180-48 BM 5301 BUFFALO AVE PUMP STATION REHABILITATION

EVALUATION OF STATION BYPASS SYSTEM

PREPARED FOR:	JEA
PREPARED BY:	Constantine Engineering, Inc. J. Collins Engineering Associates, LLC
PROJECT NUMBER:	100431.17
DATE:	April 24, 2018

Background

The JEA Buffalo Avenue Pump Station is an existing, triplex, Class IV wastewater pumping facility located at 5301 Buffalo Avenue, Jacksonville, Florida 32206. Constantine Engineering, Inc. was retained by JEA to provide evaluation, design, and limited bid- and construction-phase engineering services for the station rehabilitation (JEA Contract 170143, dated November 28, 2017). J. Collins Engineering Associates, LLC, was subcontracted by Constantine to prepare this technical memorandum (TM #7).

Purpose

This technical memorandum (TM #7) addresses the following:

- Pump station bypass options with reference to applicable JEA standards, as needed, for the temporary bypass of wastewater flows during construction of project improvements.
- Evaluation of hydraulic and operational requirements based on established design flow criteria, sequencing of work to minimize the required bypass period.
- Preliminary configuration options based on available rental equipment, and recommended design approach.

Existing Conditions

The Buffalo Avenue Pump Station serves an area roughly bounded by Long Branch Creek and Evergreen Cemetery on the south, St. Johns River on the east, Trout River on the north, and Moncrief Creek and I-95 on the west. Table 1 summarizes the existing conditions for the pump station.

Table 1: Buffalo Avenue Pump Station Existing Conditions

Item	Quantity	Comments
Service Area	2,171 acres	Per PD report
Original Station Capacity	8,000 gpm (11.52 MGD)	Per PD report
Influent Gravity Sewer	36 inches	Ductile Iron
Discharge Forcemain	24 inches	PVC
Junction Manhole (MH)	6-ft diameter base 4-ft diameter riser	Precast Concrete
MH Rim Elevation	4.65 ft	Per survey (NAVD88)
MH Floor Elevation	-11.96 ft	Per survey (NAVD88)

As detailed in Exhibit 1 below, raw wastewater enters the existing pump station through a 36-inch diameter gravity sewer, and the flow is split into two 4-foot wide channels equipped with mechanical bar screens that have been removed from service. Three service pumps and 24-inch diameter forcemain then discharge the wastewater into the trunk sewer system that ultimately flows to the Buckman Wastewater Treatment Facility.

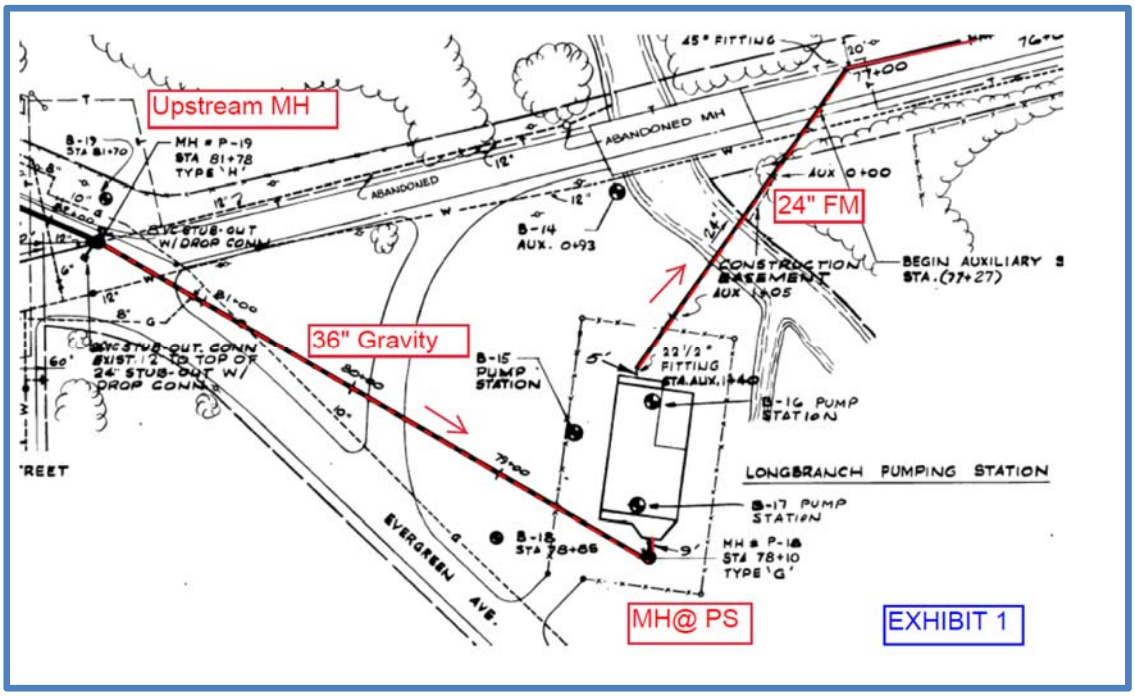


Exhibit 1: Existing Collection System at Pump Station

Design Conditions

The design criteria are based on the 2018 JEA Water and Wastewater Standards Manual and the 2018 JEA Water, Wastewater and Reclaimed Water Design Guidelines.

Design flow criteria was established by a separate evaluation task (refer to TM #4 – Evaluation of System Flows). The design annual average daily flow (AADF) is 656 gpm (0.94 MGD), and

the design peak hour flow (PHF) is 4,828 gpm (6.95 MGD). The bypass pumping system will conservatively be designed to deliver up to 5,000 gpm.

Recommendations

Based on discussions with JEA about various bypass configuration options, the recommended bypass plan is as follows:

- Install complete, self-contained, automatic diesel engine-driven pump systems that are automated by using float levels to activate the pumps. Control and monitoring of the bypass pumps should be conducted at a selected upstream manhole to better safeguard against potential sanitary sewer overflow (SS) events.
- Pumps will take suction from the existing junction manhole, and limited surcharge of the gravity sewer will be required. The bottom manhole section is 6-ft diameter and the upper riser section is 4-ft diameter which is large enough to accommodate a single 24-inch suction manifold pipe or multiple smaller suction pipes.
- A minimum of three bypass duty pumps are recommended (not including optional standby units). The recommended pumps are Godwin or Thompson rental units.
- To meet the peak flows, two of the duty pumps will be based on the Godwin DPC300 Dri-Prime model, sized for 2,500 gpm each. These pumps will require limited surcharging of the gravity system to function at full capacity, as discussed further below. It is noted that a single, larger pump such as the Godwin Dri-Prime CD400M could be utilized instead, and this option was discussed with the local Godwin pump application engineer. The two smaller pumps were considered preferable, however, to provide flexibility across a larger range of system flows, with one unit serving lower flows and the second available to assist during high flow events. Therefore, two smaller pumps are recommended for design.
- To meet average flows, the third duty pump will be based on the Godwin CD200M Dri-Prime model, sized for approximately 700 gpm. This pump will serve as a lead "jockey" unit to meet pump an even lower range of flows than the DPC300 units, with less required surcharging of the collection system. Representative pump information, including sample data sheets for the pumps discussed herein, is provided in Appendix A.
- The temporary discharge manifold for the three bypass pumps will connect to the existing 24-inch forcemain east of the pump station, as shown in Exhibit 2.
- The hydraulic calculations for the junction manhole are summarized as follows (see Appendix A), with all elevations shown per the NAVD88 datum:
    - Top of junction manhole = 4.65 ft
    - Bottom of junction manhole = -11.96 ft
    - Minimum pump start level: 0.5 ft clearance from bottom + 1.5 ft submergence
    - Water Surface Elevation (WSE) to deliver 2,500 gpm per pump = -0.27 ft

- The system surcharge calculations are summarized as follows (refer to Appendix A):
    - As indicated above, the recommended pumps require a surcharge elevation of -0.27' to deliver the design flow of 2,500 gpm. Under these conditions, the estimated WSE and extent of surcharging in the upstream gravity system indicate that no overflows would occur (see Exhibit 3 in Appendix A, which shows the estimated flow line on the existing as-built drawings). For demonstration purposes, the red line shown is shown approximately 1 ft above -0.27 ft elevation to reflect the adjustment to the current NAVD88 datum. Potential problem areas are shown in yellow, where existing stub-out or contributory sewer inverts are below the red line and would need further consideration before moving forward with partial sewer surcharging.

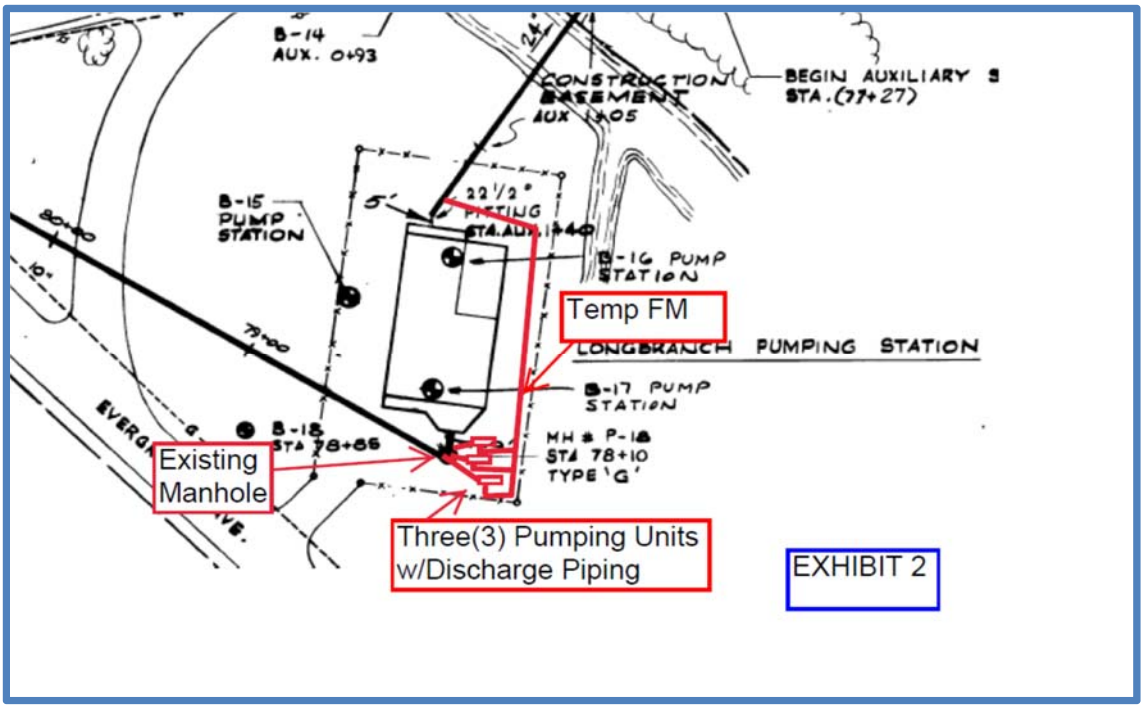


Exhibit 2: Proposed Station Bypass System

- The existing collection system includes 994 ft of 36-inch, 4,228 ft of 30-inch, and 1,410 ft of 24-inch gravity sewer. Based on these calculations, the existing system can withstand the indicated surcharge levels from the junction manhole to the upper end of the gravity collection system.
- A spreadsheet was prepared to calculate sewer system headloss during a surcharged condition. The calculations for the surcharged gravity system show that the WSE in the furthest upstream manhole would rise approximately 3.1 ft higher than at the junction manhole.
- In summary, the gravity sewer collection system can operate in the proposed limited surcharge condition with no significant risk of SSO events.

