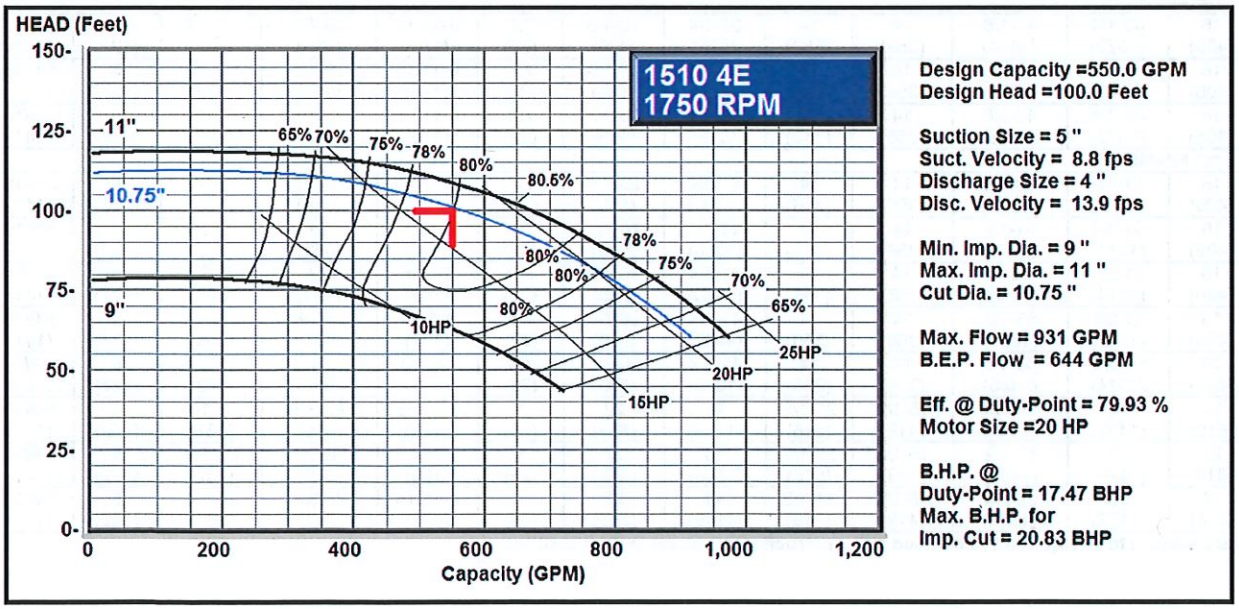
☒ ANSI/OSHA Coupling Guard
☒ Center Drop Out Spacer Coupling
☒ Fabricated Heavy Duty Baseplate

MAXIMUM WORKING PRESSURE

☐ 175 psi (12 bar) W.P.
w/125# ANSI flange drilling
250 psi (17 bar) W.P.
w/250# ANSI flange drilling
(requires 530-S)

TYPE OF SEAL

☒ 1510 Standard Seal
(Buna-Carbon/Ceramic)
☐ 1510 -F Standard Seal w/ Flush Line
(Buna-Carbon/Ceramic)
☐ 1510 -S Stuffing Box construction w/ Flushed Mechanical Single Seal
(EPR-Tungsten Carbide/Carbon)
☐ 1510 -D Stuffing Box construction w/ Flushed Double Mechanical Seal
(EPR-Carbon/Ceramic)
Requires external water source
☐ 1510 -PF Stuffing Box Construction w/ Packing
(Graphite Impregnated Teflon)



Design Capacity =550.0 GPM
Design Head =100.0 Feet

Suction Size = 5 "
Suct. Velocity = 8.8 fps
Discharge Size = 4 "
Disc. Velocity = 13.9 fps

Min. Imp. Dia. = 9 "
Max. Imp. Dia. = 11 "
Cut Dia. = 10.75 "

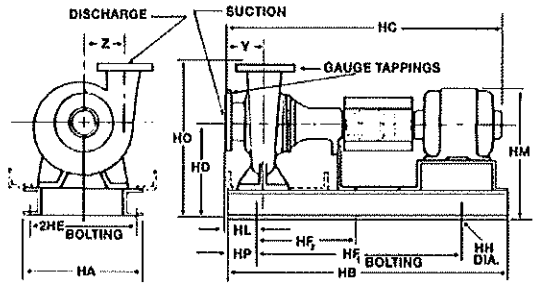
Max. Flow = 931 GPM
B.E.P. Flow = 644 GPM

Eff. @ Duty-Point = 79.93 %
Motor Size =20 HP

B.H.P. @
Duty-Point = 17.47 BHP
Max. B.H.P. for
Imp. Cut = 20.83 BHP

Bell & Gossett

Series 1510 4E Centrifugal Pump Submittal



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	4" (102)	1-1/4" (32)	9-1/2" (241)
Suction	5" (127)	1-3/8" (35)	10-3/4" (273)

FLANGES ARE 125# ANSI - STANDARD
250# ANSI - AVAILABLE

DIMENSIONS - Inches (mm) — **STANDARD SEAL 1510, 1510-F**

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
213T	16 (406)	42-1/4 (1073)	37-1/2 (952)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (410)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
215T	16 (406)	42-1/4 (1073)	39 (991)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (410)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
254T	16 (406)	42-1/4 (1073)	42-3/4 (1086)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (410)	7/8 (22)	6-11/16 (170)	20-7/8 (530)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
	"L" FRAME													
256T	16 (406)	46-1/2 (1181)	48-3/8 (1229)	14 (356)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	4-5/16 (110)	20-7/8 (530)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
284T	16 (406)	51-3/4 (1314)	49-1/8 (1248)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	22 (559)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
286TS	16 (406)	51-3/4 (1314)	50-5/8 (1286)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	22 (559)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
324TS	16 (406)	51-3/4 (1314)	51-1/8 (1299)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	23-1/8 (587)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
326TS	16 (406)	51-3/4 (1314)	52-5/8 (1337)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (123)	23-1/8 (587)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
364TS	24 (610)	56 (1422)	54-3/8 (1381)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26-1/4 (667)	6 (152)	5-9/16 (141)	7-1/4 (184)
365TS	24 (610)	56 (1422)	55-1/8 (1400)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26-1/4 (667)	6 (152)	5-9/16 (141)	7-1/4 (184)
404TS	24 (610)	56 (1422)	57-3/8 (1457)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	28-3/8 (721)	26-1/4 (667)	6 (152)	5-9/16 (141)	7-1/4 (184)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
213T	16 (406)	42-1/4 (1073)	41-1/8 (1044)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (409)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
215T	16 (406)	42-1/4 (1073)	42-5/8 (1083)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (409)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
254T	16 (406)	42-1/4 (1073)	46-3/8 (1178)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (409)	7/8 (22)	6-11/16 (170)	20-7/8 (530)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
	"L" FRAME													
256T	16 (406)	51-3/4 (1314)	50-7/8 (1292)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	20-7/8 (530)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
284T	16 (406)	51-3/4 (1314)	51-1/2 (1308)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	22 (559)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
286TS	16 (406)	51-3/4 (1314)	53 (1346)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	22 (559)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
324TS	16 (406)	51-3/4 (1314)	53-1/2 (1359)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	23-1/8 (587)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
326TS	16 (406)	51-3/4 (1314)	55-1/8 (1400)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	23-1/8 (587)	23-3/4 (603)	5 (127)	5-9/16 (141)	7-1/4 (184)
364TS	24 (610)	56 (1422)	56-7/8 (1444)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26-1/4 (667)	6 (152)	5-9/16 (141)	7-1/4 (184)
365TS	24 (610)	56 (1422)	57-1/2 (1460)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26-1/4 (667)	6 (152)	5-9/16 (141)	7-1/4 (184)
404TS	24 (610)	56 (1422)	59-3/4 (1518)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	28-3/8 (721)	26-1/4 (667)	6 (152)	5-9/16 (141)	7-1/4 (184)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

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SUBMITTAL

B-225.7D

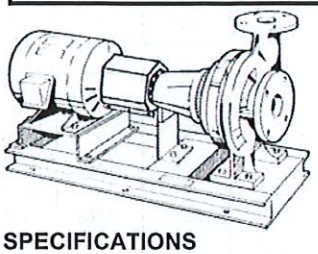
JOB: I.U. Briscoe Quad Renovation

REPRESENTATIVE: Hydronic & Steam Equipment Co.

