GEOTECHNICAL REPORT
ILLINOIS DEPARTMENT OF TRANSPORTATION
PUMP STATION NO. 37
PTB 178/002
LAKE COUNTY, ILLINOIS

For
Donohue & Associates

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Technical Report Documentation Page

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11. Abstract

The proposed improvements at IDOT Pump Station No. 37, located in Lake County, Illinois, include the construction of a new pump station building and installation of an outfall sewer. This report provides geotechnical recommendations for the design and construction of the proposed improvements.

Below the pavement structure or topsoil, the foundation soils consists of up to 6 feet of stiff to hard silty clay loam fill underlain by medium stiff to hard clay loam to silty clay loam with intercalations of loose to medium dense silt and sandy loam followed by up to 13 feet of very loose to dense sand and silt. The water table was measured at depths of 7.0 to 29.8 feet, within the sand and silt beds encountered within the cohesive soil layers.

The pump station building is proposed to be supported on a mat foundation. This report provides the recommended maximum allowable bearing pressure for the design of the foundation along with geotechnical soil parameters for the design of the temporary earth retention system. Recommendations and considerations for the construction of the pump station structure are provided as well.

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Wang Engineering

TABLE OF CONTENTS

APPENDIX C

Slope Stability Analysis

APPENDIX D

Storm Sewer and Soil Profiles

GEOTECHNICAL REPORT
ILLINOIS DEPARTMENT OF TRANSPORTATION
PUMP STATION NO. 37
PTB 178/002
LAKE COUNTY, ILLINOIS

FOR
DONOUHUE & ASSOCIATES

1.0 INTRODUCTION

This report presents the results of the Wang Engineering, Inc. (Wang) subsurface investigation, laboratory testing, and geotechnical evaluations for the design and construction of a new pump station building at the Illinois Department of Transportation (IDOT) Pump Station No. 37, in Lake Bluff, Illinois. On the USGS *Waukegan Quadrangle 7.5 Minute Series* map, the project site is located in the NE ¼ of Section 19 and the NW ¼ of Section 20, Tier 44 N, Range 12 E of the Third Principal Meridian. A *Site Location Map* is presented as Exhibit 1.

Based on drawings provided by Donohue and Associates (Donohue) dated January 31, 2016, Wang understands the proposed improvements include the construction of a new pump station building and the installation of an outfall sewer. The pump station building will be located northeast of the intersection of US 41 (Skokie Highway) and IL 176 (Rockland Road) where the proposed outfall sewer will carry water flow eastward along IL 176 to a creek east of the Skokie Valley Bike Path. At the time of preparation of this report, profiles along the proposed sewer were not available. This report addresses the pump station building and will be revised to include recommendations for placement of the sewer pipe as drawings become available.

The purpose of this investigation was to characterize the site soil and groundwater conditions, perform geotechnical engineering analyses, and provide recommendations for the design and construction of the proposed pump station building.

2.0 METHODS OF INVESTIGATION

The following sections outline the subsurface and laboratory investigations performed by Wang.

2.1 Subsurface Investigation

The subsurface investigation was performed in December 2016 by Wang and consisted of two structure borings, designated as B-01 and B-02, and four roadway borings, designated as B-03 through B-06. The structure borings B-01and B-02 were drilled at the proposed location of the new building in the northeast corner of the intersection of US 41 and IL 176. Roadway borings B-03 to B-06 were drilled along IL 176 between US 41 and the Skokie valley Bike Path in the grassy area south of the eastbound IL176 lane. The borings were drilled from elevations of 670.3 to 676.5 feet and were terminated at depths of 12.0 to 50.0 feet bgs. Northings, eastings, and elevations were surveyed in the field by Wang. The as-drilled boring locations are shown in the *Boring Location Plans* (Exhibits 2-1 to 2-4) and *Boring Logs* (Appendix A).

A truck-mounted drilling rig, equipped with hollow stem augers, was used to advance and maintain open boreholes. Soil sampling was performed in accordance with AASHTO T 206, *"Penetration Test and Split-Barrel Sampling of Soils."* In the structure borings, the soil was sampled at 2.5-foot intervals to 30 feet bgs and at 5-foot intervals thereafter. In the roadway borings, the soil was sampled continuously at 2-foot intervals to the boring termination depths. Soil samples collected from each sampling interval were placed in sealed jars and transported to Wang's geotechnical laboratory in Lombard, Illinois for further examination and testing.

Field boring logs, prepared and maintained by a Wang field engineer, included lithologic descriptions, visual-manual soil classifications, results of pocket penetrometer or Rimac unconfined compressive strength tests on cohesive soils, and Standard Penetration Test (SPT) results recorded as blows per 6 inches of penetration. The SPT N-values shown on the *Subsurface Data Profile* (Exhibit 3) are the sum of the second and third blows per 6 inches.

Groundwater levels were measured while drilling and at the end of drilling. The boreholes were backfilled with soil cuttings and bentonite chips, and the pavement was restored as close as possible to its original condition.

2.2 Laboratory Testing

The soil samples were tested in the laboratory for moisture content (AASHTO T 265). Atterberg limits (AASHTO T 89/ T 90) and particle size analysis (AASHTO T 88) tests were performed on selected samples. The soils were classified according to the IDH Textural Classification Chart. Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are shown in the *Boring Logs* (Appendix A), *Subsurface Data Profile* (Exhibit 3), and *Laboratory Test Results* (Appendix B).

The soil samples will be retained in our laboratory for 60 days following the final report submittal. The samples will be discarded unless a specific written request is received as to their disposition.

3.0 RESULTS OF FIELD AND LABORATORY INVESTIGATIONS

Detailed descriptions of the soil conditions encountered during the subsurface investigation are presented in the attached *Boring Logs* (Appendix A) and *Subsurface Data Profile* (Exhibit 3). Please note that lithological boundaries shown on the boring logs and soil profile represent approximate boundaries between soil types. In the field, the actual transition between soil types may be gradual in horizontal and vertical directions.

3.1 Existing Pavement and Topsoil

At the surface, Boring B-02 (drilled in the parking lot) encountered 5 inches of asphalt pavement overlying 8 inches of brown, sandy gravel aggregate base. Borings B-01 and B-03 to B-06 measured 9 to 12 inches of black and brown silty clay loam topsoil.

3.2 Soil Conditions

In descending order, the general lithologic succession encountered beneath the topsoil or pavement structure includes 1) man-made ground (fill); 2) medium stiff to hard clay loam to silty clay loam; and 3) very loose to dense sand and silt.

1) Man-made ground (fill)

The borings encountered up to 6.0 feet of cohesive fill beneath the surface. The fill consists of stiff to hard, brown and gray silty clay loam with unconfined compressive strength (Q_u) values of 1.6 to 6.9 tsf with an average of 3.7 tsf and moisture content values of 13 to 26%, averaging 19%. A 2-foot thick layer of medium dense, brown gravelly sand fill was sampled in Boring B-03 with an SPT N-value of

18 blows/foot and a moisture content of 6%.

2) Medium stiff to hard clay loam to silty clay loam

Beneath the fill, the borings encountered 3.0 to 31.5 feet of medium stiff to hard, brown and gray clay loam to silty clay loam with Q_u values of 1.6 to 7.7 tsf with an average of 3.1 tsf and moisture content values of 12 to 27%, averaging 18%. Laboratory index testing shows L_L values of 26 to 39% and P_L values of 15 to 17%. According to the AASHTO Soil Classification System, the soil belongs to the A-6 group. Boring B-06 sampled a 3-foot thick layer of medium stiff, gray and brown clay loam with an average Q_u value of 0.7 tsf and an average moisture content value of 26%.

At a depth of 6.0 to 8.0 feet bgs, Borings B-04 to B-06 sampled a 1.0- to 4.0-foot thick layer of loose to medium dense, brown silt and sandy loam within the silty clay loam layer. This layer has N-values of 5 to 21 blows/foot with an average of 12 blows/foot and moisture content values of 18 to 20% averaging 19%.

3) Very loose to dense sand and silt

At elevations of 647.8 to 639.1 feet, Boring B-01 uncovered a layer of very loose to dense, silt and sand that extended to the Boring B-01termination depth of 50 feet. This layer is characterized by SPT N-values of 1 to 21 blows/foot with an average of 9 blows/foot and moisture content values of 16 to 25 % averaging 22%.

3.3 Groundwater Conditions

Groundwater was encountered while drilling Borings B-01, B-04, and B-06 at elevations of 646.1 to 666.1 feet (7.0 to 29.8 feet bgs) within the silt and sand layers encountered within the silty clay loam (Layer 2). At the completion of drilling, the groundwater level was recorded at elevations of 656.1 to 667.1 feet (9.0 to 19.8 feet bgs). It should be noted that groundwater levels may vary with seasonal rainfall patterns and long-term climate fluctuations or may be influenced by local site conditions.

4.0 ANALYSIS AND RECOMMENDATIONS

Based on the preliminary drawings provided by Donohue on December 28, 2016, Wang understands that the main pump station structure will be supported on a 3-foot and 5-foot thick mat foundation at an elevation of 643.0 feet. The finished grade outside the building will be at an elevation of 676.0 feet. The following sections present geotechnical recommendations for the design and construction of the pump structure foundations.

4.1 Mat Foundations

As per Boring B-01, the soil is expected to be very stiff silty clay at the base of the mat foundation (elevation 643.0 feet). It is our opinion that the pump station building can be supported on mat foundation at the planned elevation of 643.0 feet. The mat foundation may be proportioned utilizing an allowable net bearing pressure of 4,000 pounds per square foot (psf). The allowable soil bearing pressure refers to total design loads, dead and live, and is a net pressure. The allowable bearing pressure includes a factor of safety of 3.0. It is also recommended that the Modulus of Subgrade Reaction (K_s) value used for design of the mat foundation not exceed 100 pounds per cubic inch.

4.2 Lateral Pressures

The below grade walls should be designed to resist lateral soil pressures. Since the horizontal movement of the walls will be restricted at the top, it is recommended that the walls be designed considering 60 psf per foot depth as a design lateral soil load with a drainable backfill (granular material). Design lateral pressure from surcharge loads due to adjacent foundations, construction (including backfill compaction stresses), maintenance and operation equipment, etc. should be added to the lateral soil load. The backfill against the walls should consist of free draining granular soil material, meeting the requirement of IDOT *Porous Granular Backfill* (IDOT Standard Specifications Article 1004.05). A perimeter underdrain pipe at the bottom behind the walls should be provided. The backfill should be placed in lifts not exceeding 8 inches in loose thickness and should be compacted using a small vibratory compactor. Provisions to prevent accumulation of water behind the walls should be provided.

If the walls are poured directly against the temporary earth retention system, we recommend that the wall be designed considering 60 psf per foot of depth, in addition to hydrostatic pressure. The groundwater level during the investigation was recorded to be at a depth of approximately 29.75 feet (elevation 646.0 feet). However, a conservative groundwater level should be considered at the ground surface considering a flooding condition.

Although lateral pressure will depend on the type and condition of soils present behind the walls, the distribution of pressure should be considered as triangular.

4.3 Uplift Resistance

The uplift forces due to groundwater may be resisted by the total effective weight of the structure, including weights of fixed equipment. During pump station operating conditions, it may be necessary to suppress the groundwater level to keep uplift pressures within the acceptable limits. No long-term groundwater level observations were made during this investigation. The groundwater level was measured around an approximate elevation of 656.0 feet at completion of drilling. We recommend considering the groundwater level at an elevation of 656.0 feet for calculating uplift forces. We recommend considering a Floatation Safety Factor of 1.5 for a normal operation loading condition and 1.3 for a construction loading condition. When calculating the factor of safety, the vertical resistance mobilized by friction along the exterior faces of the structure can be neglected.

4.4 Temporary Earth Retention System

The construction of the pump station structure will require temporary excavation of up to 33.0 feet below the existing grade. The side slopes for temporary excavations should be flat enough to provide a safe and stable excavation and comply with all regulatory codes and laws. Sheeting, shoring, or bracing systems may be used to create vertical excavation walls, if it is necessary due to space limitations.

If space limitations are not severe, all excavations can be accomplished as open cuts with stable side slopes. We performed a slope stability analysis using the computer program SLIDE version 6.0, to calculate the factor of safety. The Simplified Bishop Method was used. The results are shown in Appendix C-1 through C-3. The calculated minimum factor of safety for a short-term condition is 2.25 for a slope of 1:1.5 (V: H) and a depth of 33.0 feet below the existing grade.

A temporary vertical excavation support system may be required on the roadway sides and existing utilities are to be protected. A temporary slope will also require backfilling of the open cut areas. Therefore, it is our opinion that a temporary enclosed braced system will be more appropriate than the open cut excavation. Table 1 provides soil parameters recommended for the design of temporary excavation support systems. The parameters have been determined from field and laboratory test results and soil descriptions shown on the boring logs.

Table 1: Recommended Soil Parameters for the Design of Temporary Support Systems
(Boring B-01)

Elevation Range (feet)	Soil Type (Layer)	Total Unit Weight (pcf)	Shear Strength Properties		Earth Pressure Coefficients	
			Cohesion C_u (psf)	Friction Angle Ø (degree)	Active Pressure k_a	Passive Pressure k_p
675.8-669.8	Very Stiff to Hard Silty Clay Loam Fill	120	2400	0	1.00	1.00
669.8-647.8	Stiff to Hard Silty Clay Loam	120	2500	0	1.00	1.00
647.8-644.1	Medium Dense Silt	115	0	30	0.33	3.00
644.1-639.1	Very Stiff Silty Clay Loam	120	2500	0	1.00	1.00
639.1-634.0	Very Loose Sand	110	0	28	0.36	2.77
634.0-626.3	Dense Sand	120	0	34	0.29	3.39
626.3-625.8	Very Stiff Silty Clay Loam	120	3500	0	1.00	1.00

It is recommended that the design groundwater level for a short-term condition be assumed to be at an elevation of 656.0 feet. In addition, the lateral pressures imposed by adjacent foundations and other surcharge loads such as construction equipment should also be considered in the design of the bracing system. The lateral soil pressure distribution behind a bracing system will be dependent on the scheme selected to support the excavation walls. Therefore, it is recommended that the pressure distribution utilized in the design of the bracing system be reviewed by a qualified geotechnical engineer. It should be noted that the driving of steel sheet pilling would be a little difficult between depths of 4.0 and 10.0 feet through hard cohesive soil.

4.5 Storm Sewers

It is understood that the proposed storm sewer pipes are shown on the plan to be installed by open cut trenches and by jacking. Storm sewer pipe locations and profiles are show in Plan Sheet Nos. 29

through 31 included in Appendix D.

Open Cut Installation

The open cut excavation to depths of 10 to 12 below existing grade will be required. A temporary vertical excavation support system will be required due to space limitations and where existing buildings and other structures and utilities are to be protected. The soils at the base of the excavated trench is expected to be medium stiff to very stiff silty clay loam to clay loam and loose to medium dense sandy loam. Loose to medium dense saturated sandy loam is expected to be encountered at the pipe foundation elevation near Borings B-04 and B-05. If the base soils encountered become unstable during construction they should be removed and replaced with compacted aggregate or removed granular soil reused after reconditioning. Appendix E includes a soil profile along the proposed sewer extension.

Jacking Installation

The pipe should be jacked in accordance with IDOT Standard Specifications Section 552, *STORM SEWER JACKED IN PLACE*. Frictional resistance to the jacking force can be estimated from the product of shear strength of soil and the surface area of pipe in contact with the soil. The subsurface soil conditions within the jacking depths, as revealed by borings, generally consist of medium stiff to hard cohesive soils and loose granular soils. The contractor should review the subsurface soil conditions and judge their effects on means, methods, and progress of work. The jacking operation, once started, should be continued until completed. If continuous jacking cannot be maintained, the contractor should take the necessary precautions for not allowing the jacked pipes to freeze or set in the ground. We recommend that the contractor be required to submit details of his means and methods for constructing pipelines by jacking.

Jacking and Receiving Pits

Four jacking/receiving pits are identified along IL 176 (Rockland Road) on the plans. Excavations up to a depth of 15 feet will be required to construct the jacking and receiving pits. The jacking pit size should be large enough to provide a safe and adequate working area. Pit size will depend on the contractor's equipment and space constraint. The jacking pit walls should be supported in accordance with OSHA construction requirements to insure a solid, stable base for boring machine and pit sides. Some stabilizing of the base may be necessary. Jacking load can be transferred to the soil behind the jacking pit through a thrust block constructed at the back of the pit. The resistance which the soil can provide to the jacking loads may be estimated from the allowable passive pressures. The shear strength of the soils within the jacking zone varies from 5000 at Boring B-03 to 1000 pounds per square foot (psf) at Boring B-05 location. A factor of safety of 2 should be considered. If enough resistance is not available, additional ground improvement measure may be required to provide additional lateral resistance to withstand the jacking loads. We recommend that a provision be made for the removal of some base soils and replacing with the stabilization stone. Before placing stabilization stone, a geotextile fabric for ground stabilization meeting the requirements of IDOT SSRBC Sections 210 and 1080.02 should be provided. For contract estimate purposes, we recommend considering a one foot thick layer of stabilization stone. The removal and replacement thickness should be determined in the field based on the contractor's method and equipment to be used.