- Implementation

Implementation of the bypass system during project construction will be the Contractor's responsibility, and the following provisions will be included in the Contract Documents:

- For base bidding purposes, a proposed station bypass plan and functional specification will be provided in the Contract Documents. The Contractor may thereafter propose alternative bypass plans, including alternative components and/or layout, for review and approval by the Owner and Engineer.
- The Contractor will provide unit pricing for weekly rental of the proposed pumping equipment, in the event that additional units are needed during construction to accommodate forecasted wet weather events.
- Under severe wet weather conditions, the Contractor will be allowed to bypass higher flows than the design flows discussed herein, but not so high as to result in forcemain velocities exceeding 9 ft/sec.
- The Contractor will coordinate with JEA to provide remote monitoring of the bypass pumps and upstream control manhole conditions.
- The Contractor will carefully coordinate the sequencing of work and the bypass system layout to minimize the duration needed for station bypassing and to not impede other construction activities.

APPENDIX A

Supporting Information

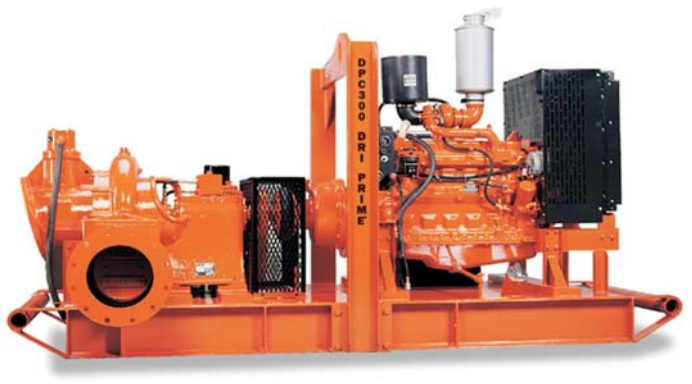
- **Manufacturer Data for Representative Godwin Pumps**
- **Hydraulic Calculations**
- **Exhibit 3: As-Built Drawings for Surcharged Collection System**
- **Headloss Calculations for Surcharged Collection System**

DPC300 Dri-Prime® Pump

The Godwin Dri-Prime DPC300 pump offers flow rates to 5080 USGPM and has the capability of handling solids up to 3.7" in diameter.

The DPC300 is able to automatically prime to 28' of suction lift from dry. Automatic or manual starting/stopping available through integral mounted control panel or optional wireless-remote access.

Solids handling and portability make the DPC300 the perfect choice for dewatering and bypass applications.



Features and Benefits

- Simple maintenance normally limited to checking fluid levels and filters.
- Dri-Prime (continuously operated Venturi air ejector priming device) requiring no periodic adjustment. Optional compressor clutch available.
- Extensive application flexibility handling sewage, slurries, and liquids with solids up to 3.7" in diameter.
- Liquid lubricated mechanical seal with high abrasion resistant solid silicon carbide faces and limited dry-running capabilities.
- Pedestal-mounted centrifugal pump with Dri-Prime system coupled to a diesel engine or electric motor.
- All cast iron construction (stainless steel construction option available) with cast steel impeller.
- Also available in a critically silenced unit which reduces noise levels to less than 70 dBA at 30'.
- Standard engine John Deere 6068HF285 (T3 Flex). Also available with John Deere 6068HC93 (IT4).

Specifications

Suction connection	12" 150# ANSI B16.5
Delivery connection	12" 150# ANSI B16.5
Max capacity	5080 USGPM †
Max solids handling	3.7"
Max impeller diameter	16.9"
Max operating temp	176°F*
Max pressure	49 psi
Max suction pressure	29 psi
Max casing pressure	74 psi
Max operating speed	1200 rpm

* Please contact our office for applications in excess of 176°F.

† Larger diameter pipes may be required for maximum flows.

Please contact the factory or office for further details. A typical picture of the pump is shown.
All information is approximate and for general guidance only.

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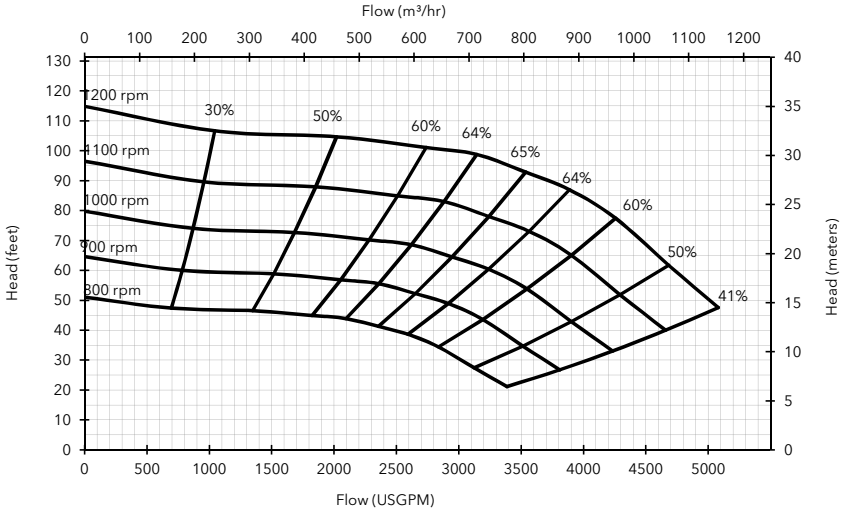
Performance Curve



Materials

Pump casing & suction cover	Cast iron BS EN 1561 - 1997
Wearplates	Cast iron BS EN 1561 - 1997
Pump Shaft	Carbon steel BS 970 - 1991 817M40T
Impeller	Cast iron BS EN 1561 - 1997
Non-return valve body	Cast iron BS EN 1561 - 1997
Mechanical seal	Silicon carbide face; Viton elastomers; Stainless steel body

Engine option 1

John Deere 6068HF285 (T3 Flex), 156 HP @ 2400 rpm

Impeller diameter 16.9"

Pump speed 1200 rpm driven by 2.0:1 gearbox

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	31	45	58	72	86
	Output (USGPM)				
10	5024	4714	4377	3937	3108
15	4921	4558	4144	3522	1036
20	4403	3885	3108	2072	777
25	2331	2072	1554	1036	-

Fuel capacity: 150 US Gal

Max Fuel consumption @ 2400 rpm: 8.7 US Gal/hr

Max Fuel consumption @ 2000 rpm: 8.0 US Gal/hr

Weight (Dry): 6,250 lbs

Weight (Wet): 7,330 lbs

Dim.: (L) 156" x (W) 55" x (H) 81"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.

Engine option 2

John Deere 6068HC93 (IT4), 157 HP @ 2400 rpm

Impeller diameter 16.9"

Pump speed 1200 rpm driven by 2.0:1 gearbox

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	31	45	58	72	86
	Output (USGPM)				
10	5024	4714	4377	3937	3108
15	4921	4558	4144	3522	1036
20	4403	3885	3108	2072	777
25	2331	2072	1554	1036	-

Fuel capacity: 150 US Gal

Max Fuel consumption @ 2400 rpm: 8.6 US Gal/hr

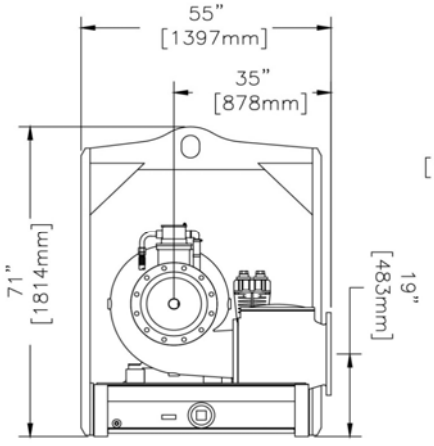
Max Fuel consumption @ 2000 rpm: 7.9 US Gal/hr

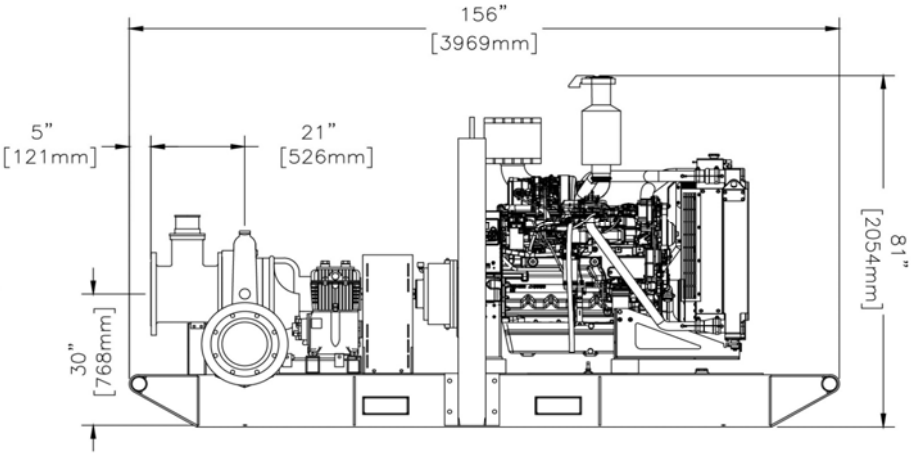
Weight (Dry): 6,550 lbs

Weight (Wet): 7,630 lbs

Dim.: (L) 156" x (W) 55" x (H) 81"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.