UNIT TAG: PP-1 & PP-2
ENGINEER: Vector Consulting
CONTRACTOR: DEEM, LLC

ORDER NO.
SUBMITTED BY: Jeff Magers
APPROVED BY:

DATE: 9/20/2010
DATE:
DATE:



6BC
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW	1200 (GPM)	HEAD	60 (FT)
HP	30	RPM	1800
VOLTS	230/460		
CYCLE	60	PHASE	3
ENCLOSURE	Baldor ODP Premium Efficient, Super-E		
APPROX. WEIGHT	928		
SPECIALS	galvanized drip pan		

Note: Equipped with NEOPRENE coupling

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

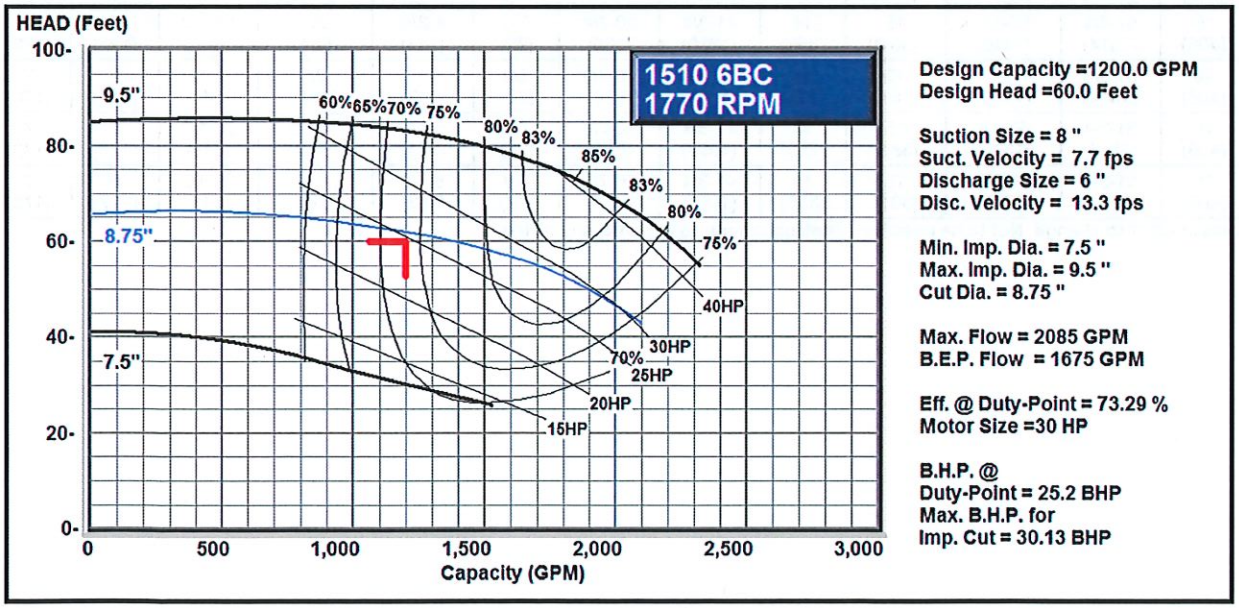
- ☒ ANSI/OSHA Coupling Guard
- ☒ Center Drop Out Spacer Coupling
- ☒ Fabricated Heavy Duty Baseplate

MAXIMUM WORKING PRESSURE

- ☒ 175 psi (12 bar) W.P. w/125# ANSI flange drilling
- ☐ 250 psi (17 bar) W.P. w/250# ANSI flange drilling (requires 530-S)

TYPE OF SEAL

- ☒ 1510 Standard Seal (Buna-Carbon/Ceramic)
- ☐ 1510 -F Standard Seal w/ Flush Line (Buna-Carbon/Ceramic)
- ☐ 1510 -S Stuffing Box construction w/ Flushed Mechanical Single Seal (EPR-Tungsten Carbide/Carbon)
- ☐ 1510 -D Stuffing Box construction w/ Flushed Double Mechanical Seal (EPR-Carbon/Ceramic) Requires external water source
- ☐ 1510 -PF Stuffing Box Construction w/ Packing (Graphite Impregnated Teflon)



Design Capacity =1200.0 GPM
Design Head =60.0 Feet

Suction Size = 8 "
Suct. Velocity = 7.7 fps
Discharge Size = 6 "
Disc. Velocity = 13.3 fps

Min. Imp. Dia. = 7.5 "
Max. Imp. Dia. = 9.5 "
Cut Dia. = 8.75 "

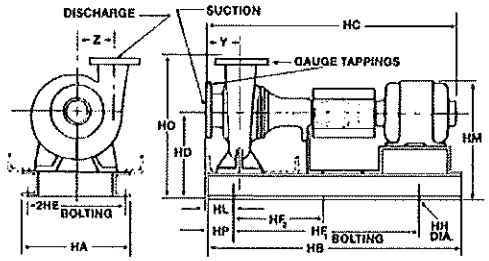
Max. Flow = 2085 GPM
B.E.P. Flow = 1675 GPM

Eff. @ Duty-Point = 73.29 %
Motor Size =30 HP

B.H.P. @
Duty-Point = 25.2 BHP
Max. B.H.P. for
Imp. Cut = 30.13 BHP

Bell & Gossett

Series 1510 6BC Centrifugal Pump Submittal



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	6" (152)	1-7/16" (37))	12-1/8" (308)
Suction	8" (203)	1-5/8" (41)	14-3/4" (375)

FLANGES ARE 125# ANSI - STANDARD
250# ANSI - AVAILABLE

DIMENSIONS - Inches (mm)

STANDARD SEAL 1510, 1510-F

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"L" FRAME													
254T	16 (406)	46-1/2 (1181)	50-5/8 (1286)	15 (381)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	8-3/8 (213)	21-7/8 (556)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
256T	16 (406)	46-1/2 (1181)	52-3/8 (1330)	15 (381)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	8-3/8 (213)	21-7/8 (556)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
284T	16 (406)	51-3/4 (1314)	53-1/8 (1349)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	23 (584)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
286T	16 (406)	51-3/4 (1314)	54-5/8 (1387)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	23 (584)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
324T	16 (406)	51-3/4 (1314)	56-7/8 (1445)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	24-1/8 (613)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
326T	16 (406)	51-3/4 (1314)	58-3/8 (1483)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	24-1/8 (613)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"L" FRAME													
254T	16 (406)	51-3/4 (1314)	53 (1346)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	21-7/8 (555)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
256T	16 (406)	51-3/4 (1314)	54-3/4 (1391)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	21-7/8 (555)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
284T	16 (406)	51-3/4 (1314)	55-1/2 (1410)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	23 (584)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
286T	16 (406)	51-3/4 (1314)	57 (1448)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	23 (584)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
324T	16 (406)	51-3/4 (1314)	59-1/4 (1505)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	24-1/8 (613)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)
326T	16 (406)	51-3/4 (1314)	60-3/4 (1543)	15 (381)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	8-3/8 (213)	24-1/8 (613)	25-1/2 (648)	5 (127)	7 (178)	8-1/4 (210)

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SUBMITTAL

B-229.4D

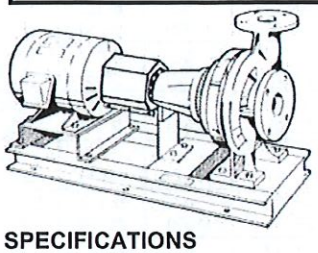
JOB: I.U. Briscoe Quad Renovation

REPRESENTATIVE: Hydronic & Steam Equipment Co.