One jacking/receiving pit will be required at US 41 (Skokie Highway) to jack 60” pipe to the pump station building. The jacking is required due to the proposed 60” pipe crossing existing retaining wall. The invert elevation is about 650.0 feet. As per Boring B-01, the soil at the invert elevation and at the base of the jacking pit is expected to be stiff silty clay loam. It is possible that medium dense saturated silt may also be encountered near the base. The shear strength of the soils within the jacking zone varies from 2400 to 4000 pounds per square foot (psf). Sheeting, shoring or bracing systems can be used to create vertical excavation walls. The soil parameters shown in Table 1 may be used for the temporary support system design.

Groundwater was observed in our· borings are shown on the boring logs. Provisions should be made to collect and remove groundwater seepage that may accumulate in the pits.

Sheeting, shoring or bracing systems can be used to create vertical excavation walls. The soil parameters may be determined from the field and laboratory test results and soil description shown on the boring logs. It is recommended that the design groundwater level for a short-term condition be assumed to be at Elevation 667.5. In addition, lateral pressure from adjacent foundations and other surcharge loads such as construction equipment should also be considered in the design of the bracing system. The lateral soil pressure distribution behind a bracing system will be dependent on the scheme selected to support the excavation walls.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Excavation

Foundation excavations should be performed in accordance with local, state, and federal regulations. The potential effect of ground movement upon nearby roadways and utilities should be considered. The soils excavated below the topsoil can be reused for general site grading and for the construction of the roadway and parking embankment. The excavated soil consisting of silt should not be reused as structural fill but can be used in the landscaping areas.

5.2 Groundwater Control

Boring B-1 encountered 12.8 feet thick saturated sand layer between approximate depths of 36.7 (elevation 639.1) and 49.5 (elevation 626.3) bgs. During drilling groundwater was encountered at a depth of 29.75 feet bgs (elevation 646.1) and at completion of drilling at a depth of 19.75 feet (elevation 656.1). During construction, approximately 4 feet thick clay layer below the mat base level will not be able to resist hydrostatic groundwater pressure. We recommend providing groundwater control system before starting excavation.

5.3 Mat Foundation

The in-place bearing stratum (the subgrade) for the mat foundation should be checked to verify the in-situ condition. If the conditions deviate from those anticipated, the geotechnical engineer should be consulted to determine if additional measures are necessary. Prior to pouring foundations, all loose and soft material and water must be removed from the bottom of the foundation excavations. If soft soils are encountered at the bottom of the foundation excavations, the soft soils should excavated and replaced with a controlled, compacted crushed stone meeting the requirement of IDOT gradation CA-6 material. No softening of the subgrade should be allowed because of water accumulation at the bottom of the foundation excavations, particularly if construction is undertaken during periods of rain. The exposed foundation bearing subgrade may deteriorate upon exposure to construction disturbance and water. Therefore, final excavation should be deferred until just before concreting. If delays in pouring of foundations are anticipated, the bottom of the foundation excavation should be protected by a thin layer of lean concrete (approximately 3 inches thick).

5.4 Filling and Backfilling

Fill material used to attain the final design structure subgrade elevations should be structural fill material. An IDOT gradation CA-6 aggregate or an approved on-site soil could be acceptable as structural fill. This fill material should be free of organic matter and debris, and it should be placed in lifts not exceeding 8 inches in loose thickness. The fill should be compacted to a minimum of 95 percent maximum dry density, as determined in accordance with AASHTO T 99, Standard Proctor Method.

All backfill materials against the buildings must be approved by the site engineer. The fill should be free of organic materials and debris.

6.0 QUALIFICATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown in the boring logs and in Exhibit 2. This report does not account for any variations that may occur between the borings or elsewhere on the site, variations whose nature and extent may not become evident until the course of construction. In the event that any changes in the design and/or location of the proposed structure are planned, Wang should be timely informed so that our recommendations may be adjusted accordingly.

It has been a pleasure to assist Donohue & Associates and the Illinois Department of Transportation on this project. Please contact us if you have any questions, or if we can be of further service.

Respectfully Submitted,

WANG ENGINEERING, INC.

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Sr. Project Manager/ Sr. Geotechnical Engineer

Corina Farez, P.E., P.G.
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License expires: 11-30-2019

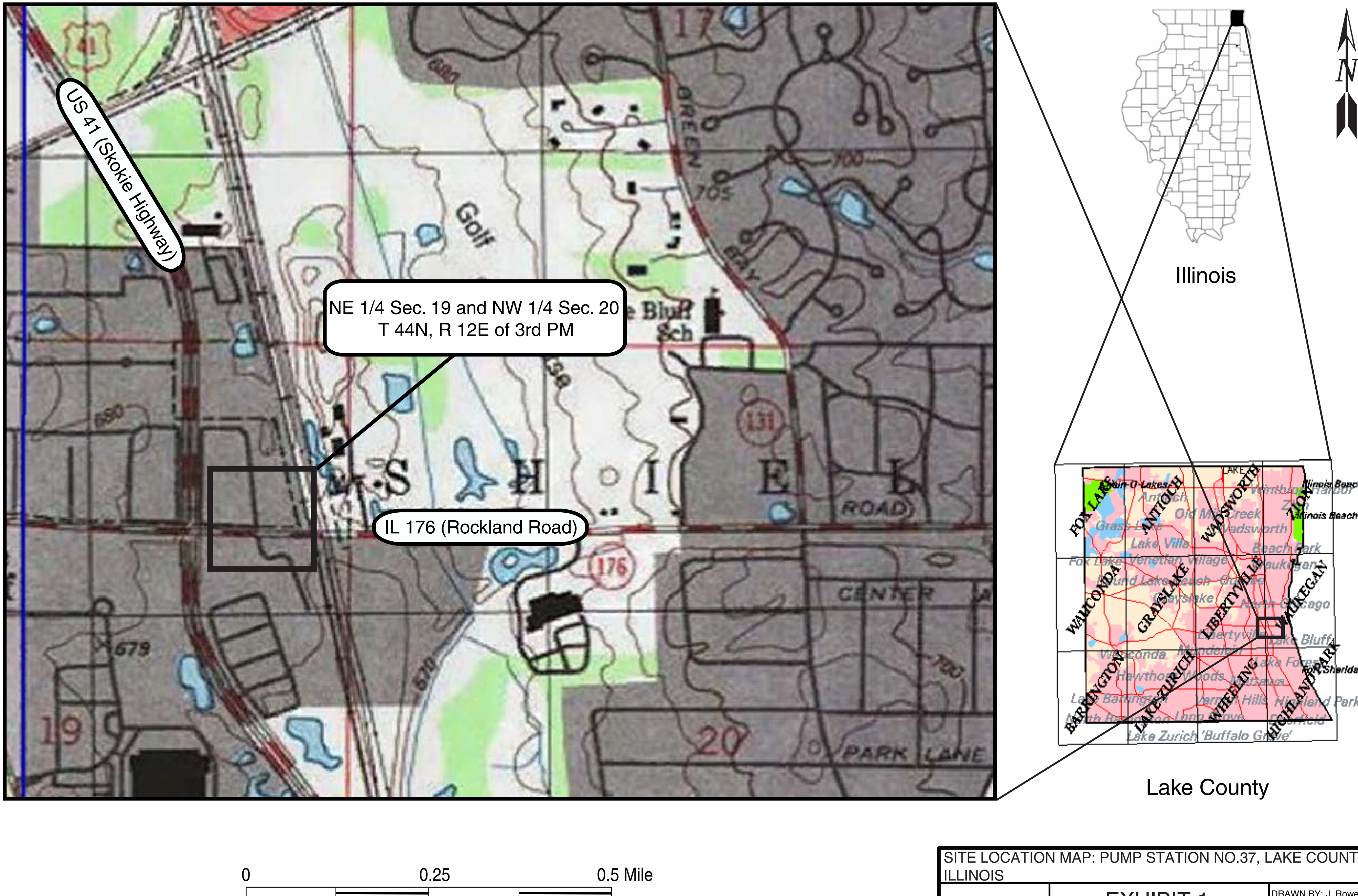
REFERENCES

AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS (2002) *Standard Specifications for Highway Bridges*. United States Department of Transportation, Washington, D.C.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2015) *Geotechnical Manual.* IDOT Bureau of Bridges and Structures, Springfield, IL.

ILLINOIS DEPARTMENT OF TRANSPORTATION (2015) *Standard Specifications for Road and Bridge Construction.* IDOT Division of Highways, Springfield, IL.

EXHIBITS



SITE LOCATION MAP: PUMP STATION NO.37, LAKE COUNTY, ILLINOIS		
SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: J. Rowells CHECKED BY: A. Hamad
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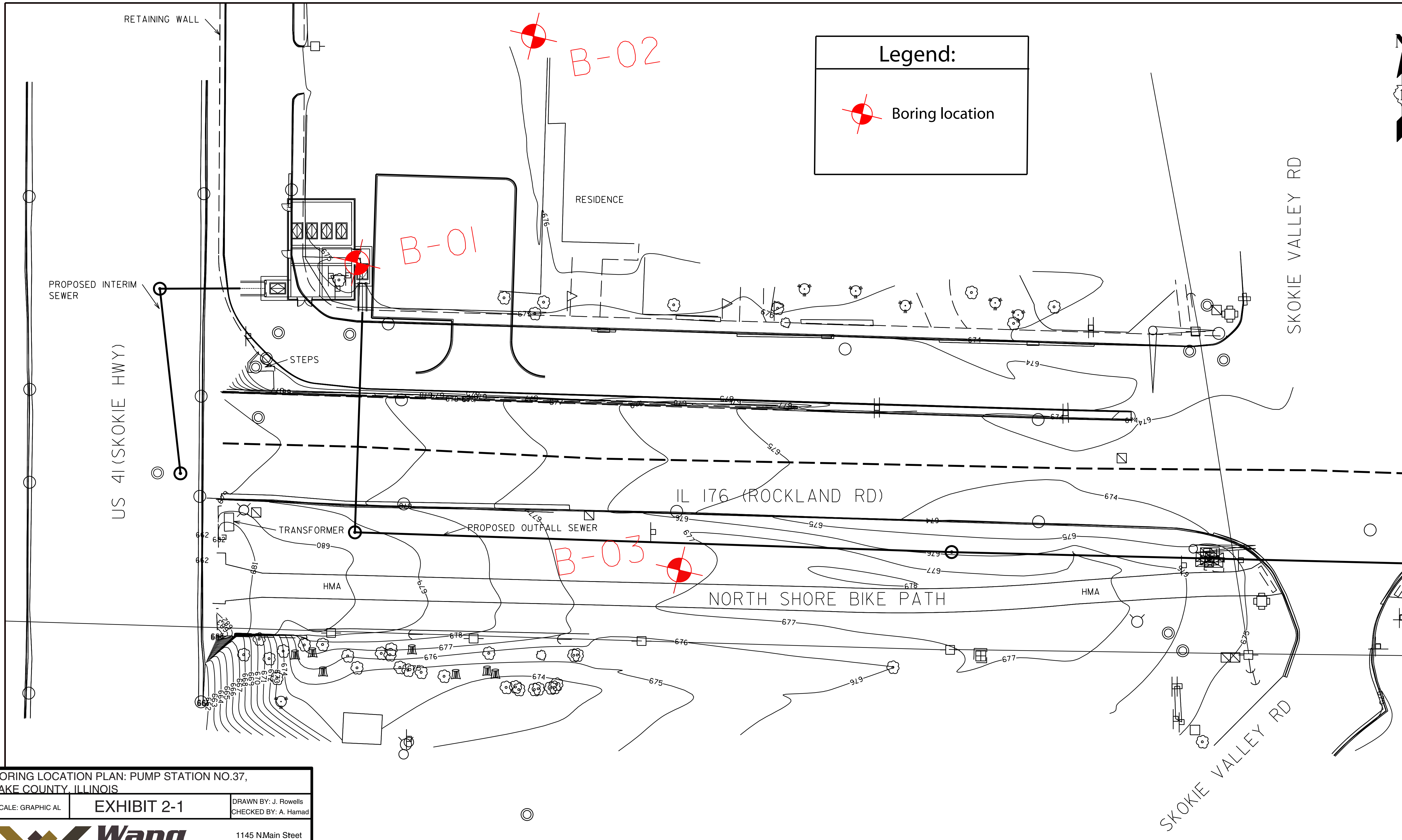
FOR DONOHUE & ASSOCIATES		769-01-01



BORING LOCATION PLAN: PUMP STATION NO.37, LAKE COUNTY, ILLINOIS

SCALE: GRAPHIC AL	EXHIBIT 2-1	DRAWN BY: J. Rowells CHECKED BY: A. Hamad

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PLOT DATE =	DATE - 1-31-16	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PUMP STATION NO. 37
CIVIL
SITE PLAN

SCALE: SHEET OF SHEETS STA. TO STA.

RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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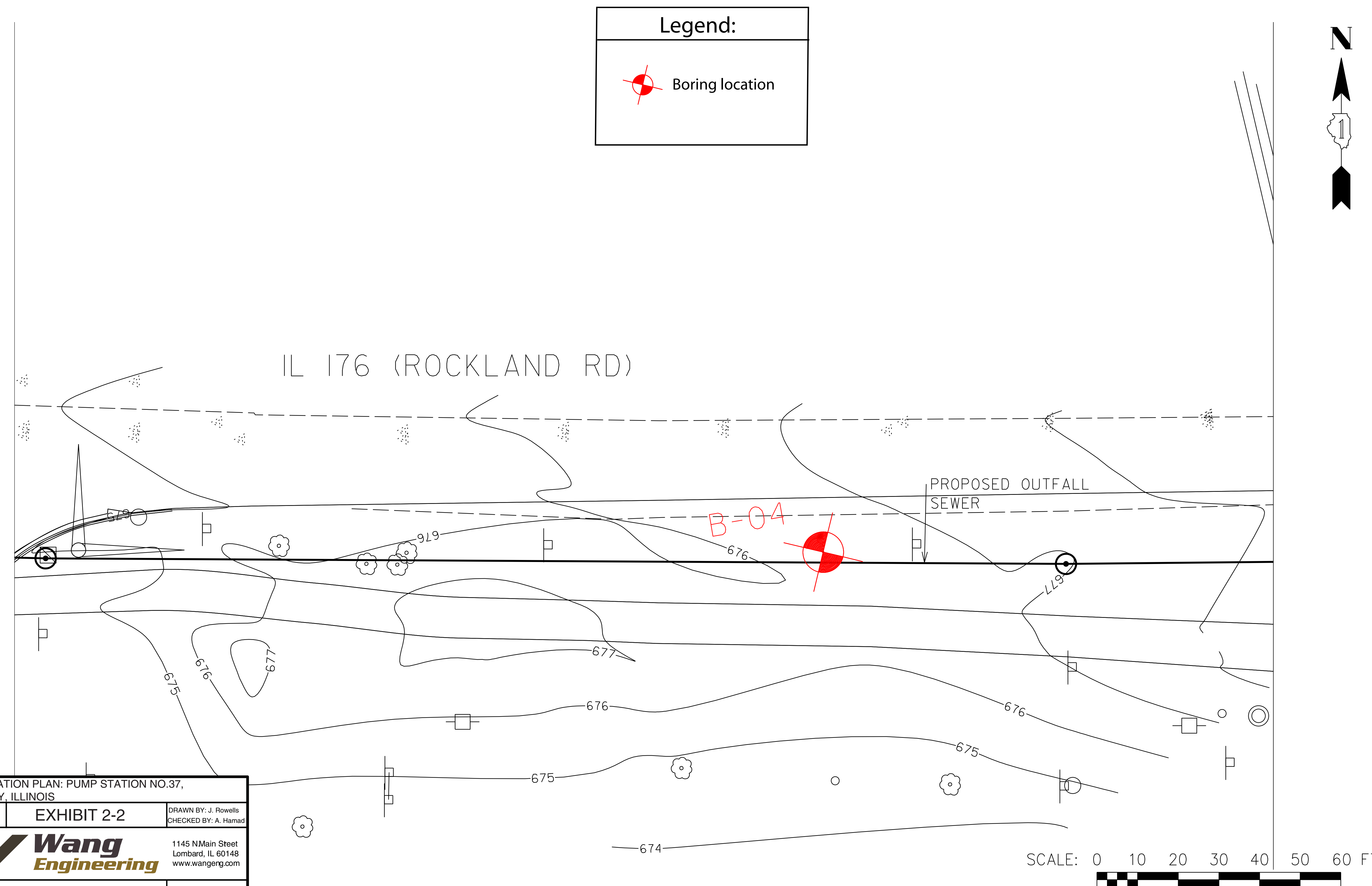
	ILLINOIS	FED. AID PROJECT		



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SCALE: GRAPHICAL	EXHIBIT 2-2	DRAWN BY: J. Rowells CHECKED BY: A. Hamad
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PUMP STATION NO. 37
CIVIL
ENLARGED SITE PLAN

SCALE: | SHEET OF SHEETS | STA. TO STA.

RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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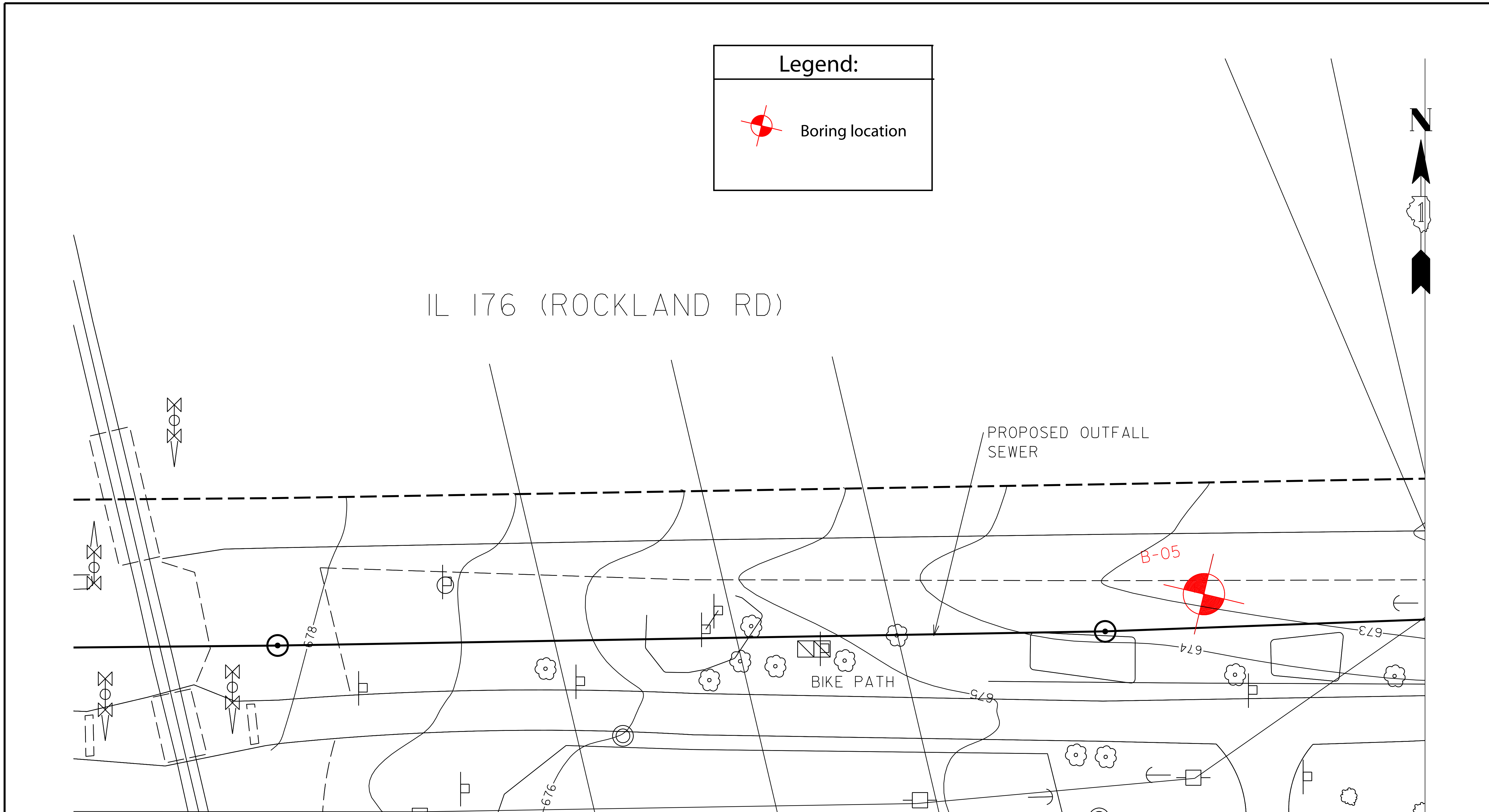

BORING LOCATION PLAN: PUMP STATION NO.37, LAKE COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2-3	DRAWN BY: J. Rowells CHECKED BY: A. Hamad

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STATE OF ILLINOIS
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PUMP STATION NO. 37
CIVIL
ENLARGED SITE PLAN

SCALE:	SHEET OF SHEETS	STA. TO STA.

RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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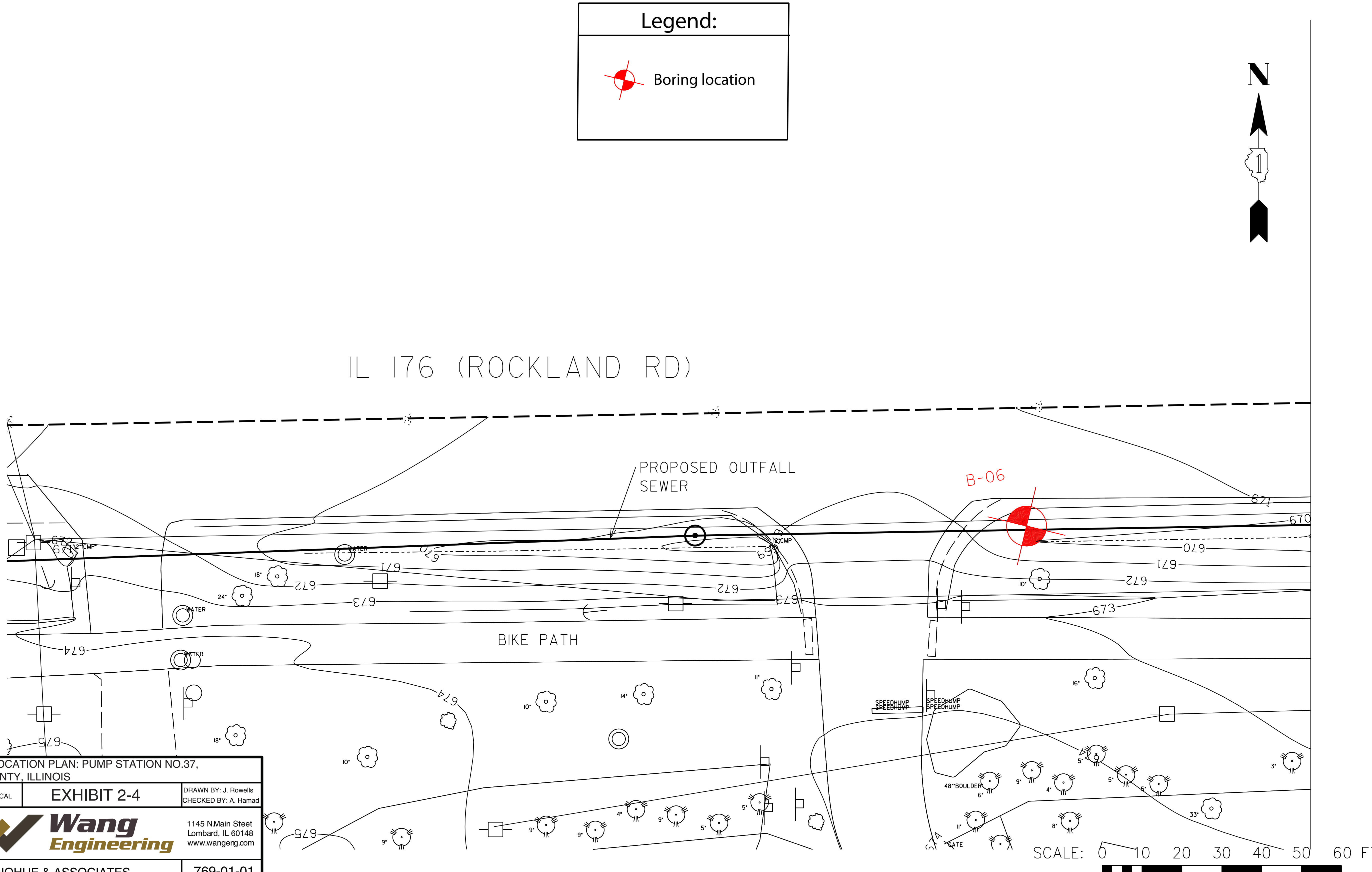
		CONTRACT NO. XXXXX		
	ILLINOIS	FED. AID PROJECT		



BORING LOCATION PLAN: PUMP STATION NO.37, LAKE COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 2-4	DRAWN BY: J. Rowells CHECKED BY: A. Hamad

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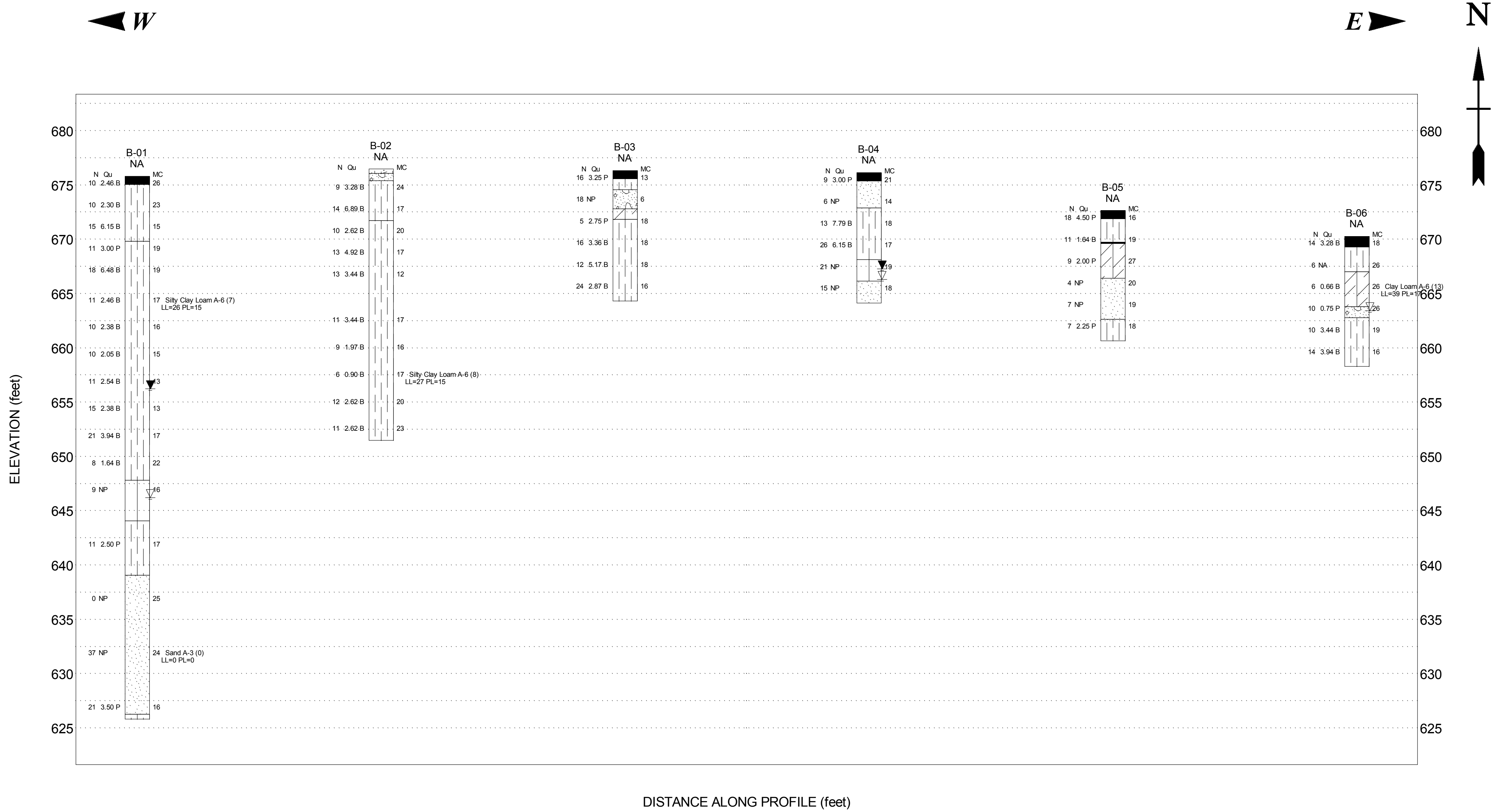
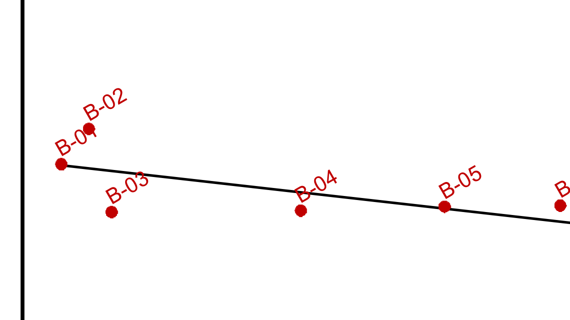
SCALE:	SHEET OF SHEETS	STA.	TO STA.

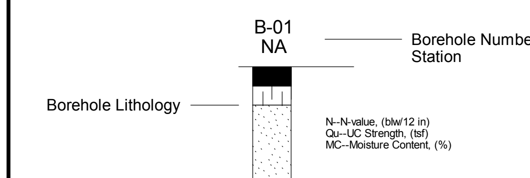
RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
US 41 ILLINOIS 176	** X-X-X	LAKE	X	
		CONTRACT NO. XXXXX		
	ILLINOIS FED. AID PROJECT			





Site Map Scale 1 inch equals 515 feet

Explanation:



Water Level Reading at time of drilling.