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(856) 467-3636 . Fax (856) 467-4841
Email: sales@godwinpumps.com

Reference number : 95-1017-3000
Date of issue : February 26, 2014
Issue : 5

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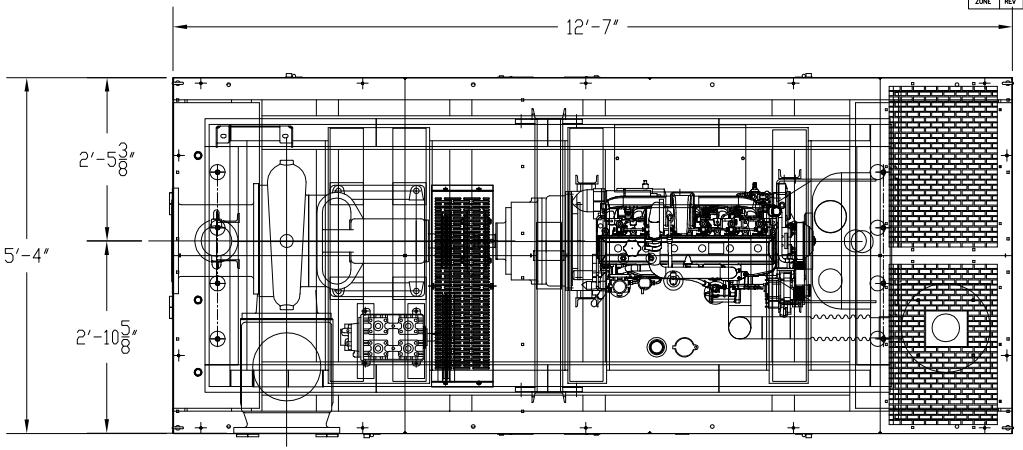
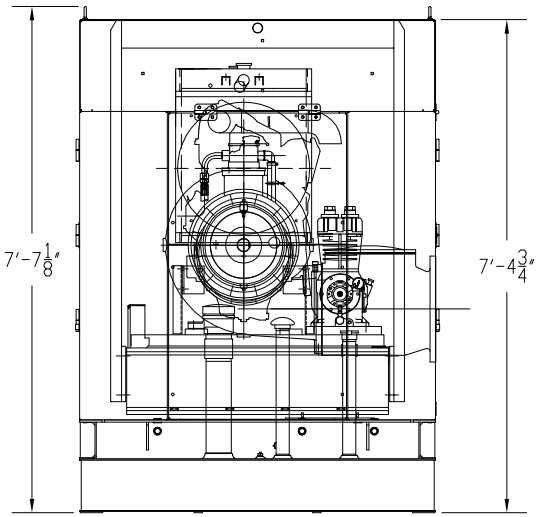
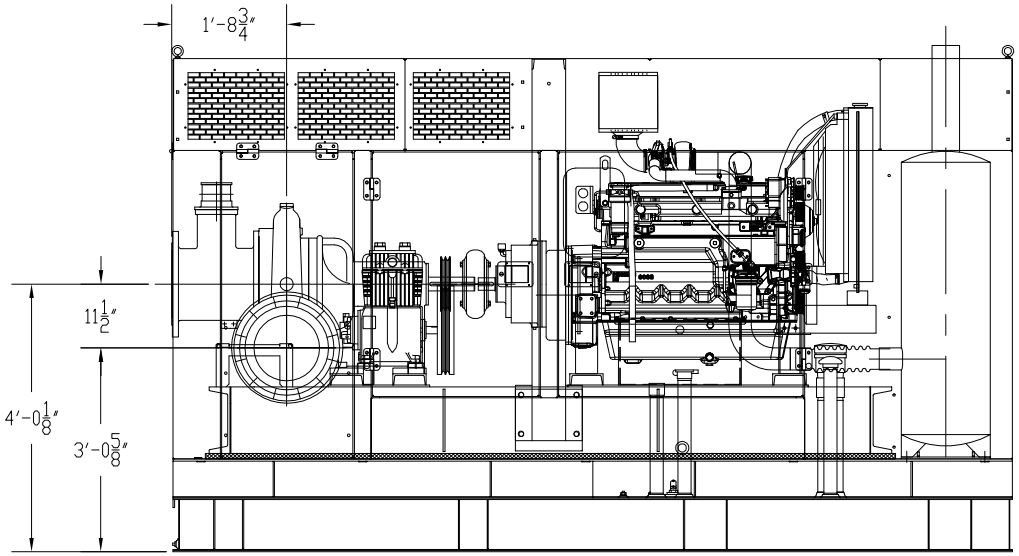
NOTES
1. DIMENSIONS IN INCHES
2. DO NOT SCALE DRAWING
3. DRAWING IS NOT FOR CONSTRUCTION
4. CONSULT FACTORY FOR CERTIFIED DIMENSIONS
5. SUCTION FLANGE: 12"/150# ANSI RF
6. DISCHARGE FLANGE: 12"/150# ANSI FF







REVISIONS				
ZONE	REV	DESCRIPTION	Date	APPROVED

SYMBOLS ETC. TO ANSI Y14	UNLESS OTHERWISE SPECIFIED
THIRD ANGLE PROJ.	DIMENSIONS ARE IN INCHES AND INCLUDE COATINGS TOLERANCES ARE: 2-PLACE DECIMALS ± .03 3-PLACE DECIMALS ± .010 ANGLES FRACTIONS 1/16

APPROVALS	DAY	MON.	YEAR
DRAWN BY D. STETSER	17	03	06
APPROVED BY X	x	x	x
ISSUED X	x	x	x

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TITLE
DPC300 CRITICAL
JD 6068T
UL TANK

CONTRACT# XXX

SIZE	FSCM NO.	DWG NO.	REV
B		2000	–

Scale 1/1 Sheet 1 OF 1

REV. –
DWG NO. 2000

DPC300 Dri-Prime® Pump

Pump Type	DPC300
Curve No	95-1017-3098
Revision	7
Date	12 April 2012

Branch Sizes	300 x 300 mm
Speed	Variable
Max Solids Handling	4 "
Max Impeller Diameter	17 "
Min Impeller Diameter	14 "

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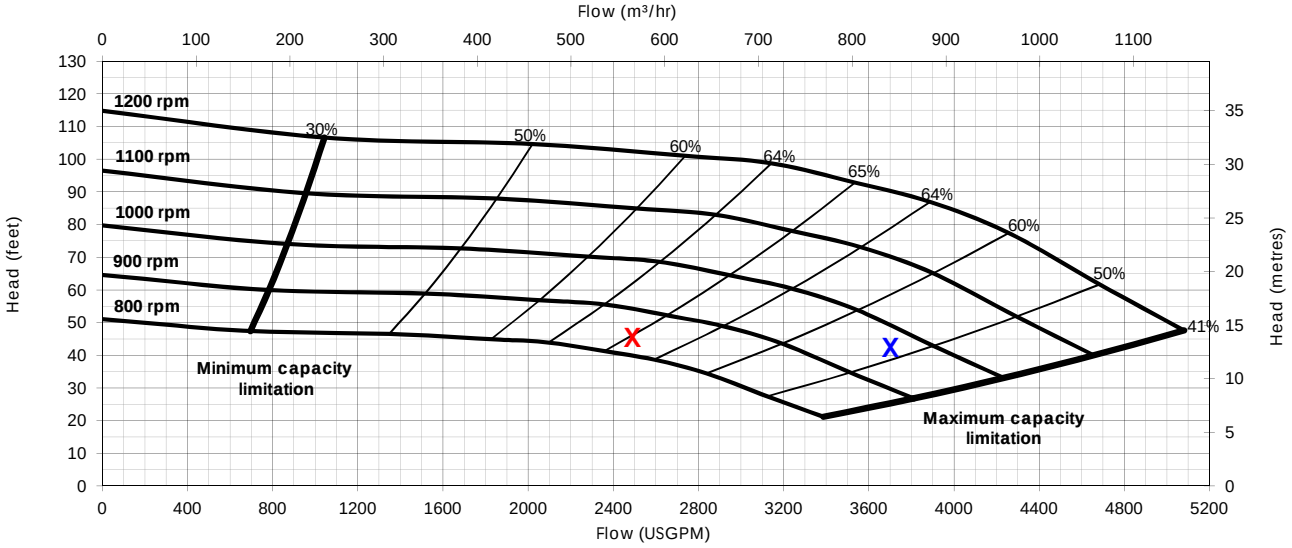
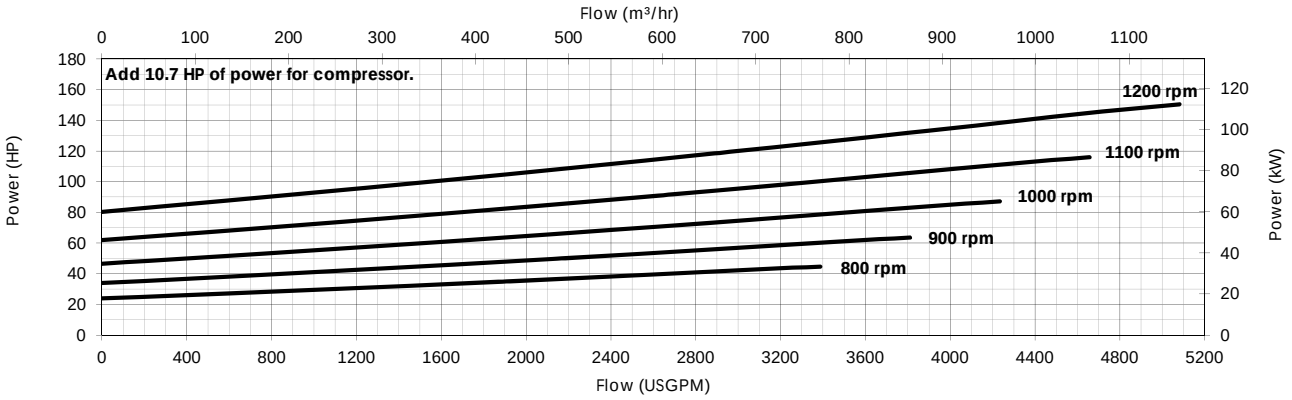
DPC300

Performance

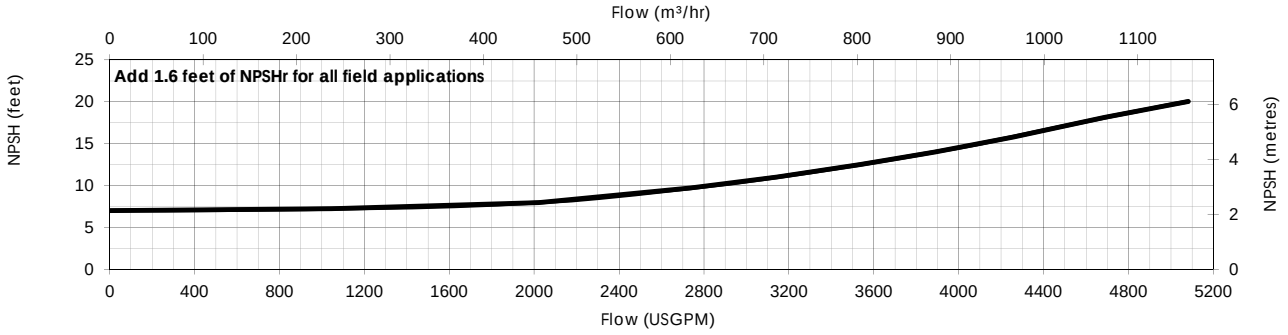
Design Point 1: 2500 gpm @ 46' TDH
Design Point 2: 3700 gpm @ 42' TDH



Power



NPSH



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CD200M Dri-Prime® Pump

The Godwin Dri-Prime CD200M pump offers flow rates to 2290 USGPM and has the capability of handling solids up to 3.0" in diameter.