UNIT TAG: SP-1 & SP-2
ENGINEER: Vector Consulting
CONTRACTOR: DEEM, LLC

ORDER NO.
SUBMITTED BY: Jeff Magers
APPROVED BY:

DATE: 9/20/2010
DATE:
DATE:



6G
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW 1800 (GPM) HEAD 135 (FT)
HP 75 RPM 1800
VOLTS 230/460
CYCLE 60 PHASE 3
ENCLOSURE Baldor ODP Premium Efficient, Super-E
APPROX. WEIGHT 1552
SPECIALS galvanized drip pan

Note: Equipped with NEOPRENE coupling on "L" bearing frames. Hytrel coupler sleeve is standard on "XL" bearing frames.

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

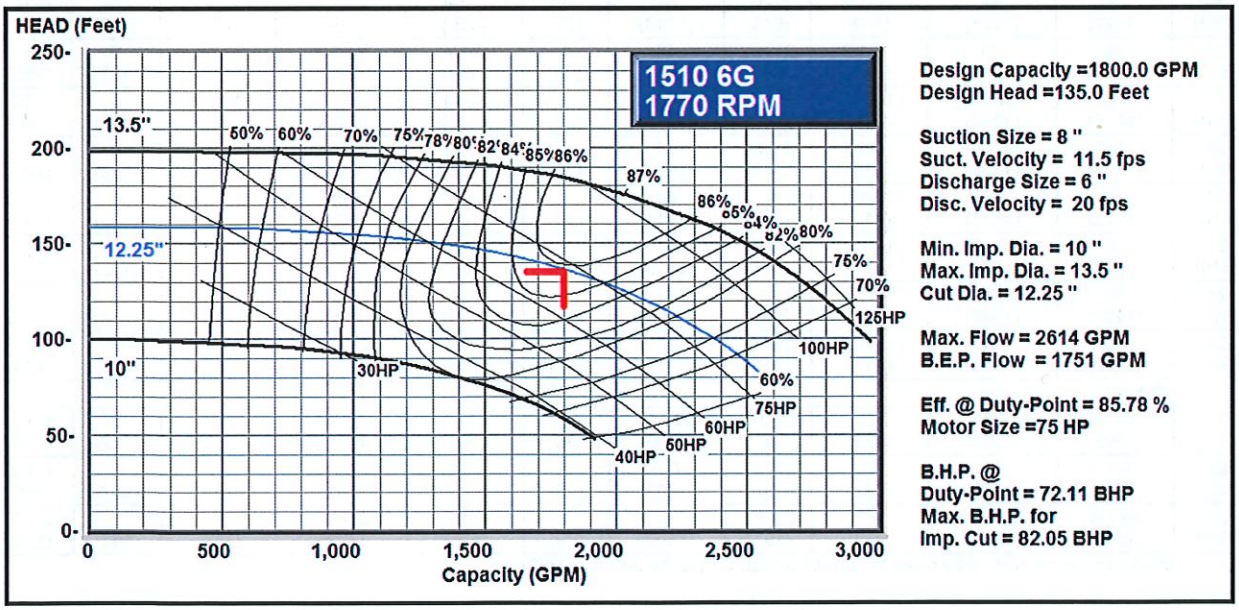
☒ ANSI/OSHA Coupling Guard
☒ Center Drop Out Spacer Coupling
☒ Fabricated Heavy Duty Baseplate

MAXIMUM WORKING PRESSURE

☐ 175 psi (12 bar) W.P.
w/125# ANSI flange drilling
250 psi (17 bar) W.P.
w/250# ANSI flange drilling
(requires 530-S)

TYPE OF SEAL

☒ 1510 Standard Seal
(Buna-Carbon/Ceramic)
☐ 1510 -F Standard Seal w/ Flush Line
(Buna-Carbon/Ceramic)
☐ 1510 -S Stuffing Box construction w/ Flushed Mechanical Single Seal
(EPR-Tungsten Carbide/Carbon)
☐ 1510 -D Stuffing Box construction w/ Flushed Double Mechanical Seal
(EPR-Carbon/Ceramic)
Requires external water source
☐ 1510 -PF Stuffing Box Construction w/ Packing
(Graphite Impregnated Teflon)



Design Capacity =1800.0 GPM
Design Head =135.0 Feet

Suction Size = 8 "
Suct. Velocity = 11.5 fps
Discharge Size = 6 "
Disc. Velocity = 20 fps

Min. Imp. Dia. = 10 "
Max. Imp. Dia. = 13.5 "
Cut Dia. = 12.25 "

Max. Flow = 2614 GPM
B.E.P. Flow = 1751 GPM

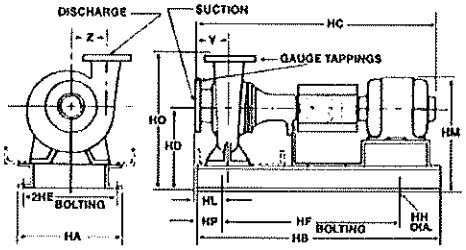
Eff. @ Duty-Point = 85.78 %
Motor Size =75 HP

B.H.P. @
Duty-Point = 72.11 BHP
Max. B.H.P. for
Imp. Cut = 82.05 BHP

Bell & Gossett

Series 1510 6G Centrifugal Pump Submittal

B-229.4E



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	6" (152)	1-7/16 (37)	12-1/8 (308)
Suction	8" (203)	1-5/8 (41)	14-3/4 (375)

FLANGES ARE: 125# ANSI - STANDARD
250# ANSI - AVAILABLE

DIMENSIONS - Inches (mm)

STANDARD SEAL 1510, 1510-F

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF	HH	HL	HM MAX	HO	HP	Y	Z
	"L" FRAME												
256T	24 (610)	56 (1422)	49-5/8 (1260)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	23-3/8 (594)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
284T	24 (610)	56 (1422)	50-5/8 (1286)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	24-1/2 (622)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
286T	24 (610)	56 (1422)	52-1/8 (1324)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	24-1/2 (622)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
324T	24 (610)	56 (1422)	54-1/8 (1375)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	25-5/8 (651)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
326T	24 (610)	56 (1422)	55-5/8 (1413)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	25-5/8 (651)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
364T	24 (610)	56 (1422)	57-7/8 (1470)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	26-3/4 (679)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
365T	24 (610)	56 (1422)	58-1/2 (1486)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	26-3/4 (679)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
404TS	24 (610)	56 (1422)	58-5/8 (1489)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	28-3/8 (721)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
	"XL" FRAME												
365TS	26 (660)	59-1/4 (1505)	62-1/2 (1588)	17 (432)	23-1/2 (597)	47-1/4 (1200)	1 (25)	6-1/2 (165)	27-1/4 (692)	31 (787)	6 (152)	6-1/2 (165)	9-5/16 (237)
404TS	26 (660)	59-1/4 (1505)	64-3/4 (1645)	17 (432)	23-1/2 (597)	47-1/4 (1200)	1 (25)	6-1/2 (165)	28-7/8 (733)	31 (787)	6 (152)	6-1/2 (165)	9-5/16 (237)
405TS	26 (660)	59-1/4 (1505)	66-1/4 (1683)	17 (432)	23-1/2 (597)	47-1/4 (1200)	1 (25)	6-1/2 (165)	28-7/8 (733)	31 (787)	6 (152)	6-1/2 (165)	9-5/16 (237)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF	HH	HL	HM MAX	HO	HP	Y	Z
	"L" FRAME												
256T	24 (610)	56 (1422)	52 (1321)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	23-3/8 (594)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
284T	24 (610)	56 (1422)	53 (1346)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	24-1/2 (622)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
286T	24 (610)	56 (1422)	54-1/2 (1384)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	24-1/2 (622)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
324T	24 (610)	56 (1422)	56-1/2 (1435)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	25-5/8 (651)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
326T	24 (610)	56 (1422)	58 (1473)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	25-5/8 (651)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
364T	24 (610)	56 (1422)	60-1/4 (1530)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	26-3/4 (679)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
365T	24 (610)	56 (1422)	60-7/8 (1546)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	26-3/4 (679)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
404TS	24 (610)	56 (1422)	61 (1549)	16-1/2 (419)	21-1/2 (546)	44 (1118)	1 (25)	6-1/4 (159)	28-3/8 (721)	30-1/2 (775)	6 (152)	6-1/2 (165)	9-5/16 (237)
	"XL" FRAME												
365TS	26 (660)	59-1/4 (1505)	64-3/4 (1645)	17 (432)	23-1/2 (597)	47-1/4 (1200)	1 (25)	6-1/2 (165)	27-1/4 (692)	31 (787)	6 (152)	6-1/2 (165)	9-5/16 (237)
404TS	26 (660)	59-1/4 (1505)	67 (1702)	17 (432)	23-1/2 (597)	47-1/4 (1200)	1 (25)	6-1/2 (165)	28-7/8 (733)	31 (787)	6 (152)	6-1/2 (165)	9-5/16 (237)
405TS	26 (660)	59-1/4 (1505)	68-1/2 (1740)	17 (432)	23-1/2 (597)	47-1/4 (1200)	1 (25)	6-1/2 (165)	28-7/8 (733)	31 (787)	6 (152)	6-1/2 (165)	9-5/16 (237)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