Water Level Reading 24-hr after drilling or at end of drilling

Horizontal Scale (feet)

Vertical Exaggeration: 12.5x

Lithology Graphics

Topsoil	Pavement
IDH Silty Clay, Silty Clay Loam	Gravelly sand, sandy gravel
IDH Silt, Silty Loam	IDH Clay Loam
IDH Sand, Sandy Loam	

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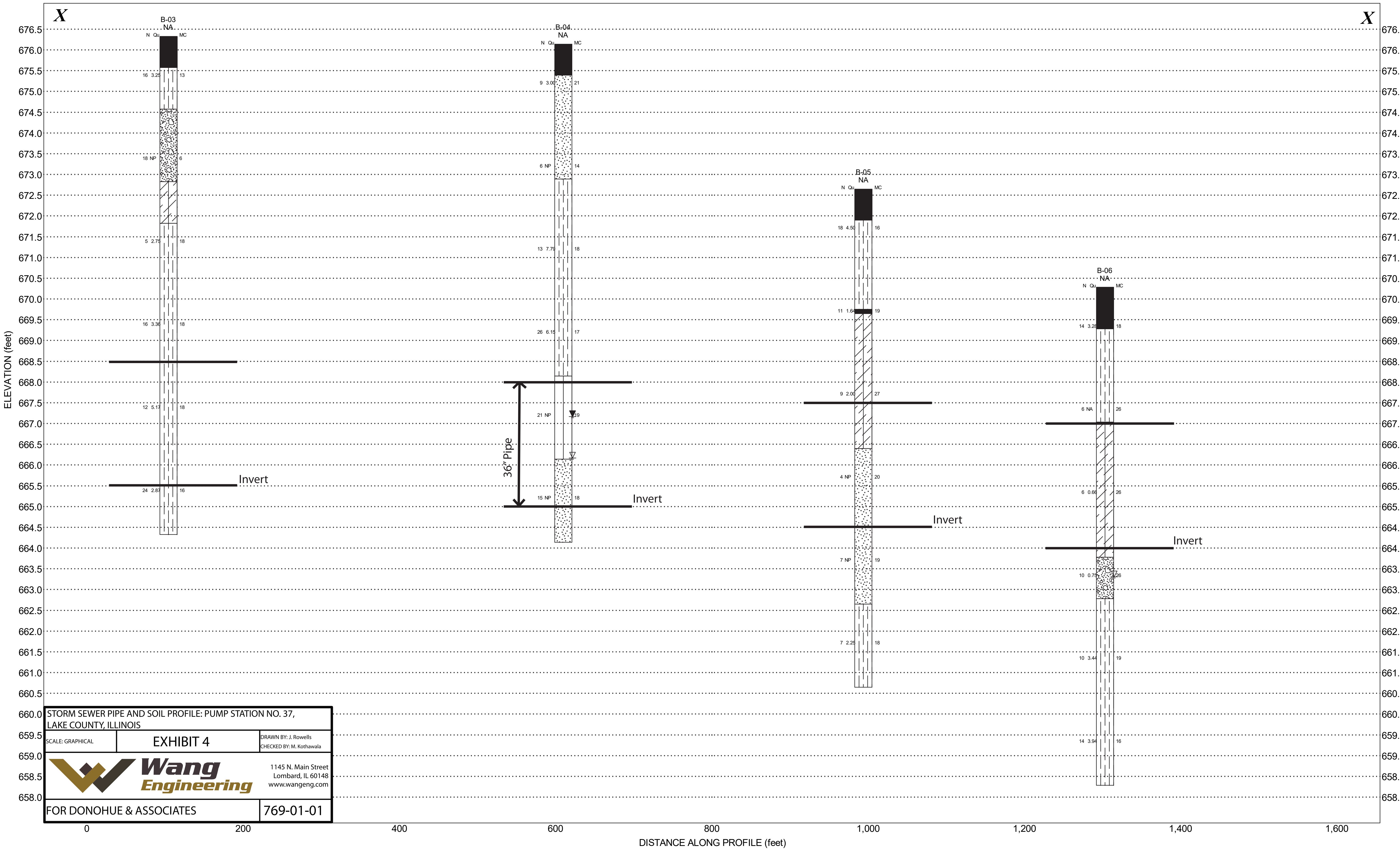
Subsurface Data Profile
Pump Station No. 37

WEI SINCE 1982

Pump Station No.37
Lake County, Illinois

JOB NUMBER	PLATE NUMBER
769-01-01	EXHIBIT 3



X
X
B-03
NA
B-04
NA
B-05
NA
B-06
NA
N Qu MC
Invert
Invert
Invert
Invert
36" Pipe
ELEVATION (feet)
DISTANCE ALONG PROFILE (feet)
0
200
400
600
800
1,000
1,200
1,400
1,600
STORM SEWER PIPE AND SOIL PROFILE: PUMP STATION NO. 37, LAKE COUNTY, ILLINOIS
SCALE: GRAPHICAL
EXHIBIT 4
DRAWN BY: J. Rowells
CHECKED BY: M. Kothawala
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FOR DONOHUE & ASSOCIATES
769-01-01

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APPENDIX A

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BORING LOG B-01

WEI Job No.: 769-01-01

Client: **Donohue & Associates**
Project: **Pump Station No.37**
Location: **Lake County, Illinois**

Datum: NAVD 88
Elevation: 675.82 ft
North: 2044886.95 ft
East: 1109573.58 ft
Station: NA
Offset: NA

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
675.1	9-inch thick, black SILTY CLAY LOAM --TOPSOIL--		1	5 5 5 7	2.46 B	26
	Very stiff to hard, brown and gray SILTY CLAY LOAM --FILL--		2	2 4 6 7	2.30 B	23
		5	3	3 7 8 8	6.15 B	15
669.8	Very stiff to hard, brown to gray SILTY CLAY LOAM, trace gravel		4	4 5 6 8	3.00 P	19
		10	5	4 6 12 13	6.48 B	19
	--L_L(%)=26, P_L(%)=15-- --%Gravel=02.9-- --%Sand=16.3-- --%Silt=58.7-- --%Clay=22.1-- --A-6 (7)--		6	3 5 6	2.46 B	17
		15	7	3 4 6	2.38 B	16
			8	3 4 6	2.05 B	15
		20	9	2 4 7	2.54 B	13
			10	4 6 9	2.38 B	13
		25	11	5 9 12	3.94 B	17
			12	2 3 5	1.64 B	22
647.8	Medium dense, gray SILT; wet	30	13	2 4 5	NP	16
644.1	Very stiff, gray SILTY CLAY LOAM, trace gravel --few silt laminations; wet--	35	14	3 5 6	2.50 P	17
639.1	Very loose to dense, gray, fine SAND, little gravel; saturated	40	15	0 0 0	NP	25

GENERAL NOTES

Begin Drilling **12-12-2016** Complete Drilling **12-13-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **CME55 TMR [85%]**
Driller **RR&KG** Logger **M. Schmelzel** Checked by **J. Rowells**
Drilling Method **3.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **29.75 ft**
At Completion of Drilling **19.75 ft**
Time After Drilling **NA**
Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG B-01

WEI Job No.: 769-01-01

Client: **Donohue & Associates**
Project: **Pump Station No.37**
Location: **Lake County, Illinois**

Datum: NAVD 88
Elevation: 675.82 ft
North: 2044886.95 ft
East: 1109573.58 ft
Station: NA
Offset: NA

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type *recovery*	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		--heaving sand in augers--						
		--%Gravel=14.6-- --%Sand=79.6-- --%Silt=05.4-- --%Clay=00.5-- --A-3 (0)--	45		16	6 15 22	NP	24
	626.3				17	12 11 10	3.50 P	16
	625.8	Very stiff, gray SILTY CLAY LOAM, trace gravel	50					
		Boring terminated at 50.00 ft						
			55					
			60					

GENERAL NOTES

Begin Drilling **12-12-2016** Complete Drilling **12-13-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **CME55 TMR [85%]**
Driller **RR&KG** Logger **M. Schmelzel** Checked by **J. Rowells**
Drilling Method **3.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **29.75 ft**
At Completion of Drilling ▼ **19.75 ft**
Time After Drilling **NA**
Depth to Water ▽ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG B-02

WEI Job No.: 769-01-01

Client **Donohue & Associates**
Project **Pump Station No.37**
Location **Lake County, Illinois**

Datum: NAVD 88
Elevation: 676.47 ft
North: 2044981.37 ft
East: 1109647.23 ft
Station: NA
Offset: NA

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
676.1	5-inch thick ASPHALT --PAVEMENT--					
675.4	8-inch thick, brown SANDY GRAVEL --AGGREGATE BASE--		1	3 4 5 5	3.28 B	24
	Very stiff to hard, brown SILTY CLAY LOAM, trace gravel --FILL--		2	2 6 8 7	6.89 B	17
671.7	Medium stiff to hard, brown to gray SILTY CLAY LOAM, trace gravel	5	3	3 5 5 7	2.62 B	20
			4	3 5 8 11	4.92 B	17
		10	5	3 5 8 11	3.44 B	12
		15	6	2 4 7	3.44 B	17
			7	2 3 6	1.97 B	16
	--L_L(%)=27, P_L(%)=15-- --%Gravel=02.8-- --%Sand=12.8-- --%Silt=59.2-- --%Clay=25.2-- --A-6 (8)--	20	8	3 3 3	0.90 B	17
			9	3 5 7	2.62 B	20
651.5		25	10	3 5 6	2.62 B	23
	Boring terminated at 25.00 ft					

GENERAL NOTES

Begin Drilling	**12-12-2016**	Complete Drilling	**12-12-2016**
Drilling Contractor	**Wang Testing Services**	Drill Rig	**CME55 TMR [85%]**
Driller	**RR&KG**	Logger **M. Schmelzel**	Checked by **J. Rowells**
Drilling Method	**3.25" IDA HSA; boring backfilled upon completion**		

WATER LEVEL DATA

While Drilling	**DRY**
At Completion of Drilling	**DRY**
Time After Drilling	**NA**
Depth to Water	**NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG B-03

WEI Job No.: 769-01-01

Client: **Donohue & Associates**
Project: **Pump Station No.37**
Location: **Lake County, Illinois**

Datum: NAVD 88
Elevation: 676.33 ft
North: 2044758.85 ft
East: 1109707.97 ft
Station: NA
Offset: NA

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
675.6	9-inch thick, dark brown SILTY CLAY LOAM, trace gravel --TOPSOIL--		1	3, 7, 9, 19	3.25 P	13
674.6	Very stiff, brown SILTY CLAY LOAM, trace gravel --FILL--					
672.8	Medium dense, brown GRAVELLY SAND, few silty clay seams; dry --FILL--		2	8, 8, 10, 7	NP	6
671.8	Soft, brown CLAY LOAM, little gravel	5	3	3, 2, 3, 4	2.75 P	18
664.3	Very stiff to hard, brown to gray SILTY CLAY LOAM, trace gravel		4	5, 7, 9, 10	3.36 B	18
		10	5	4, 4, 8, 12	5.17 B	18
			6	8, 12, 12, 17	2.87 B	16
	Boring terminated at 12.00 ft	15				
		20				

GENERAL NOTES

Begin Drilling **12-13-2016** Complete Drilling **12-13-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **CME55 TMR [85%]**
Driller **RR&KG** Logger **M. Schmelzel** Checked by **J. Rowells**
Drilling Method **3.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **DRY**
At Completion of Drilling ▼ **DRY**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG B-04

WEI Job No.: 769-01-01

Client: **Donohue & Associates**
Project: **Pump Station No.37**
Location: **Lake County, Illinois**

Datum: NAVD 88
Elevation: 676.14 ft
North: 2044762.89 ft
East: 1110213.40 ft
Station: NA
Offset: NA

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
675.4	9-inch thick, dark brown SILTY CLAY LOAM, trace gravel --TOPSOIL--		1	3, 3, 6, 6	3.00 P	21
	Loose, brown SANDY LOAM, some gravel; moist		2	2, 3, 3, 3	NP	14
672.9	Hard, brown SILTY CLAY LOAM, trace gravel	5	3	4, 5, 8, 13	7.79 B	18
			4	6, 11, 15, 17	6.15 B	17
668.1	Medium dense, brown SILT; moist to wet	10	5	4, 9, 12, 9	NP	19
666.1	Medium dense, brown SANDY LOAM, trace gravel; saturated		6	5, 6, 9, 11	NP	18
664.1	Boring terminated at 12.00 ft	15, 20				

GENERAL NOTES

Begin Drilling **12-13-2016** Complete Drilling **12-13-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **CME55 TMR [85%]**
Driller **RR&KG** Logger **M. Schmelzel** Checked by **J. Rowells**
Drilling Method **3.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **10.00 ft**
At Completion of Drilling ▼ **9.00 ft**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG B-05

WEI Job No.: 769-01-01

Client: **Donohue & Associates**
Project: **Pump Station No.37**
Location: **Lake County, Illinois**

Datum: NAVD 88
Elevation: 672.65 ft
North: 2044773.39 ft
East: 1110597.49 ft
Station: NA
Offset: NA

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
671.9	9-inch thick, dark brown SILTY CLAY LOAM, trace gravel --TOPSOIL--					
669.8	Stiff to hard, brown to gray SILTY CLAY LOAM, little gravel --FILL--		1	7, 8, 10, 10	4.50 P	16
669.7	1-inch thick, dark gray SILTY CLAY LOAM, trace organic matter --BURIED TOPSOIL--		2	4, 7, 4, 6	1.64 B	19
666.4	Very stiff, brown CLAY LOAM, trace gravel	5	3	4, 5, 4, 5	2.00 P	27
662.7	Loose, brown SANDY LOAM, some gravel; moist --few 1 to 2-inch thick clay loam lenses--	10	4	3, 2, 2, 3	NP	20
			5	3, 3, 4, 5	NP	19
660.7	Very stiff, brown and gray SILTY CLAY LOAM, trace gravel		6	2, 3, 4, 8	2.25 P	18
	Boring terminated at 12.00 ft	15, 20				

GENERAL NOTES

Begin Drilling **12-13-2016** Complete Drilling **12-13-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **CME55 TMR [85%]**
Driller **RR&KG** Logger **M. Schmelzel** Checked by **J. Rowells**
Drilling Method **3.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **DRY**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

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BORING LOG B-06

WEI Job No.: 769-01-01

Client: **Donohue & Associates**
Project: **Pump Station No.37**
Location: **Lake County, Illinois**

Datum: NAVD 88
Elevation: 670.28 ft
North: 2044776.08 ft
East: 1110906.57 ft
Station: NA
Offset: NA

Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
669.3	12-inch thick, dark brown SILTY CLAY LOAM, little gravel --TOPSOIL--		1	6 6 8 8	3.28 B	18
667.0	Very stiff, dark brown SILTY CLAY LOAM, little gravel --FILL-- --sample disturbed--		2	6 3 3 4	NA	26
663.8	Medium stiff, gray and brown CLAY LOAM, trace gravel --L_L(%)=39, P_L(%)=17-- --%Gravel=06.2-- --%Sand=25.1-- --%Silt=45.1-- --%Clay=23.6-- --A-6 (13)--	5	3	2 2 4 4	0.66 B	26
662.8	Gray, coarse GRAVELLY SAND; wet		4	2 4 6 4	0.75 P	26
	Very stiff, gray SILTY CLAY LOAM, trace gravel		5	3 4 6 9	3.44 B	19
658.3	--trace wood fragments--	10	6	3 6 8 12	3.94 B	16
	Boring terminated at 12.00 ft	15, 20				

GENERAL NOTES

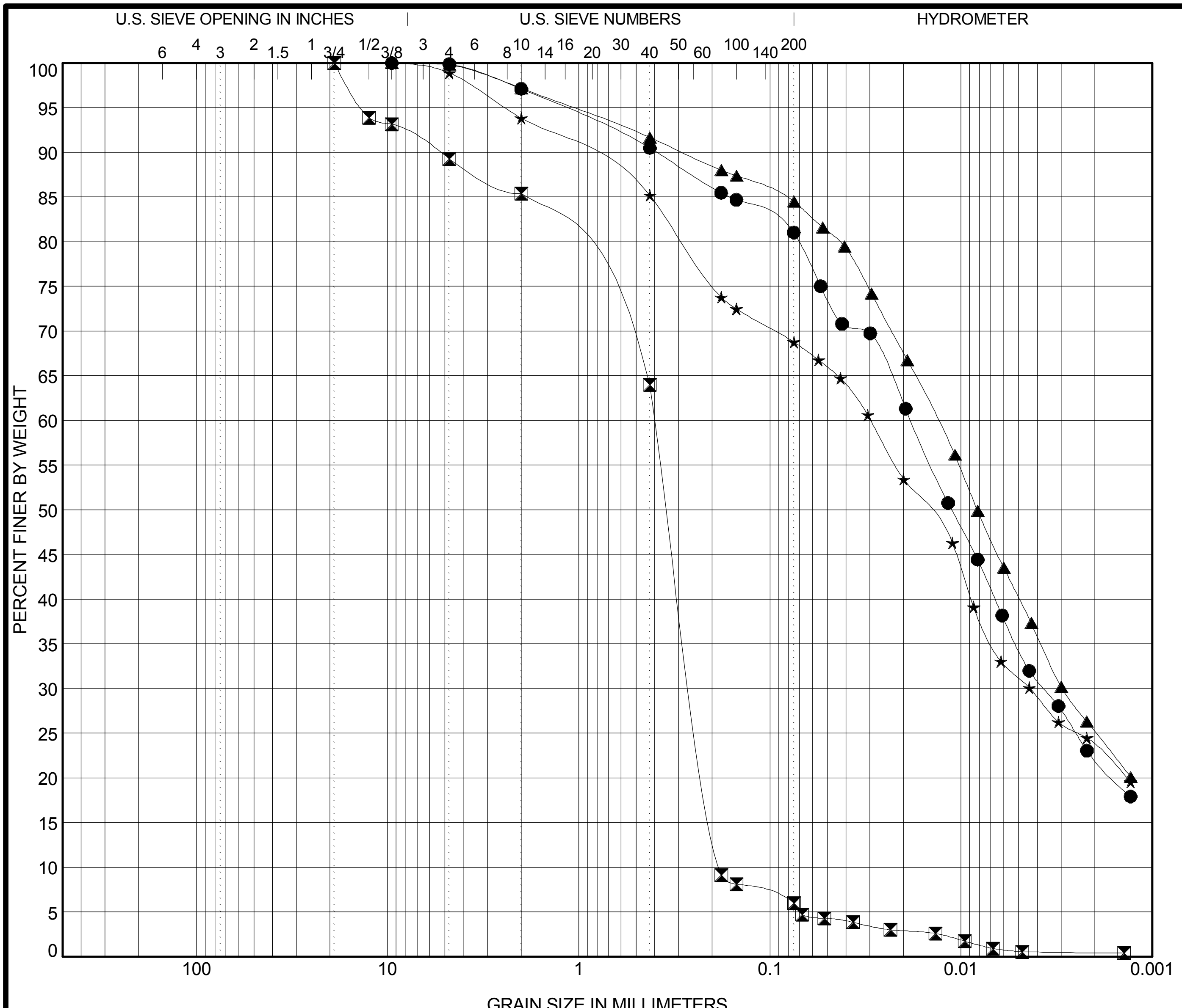
Begin Drilling **12-13-2016** Complete Drilling **12-13-2016**
Drilling Contractor **Wang Testing Services** Drill Rig **CME55 TMR [85%]**
Driller **RR&KG** Logger **M. Schmelzel** Checked by **J. Rowells**
Drilling Method **3.25" IDA HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ▽ **7.00 ft**
At Completion of Drilling ▼ **DRY**
Time After Drilling **NA**
Depth to Water ▼ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