The CD200M is able to automatically prime to 28' of suction lift from dry. Automatic or manual starting/stopping available through integral mounted control panel or optional wireless-remote access.

Indefinite dry-running is no problem due to the unique Godwin liquid bath mechanical seal design. Solids handling, dry-running, and portability make the CD200M the perfect choice for dewatering and bypass applications.

Features and Benefits

- Simple maintenance normally limited to checking fluid levels and filters.
- Dri-Prime (continuously operated Venturi air ejector priming device) requiring no periodic adjustment. Optional compressor clutch available.
- Extensive application flexibility handling sewage, slurries, and liquids with solids up to 3.0" in diameter.
- Dry-running high pressure liquid bath mechanical seal with high abrasion resistant solid silicon carbide faces.
- Close-coupled centrifugal pump with Dri-Prime system coupled to a diesel engine or electric motor.
- All cast iron construction (stainless steel construction option available) with cast steel impeller.
- Also available in a critically silenced unit which reduces noise levels to less than 70 dBA at 30'.
- Standard engine John Deere 4045TF290 (IT4 Flex). Also available with Caterpillar C4.4M-T (Export Only).

Specifications

Suction connection	8" 150# ANSI B16.5
Delivery connection	8" 150# ANSI B16.5
Max capacity	2290 USGPM †
Max solids handling	3.0"
Max impeller diameter	11.0"
Max operating temp	176°F*
Max pressure	70 psi
Max suction pressure	58 psi
Max casing pressure	105 psi
Max operating speed	2200 rpm

* Please contact our office for applications in excess of 176°F.

† Larger diameter pipes may be required for maximum flows.

Please contact the factory or office for further details. A typical picture of the pump is shown.
All information is approximate and for general guidance only.

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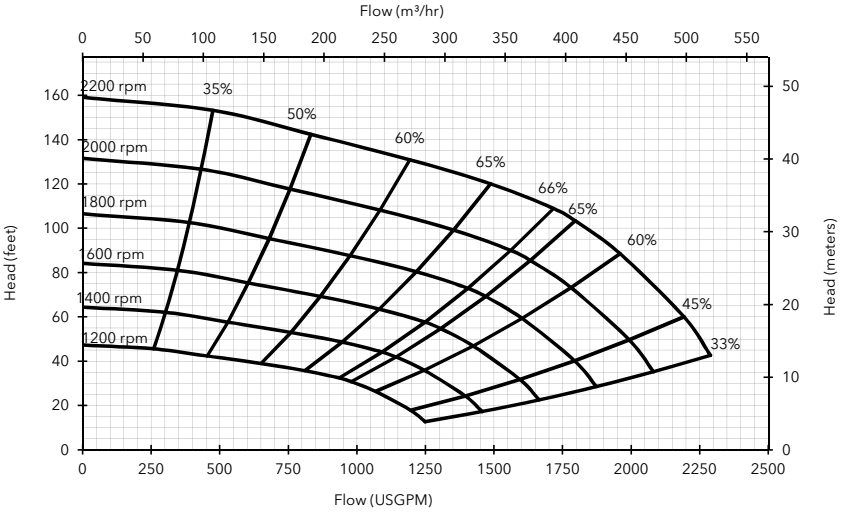
Performance Curve



Materials

Pump casing & suction cover	Cast iron BS EN 1561 - 1997
Wearplates	Cast iron BS EN 1561 - 1997
Pump Shaft	Carbon steel BS 970 - 1991 817M40T
Impeller	Cast Steel BS3100 A5 Hardness to 200 HB Brinell
Non-return valve body	Cast iron BS EN 1561 - 1997
Mechanical seal	Silicon carbide face; Viton elastomers; Stainless steel body

Engine option 1

John Deere 4045TF290 (IT4 Flex), 75 HP @ 2200 rpm

Impeller diameter 11.0"

Pump speed 2200 rpm

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	30	46	62	81	137
	Output (USGPM)				
10	2291	2208	2107	1913	605
15	2208	2160	2063	1821	484
20	2083	2034	1986	1773	412
25	1937	1889	1816	1724	-

Fuel capacity: 60 US Gal

Max Fuel consumption @ 2200 rpm: 4.4 US Gal/hr

Max Fuel consumption @ 1800 rpm: 3.8 US Gal/hr

Weight (Dry): 3,070 lbs

Weight (Wet): 3,490 lbs

Dim.: (L) 119" x (W) 66" x (H) 77"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.

Engine option 2

Caterpillar C4.4M-T (Export Only), 78 HP @ 2200 rpm

Impeller diameter 11.0"

Pump speed 2200 rpm

Suction Lift Table

Total Suction Head (feet)	Total Delivery Head (feet)				
	30	46	62	81	137
	Output (USGPM)				
10	2291	2208	2107	1913	605
15	2208	2160	2063	1821	484
20	2083	2034	1986	1773	412
25	1937	1889	1816	1724	-

Fuel capacity: 60 US Gal

Max Fuel consumption @ 2200 rpm: 4.6 US Gal/hr

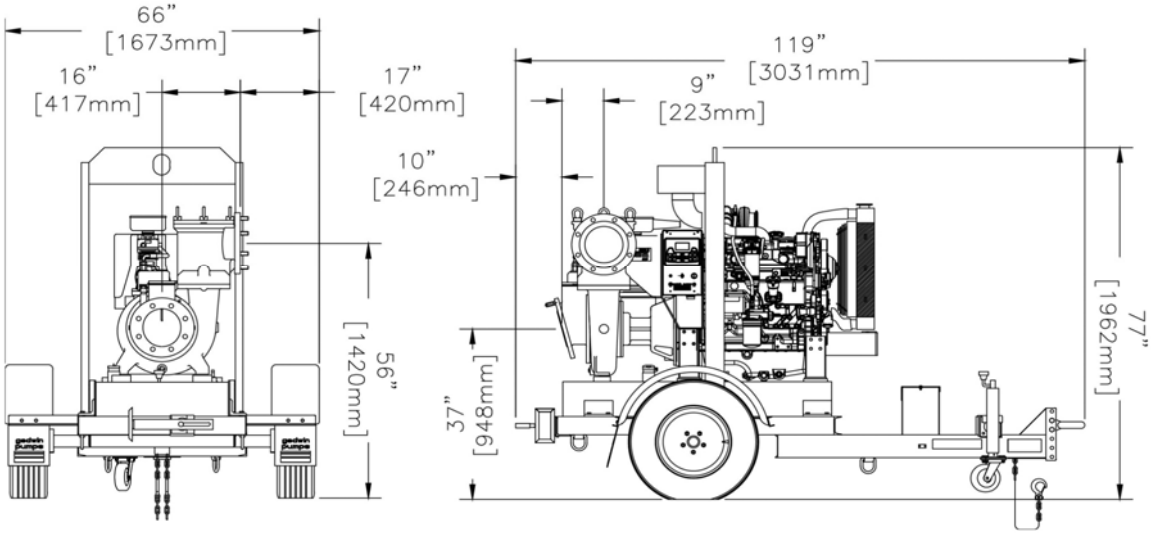
Max Fuel consumption @ 1800 rpm: 4.2 US Gal/hr

Weight (Dry): 3,070 lbs

Weight (Wet): 3,490 lbs

Dim.: (L) 119" x (W) 66" x (H) 77"

Performance data provided in tables is based on water tests at sea level and 20°C ambient. All information is approximate and for general guidance only. Please contact the factory or office for further details.



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Bypass Pumping

Option 1 - Use junction mH to set "Godwin" pumps.
Max Q = 4828 gpm → Use 5000 gpm
Use 2 pumps, each 2500 gpm @ 46' TDH

Operation Note:
Per discussion w/Godwin rep., the pumps are set to operate as follows:
- Minimum pump run time = 6 min
- Pump starts when water level rises to 1.5 times suction pipe ID

It is assumed that the pump(s) shut off when water level lowers to 1.0 x Suction ID

The objective of this calculation is to determine the water level at which NPSHR = NPSHA + margin at 5000 gpm (2500 gpm/pump) @ 46' TDH.

From Godwin catalog info for DPC300 pump operating at 2500 gpm @ 46' TDH:

- Suction pipe size = 12" nominal
- RPM = 850
- From Godwin "Suction Lift Table":
  Interpolate to determine Total Suction Head @ 2500 gpm

Tot. Suct Hd (ft)	Output (GPM) @ TDH = 46'
20	3885
25	2072

Tot Suction Hd @ 2500 gpm

$$= 20 + \left(\frac{3885-2500}{3885-2072}\right)(25-20)$$

$$= 20 + \left(\frac{1385}{1813}\right)(+5)$$

$$= 20 + (0.76)(5)$$

$$= 20 + 3.82$$

$$= \underline{23.82'}$$

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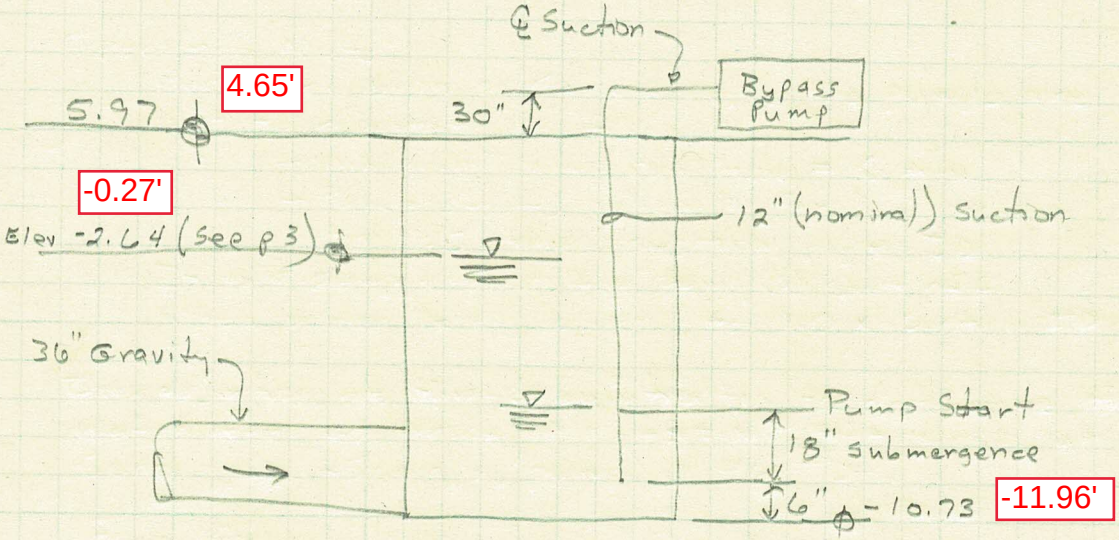
Total Suction Head = NPSHR