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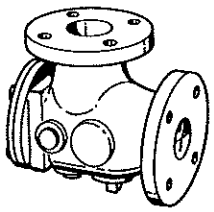
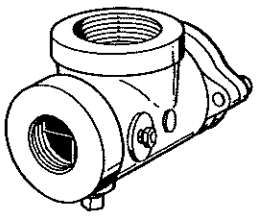
SUBMITTAL

B-825H

JOB: I.U. Briscoe Quad Renovation	**REPRESENTATIVE:** Hydronic & Steam Equipment Co.	
UNIT TAG:	**ORDER NO.**	**DATE:** 9/20/2010
ENGINEER: Vector Consulting	**SUBMITTED BY:** Jeff Magers	**DATE:**
CONTRACTOR: DEEM, LLC	**APPROVED BY:**	**DATE:**





B&G Suction Diffuser

Centrifugal Pump Accessories

DESCRIPTION

The Bell & Gossett Suction Diffuser with disposable start-up strainer is designed for direct application to the pump suction and provides ideal flow conditions for the pump providing NPSH requirements are met. The integral orifice cylinder has a free area equal to five times the cross section of the pump suction opening and serves as a strainer protecting the pump.

OPERATING DATA

Operating Temperature: 250°F (121°C)
Working Pressure: 175 psi (1,207 kPa)

MATERIALS OF CONSTRUCTION

Type	Body	Inlet Vanes	Orifice Cylinder	Start-Up Strainer
X	Cast Iron	Steel		16 Mesh Bronze
Z	Cast Iron	Stainless Steel		16 Mesh Bronze

NOTES: Type X-For Closed Systems.
Type Z-For Domestic Water and Tower Systems.

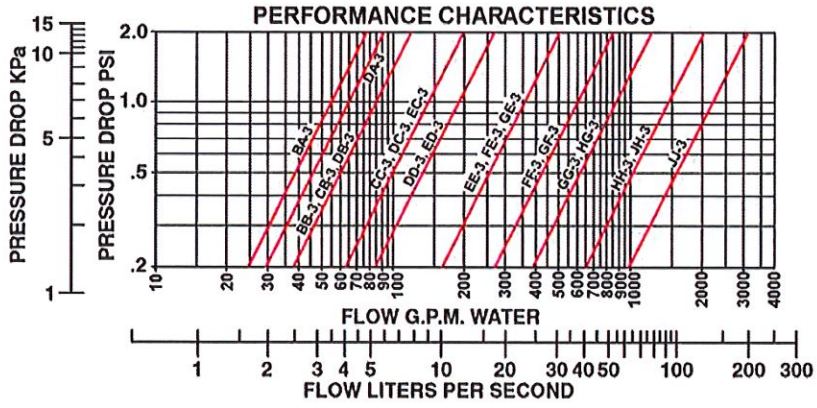
SCHEDULE

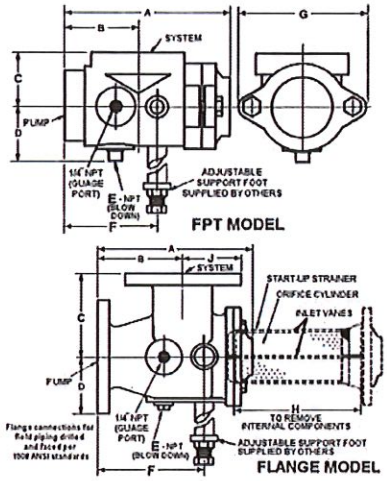
MODEL NUMBER	DIMENSIONS INCHES (mm) SYSTEM SIDE		PUMP SIDE		TAGGING INFORMATION	X QUANTITY	Z QUANTITY
BA-3X/BA-3Z	2 (50.8)	FPT	1-1/2 (38.1)	FPT			
BB-3X/BB-3Z	2 (50.8)	FPT	2 (50.8)	FPT			
CB-3X/CB-3Z	2-1/2 (63.5)	FPT	2 (50.8)	FPT			
CC-3X/CC-3Z	2-1/2 (63.5)	FLG	2-1/2 (63.5)	FLG			
DA-3X/DA-3Z	3 (76.2)	FPT	1-1/2 (38.1)	FPT			
DB-3X/DB-3Z	3 (76.2)	FPT	2 (50.8)	FPT			
DC-3X/DC-3Z	3 (76.2)	FLG	2-1/2 (63.5)	FLG	, ,	10	
DD-3X/DD-3Z	3 (76.2)	FLG	3 (76.2)	FLG			
EC-3X/EC-3Z	4 (101.6)	FLG	2-1/2 (63.5)	FLG			
ED-3X/ED-3Z	4 (101.6)	FLG	3 (76.2)	FLG			
EE-3X/EE-3Z	4 (101.6)	FLG	4 (101.6)	FLG			
FE-3X/FE-3Z	5 (127)	FLG	4 (101.6)	FLG			
FF-3X/FF-3Z	5 (127)	FLG	5 (127)	FLG			
GE-3X/GE-3Z	6 (152.4)	FLG	4 (101.6)	FLG			
GF-3X/GF-3Z	6 (152.4)	FLG	5 (127)	FLG		2	
GG-3X/GG-3Z	6 (152.4)	FLG	6 (152.4)	FLG			
HG-3X/HG-3Z	8 (203.2)	FLG	6 (152.4)	FLG			
HH-3X/HH-3Z	8 (203.2)	FLG	8 (203.2)	FLG		2	
JH-3X/JH-3Z	10 (254)	FLG	8 (203.2)	FLG		2	
JJ-3X/JJ-3Z	10 (254)	FLG	10 (254)	FLG			

Bell & Gossett

SUCTION DIFFUSER

B-825H





TYPICAL SPECIFICATIONS

Provide at each pump a Suction Diffuser for mechanical coupling systems of the sized noted on drawings. Units shall consist of angle type body, grooved system connection, flanged pump connection, stainless steel inlet vanes and combination Diffuser-Strainer-Orifice Cylinder with 3/16 diameter openings for pump protection. The orifice cylinder shall be equipped with a disposable fine mesh strainer which shall be removed after system start-up.

Orifice cylinder shall be designed to withstand pressure differential equal to pump shut-off head (maximum _____ PSI) and shall have a free area equal to five times cross section area of pump suction opening. Vane length shall be no less than 2-1/2 times the pump connection diameter. Unit shall be provided with adjustable support foot to carry the weight of suction piping.
Each Suction Diffuser to be ITT Bell & Gossett Model No. SDG-_____.