APPENDIX B



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

	Specimen Identification		IDH Classification	LL	PL	PI	Cc	Cu
●	B-01#6	11.0 ft	**Silty Clay Loam**	26	15	11		
⧗	B-01#16	43.5 ft	**Sand**	NP	NP	NP	0.85	2.19
▲	B-02#8	18.5 ft	**Silty Clay Loam**	27	15	12		
★	B-06#3	4.0 ft	**Clay Loam**	39	17	22		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-01#6	11.0 ft	9.5	0.018	0.004		2.9	16.3	58.7	22.1
⧗	B-01#16	43.5 ft	19	0.399	0.249	0.182	14.6	79.6	5.4	0.5
▲	B-02#8	18.5 ft	9.5	0.013	0.003		2.8	12.8	59.2	25.2
★	B-06#3	4.0 ft	9.5	0.03	0.004		6.2	25.1	45.1	23.6

WEI
SINCE 1982

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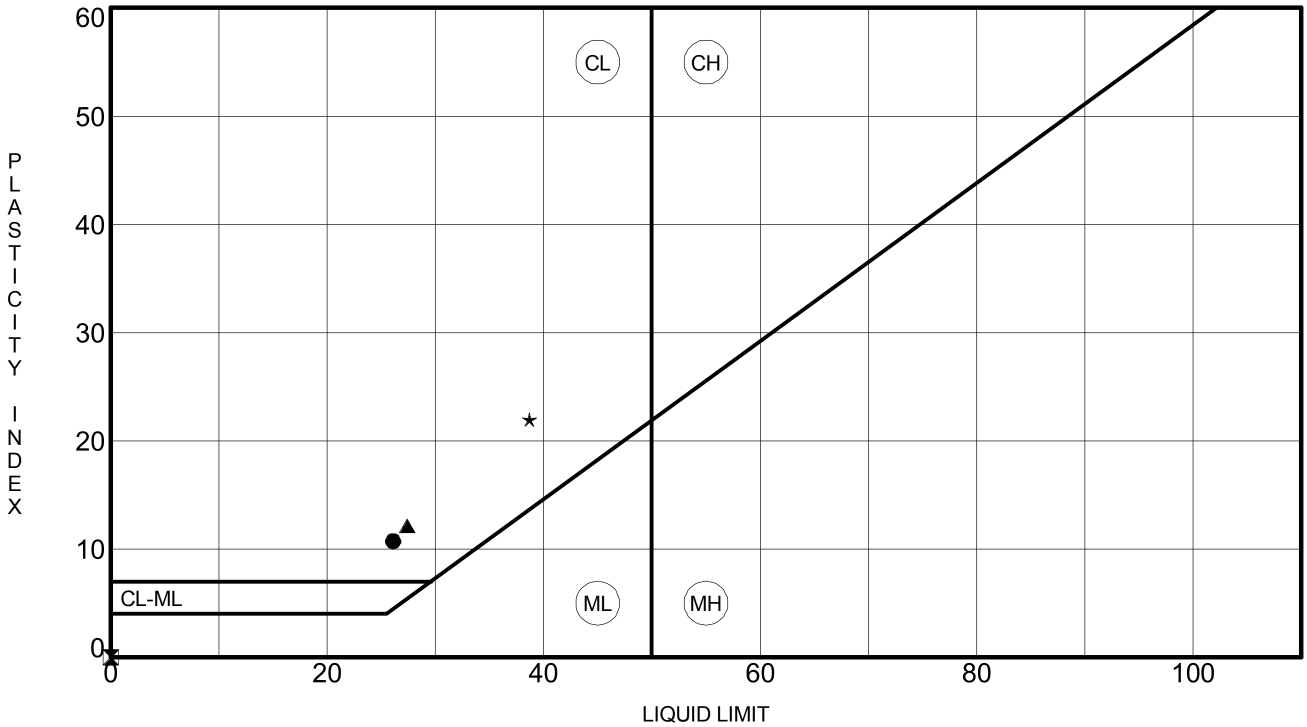
GRAIN SIZE DISTRIBUTION

Project: Pump Station No.37

Location: Lake County, Illinois

Number: 769-01-01

WEI GRAIN SIZE IDH 7690101.GPJ US LAB.GDT 1/31/17



	Specimen Identification		LL	PL	PI	Fines	IDH Classification
●	**B-01#6**	**11.0 ft**	**26**	**15**	**11**	**81**	**Silty Clay Loam**
⧗	**B-01#16**	**43.5 ft**	**NP**	**NP**	**NP**	**6**	**Sand**
▲	**B-02#8**	**18.5 ft**	**27**	**15**	**12**	**85**	**Silty Clay Loam**
★	**B-06#3**	**4.0 ft**	**39**	**17**	**22**	**69**	**Clay Loam**

WEI ATTERBERG LIMITS IDH 7690101.GPJ US LAB.GDT 1/31/17

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ATTERBERG LIMITS' RESULTS

Project: Pump Station No.37

Location: Lake County, Illinois

Number: 769-01-01

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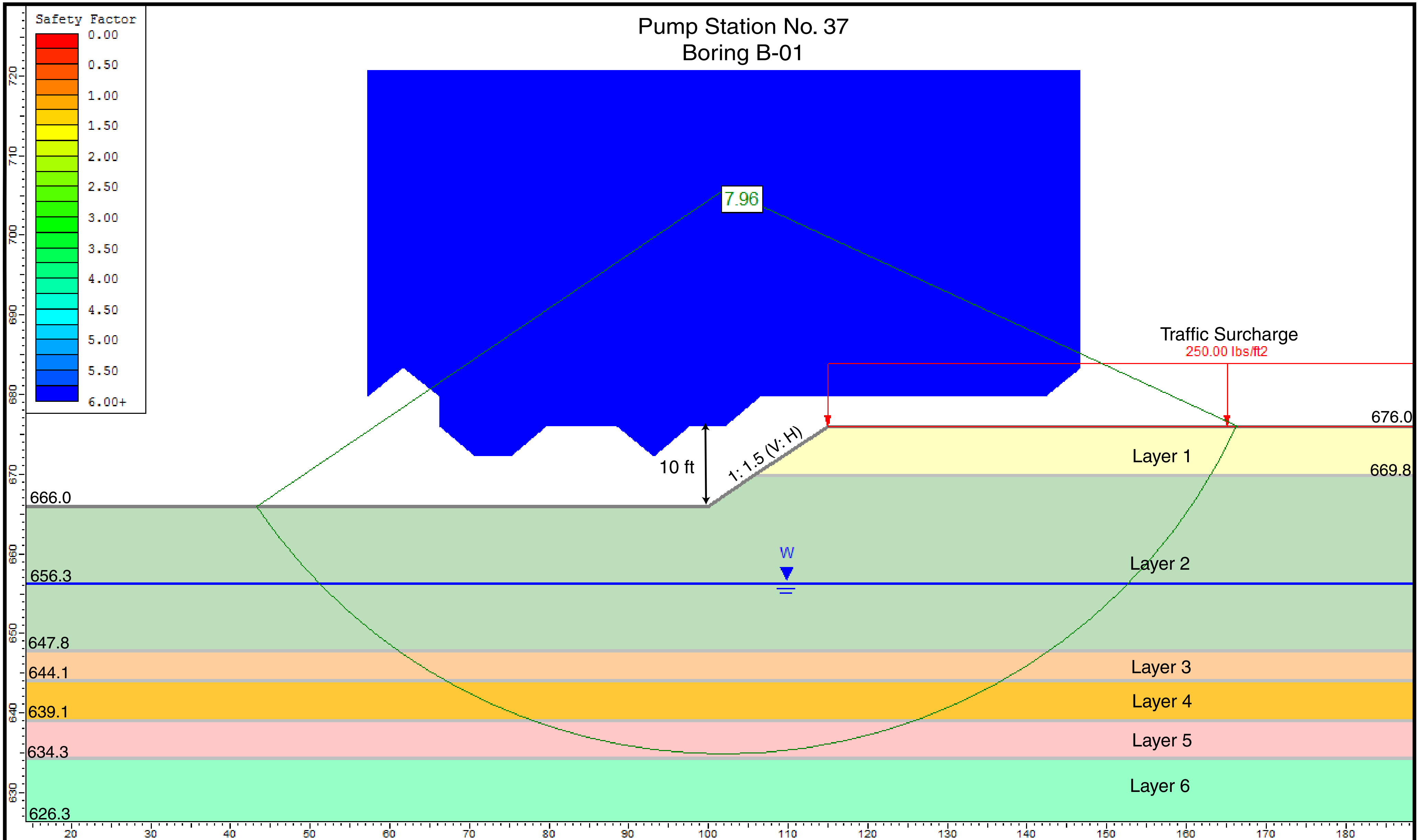
APPENDIX C



Soil Properties

Layer ID	Soil Type	Unit Weight (pcf)	Undrained Parameter C_u (psf)	Undrained Parameter ϕ (deg.)
1	V. Stiff to Hard Silty Clay Loam Fill	120	2400	0
2	Stiff to Hard Silty Clay Loam	120	2500	0
3	Medium Dense Silt	115	0	30
4	Very Stiff Silty Clay Loam	120	2500	0
5	Very Loose Sand	110	0	28
6	Dense Sand	120	0	33

SLOPE STABILITY ANALYSIS: PUMP STATION NO. 37, LAKE COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX C-1

DRAWN BY: A. Hamad
CHECKED BY: M. Kothawala

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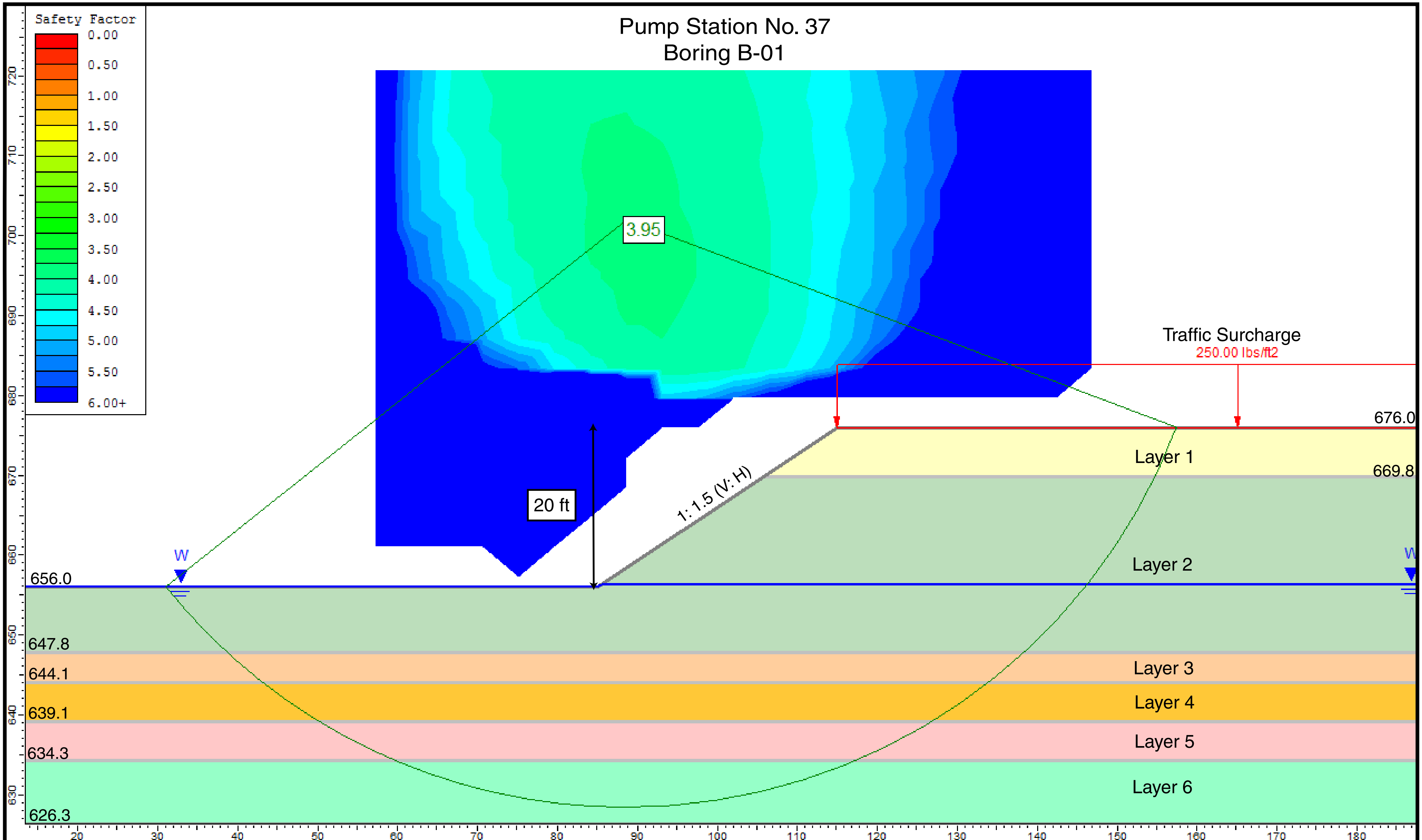
FOR DONOHUE & ASSOCIATES

769-01-01



Soil Properties

Layer ID	Soil Type	Unit Weight (pcf)	Undrained Parameter C_u (psf)	Undrained Parameter ϕ (deg.)
1	V. Stiff to Hard Silty Clay Loam Fill	120	2400	0
2	Stiff to Hard Silty Clay Loam	120	2500	0
3	Medium Dense Silt	115	0	30
4	Very Stiff Silty Clay Loam	120	2500	0
5	Very Loose Sand	110	0	28
6	Dense Sand	120	0	33

SLOPE STABILITY ANALYSIS: PUMP STATION NO. 37, LAKE COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX C-2

DRAWN BY: A. Hamad
CHECKED BY: M. Kothawala

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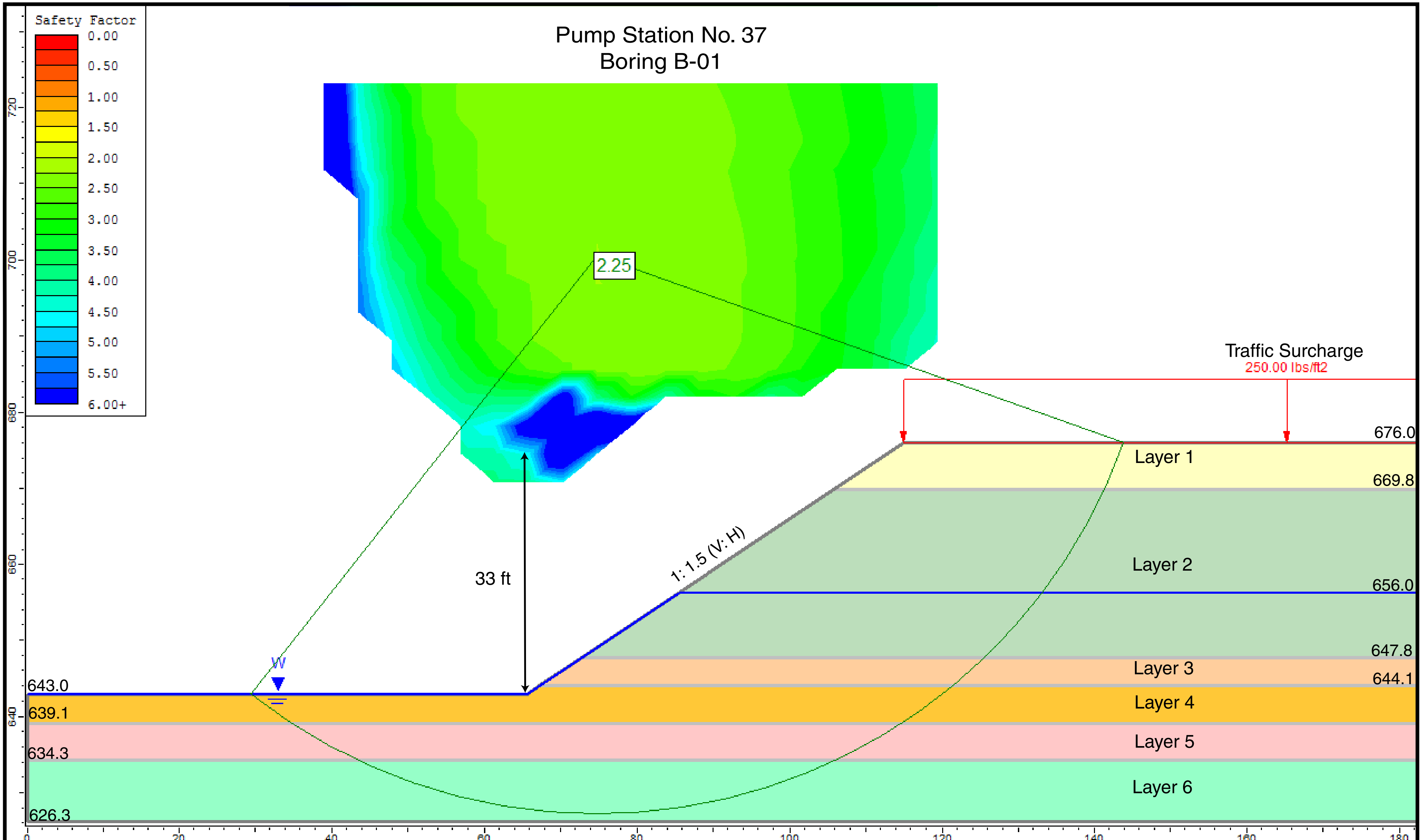
FOR DONOHUE & ASSOCIATES