ICEA recommends a margin of -4' on NPSHA

☐ Nos in box = NAVD88 elevations



NPSHA = Atmospheric Press - Vapor Press $_{H_2O}$ @ 80° - Suction Lift - Suction Losses

Average Min. Baro. Press. for Jax (40 years) = 29.57 in 33.5 ft H_2O

For extreme weather use 12.9 psi; 29.8 ft H20

Vapor Press $_{H_2O}$ @ 80°F = 0.51 psi = 1.18' H_2O

Suction Lift = to be determined

Suction Losses:

Assume 12" PVC, C = 130

for 12" PVC @ 2500 gpm

V = 7.09 fps

$V^2/2g$ = 0.78'

h_f = 13.77'/1000'

Item	No. or Length	K or C	h_f
Entrance Loss, 12"	1	1.00	0.78
90° Ell, 12"	1	0.34	0.27
Pipe, 12"	25' (est.)	130	0.34

Suction Hd Loss = 1.39'

- See next page -

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Determine max. static suction lift for the system

This occurs when NPSHR = NPSHA + margin

∴ NPSHA = NPSHR − 4'

= Suction Head − 4'

= 23.82' − 4'

= 19.82'

Determine static Lift:

Use 29.8' H2O

19.82' = 33.5' − 1.18' − 1.39' − static Lift

19.82' = 30.93 − static Lift

static Lift = 30.93 − 19.82

= 11.11'

19.82'=29.8 - 1.18' -1.39'-sL

19.82' = 27.24'-SL

SL = 27.24-19.82' = 7.42'

∴ Pump will not deliver 2500 gpm until the water level is higher than 11.11' below pump ℄. (7.42')

∴ Elev @ which pump will deliver 2500 gpm;

El. @ Suction = 5.97 + 2.50 = 8.47

less: max Suction Lift = −11.11

Elev = −2.64

4.65' + 2.50' = 7.15'

-7.42'

-0.27'

Convert to NGVD 1929 for asbuilts

0.8'

EVERGREEN AVE. | WIGMORE ST.

LONGBRANCH CREEK

MATCH STA. 85+00

MATCH STA. 71+75

7½° RADIUS OF CURVATURE IN RUN OF 72' (4 PIPE SECTIONS) 11½° PER JOINT

STA 76+99 45° FITTING

FM 76+00

FM 74+00

75+00

72+00

ABANDONED MH

ABANDONED

B-13 STA 81+70

MH # P-19 STA 81+78 TYPE 'H'

8" S.S. STUB-OUT W/ DROP CONN

B-14 AUX. 0+93

AUX 0+00

CONSTRUCTION EASEMENT AUX 1+05

BEGIN AUXILIARY STA. 0-48 AT STA. (77+27)

B-15 PUMP STATION

22½° FITTING STA. AUX. 1+40

B-16 PUMP STATION

LONGBRANCH PUMPING STATION

B-17 PUMP STATION

B-18 STA 78+65

MH # P-18 STA 78+10 TYPE 'G'

BUFFALO AVE,

8" S.S. STUB-OUT. CONN EXIST 12" TO TOP OF 24" STUB-OUT W/ DROP CONN

44TH STREET

EVERGREEN AVE.

NOTE:
BENCH MARK EL. 10.97 44TH & EVERGREEN AND BUFFALO AVE. X CUT IS ON W. END OF PUMP ISLAND 0.3' W. OF W. EDGE 0.4' N. OF S. EDGE.

PLAN - WIGMORE ST.

SCALE: 1" = 50'

N

PROFILE

SCALE - HORIZ: 1" = 50'
VERT: 1" = 10'

TO STA 86+64

486' OF 36" DIA S=0.15'/100' DIP - 0.75 WALL THK.

368' OF 36" DIA S=0.08'/100' DIP - CLASS G

9' OF 36" DIA S=0.50'/100' DIP - CLASS G

32' OF 24" DIA DIP-CLASS 3 MECH. JOINT

153' OF 24" FORCE MAIN DIP CLASS 3 BALL & SOCKET JOINT

555' OF 24" FORCE MAIN DIP - CLASS 3 MECH. JOINT

85+00 84+00 83+00 82+00 81+00 80+00 79+00 78+01 AUX STA 1+45 AUX STA 1+05 AUX STA 0+00 0-48 77+27 77+00 76+00 75+00 74+00 73+00 72+00 71+75

MH # P-19 STA 81+78 TYPE 'H' TOP 7.95

B-13 STA 81+70

MH # P-18 STA 78+10 TYPE 'G' TOP 5.97

B-15 STA 78+65

B-14 STA 0+93

375' BRICK PAVING (POOR CONDITION)

595' ASPHALT PAVING (GOOD CONDITION)

EXISTING 6" WATER
EXISTING TELEPHONE CABLE
EXISTING 8" SEWER
EXISTING 12" SEWER CONNECTED TO MH DROP CONNECTION
EXISTING LINE INV. 3.46 (MH N.W. SIDE)
STUB OUT AND DROP CONNECTION FOR FUTURE 8" N.E. SIDE MH LINE INV. 1.75

EXISTING 12" WATER
EXISTING 10" GAS
EXISTING 8" GAS

STUB OUT FOR FUT. 24" 44TH ST. CONNECTION
N.W. SIDE MH LINE INV. - 9.54
CONN EXIST 12" WITH NEW DROP CONN TO TOP OF 24" STUB-OUT
INV. -10.39

INV. -10.68
INV. -10.73

LONG BRANCH PUMP STATION

22½° FITTING AUX STA 1+40

STA AUX 1+45 INV EL -2.50
STA AUX 1+08 INV EL -2.48
STA AUX 0+58 INV EL -6.00
STA AUX 0+37 INV EL -5.78
0-15 INV EL -3.00

WATER LEVEL 7 APRIL, 71

37' S=0.00

185' S=0.00

45° FITTING STA 76+99

LAY PIPE WITH HORIZ RADIUS OF CURVATURE 30'

12" WATER

EXISTING TELE PHONE CABLE

425' S=1.96'/100'

STA 75+75 INV EL -1.50

NAVD 88 - 1.07'

10
5
0
-5
-10

15468

NOTE ALL VERTICAL CHANGE IN SLOPE OF FORCE MAIN DONE BY RADIUS OF CURVATURE ANGULAR OFFSET AT PIPE JOINTS - MAXIMUM 1½° PER JOINT FOR MECHANICAL JOINT AND 10° PER JOINT FOR BALL & SOCKET JOINT.

AS BUILT
OCTOBER 1975

POSTED TO 44TH AND SAINT JOHNS AVE. 7-30-80

DAVID R. ATKINS CERTIFICATE No. 7555 STATE OF FLORIDA REGISTERED ENGINEER

NO.	DESCRIPTION	BY	FIRM	DATE	S&P	DATE	PW	DATE
	REVISIONS	SUBMITTAL			APPROVAL			

SUBMITTED BY: David R. Atkins
REG. ENGR. FLA. NO. 7555 DATE 4/21/71
ATKINS, CONNER & TURKNETT CO.

APPROVAL RECOMMENDED BY: W. Sverdrup
REG. ENGR. FLA. NO. 9663 DATE 7-22-71
SVERDRUP & PARCEL AND ASSOCIATES, Inc.

APPROVED BY
REG. ENGR. FLA. NO. DATE
WATER AND SEWER DIVISION

AUTHORIZED BY:
REG. ENGR. FLA. NO. 6547 DATE 7-23-71
OFFICE OF DIRECTOR OF PUBLIC WORKS
CITY OF JACKSONVILLE, FLORIDA

CITY OF JACKSONVILLE, FLORIDA

SEWERAGE IMPROVEMENT PROGRAM

PANAMA TRUNK SYSTEM

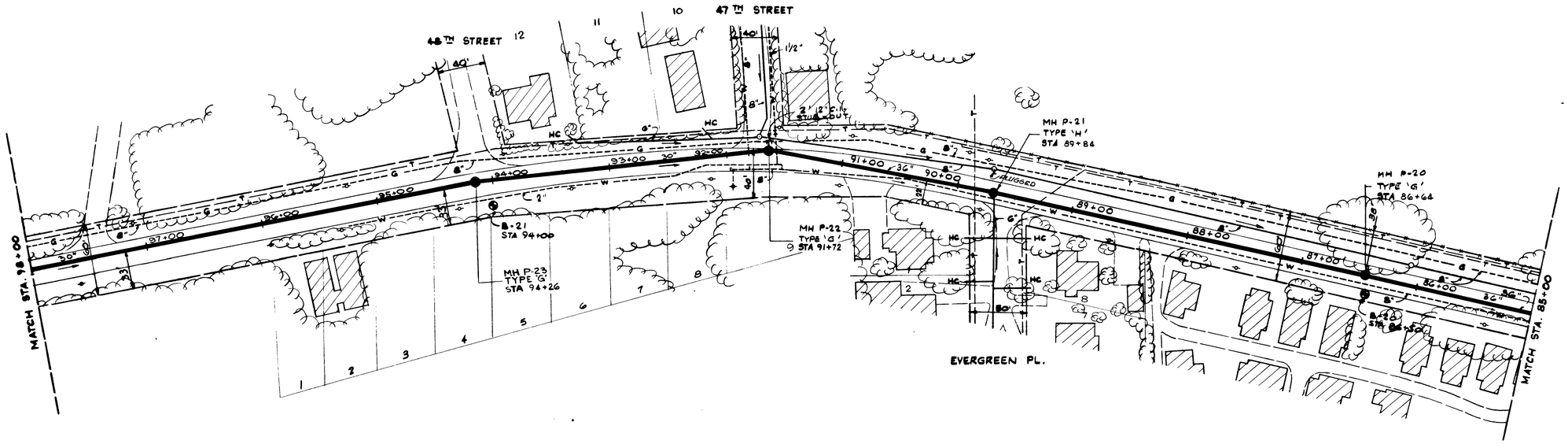
ATKINS, CONNER & TURKNETT CO.
DESIGN CONSULTANT
SVERDRUP & PARCEL AND ASSOCIATES, Inc. --- GENERAL CONSULTANT

DETAILED BY: EEH | SCALE AS SHOWN | DATE MAY, 1971
CHECKED BY: DRA | FILE 922.G

PLAN & PROFILE
EVERGREEN AVE. & WIGMORE STREET
STA. 71+75 TO STA. 85+00

CONTR. NO. JS-2 | PROJ. NO. 003 | SHEET NO. 10 OF 56

E&E 10 1293 9-70



PLAN - EVERGREEN AVE.