DIMENSIONS – INCHES (mm)

Model No.	System Side		Pump Side		A	B	C	D	E	F	G	H	J	Orifice Cylinder Free Area in^2 (cm^2)	Approx. Shpg. Wt. Lbs. (Kg)
BA-3	2 (50.8)	T	1-1/2 (38.1)	T	6-13/16 (173)	3 (76)	2-1/4 (57)	2-3/8 (60)	3/4 (19)	3-13/16 (97)	5-1/4 (133)	8 (203)	N/A	11 (71)	13 (6)
BB-3	2 (50.8)	T	2 (50.8)	T	8-3/8 (213)	3-7/8 (98)	2-3/4 (70)	2-3/4 (70)	3/4 (19)	3-7/8 (98)	5-3/4 (146)	9 (229)	N/A	20-1/2 (132)	14 (6)
CB-3	2-1/2 (63.5)	T	2 (63.5)	T	8-3/8 (213)	3-7/8 (98)	2-3/4 (70)	2-3/4 (70)	3/4 (19)	3-7/8 (98)	5-3/4 (146)	9 (229)	N/A	20-1/2 (132)	16 (7)
CC-3	2-1/2 (63.5)	F	2-1/2 (63.5)	F	9 (229)	4-3/4 (121)	4-3/4 (121)	3-1/2 (89)	3/4 (19)	5-5/8 (143)	N/A	11 (279)	3-1/2 (89)	26 (168)	36 (16)
DA-3	3 (76.2)	T	1-1/2 (38.1)	T	8-3/8 (213)	3-7/8 (98)	2-3/4 (70)	2-3/4 (70)	3/4 (19)	3-7/8 (98)	5-3/4 (146)	9 (229)	N/A	20-1/2 (132)	17 (8)
DB-3	3 (76.2)	T	2 (50.8)	T	8-3/8 (213)	3-7/8 (98)	2-3/4 (70)	2-3/4 (70)	3/4 (19)	3-7/8 (98)	5-3/4 (146)	9 (229)	N/A	20-1/2 (132)	17 (8)
➡ DC-3	3 (76.2)	F	2-1/2 (63.5)	F	9 (229)	5 (127)	5 (127)	3-1/2 (89)	3/4 (19)	5-5/8 (143)	N/A	11 (279)	3-3/4 (95)	26 (168)	44 (20)
DD-3	3 (76.2)	F	3 (76.2)	F	10 (254)	5-1/2 (140)	5-1/2 (140)	3-3/4 (95)	3/4 (19)	6-7/8 (175)	N/A	12 (305)	3-3/4 (95)	37-1/2 (242)	48 (22)
EC-3	4 (101.6)	F	2-1/2 (63.5)	F	9 (229)	6-1/2 (165)	6-1/2 (165)	3-1/2 (95)	3/4 (19)	5-5/8 (143)	N/A	11 (279)	4-1/2 (114)	26 (168)	42 (19)
ED-3	4 (101.6)	F	3 (76.2)	F	10 (254)	6-1/2 (165)	6-1/2 (165)	3-3/4 (95)	3/4 (19)	6-7/8 (175)	N/A	13 (330)	4-1/2 (114)	37-1/2 (242)	55 (25)
EE-3	4 (101.6)	F	4 (101.6)	F	12-5/8 (321)	6-1/2 (165)	6-1/2 (165)	4-1/2 (114)	3/4 (19)	7-5/8 (194)	N/A	14 (356)	4-1/2 (114)	65 (419)	72 (33)
FE-3	5 (127)	F	4 (101.6)	F	12-5/8 (321)	7-1/2 (191)	7-1/2 (191)	4-1/2 (114)	3/4 (19)	7-5/8 (194)	N/A	15 (381)	5 (127)	65 (419)	84 (38)
FF-3	5 (127)	F	5 (127)	F	14-1/4 (362)	7-1/2 (191)	7-1/2 (191)	5 (127)	3/4 (19)	9 (229)	N/A	15 (381)	5 (127)	90 (581)	100 (45)
GE-3	6 (152.4)	F	4 (101.6)	F	12-5/8 (321)	8 (203)	8 (203)	4-1/2 (114)	3/4 (19)	7-5/8 (194)	N/A	15 (381)	5-1/2 (140)	65 (419)	90 (41)
➡ GF-3	6 (152.4)	F	5 (127)	F	14-1/4 (362)	8 (203)	8 (203)	5 (127)	3/4 (19)	9 (229)	N/A	15 (381)	5-1/2 (140)	90 (581)	105 (48)
GG-3	6 (152.4)	F	6 (152.4)	F	16-3/8 (416)	8 (203)	8 (203)	5-1/2 (140)	3/4 (19)	10-1/8 (257)	N/A	17 (432)	5-1/2 (140)	127 (819)	134 (61)
HG-3	8 (203.2)	F	6 (152.4)	F	16-3/8 (416)	9 (229)	9 (229)	5-1/2 (140)	3/4 (19)	10-1/8 (257)	N/A	18 (457)	6-3/4 (171)	127 (819)	150 (68)
➡ HH-3	8 (203.2)	F	8 (203.2)	F	20-1/2 (2553)	9 (229)	9 (229)	6-3/4 (171)	3/4 (19)	11 (279)	N/A	21 (533)	6-3/4 (171)	218 (1406)	250 (113)
➡ JH-3	10 (254)	F	8 (203.2)	F	20-1/2 (521)	10 (254)	11 (279)	6-3/4 (171)	3/4 (19)	11 (279)	N/A	21 (533)	8 (203)	218 (1406)	290 (132)
JJ-3	10 (254)	F	10 (254)	F	25-1/4 (641)	11 (279)	11 (279)	8 (203)	3/4 (19)	13-1/2 (343)	N/A	25 (635)	8 (203)	338 (2180)	415 (188)

(T) Threaded - FPT (F) Flanged *Dimensions include orifice cylinder + 2-1/2 (64) inch clearance.
Dimensions are subject to change. Not to be used for construction purposes unless certified.

ITT
8200 N. Austin Avenue
Morton Grove, IL 60053
Phone (847)966-3700
Facsimile (847)966-9052
www.bellgossett.com

ISO 9001 Certified

Pump Performance Datasheet

Customer	: Hydronic & Steam Equipment	Quote number	: 119459
Customer reference	: CP-1 & CP-2	Item description	: 14RJHC
Item number	: CP-1 & CP-2	Stages	: 1
Service	: Condenser Water	Based on curve number	: 14RJHC-1770
Quantity	: 2	Date last saved	: 12 May 2010 5:41 AM

Operating Conditions

Flow, rated	: 2,250.0 USgpm
Differential head / pressure, rated (requested)	: 75.00 ft
Differential head / pressure, rated (actual)	: 75.14 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 1,770 rpm
Impeller diameter, rated	: 9.25 in
Impeller diameter, maximum	: 9.82 in
Impeller diameter, minimum	: 7.75 in
Efficiency (bowl / pump)	: 84.66 / 81.42 %
NPSH required / margin required	: 32.01 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 58 / 121 Metric units
MCSF	: 1,200.0 USgpm
Head, maximum, rated diameter	: 100.3 ft
Head rise to shutoff	: 33.79 %
Flow, best eff. point (BEP)	: 2,228.1 USgpm
Flow ratio (rated / BEP)	: 100.98 %
Diameter ratio (rated / max)	: 94.20 %
Head ratio (rated dia / max dia)	: 87.92 %
Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 0.998 / 0.998 SG
Viscosity, rated	: 1.00 cP
-	:

Material

Material requested	: Auto
Material selected	: CI Bowl (Lined) / Std. Brz Impeller