769-01-01



Soil Properties

Layer ID	Soil Type	Unit Weight (pcf)	Undrained Parameter C_u (psf)	ϕ (deg.)
1	V. Stiff to Hard Silty Clay Loam Fill	120	2400	0
2	Stiff to Hard Silty Clay Loam	120	2500	0
3	Medium Dense Silt	115	0	30
4	Very Stiff Silty Clay Loam	120	2500	0
5	Very Loose Sand	110	0	28
6	Dense Sand	120	0	33

SLOPE STABILITY ANALYSIS: PUMP STATION NO. 37, LAKE COUNTY, ILLINOIS

SCALE: GRAPHICAL

APPENDIX C-3

DRAWN BY: A. Hamad
CHECKED BY: M. Kothawala

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FOR DONOHUE & ASSOCIATES

769-01-01

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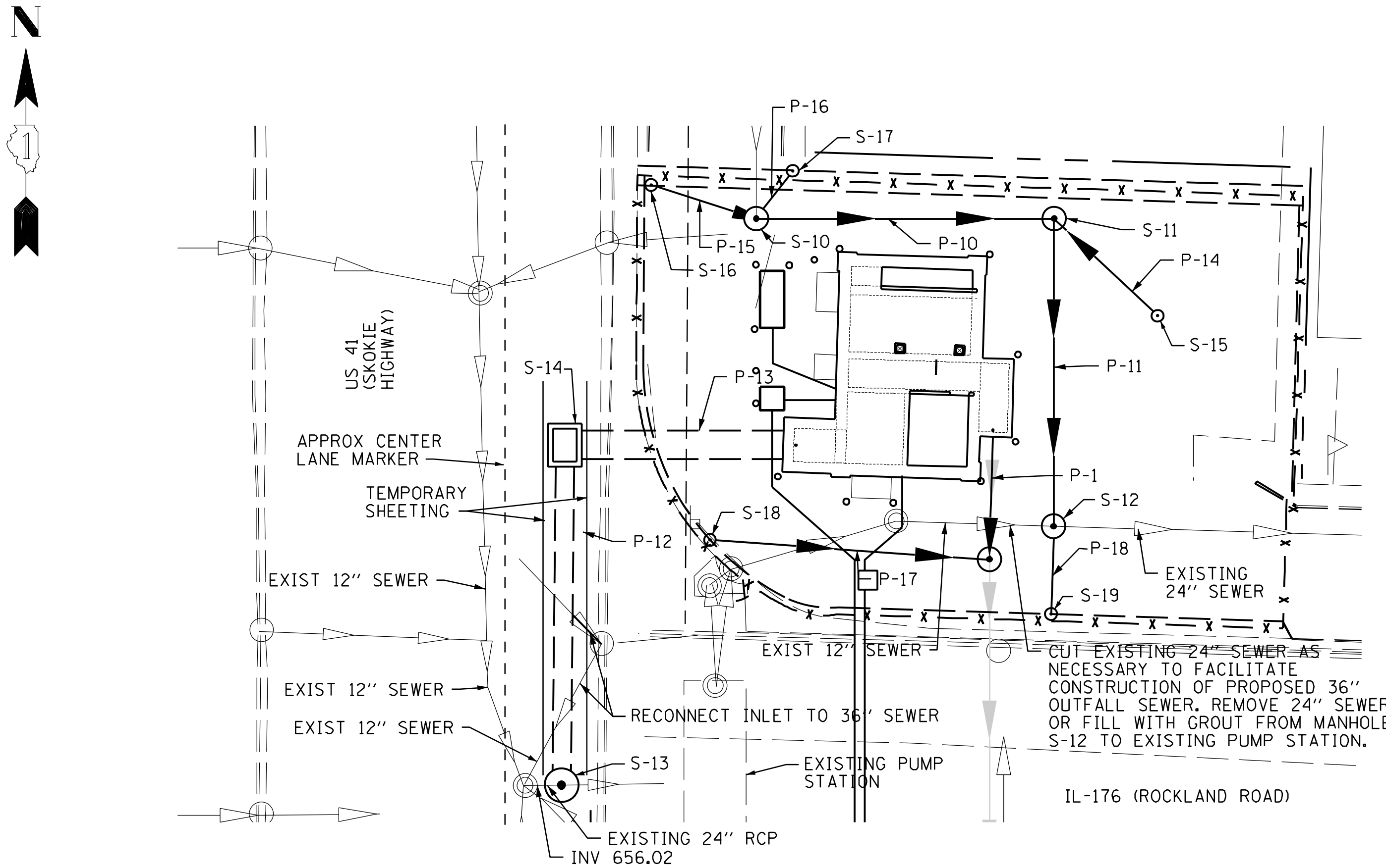
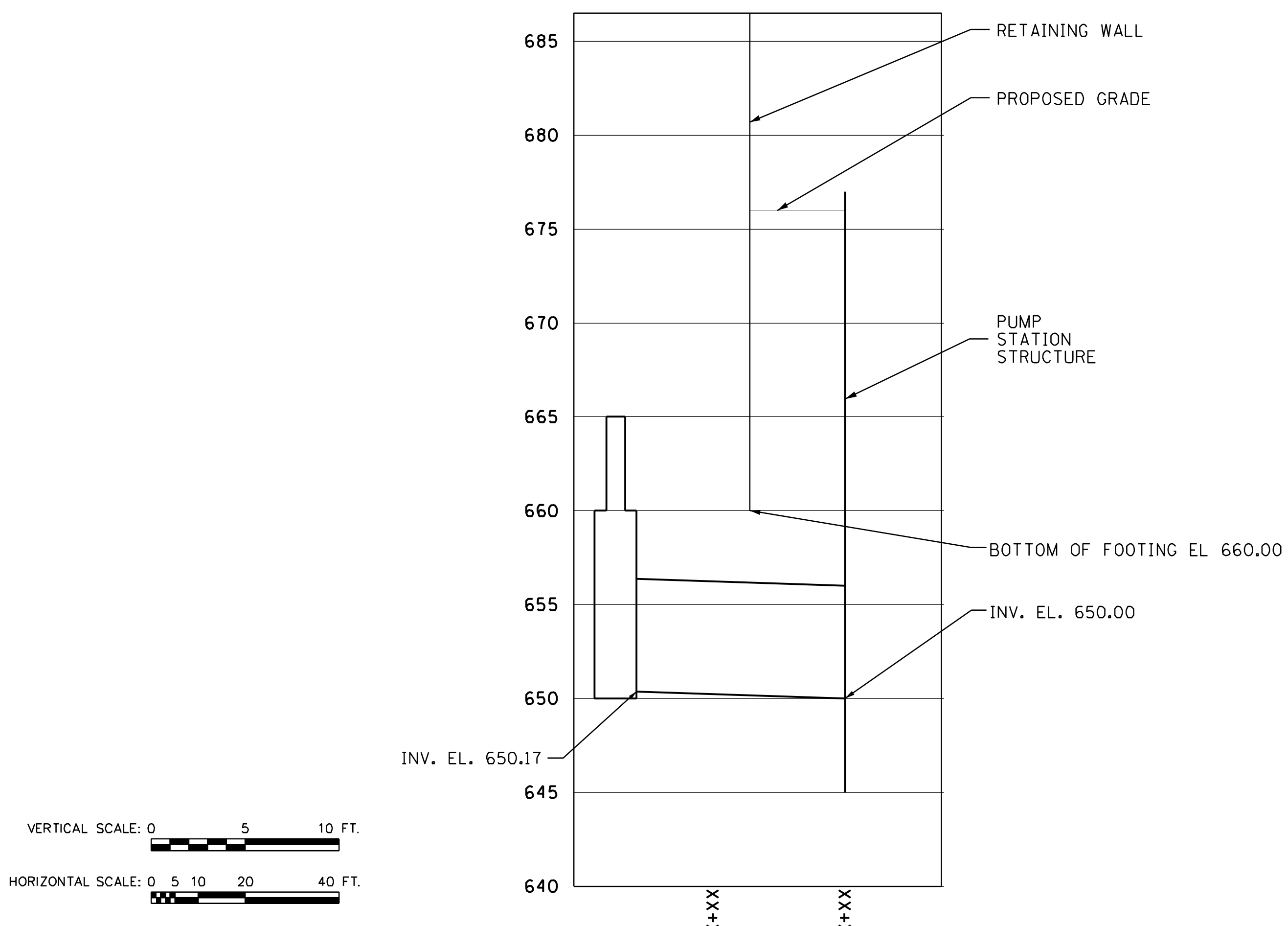
APPENDIX D



STRUCTURE SCHEDULE

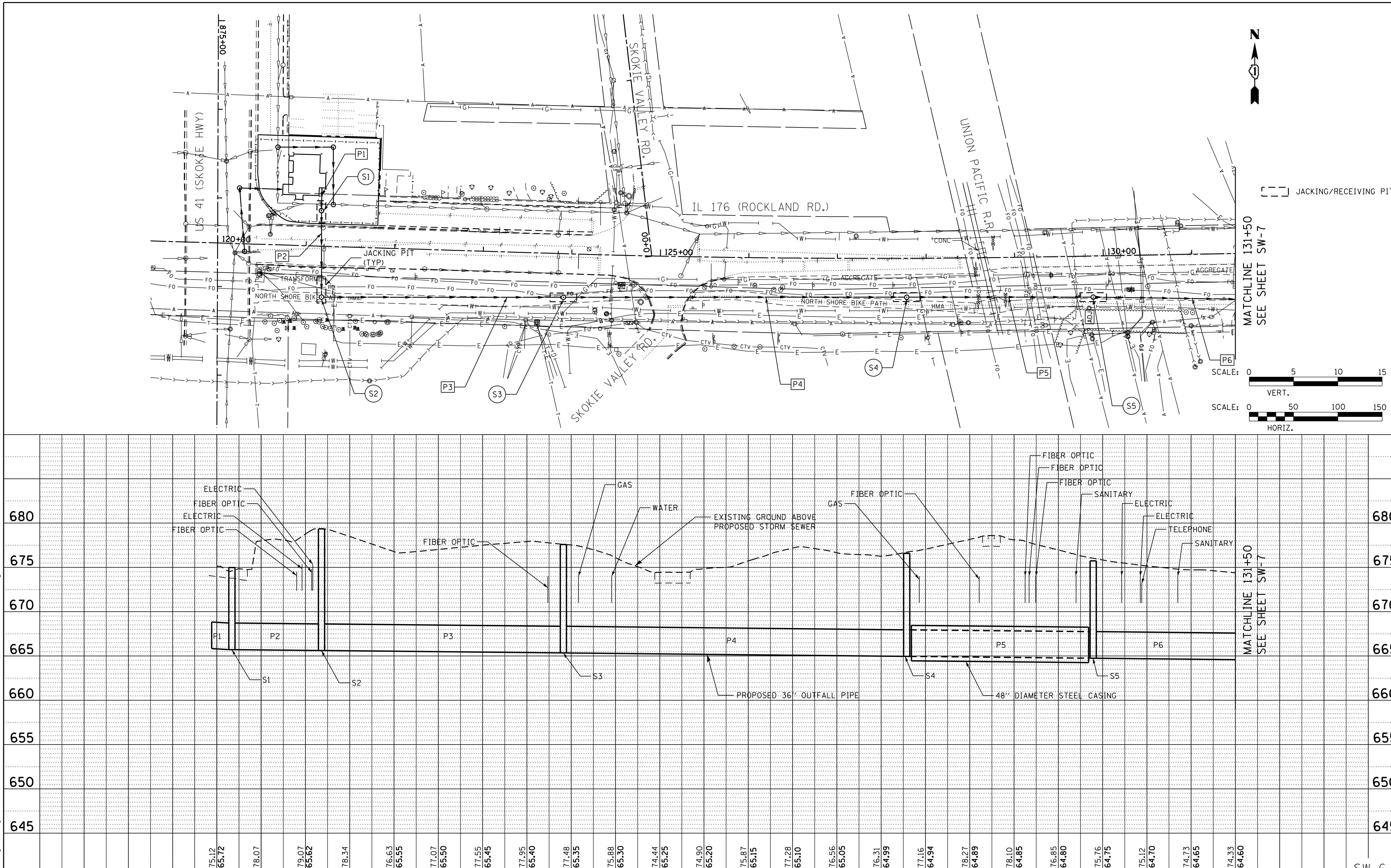
STRUCTURE NO.	DESCRIPTION	INVERT EL.	RIM EL.	NORTHING	EASTING
S-10	MANHOLE, TYPE A. 5' DIAMETER WITH TY 1 FRAME, CLOSED LID	668.04	676.70	XXXXXX	XXXXXX
S-11	MANHOLE, TYPE A. 5' DIAMETER WITH TY 1 FRAME, CLOSED LID	667.58	676.70	XXXXXX	XXXXXX
S-12	MANHOLE, TYPE A. 5' DIAMETER WITH TY 1 FRAME, CLOSED LID	667.11	676.70	XXXXXX	XXXXXX
S-13	MANHOLE, TYPE A. 6' DIAMETER WITH TY 1 FRAME, CLOSED LID	674.84	676.70	XXXXXX	XXXXXX
S-14	CAST IN PLACE 5' X 7' MANHOLE SEE DETAIL XXXXX	674.84	676.70	XXXXXX	XXXXXX
S-15	CATCH BASIN, TYPE C. WITH TY 1 FRAME, CAST OPEN LID	671.67	675.00	XXXXXX	XXXXXX
S-16	CATCH BASIN, TYPE C. WITH TY 1 FRAME, CAST OPEN LID	671.42	674.75	XXXXXX	XXXXXX
S-17	CATCH BASIN, TYPE C. WITH TY 1 FRAME, CAST OPEN LID	671.74	675.07	XXXXXX	XXXXXX
S-18	CATCH BASIN, TYPE C. WITH TY 1 FRAME, CAST OPEN LID	671.34	674.67	XXXXXX	XXXXXX
S-19	CATCH BASIN, TYPE C. WITH TY 1 FRAME, CAST OPEN LID	671.17	674.50	XXXXXX	XXXXXX



STORM SEWER SCHEDULE

PIPE NO.	FROM STR.	TO STR.	LENGTH (FEET)	DIA. (IN)	PIPE TYPE	SLOPE	TB (CY)	UPSTREAM INVERT	DOWNSTREAM INVERT
P-10	S-10	S-11	63	24	XX	0.7%	XX	668.04	667.58
P-11	S-11	S-12	64	24	XX	0.7%	XX	667.58	667.11
P-12	S-13	S-14	73	36	XX	0.5%	XX	655.90	655.55
P-13	S-14	PS SCREEN CHAMBER	49	60	XX	0.3%	XX	650.17	650.00
P-14	S-15	S-11	27	12	XX	1.0%	XX	671.67	671.40
P-15	S-16	S-10	25	12	XX	1.0%	XX	671.42	671.17
P-16	S-17	S-10	16	12	XX	1.0%	XX	671.74	671.58
P-17	S-18	S-9	24	12	XX	1.0%	XX	671.34	671.10
P-18	S-19	S-12	24	12	XX	1.0%	XX	XXX.XX	XXX.XX