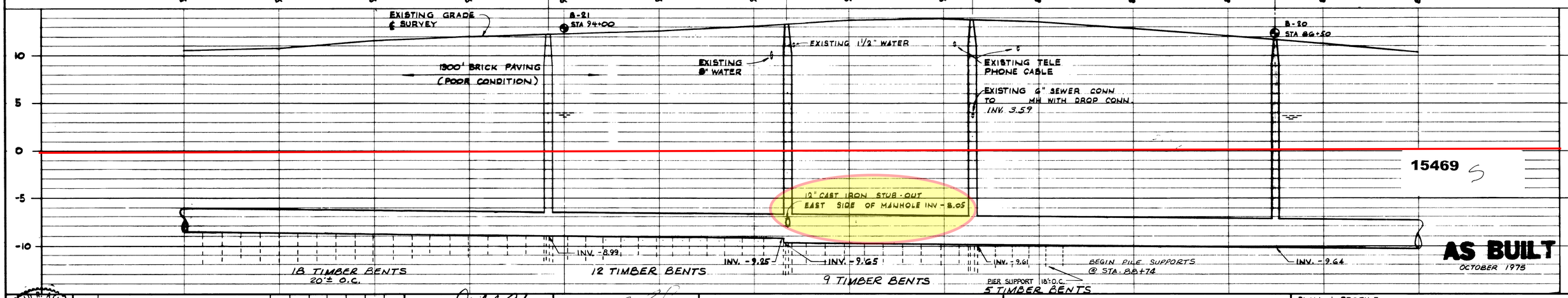
SCALE : 1" = 50'

N

PROFILE

SCALE - HORIZ : 1" = 50'
VERT : 1" = 05'

	TO STA. 99+95	569' OF 30" DIA S = 0.07 '/100' DIP - CLASS G	MH # P-23 (PILE SUPPORTED) TYPE 'G' STA 94+26 TOP 12.27	254' OF 30" DIA. S = 0.10 '/100' DIP - 0.68 WALL THK.	MH # P-22 (PILE SUPPORTED) TYPE 'G' STA 91+72 TOP 13.20	188' OF 36" DIA S = 0.02'/100' DIP - 0.78 WALL THK	MH # P-21 (PILE SUPPORTED) TYPE 'H' STA 89+84 TOP 13.99	320' OF 36" DIA S = 0.009'/100' DIP - 0.78 WALL THK	MH # P-20 TYPE 'G' STA 86+64 TOP 11.75	TO STA 81+78



15469 S

AS BUILT
OCTOBER 1975

DAVID R. ATKINS CERTIFICATE No. 7555 STATE OF FLORIDA REGISTERED ENGINEER

NO.	DESCRIPTION	BY	FIRM DATE	S&P DATE	PW DATE
	REVISIONS	SUBMITTAL	APPROVAL		
1	RELOCATION OF MH # P-23 - TRUNK LINE	JC	S&P 1-74	W.D. 1-74	12-5-74

SUBMITTED BY: David R Atkins
REG. ENGR. FLA. NO. 7555 DATE 4/21/71
ATKINS, CONNER & TURKNETT CO.

APPROVAL RECOMMENDED BY: H. Sutterfield
REG. ENGR. FLA. NO. 9663 DATE 7-22-71
SVERDRUP & PARCEL AND ASSOCIATES, Inc.

APPROVED BY:
REG. ENGR. FLA. NO. 4224 DATE 7/26/71
WATER AND SEWER DIVISION

AUTHORIZED BY:
REG. ENGR. FLA. NO. 6567 DATE 7-28-71
OFFICE OF DIRECTOR OF PUBLIC WORKS
CITY OF JACKSONVILLE, FLORIDA

CITY OF JACKSONVILLE, FLORIDA

SEWERAGE IMPROVEMENT PROGRAM

PANAMA TRUNK SYSTEM

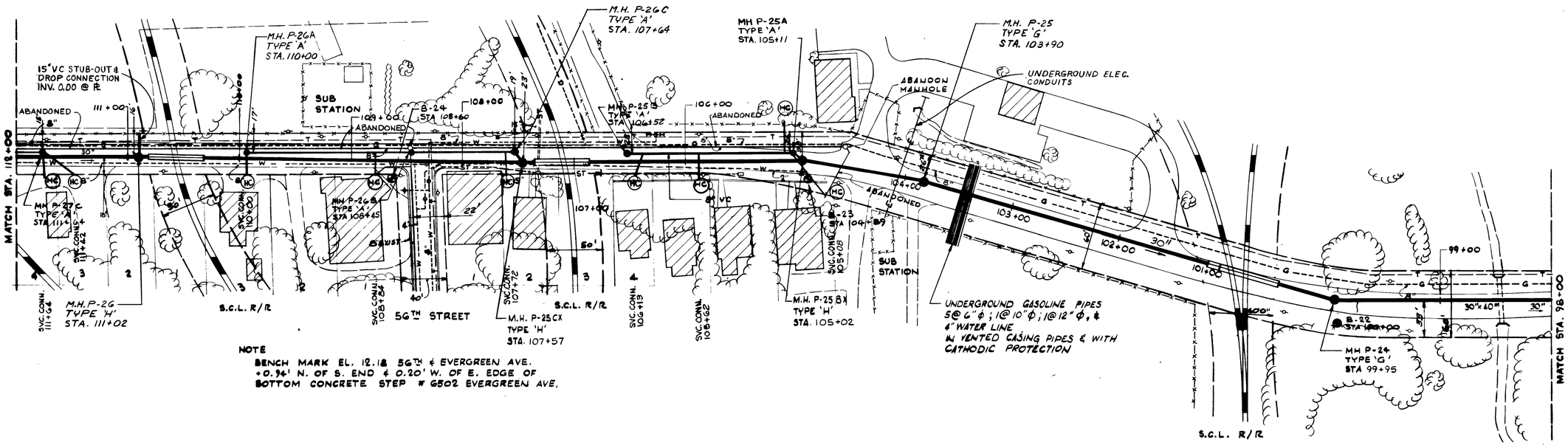
ATKINS, CONNER & TURKNETT CO.
DESIGN CONSULTANT
SVERDRUP & PARCEL AND ASSOCIATES, Inc. --- GENERAL CONSULTANT

DETAILED BY: EEH | SCALE AS SHOWN | DATE MAY, 1971
CHECKED BY: DRA | FILE 922.G

PLAN & PROFILE
EVERGREEN AVENUE
STA 85+00 TO STA. 98+00

CONTR. NO. JS-2 | PROJ. NO. 003 | SHEET NO. 11 OF 56

EAE 10 1253 8-70



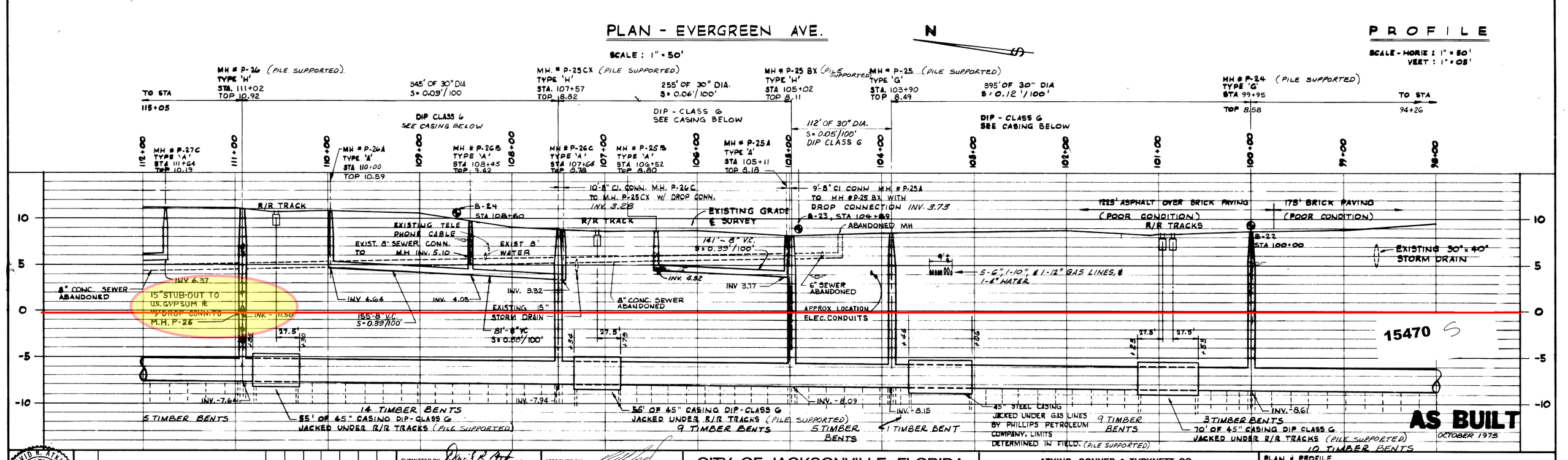
PLAN - EVERGREEN AVE.

SCALE : 1" = 50'

N

PROFILE

SCALE - HORIZ : 1" = 50'
VERT : 1" = 05'



DAVID K. ATKINS CERTIFICATE No. 7555 STATE OF FLORIDA REGISTERED ENGINEER

NO.	DESCRIPTION	BY	FIRM DATE	S&P DATE	AS DATE
1	REVISED LOCATION ALL MANHOLES AND ALIGNMENTS ADDED CASING UNDER GAS LINES	RGB	S&P 1-74	1-74	

REVISIONS — SUBMITTAL — APPROVAL

SUBMITTED BY: David K Atkins
REG. ENGR. FLA. NO 7555 DATE 4/21/71
ATKINS, CONNER & TURKNETT CO.

APPROVAL RECOMMENDED BY: M. Sturgeon
REG. ENGR. FLA. NO. 9663 DATE 7-22-71
SVERDRUP & PARCEL AND ASSOCIATES, Inc.