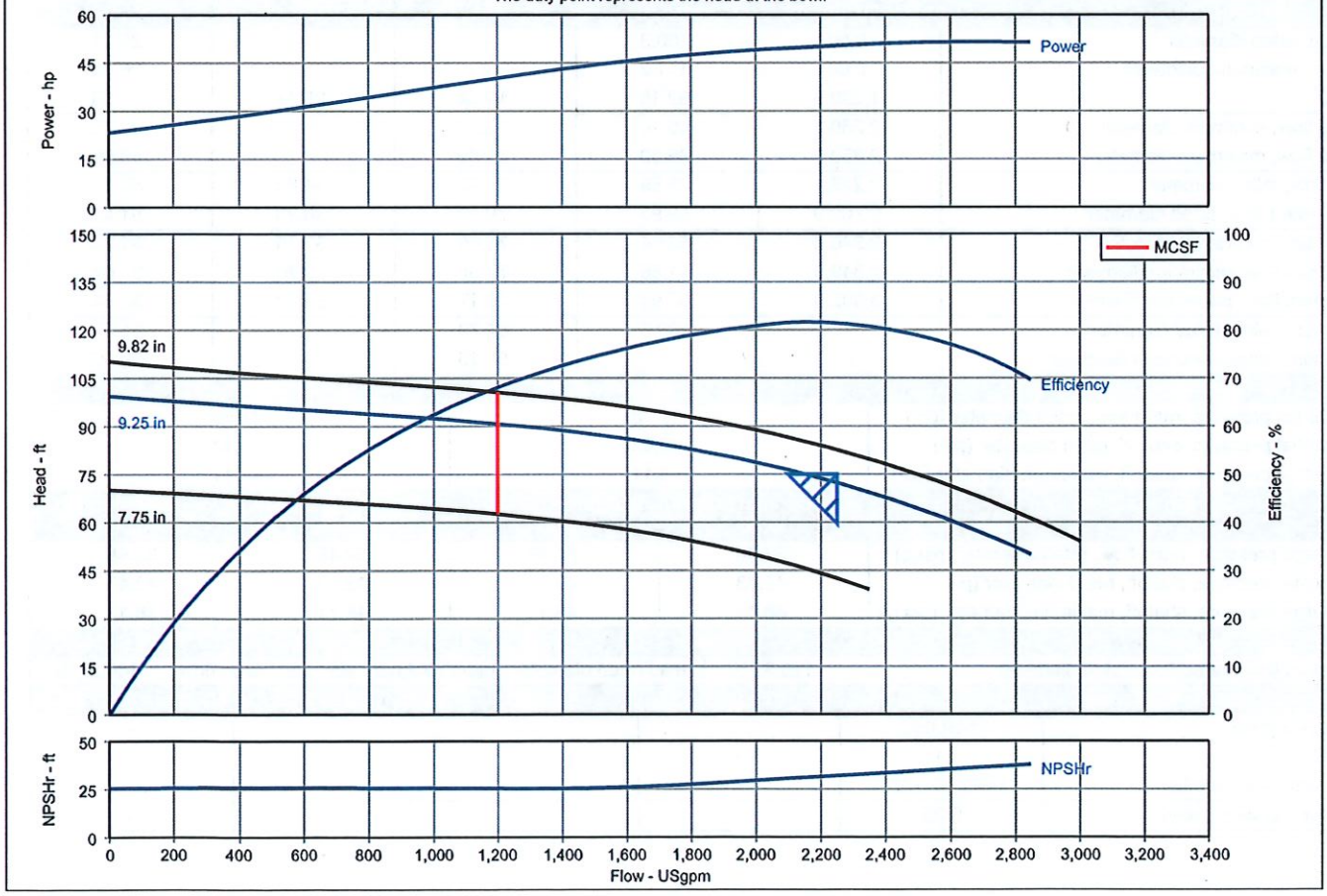
Pressure Data

Maximum working pressure	: 43.43 psi.g
Maximum allowable working pressure	: 420.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 42.54 hp
Power (bowl / pump)	: 50.25 / 50.40 hp
Power, maximum, rated diameter	: 51.57 hp
Minimum recommended motor rating	: 60.00 hp / 44.74 kW

Pump performance. Adjusted for construction, viscosity, static lift to discharge nozzle centerline, friction and power losses of lineshaft and thrust bearings.
The duty point represents the head at the bowl.



Pump Performance - Additional Data

Customer	: Hydronic & Steam Equipment	Quote number	: 119459
Customer reference	: CP-1 & CP-2	Item description	: 14RJHC
Item number	: CP-1 & CP-2	Stages	: 1
Service	: Condenser Water	Speed, rated	: 1,770 rpm
Quantity	: 2	Intellicode	:
		Date last saved	: 12 May 2010 5:41 AM

Performance Data	
Head, maximum diameter, rated flow	: 85.30 ft
Head, minimum diameter, rated flow	: 45.16 ft
Head, maximum, rated diameter	: 100.3 ft
Efficiency adjustment factor, total	: 0.99
Power adjustment, total	: 0.50 hp
Head adjustment factor, total	: 0.99
Flow adjustment factor, total	: 1.00
NPSH required adjustment factor, total	: 1.00
NPSH margin dictated by pump supplier	: 0.00 ft
NPSH margin dictated by user	: 0.00 ft
NPSH margin used (added to 'required' values)	: 0.00 ft

Mechanical Limits	
Torque, rated power	: 2.85 hp/100 rpm
Torque, maximum power	: 2.91 hp/100 rpm
Torque, driver power	: 3.37 hp/100 rpm
Torque, pump shaft limit	: 46.23 hp/100 rpm
Radial load, rated	: -
Radial load limit	: -
Impeller peripheral speed, rated	: -
Impeller peripheral speed limit	: -

Stage, Speed and Solids Limits	
Stages, maximum	: 15
Stages, minimum	: 1
Pump speed limit, maximum	: 2,200 rpm
Pump speed limit, minimum	: 400 rpm
Curve speed limit, maximum	: 2,200 rpm
Curve speed limit, minimum	: 400 rpm
Variable speed limit, minimum	: -
Solids diameter limit	: 1.18 in

Recommended Driver Data (Not applicable to actual driver)	
Driver speed, full load	: 1,780 rpm
Driver speed, rated load	: 1,783 rpm
Driver efficiency, 100% load	: N/A
Driver efficiency, 75% load	: N/A
Driver efficiency, 50% load	: N/A

Various Performance Data	Flow (USgpm)	Head (ft)	Efficiency (%)	NPSHr (ft)	Power (hp)
Shutoff, rated diameter	0.00	100.3	-	-	23.11
Shutoff, maximum diameter	0.00	111.2	-	-	26.14
MCSF	1,200.0	92.18	69.44	25.41	40.16
Rated flow, minimum diameter	2,250.0	45.16	78.31	-	32.71
Rated flow, maximum diameter	2,250.0	85.30	85.09	-	56.86
BEP flow, rated diameter	2,228.1	75.59	84.70	31.80	50.13
120% rated flow, rated diameter	2,700.0	59.93	79.36	36.35	51.41
Maximum flow, rated diameter	2,846.8	53.64	75.00	37.75	51.33
Maximum flow, minimum diameter	2,349.0	41.86	75.06	32.90	33.02
Maximum flow, maximum diameter	3,002.0	57.94	75.17	39.30	58.33
Maximum value, rated diameter	-	100.3	84.70	-	51.57
Maximum value, maximum diameter	-	-	85.16	-	59.40

Differential pressure	@ Density, rated	@ Density, max
Differential pressure, rated flow, rated diameter (psi)	32.46	32.46
Differential pressure, shutoff, rated diameter (psi)	43.43	43.43
Differential pressure, shutoff, maximum diameter (psi)	48.11	48.11

Discharge pressure	@ Suction pressure, rated	@ Suction pressure, max	@ Suction pressure, rated	@ Suction pressure, max
Discharge pressure, rated flow, rated diameter (psi.g)	32.46	32.46	32.46	32.46
Discharge pressure, shutoff, rated diameter (psi.g)	43.43	43.43	43.43	43.43
Discharge pressure, shutoff, maximum diameter (psi.g)	48.11	48.11	48.11	48.11

Ratios			
Maximum flow / rated flow, rated diameter	:126.52 %	Head rated diameter / head minimum diameter, rated flow	:166.07 %

Mixed Stage Performance	Set #1	Set #2	Set #3	Set #4	Alternate First Stage
Item description	14RJHC	-	-	-	-
Stages	1	-	-	-	-
Based on curve number	14RJHC-1770	-	-	-	-
Impeller diameter, rated	9.25	-	-	-	-