SW-5



120+00		121+00		122+00		123+00		124+00		125+00		126+00		127+00		128+00		129+00		130+00		131+00	
675.12 / 665.72	678.07	679.07 / 665.62	678.34	676.63 / 665.55	677.07 / 665.50	677.55 / 665.45	677.95 / 665.40	677.48 / 665.35	675.88 / 665.30	674.44 / 665.25	674.90 / 665.20	675.87 / 665.15	677.28 / 665.10	676.56 / 665.05	676.31 / 664.99	677.16 / 664.94	678.27 / 664.89	678.10 / 664.85	676.85 / 664.80	675.76 / 664.75	675.12 / 664.70	674.73 / 664.65	674.33 / 664.60

SW-6

Accurate GROUP, INC.	USER NAME = johnn	DESIGNED - TGM	REVISED -
		DRAWN - JN	REVISED -
	PLOT SCALE = 100.0000 ' / in.	CHECKED - JMT	REVISED -
	PLOT DATE = 9/18/2017	DATE - 9-20-17	REVISED -

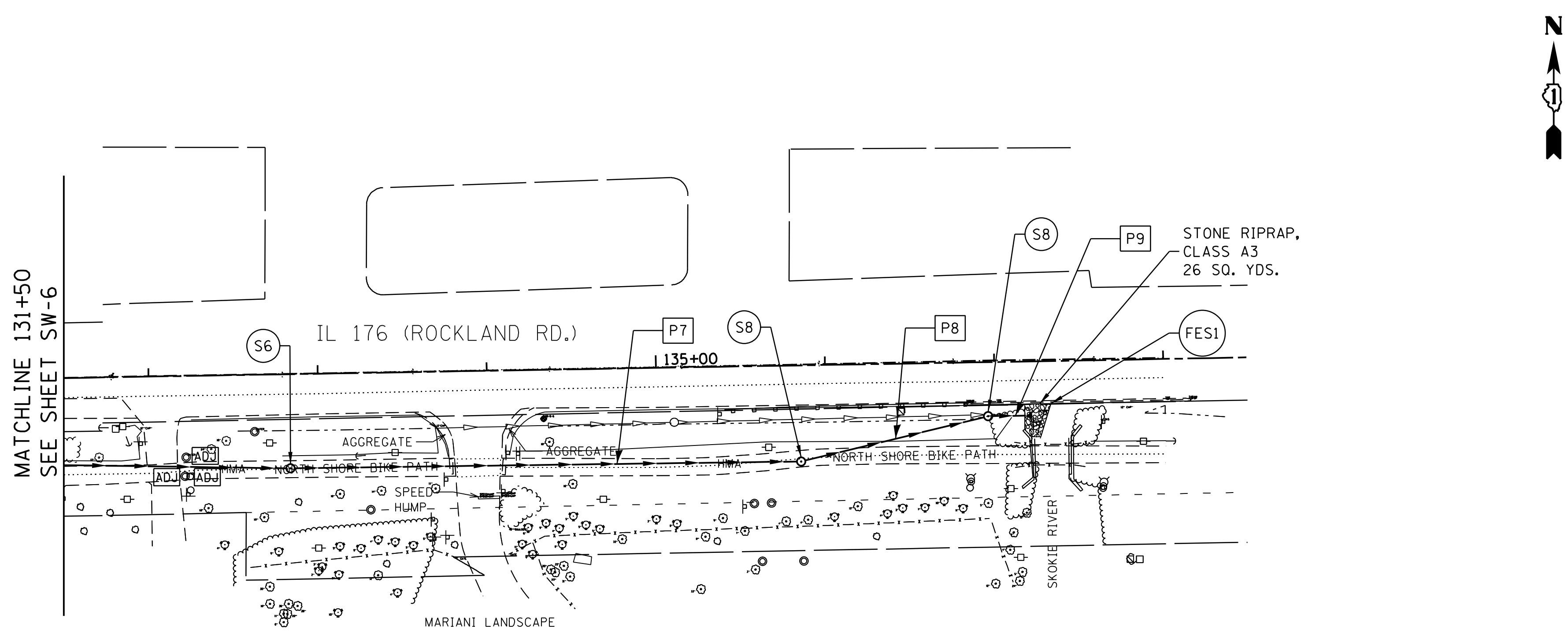
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PUMP STATION NO. 37
SEWER WORK
DRAINAGE PLAN AND PROFILE - I

SCALE: | SHEET OF SHEETS | STA. TO STA.

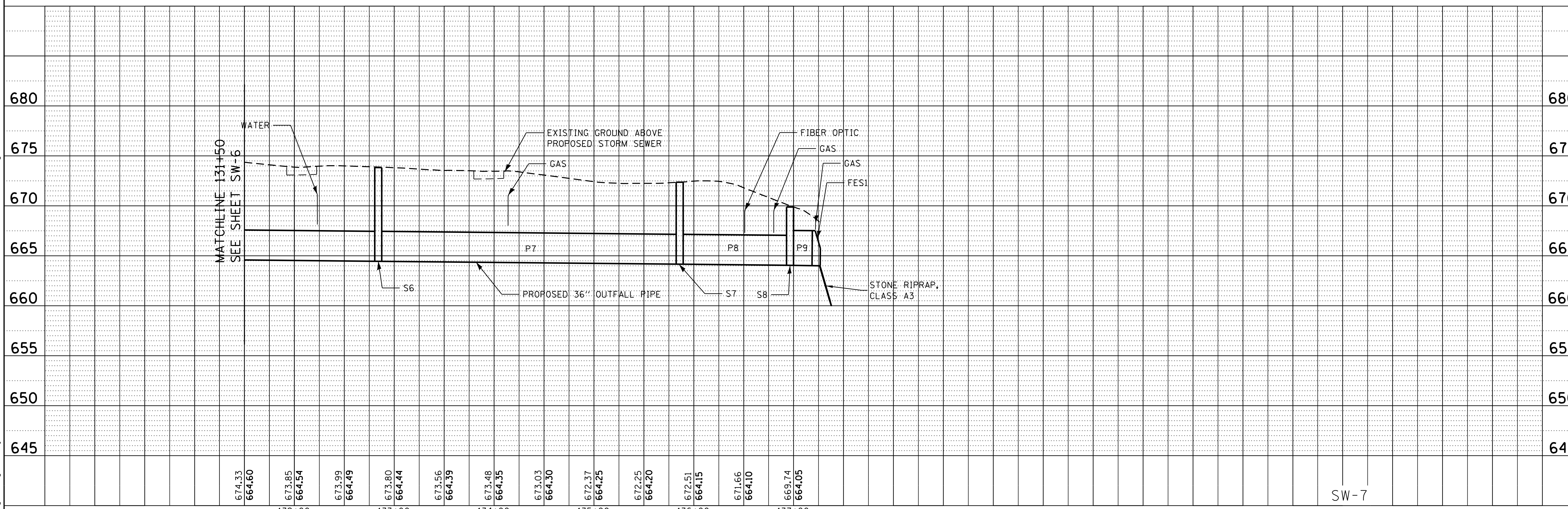
RTE.	SECTION	COUNTY	SHEET NO.	TOTAL SHEETS
US 41 ILLINOIS 176	(125S-1) I-4	LAKE	29	138
		CONTRACT NO. 62B66		
	ILLINOIS FED. AID PROJECT			

FILE NAME = O:\Engineering\LiveProjects\13027_Donahue PS 37\CADD\CADD Sheets\Civil\0162B66-sht-Drain PlnProf.dgn



SCALE: 0 5 10 15 FT
VERT.

SCALE: 0 50 100 150 FT
HORIZ.



PLAN: SURVEYED, PLOTTED, ALIGNMENT CHECKED, R/T. OF WAY CHECKED, CADD FILE NAME, NOTE BOOK NO., BY, DATE

PROFILE: SURVEYED, PLOTTED, GRADES CHECKED, B.M. NOTED, STRUCTURE NOTATIONS CHKD, NOTE BOOK NO., BY, DATE

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Accurate GROUP, INC.

USER NAME = johnn	DESIGNED - TGM	REVISED -
	DRAWN - JN	REVISED -
PLOT SCALE = 100.0000 ' / in.	CHECKED - JMT	REVISED -
PLOT DATE = 9/18/2017	DATE - 9-20-17	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PUMP STATION NO. 37
SEWER WORK
DRAINAGE PLAN AND PROFILE-II

SCALE: SHEET OF SHEETS STA. TO STA.

RTE.	SECTION	COUNTY	SHEET NO.	TOTAL SHEETS
US 41 ILLINOIS 176	(125S-1) I-4	LAKE	30	138
	CONTRACT NO. 62B66			
	ILLINOIS FED. AID PROJECT			

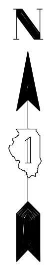
DRAINAGE STRUCTURE SCHEDULE					
STRUCTURE NO.	DESCRIPTION	STATION	OFFSET	INVERT EL.	RIM EL.
S-1	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	121+16	40' LT	665.73	675.00
S-2	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	121+19	57.5' RT	665.63	679.35
S-3	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	123+92	49.3' RT	665.35	677.60
S-4	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	127+78	44' RT	664.97	676.60
S-5	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	129+88	46.4' RT	664.76	675.75
S-6	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	132+83	55.7' RT	664.46	673.85
S-7	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	135+85	56.9' RT	664.16	672.37
S-8	MANHOLES, TYPE A, 8' DIAMETER WITH TY 1 FRAME, CLOSED LID	136+96	32' RT	664.05	669.90
FES-1	PRECAST REINFORCED CONCRETE FLARED END SECTIONS, 42"	137+22	32' RT	664.02	-

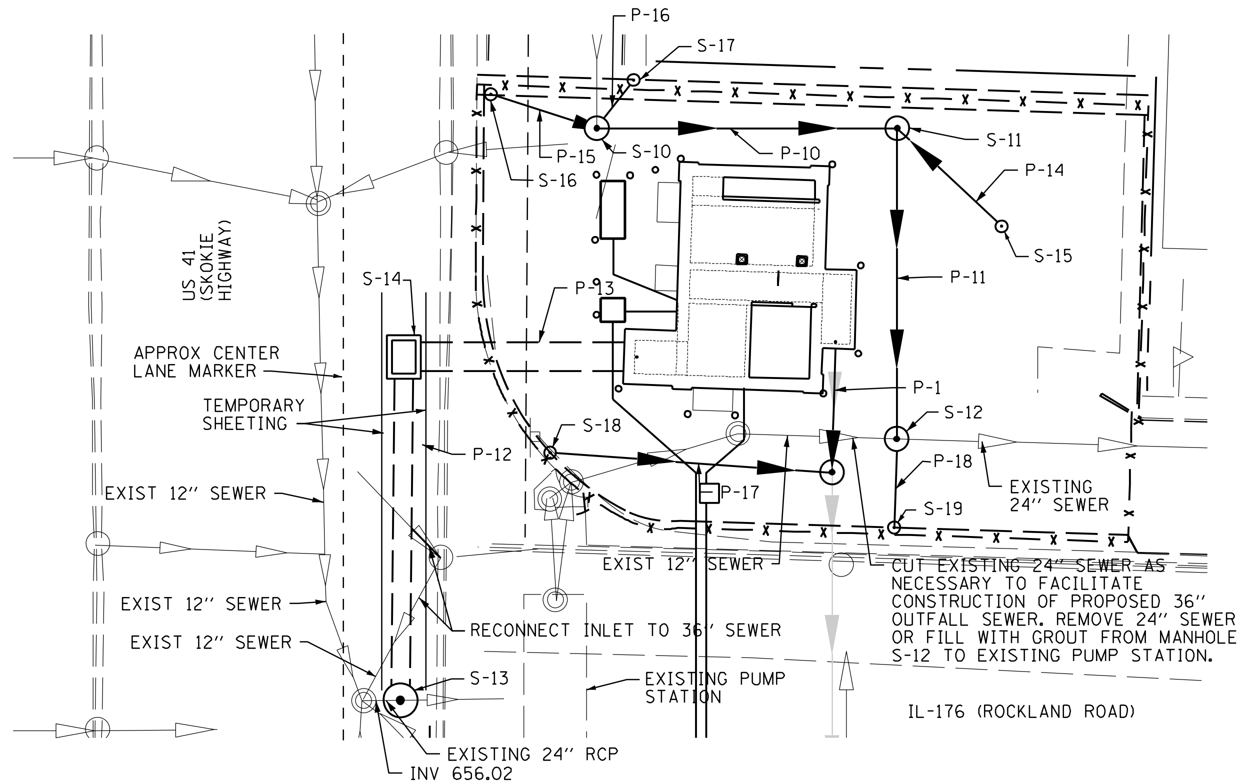
	STORM SEWER SCHEDULE									
	PIPE NO.	FROM STR.	TO STR.	LENGTH (FT)	DIA. (IN)	PIPE TYPE	SLOPE %	TB (CY)	UPSTREAM INVERT	DOWNSTREAM INVERT
	P-1	PS 37	S-1	24	36	C-A T3	0.50	697	665.85	665.73
*	P-2	S-1	S-2	94	36	C-A T3	0.11	697	665.73	665.63
	P-3 (WMQ)	S-2	S-3	269.5	36	C-A T3	0.10	663	665.63	665.35
*	P-4 (WMQ)	S-3	S-4	384	36	C-A T2	0.10	370	665.35	664.97
*	P-5 (WMQ)	S-4	S-5	207	36	C-A T2	0.10	373	664.97	664.76
	P-6 (WMQ)	S-5	S-6	291.5	36	C-A T2	0.10	907	664.76	664.46
	P-7 (WMQ)	S-6	S-7	298.5	36	C-A T2	0.10	422	664.46	664.16
	P-8 (WMQ)	S-7	S-8	110	36	C-A T2	0.10	89	664.16	664.05
	P-9 (WMQ)	S-8	FES-1	15	42	C-A T1	0.20	--	664.05	664.02

* STORM SEWERS JACKED IN PLACE

WMQ - WATER MAIN QUALITY PIPE

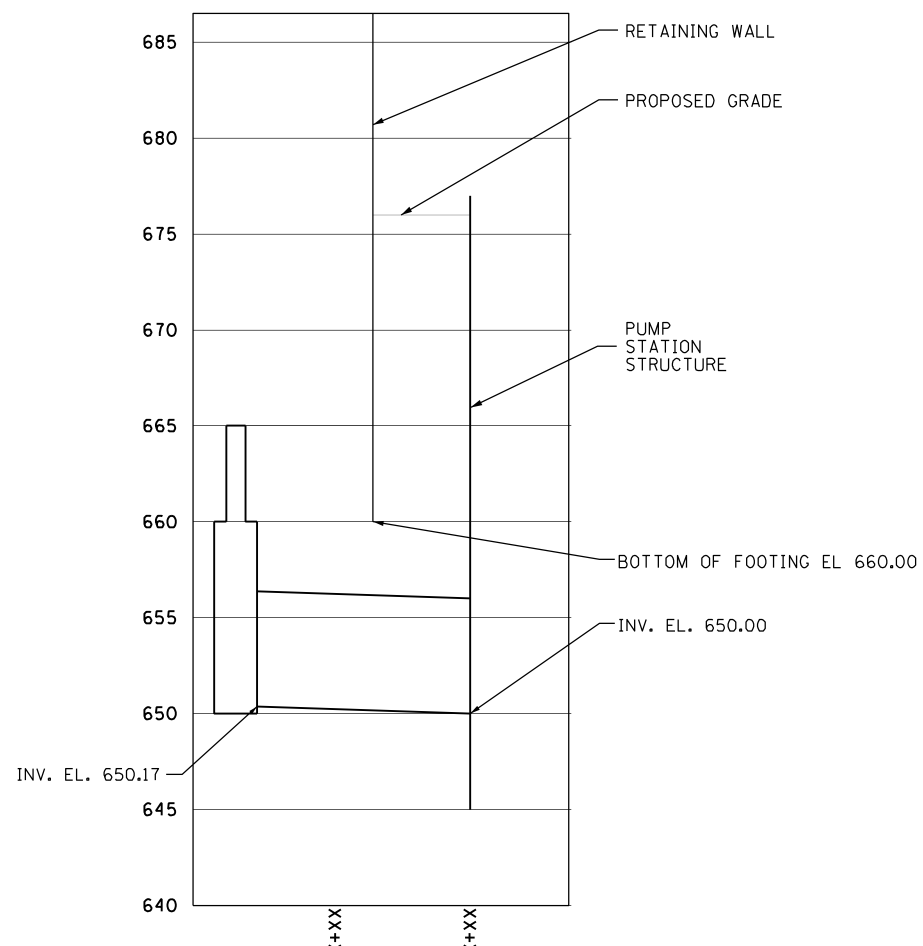
SW-8





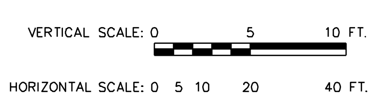
STRUCTURE SCHEDULE

STRUCTURE NO.	DESCRIPTION	INVERT EL.	RIM EL.	NORTHING	EASTING
S-10	MANHOLE, TYPE A, 5' DIAMETER WITH TY 1 FRAME, CLOSED LID	668.04	676.70	XXXXXX	XXXXXX
S-11	MANHOLE, TYPE A, 5' DIAMETER WITH TY 1 FRAME, CLOSED LID	667.58	676.70	XXXXXX	XXXXXX
S-12	MANHOLE, TYPE A, 5' DIAMETER WITH TY 1 FRAME, CLOSED LID	667.11	676.70	XXXXXX	XXXXXX
S-13	MANHOLE, TYPE A, 6' DIAMETER WITH TY 1 FRAME, CLOSED LID	674.84	676.70	XXXXXX	XXXXXX
S-14	CAST IN PLACE 5' X 7' MANHOLE SEE DETAIL XXXXX	674.84	676.70	XXXXXX	XXXXXX
S-15	CATCH BASIN, TYPE C, WITH TY 1 FRAME, CAST OPEN LID	671.67	675.00	XXXXXX	XXXXXX
S-16	CATCH BASIN, TYPE C, WITH TY 1 FRAME, CAST OPEN LID	671.42	674.75	XXXXXX	XXXXXX
S-17	CATCH BASIN, TYPE C, WITH TY 1 FRAME, CAST OPEN LID	671.74	675.07	XXXXXX	XXXXXX
S-18	CATCH BASIN, TYPE C, WITH TY 1 FRAME, CAST OPEN LID	671.34	674.67	XXXXXX	XXXXXX
S-19	CATCH BASIN, TYPE C, WITH TY 1 FRAME, CAST OPEN LID	671.17	674.50	XXXXXX	XXXXXX