APPROVED BY
REG. ENGR. FLA. NO. 7314 DATE 7/22/71
WATER AND SEWER DIVISION

AUTHORIZED BY: J. Hartsfield
REG. ENGR. FLA. NO. 6247 DATE 7-23-71
OFFICE OF DIRECTOR OF PUBLIC WORKS
CITY OF JACKSONVILLE, FLORIDA

CITY OF JACKSONVILLE, FLORIDA

SEWERAGE IMPROVEMENT PROGRAM

PANAMA TRUNK SYSTEM

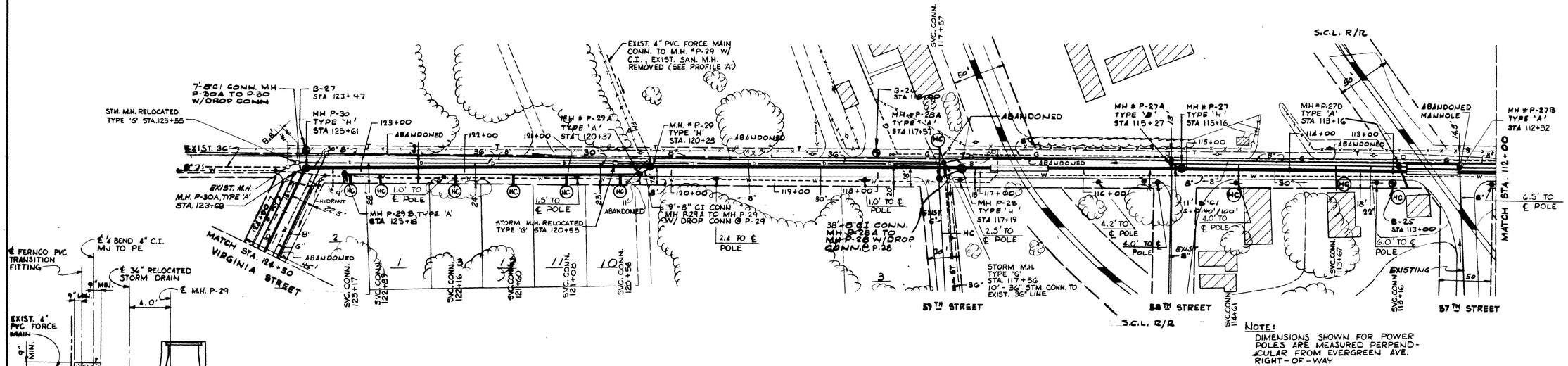
ATKINS, CONNER & TURKNETT CO.
DESIGN CONSULTANT
SVERDRUP & PARCEL AND ASSOCIATES, Inc. --- GENERAL CONSULTANT

DETAILED BY: EEH | SCALE: AS SHOWN | DATE: MAY, 1971
CHECKED BY: DRA | FILE 982.G

PLAN & PROFILE
EVERGREEN AVENUE
STA 98+00 TO STA 112+00

CONTR. NO. J8-2 | PROJ. NO. 003 | SHEET NO. 12 OF 56

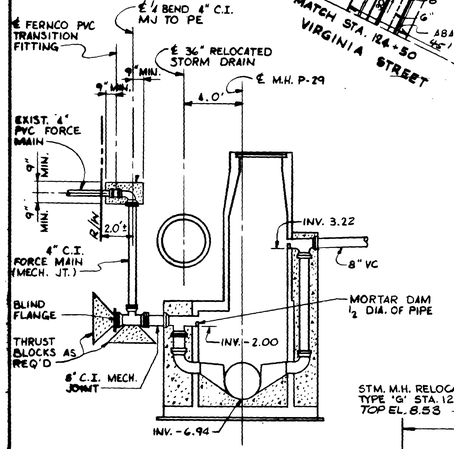
EJE 10 1253 8-70



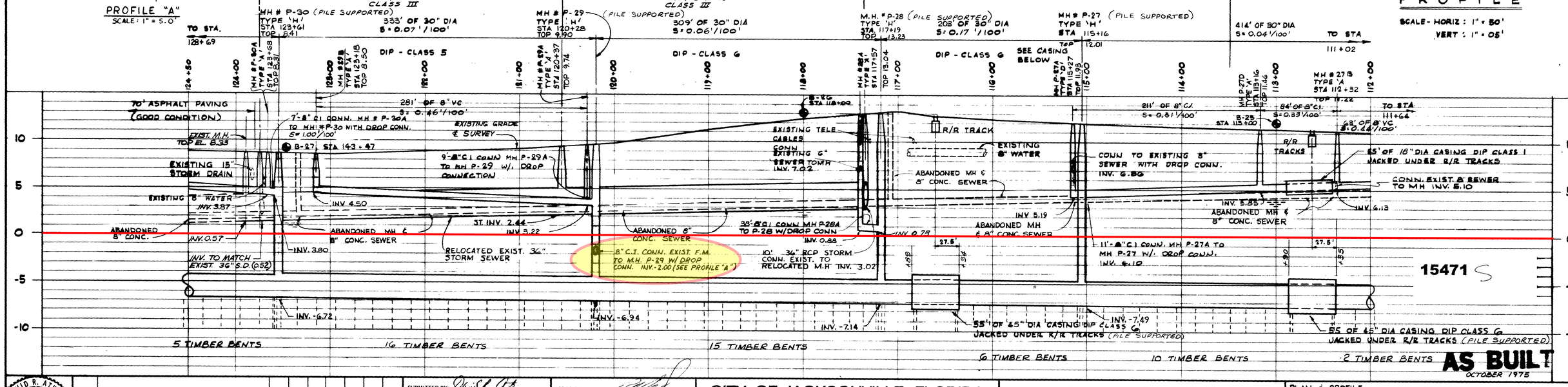
PLAN - EVERGREEN AVE.

SCALE: 1" = 50'

N



PROFILE "A"
SCALE: 1" = 5.0'



DAVID R. ATKINS CERTIFICATE No. 7555 STATE OF FLORIDA REGISTERED ENGINEER

NO.	DESCRIPTION	BY	FIRM	DATE	S&P	DATE	PW	DATE
	REVISIONS	SUBMITTAL			APPROVAL			
1	MANHOLE AND SEWER RELOCATION	B.R.	S&P	10/6/72	W.L.	10/6/72	J.H.H.	10/6/72

SUBMITTED BY: [signature] REG. ENGR. FLA. NO. 7555 DATE 6/21/71 ATKINS, CONNER & TURKNETT CO.

APPROVAL RECOMMENDED BY: [signature] REG. ENGR. FLA. NO. 9663 DATE 7-22-71 SVERDRUP & PARCEL AND ASSOCIATES, Inc.

APPROVED BY: [signature] REG. ENGR. FLA. NO. 4374 DATE 7/27/71 WATER AND SEWER DIVISION

AUTHORIZED BY: [signature] REG. ENGR. FLA. NO. 8147 DATE 7/27/71 OFFICE OF DIRECTOR OF PUBLIC WORKS CITY OF JACKSONVILLE, FLORIDA

CITY OF JACKSONVILLE, FLORIDA

SEWERAGE IMPROVEMENT PROGRAM

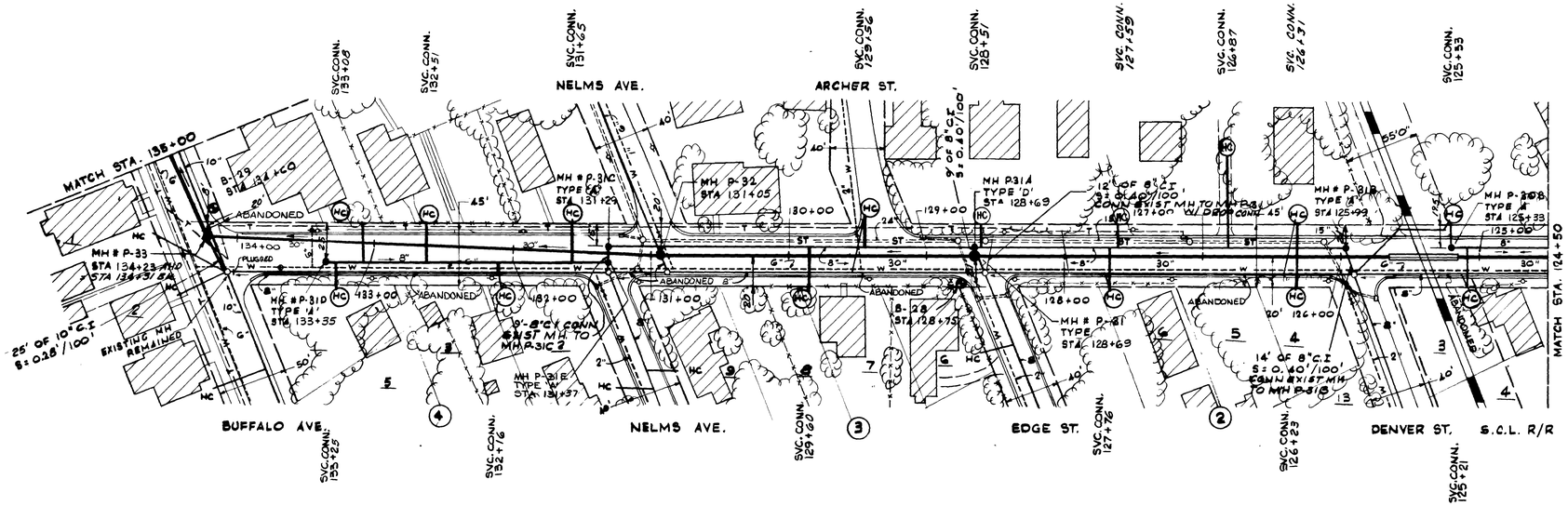
PANAMA TRUNK SYSTEM

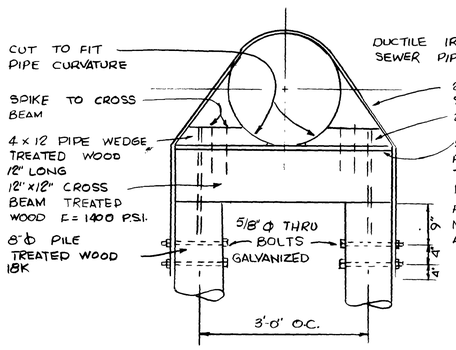
ATKINS, CONNER & TURKNETT CO.
DESIGN CONSULTANT
SVERDRUP & PARCEL AND ASSOCIATES, Inc. — GENERAL CONSULTANT

DETAILED BY: EEH | SCALE: AS SHOWN | DATE: MAY 1971
CHECKED BY: DRA | FILE 922.6

PLAN & PROFILE
EVERGREEN AVENUE
STA 112+00 TO STA 124+50

CONTR. NO. JS-2 | PROJ. NO. 003 | SHEET NO. 13 OF 56





TYPICAL PIER SUPPORT FOR PIPE

NO SCALE

NOTE:

BENCH MARK EL. 11.23 BUFFALO AND VIRGINIA ST. N.E. CORNER OF INTERSECTION +0.45' N. OF N. FACE CONCRETE BLOCK COLUMN NEAR S. END CONCRETE PUMP BASE E. OF W. EDGE 0.35' N. OF N.E. R. 18' W. OF W. FACE OF SERVICE STATION OFFICE.