Pump Performance - Additional Data

Customer	: Hydronic & Steam Equipment	Quote number	: 119459
Customer reference	: CP-1 & CP-2	Item description	: 14RJHC
Item number	: CP-1 & CP-2	Stages	: 1
Service	: Condenser Water	Speed, rated	: 1,770 rpm
Quantity	: 2	Intellicode	:
		Date last saved	: 12 May 2010 5:41 AM

Head and Power Losses

Friction loss rate, column	: 9.37 %
Friction loss, column	: 0.53 ft
Friction loss, discharge head	: 0.32 ft
Friction loss, can/barrel	: -
Friction loss, bowl/column adaptor	: 0.89 ft
Friction loss, total	: 1.75 ft
Power loss, lineshaft bearings	: 0.04 hp
Power loss, thrust bearing	: 0.12 hp
Power loss, total	: 0.16 hp

Bowl vs. Pump Performance

Head (bowl / pump)	: 75.00 ft / 72.35 ft
Efficiency (bowl / pump)	: 84.66 % / 81.42 %
Power (bowl / pump)	: 50.25 hp / 50.40 hp
NPSH required at first stage impeller eye	: 32.01 ft

Weights and Down Thrust

Weight, lineshaft	: 20.47 lb
Weight, bowl assembly rotating element	: 37.00 lb
Thrust factor	: 10.00 lb/ft
Thrust, hydraulic (rated / max)	: 748.7 / 1,001.7 lbf
Thrust, bowl shaft end (rated / max)	: -0.00 / -0.00 lbf
Thrust, shaft step (rated / max)	: 64.87 / 64.87 lbf
Thrust, headshaft sleeve (rated / max)	: 0.00 / 0.00 lbf
Thrust, total (rated / max)	: 871.1 / 1,124.1 lbf

Pressure and Torque Limits

Maximum column pressure	: 43.43 psi.g
Column pressure limit	: 921.0 psi.g
Maximum discharge head pressure	: 43.43 psi.g
Discharge head pressure limit	: 175.0 psi.g
Maximum can / barrel pressure	: -
Can / barrel pressure limit	: -
Torque, lineshaft limit	: 3.39 hp/100 rpm

Dimensions

Minimum clearance below suction bell lip/case	: 12.75 in
Minimum well diameter	: 16.00 in
Suction nozzle centerline height	: -
Bowl assembly length, first stage (does not include motor adapter)	: 17.75 in
Bowl assembly length, upper stage	: 11.50 in
Bowl assembly length, total	: 17.75 in
Suction bearing hub length	: 5.25 in
Strainer length	: 9.75 in
Bowl to column adaptor length	: 3.13 in
Discharge head stick-down	: 0.00 in
Submersible motor adaptor length	: -
Submersible motor length	: -
Column length	: 5.70 ft
Total pump length (does not include motor adapter or motor length)	: 8.25 ft
Can / barrel length	: -
Headshaft sleeve diameter (if used)	: 1.00 in
Suction bell diameter	: 13.50 in
Minimum submergence to prevent vortexing	: 32.00 in
Discharge head height	: 23.00 in
Discharge nozzle centerline height	: 10.75 in
Lineshaft length	: 7.88 ft
Bowl shaft diameter	: 1.94 in
Bowl diameter, outside	: 14.75 in
Bowl diameter, exit	: 6.38 in
Column diameter, inside	: 7.98 in
Column internal obstruction diameter	: 1.00 in
Can/barrel diameter, inside	: -

NPSH

NPSH at bowl (available / required)	: Ample / 32.01 ft
NPSH at low liquid level (available / required)	: Ample / 24.96 ft
NPSH at suction flange (available / required)	: - / -

Liquid Velocities

Column liquid velocity	: 14.66 ft/s
Can liquid velocity	: -
Suction nozzle liquid velocity	: -

Additional Conditions

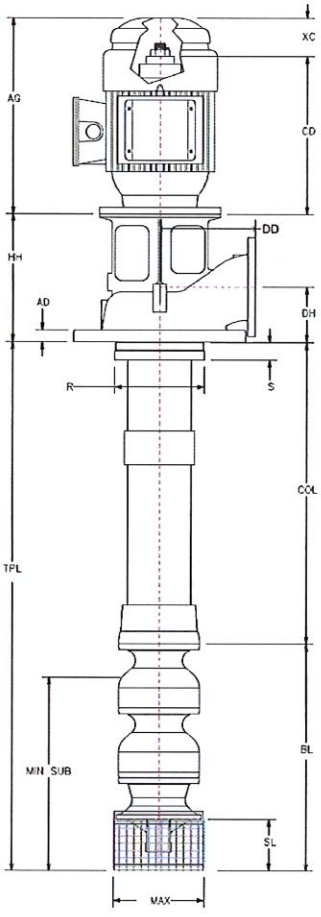
Pump type	: Vertical wet pit	Low liquid level	: 0.00 ft
Head measured at	: Bowl	NPSHa measured at	: Bowl
Length strategy	: Pump length or TPL	Column friction rate limit	: 10.00 %
Length	: 8.25 ft		

Construction

Suction type	: Suction bell	Discharge head design	: Cast iron (low profile)
Suction strainer	: Clip-on (bolt-on) basket strainer	Discharge head size	: 12 inch
Lineshaft diameter	: 1 inch	Column diameter	: 8 inch
Lineshaft lubrication	: Open lineshaft, product lube	Column construction	: Threaded
Lineshaft material	: 416SS	Headshaft sleeve	: Not included

Dimensional Outline

Customer	: Hydronic & Steam Equipment	Quote number	: 119459
Customer reference	: CP-1 & CP-2	Item description	: 14RJHC
Item number	: CP-1 & CP-2	Stages	: 1
Service	: Condenser Water	Speed	: 1,770 rpm
Quantity of pumps	: 2	Date last saved	: 12 May 2010 5:41 AM



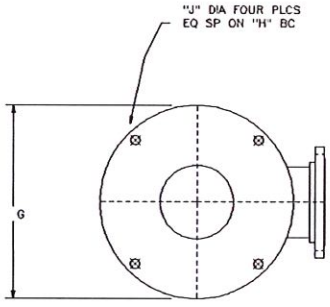
Pump Data

AD	: 1.50 in
AG	: 36.00 in
BD	: 24.50 in
BL	: 20.88 in
CD	: 31.16 in
CL	:
COL	: 5.70 ft
	:
DD	: 16.00 in
MIN SUB	: 36.75 in
MS	:
DH	: 10.75 in
G	: 32.00 in
H	: 30.00 in
HH	: 23.00 in
J	: 0.88 in
R	: 12.25 in
S	: 2.06 in
SL	: 9.75 in
TPL	: 8.25 ft
UG	:
V	:
W	:
X	:
XC	: 4.69 in
Y	:
Z	:
	:
	:
	:
MAX	: 14.00 in

Bowl Shaft	: 1.94 in
Line Shaft	: 1.00 in
Line Shaft Type	: Open
Column Type	: Standard
Column	: 8 in. Threaded
Bearing Spacing	: 10.00 ft
Section Length	: 10.00 ft
Head Type	: A Cast
Head Size	: 12 x 24 1/2 CA
Flange Rating	: 125#
Seal	: Packing
Strainer	: Clip-on basket
SubBase	: No

Hydraulic Data

Flow	: 2,250.0 USgpm
TDH (total dynamic head)	: 72.35 ft
	:
Speed	: 1,770 rpm
Fluid	: Fresh Water
Temperature	: 68.00 deg F
Viscosity	: 1.00 cP
Density	: 0.998 SG
SU	: 0.00 in
	:
	:
M (TPI)	: 0
L	: 1.00 in



DISC HEAD

Miscellanious

Thrust at Design	: 871.1 lbf
Max Thrust	: 1,124.1 lbf
	:

Weight

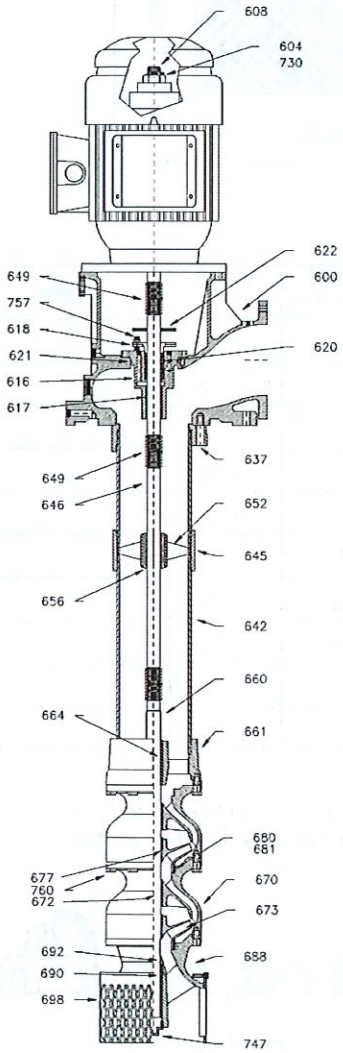
Pump	: 1,511.6 lb
Motor	: 730.0 lb
Total	: 2,241.6 lb

Motor Data

Model	: HO60E2SLG
Make	: -
HP	: 60
"Nominal" RPM	: 1800
ITT Item No.	: N/A
"Nominal" Efficiency	: 94.1
Frame	: 364TP
Ratchet	: NRR

Sectional Drawing

Customer	: Hydronic & Steam Equipment	Quote number	: 119459
Customer reference	: CP-1 & CP-2	Item description	: 14RJHC
Item number	: CP-1 & CP-2	Stages	: 1
Service	: Condenser Water	Speed	: 1,770 rpm
Quantity of pumps	: 2	Date last saved	: 12 May 2010 5:41 AM



Discharge Head Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
600	Head- Discharge	1003	Cast Iron CL30	A48-94ae1
604	Adjusting Nut	2130	Brass C36000	B16M-00
608	Headshaft	2227	SST 416	A582M-95b
616	Housing	1003	Cast Iron CL30	A48-94ae1
617	Housing bearing	1109	Federalloy Bismuth Bronze	B584-00
618	Split Gland	1203	SST 316	A744M-00
620	Packing	5026	Graphite Packing	ML402-99
621	O-Ring	5302	Nitrile Buna N	D4322-96
637	Top Column Flange	1003	Cast Iron CL30	A48-94ae1
757	Screw- Gland Adjusting	2229	SST 316	A276-00a
779	Gasket- Housing	5136	Acrylic/Nitrile	5136 REV 4

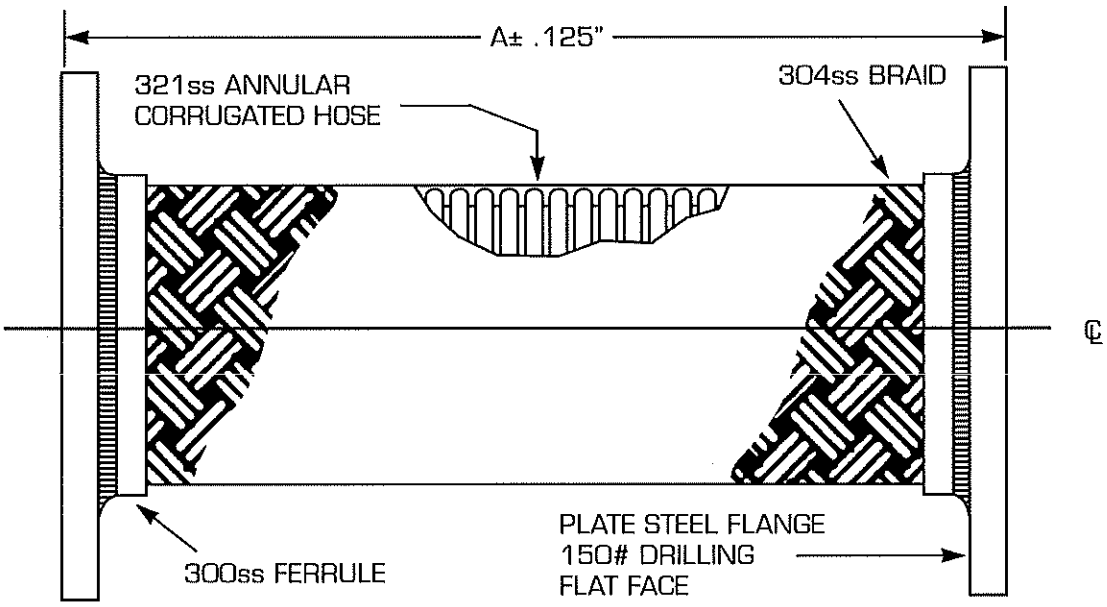
Column And Lineshaft Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
642	Column Pipe	6501	Black Pipe	A 53-98
645	COLUMN FASTENER	6501	Black Pipe SCH 40	A 53-98
646	Lineshaft	2227	416 SS	A582M-95b
649	Lineshaft Coupling	2265	416 SS	A582M-95b
652	Retainer- Bearing	1102	Silicon Bronze C87600	B584-00
656	Lineshaft Bearing	5121	Rubber EPDM	D3568-98

Bowl Assembly

ITEM	NAME	CODE	MATERIAL	ASTM
660	Bowl Shaft	2227	416 SS	A582M-95b
661	Bowl- Discharge	1003	Cast Iron CL30	A48-94ae1
664	Bearing- Disc Bowl	1109	Federalloy Bismuth Bronze	B584-00
670	Bowl - Intermediate	6911	Cast Iron 30 Lined	A48-94e1
672	Bearing- Int. Bowl	1109	Federalloy Bismuth Bronze	B584-00
673	IMPELLER	1102	Silicon Bronze	B584-00
677	Collet	2217	CARBON STEEL 1018	A108-99
680	wear ring - bowl	1128	Aluminum Bronze	B148-97e1
681	wear ring - impeller	1128	Aluminum Bronze	B148-97e1
688	Bowl/Bell- Suction	1003	Cast Iron CL30	A48-94ae1
690	Bearing- Suction	1109	Federalloy Bismuth Bronze	B584-00
692	Sandcollar	1205	304 SST	A744M-00
698	Strainer- Suction	6952	Carbon Steel Galv.	A123M-00
747	Suction Plug	1046	Malleable Iron	A197
760	CAP SCREW	2298	Grade 8 Steel	J429-99

Pumpsaver® Braided Pump Connectors



FOR TEMP ABOVE 70°F	
TEMP °F	FACTOR S.S.
70	1.00
200	.94
300	.88
400	.83
500	.78
600	.74

Qty	I.D. (In.)	A (In.)	Pressure (PSI) 70°F	Parallel Offset (In.) Permanent	Parallel Offset (In.) Intermittent	Weight (lb)	Notes
	2.00	9.00	450	1⅛	⅜	10.00	
	2.50	9.00	300	1	⅜	12.00	
20	3.00	9.00	275	⅝	¼	14.00	
	4.00	9.00	270	½	¼	19.00	
	5.00	11.00	225	¾	⅜	25.00	
4	6.00	11.00	165	⅝	¼	30.00	
4	8.00	12.00	155	½	¼	54.00	
4	10.00	13.00	150	½	¼	75.00	
2	12.00	14.00	145	½	¼	105.00	
	14.00	14.00	130	⅜	⅛	135.00	

**For safe working pressure above 70°F, multiply pressure shown at 70°F times correction factor of required temp.*

**Working pressures shown for the hose and braid are based on an operating temperature of 70°F (21°C) with a 4:1 safety factor.*

PROJECT	I.U. Briscoe Quad Reno.
CUSTOMER	DEEM, LLC
ENGINEER	Vector Consulting
REPRESENTATIVE	Hydronic & Steam
DRAWING #	

REV. 1/02

FLEX-HOSE CO., INC.

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