STORM SEWER SCHEDULE

PIPE NO.	FROM STR.	TO STR.	LENGTH (FEET)	DIA. (IN)	PIPE TYPE	SLOPE	TB (CY)	UPSTREAM INVERT	DOWNSTREAM INVERT
P-10	S-10	S-11	63	24	XX	0.7%	XX	668.04	667.58
P-11	S-11	S-12	64	24	XX	0.7%	XX	667.58	667.11
P-12	S-13	S-14	73	36	XX	0.5%	XX	655.90	655.55
P-13	S-14	PS SCREEN CHAMBER	49	60	XX	0.3%	XX	650.17	650.00
P-14	S-15	S-11	27	12	XX	1.0%	XX	671.67	671.40
P-15	S-16	S-10	25	12	XX	1.0%	XX	671.42	671.17
P-16	S-17	S-10	16	12	XX	1.0%	XX	671.74	671.58
P-17	S-18	S-9	24	12	XX	1.0%	XX	671.34	671.10
P-18	S-19	S-12	24	12	XX	1.0%	XX	XXX.XX	XXX.XX

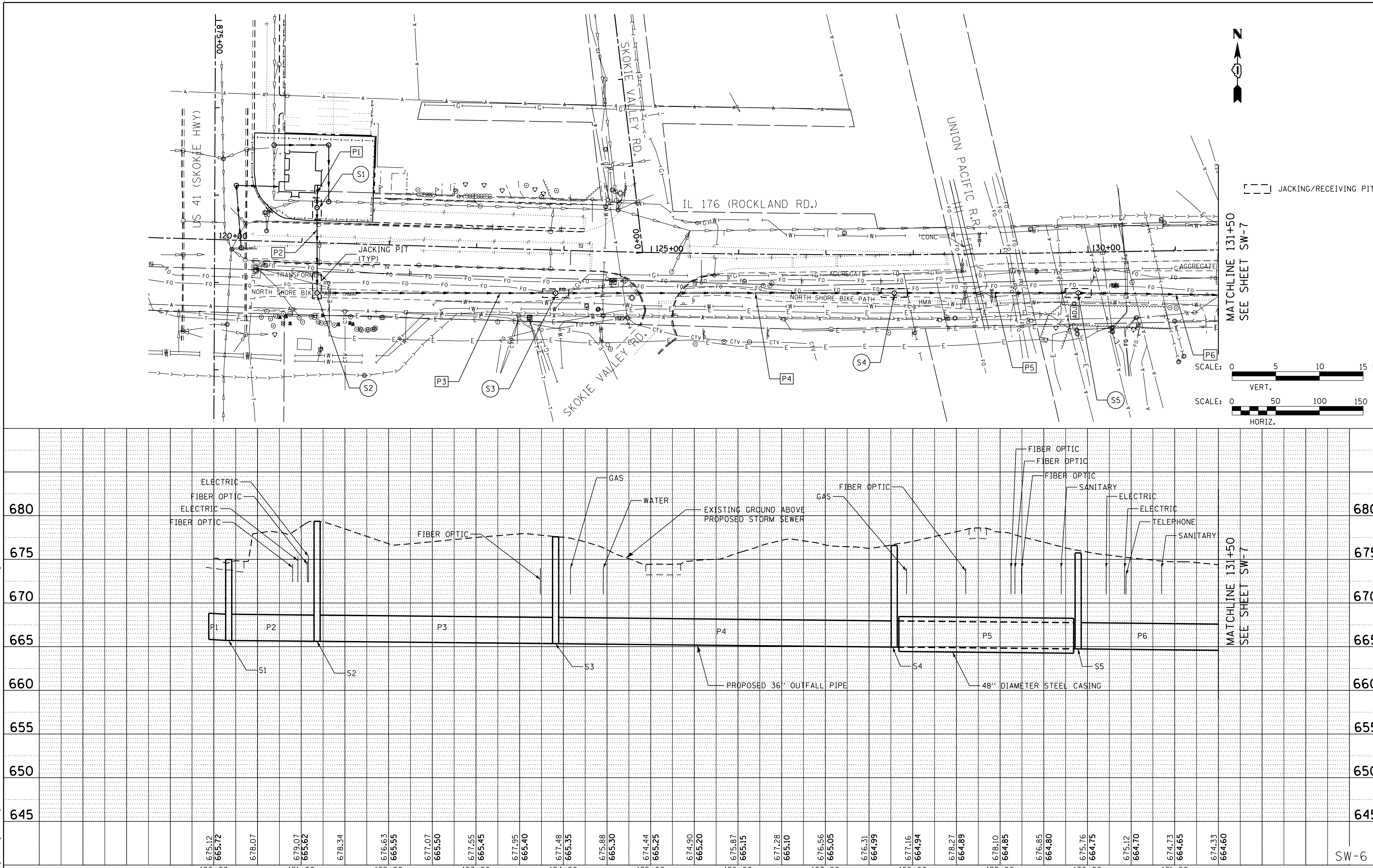


SW-5

DONOHUE	USER NAME =	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	PUMP STATION NO. 37 SEWER WORK PROPOSED 60" INLET SEWER PLAN & PROFILE, AN
		DRAWN -	REVISED -		
	PLOT SCALE =	CHECKED -	REVISED -		
	PLOT DATE =	DATE - 9-20-17	REVISED -		SCALE: SHEET OF SHEETS STA. TO STA.

RTE.	SECTION	COUNTY	SHEET NO.	TOTAL SHEETS
US 41 ILLINOIS 176	(125S-1) I-4	LAKE	28	138
		CONTRACT NO. 62B66		
	ILLINOIS FED. AID PROJECT			

FILE NAME =



USER NAME = johnn	DESIGNED - TGM	REVISED -	
	DRAWN - JN	REVISED -	
PLOT SCALE = 100.0000 ' / in.	CHECKED - JMT	REVISED -	
PLOT DATE = 9/18/2017	DATE - 9-20-17	REVISED -	

Accurate Group, Inc.

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PUMP STATION NO. 37
SEWER WORK
DRAINAGE PLAN AND PROFILE – I

SCALE: | SHEET OF SHEETS | STA. TO STA.

RTE.	SECTION	COUNTY	SHEET NO.	TOTAL SHEETS
US 41 ILLINOIS 176	(125S-1) I-4	LAKE	29	138
		CONTRACT NO. 62B66		
	ILLINOIS FED. AID PROJECT			

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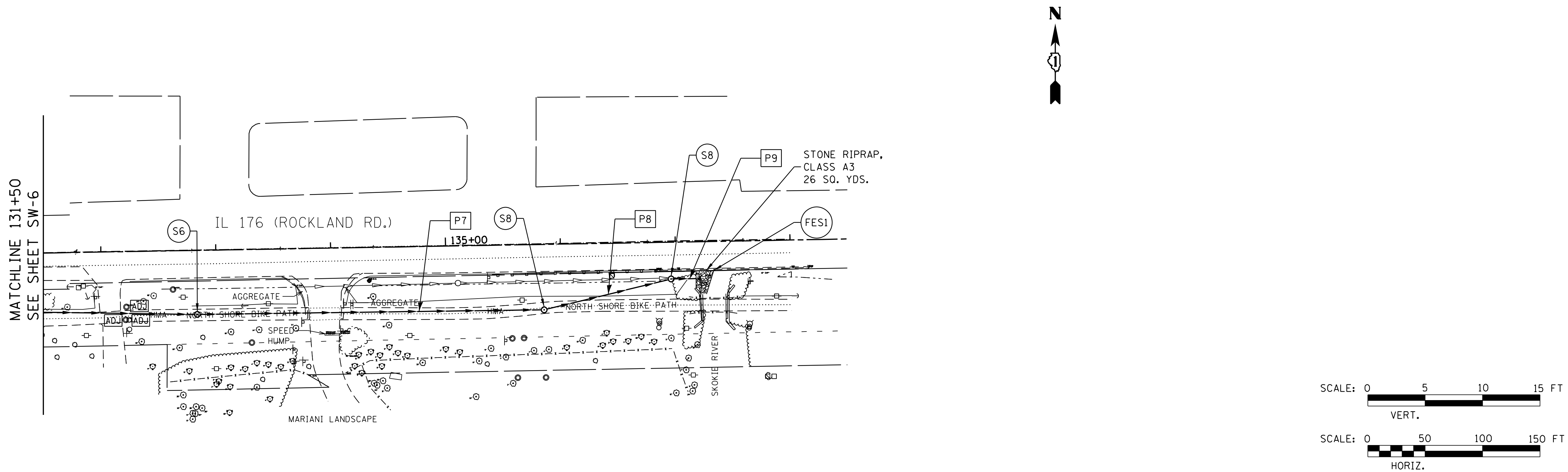

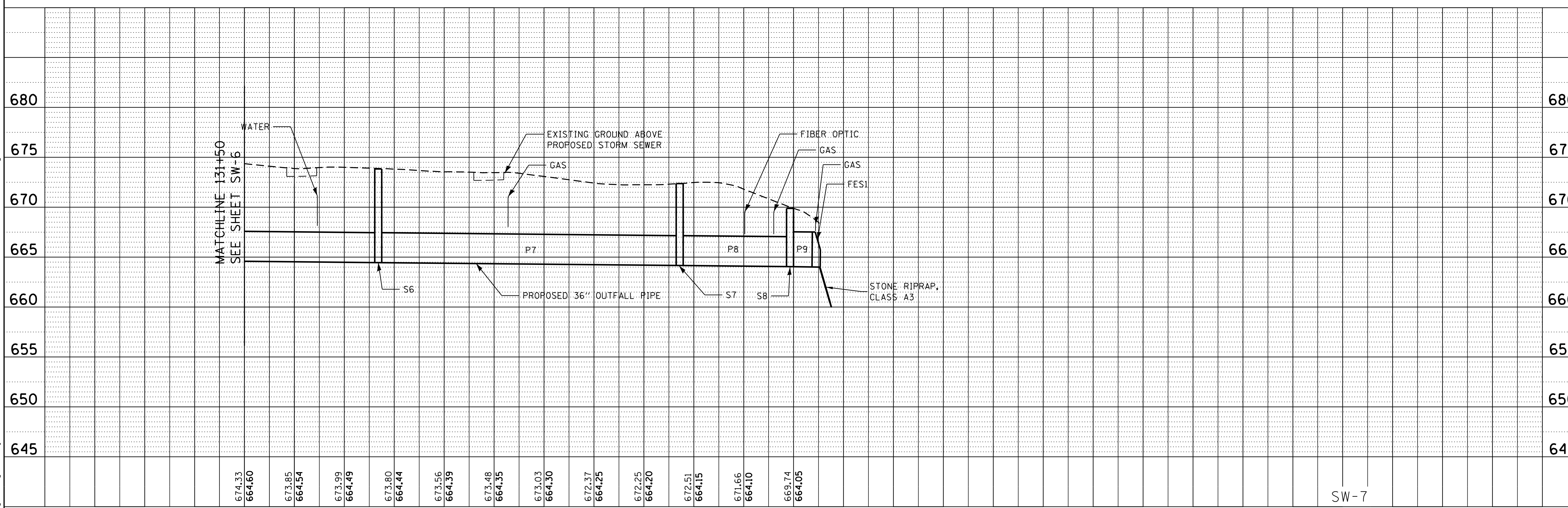

Accurate GROUP, INC.	USER NAME = johnn	DESIGNED - TGM	REVISED -
		DRAWN - JN	REVISED -
	PLOT SCALE = 100.0000 ' / in.	CHECKED - JMT	REVISED -
	PLOT DATE = 9/18/2017	DATE - 9-20-17	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PUMP STATION NO. 37
SEWER WORK
DRAINAGE PLAN AND PROFILE-II

SCALE: | SHEET OF SHEETS | STA. TO STA.

RTE.	SECTION	COUNTY	SHEET NO.	TOTAL SHEETS
US 41 ILLINOIS 176	(125S-1) I-4	LAKE	30	138
		CONTRACT NO. 62B66		
	ILLINOIS FED. AID PROJECT			

FILE NAME = Q:\Engineering\LiveProjects\13027_Donohue PS 37\CADD\CADD Sheets\Civil\D162B66-sht-Drain PlnProf 2.dgn

DRAINAGE STRUCTURE SCHEDULE					
STRUCTURE NO.	DESCRIPTION	STATION	OFFSET	INVERT EL.	RIM EL.
S-1	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	121+16	40' LT	665.73	675.00
S-2	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	121+19	57.5' RT	665.63	679.35
S-3	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	123+92	49.3' RT	665.35	677.60
S-4	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	127+78	44' RT	664.97	676.60
S-5	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	129+88	46.4' RT	664.76	675.75
S-6	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	132+83	55.7' RT	664.46	673.85
S-7	MANHOLES, TYPE A, 7' DIAMETER WITH TY 1 FRAME, CLOSED LID	135+85	56.9' RT	664.16	672.37
S-8	MANHOLES, TYPE A, 8' DIAMETER WITH TY 1 FRAME, CLOSED LID	136+96	32' RT	664.05	669.90
FES-1	PRECAST REINFORCED CONCRETE FLARED END SECTIONS, 42"	137+22	32' RT	664.02	-

STORM SEWER SCHEDULE										
	PIPE NO.	FROM STR.	TO STR.	LENGTH (FT)	DIA. (IN)	PIPE TYPE	SLOPE %	TB (CY)	UPSTREAM INVERT	DOWNSTREAM INVERT
	P-1	PS 37	S-1	24	36	C-A T3	0.50	697	665.85	665.73
*	P-2	S-1	S-2	94	36	C-A T3	0.11	697	665.73	665.63
	P-3 (WMQ)	S-2	S-3	269.5	36	C-A T3	0.10	663	665.63	665.35
*	P-4 (WMQ)	S-3	S-4	384	36	C-A T2	0.10	370	665.35	664.97
*	P-5 (WMQ)	S-4	S-5	207	36	C-A T2	0.10	373	664.97	664.76
	P-6 (WMQ)	S-5	S-6	291.5	36	C-A T2	0.10	907	664.76	664.46
	P-7 (WMQ)	S-6	S-7	298.5	36	C-A T2	0.10	422	664.46	664.16
	P-8 (WMQ)	S-7	S-8	110	36	C-A T2	0.10	89	664.16	664.05
	P-9 (WMQ)	S-8	FES-1	15	42	C-A T1	0.20	--	664.05	664.02

* STORM SEWERS JACKED IN PLACE

WMQ - WATER MAIN QUALITY PIPE

SW-8