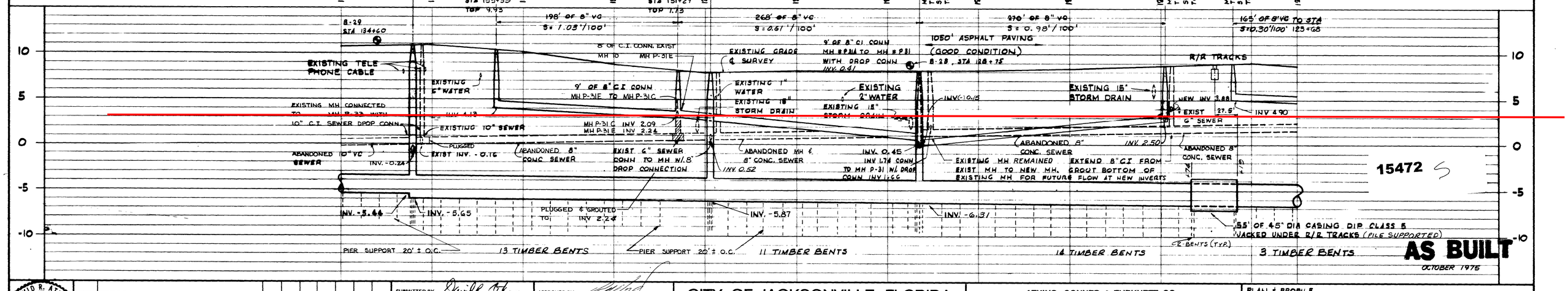
PLAN - VIRGINIA ST.

SCALE: 1" = 50'

N

PROFILE

SCALE - HORIZ: 1" = 50'
VERT: 1" = 05'



15472 S

AS BUILT

OCTOBER 1975

DAVID R. ATKINS CERTIFICATE No. 7555 STATE OF FLORIDA REGISTERED ENGINEER

NO.	DESCRIPTION	BY	FIRM	DATE	S&P	DATE	PW	DATE
	REVISIONS	SUBMITTAL			APPROVAL			

SUBMITTED BY: David R. Atkins
REG. ENGR. FLA. NO. 7555 DATE 4/21/71
ATKINS, CONNER & TURKNETT CO.
APPROVAL RECOMMENDED BY: H. Sutterfield
REG. ENGR. FLA. NO. 9663 DATE 7-22-71
SVERDRUP & PARCEL AND ASSOCIATES, Inc.

APPROVED BY:
REG. ENGR. FLA. NO. 4374 DATE 7-22-71
WATER AND SEWER DIVISION
AUTHORIZED BY: Sheppard
REG. ENGR. FLA. NO. 6640 DATE 7-23-71
OFFICE OF DIRECTOR OF PUBLIC WORKS
CITY OF JACKSONVILLE, FLORIDA

CITY OF JACKSONVILLE, FLORIDA

SEWERAGE IMPROVEMENT PROGRAM

PANAMA TRUNK SYSTEM

ATKINS, CONNER & TURKNETT CO.
DESIGN CONSULTANT
SVERDRUP & PARCEL AND ASSOCIATES, Inc. --- GENERAL CONSULTANT

DETAILED BY: EEH | SCALE AS SHOWN | DATE MAY, 1971
CHECKED BY DRA | FILE 922.G

PLAN & PROFILE
VIRGINIA STREET
STA 124+50 TO STA 135+00

CONTR. NO. JS-2 | PROJ. NO. 003 | SHEET NO. 14 OF 56

KAE 10 1253 8-70

TROUT RIVER

EXISTING 36" SEWER, TAMARACK OUTFALL - LEFT IN OPERATION AS STORM SEWER (1)

EXISTING M.H. CONNECTED TO M.H.#P-37 W/ 10' OF 10" VC INV. CONNECTION TO M.H.#P-37 - 3.43

MH P-37 TYPE 'G' STA 148+33 (1)

B-32 STA 148+35

SEWER REMAINED

MH P-36 TYPE 'G' STA 146+31

B-31 STA 142+00

MH P-35A TYPE 'G' STA. 143+53

MH P-35 TYPE 'G' STA. 142+57

MH P-34 TYPE 'G' STA 139+06

B-30 STA 133+20

90° VC STUB-OUT

SEWER REMAINED

ABANDONED 10" SEWER

MATCH STA. 135+00

TAMARACK ST.

TROUT RIVER DRIVE

FLOYD ST.

BUFFALO ST

KENILWORTH ST.

LAWTON AVE.

64TH ST.

PLAN - TROUT RIVER DR & BUFFALO ST

N

SCALE : 1" = 50'

96' OF 24" DIA. S=0.09'/100'

DIP - CLASS 2 PIER SUPPORT 20± O.C.

(1) MH P-37 TYPE 'G' STA 148+33 — (1) 202' OF 24" DIA S=0.10'/100' — TOP 5.20

MH P-36 (PILE SUPPORTED) TYPE 'G' STA 146+31 — 278' OF 24" DIA. S=0.11'/100' — TOP 5.33

MH P-35A (PILE SUPPORTED) TYPE 'G' STA 143+53 — MH P-35 (PILE SUPPORTED) TYPE 'G' STA 142+57 — 351' OF 24" DIA S=0.07'/100' — TOP 6.88

MH P-34 (PILE SUPPORTED) TYPE 'G' STA 139+06 — 483' OF 24" DIA S=0.08'/100' — TO STA 134+23 — TOP 8.85

DIP - CLASS 2 PIER SUPPORT 20' ± O.C.

DIP - CLASS 3 PIER SUPPORT 20' ± O.C.

DIP - CLASS 4 PIER SUPPORT 20' ± O.C.

148+00 147+00 146+00 145+00 144+00 143+00 142+00 141+00 140+00 139+00 138+00 137+00 136+00 135+00

10 5 0 -5 -10

1300' ASPHALT PAVING (GOOD CONDITION)

B-32 STA 148+35 — B-31 STA 142+00 — B-30 STA 133+20

EXISTING GRADE & SURVEY

EXISTING TELE PHONE CABLE

EXISTING 6" SEWER

EXISTING 10" VC

EXISTING 2" WATER

EXISTING 42" STORM DRAIN

STUB OUT PLUGGED FOR FUTURE 8" LATERAL CONNECTION EAST SIDE MH LINE INV. -3.00

EXISTING TELE PHONE CABLE

EXISTING 8" SEWER

EXISTING 15" STORM DRAIN

EXISTING MANHOLE

EXISTING 8" SEWER

EXISTING 8" SEWER

10" VC ABANDONED

PLUGGED

EXISTING SEWER

INV. -4.16 — PIER SUPPORT 20' ± O.C. 9 TIMBER BENTS

INV. -4.37 — PIER SUPPORT 20' ± O.C. 13 TIMBER BENTS

INV. -4.68 — INV. -4.77 — 4 TIMBER BENTS

PIER SUPPORT 20' ± O.C. 17 TIMBER BENTS

INV. -5.03 — PIER SUPPORT 20' ± O.C. 24 TIMBER BENTS

15473 S

AS BUILT OCTOBER 1975

DAVID R. ATKINS CERTIFICATE No. 7555 STATE OF FLORIDA REGISTERED ENGINEER

NO.	DESCRIPTION	BY	FIRM	DATE
	REVISIONS	SUBMITTAL		
(2)	REV. TO COORD. W/ FUT. WORK	DRA	ACT	8/12
(1)	REV. ADDENDUM #3, ITEM 37	DRA	ACT	8/12

SUBMITTED BY: David R. Atkins					
REG. ENGR. FLA. NO. 7555 DATE 4/21/71					
ATKINS, CONNER & TURKNETT CO.					
APPROVAL RECOMMENDED BY: H. Litchfield					
REG. ENGR. FLA. NO. 9663 DATE 7-22-71					
SVERDRUP & PARCEL AND ASSOCIATES, Inc.					
S&P	DATE	PW	DATE		
APPROVAL					

APPROVED BY: _____

REG. ENGR. FLA. NO. 4374 DATE 7/22/71

AUTHORIZED BY: _____

REG. ENGR. FLA. NO. 6642 DATE 7-23-71

WATER AND SEWER DIVISION

OFFICE OF DIRECTOR OF PUBLIC WORKS

CITY OF JACKSONVILLE, FLORIDA

CITY OF JACKSONVILLE, FLORIDA

SEWERAGE IMPROVEMENT PROGRAM

PANAMA TRUNK SYSTEM

ATKINS, CONNER & TURKNETT CO.

DESIGN CONSULTANT

SVERDRUP & PARCEL AND ASSOCIATES, Inc. --- GENERAL CONSULTANT

DETAILED BY EEH | SCALE AS SHOWN | DATE MAY 1971

CHECKED BY DRA | FILE 922.G

PLAN & PROFILE

BUFFALO ST AND TROUT RIVER DRIVE

STA. 135+00 TO STA. 148+57

CONTR. NO. JS-2 | PROJ. NO. 003 | SHEET NO. 15 OF 56

EAE 10 1253 9-70

Buffalo PS Major Gravity System rev 3/21/18

Size	Length
24	1410
30	4228
36	994

Total Flow to be allocated 5000 gpm

C 100

k 1

Buffalo St PS Upstream Gravity Sewer

From			To		Length	Size	Matl		Flow Contribution			Head Loss (ft)	
MH Num	Sta		MH Num	Sta					MH	gpm	Cum flow	Segment	Cum
Buffalo PS			P-18	78+01	9	36	DI		--	0	5000	0.081	**3.144**
P-18	78+01		P-19	81+78	368	36	DI		P-18	227	5000	0.223	3.064
P-19	81+78		P-20	86+64	486	36	DI		P-19	227	4773	0.247	2.841
P-20	86+64		P-21	89+94	320	36	DI		P-20	227	4545	0.170	2.595
P-21	89+94		P-22	91+72	188	36	DI		P-21	227	4318	0.114	2.425
P-22	91+72		P-23	94+26	254	30	DI		P-22	227	4091	0.275	2.311
P-23	94+26		P-24	99+25	569	30	DI		P-23	227	3864	0.434	2.035
P-24	99+25		P-25	103+90	395	30	DI		P-24	227	3636	0.295	1.601
P-25	103+90		P-25BX	105+02	112	30	DI		P-25	227	3409	0.127	1.306
P-25BX	105+02		P-25CX	107+57	255	30	DI		P-25BX	227	3182	0.171	1.179
P-25CX	107+57		P-26	111+02	345	30	DI		P-25CX	227	2955	0.181	1.008
P-26	111+02		P-27	115+16	414	30	DI		P-26	227	2727	0.177	0.827
P-27	115+16		P-28	117+19	203	30	DI		P-27	227	2500	0.094	0.650
P-28	117+19		P-29	120+28	309	30	DI		P-28	227	2273	0.102	0.556
P-29	120+28		P-30	123+61	302	30	DI		P-29	227	2045	0.082	0.454
P-30	123+61		P-31	128+69	508	30	DI		P-30	227	1818	0.096	0.372
P-31	128+69		P-32	131+05	236	30	DI		P-31	227	1591	0.043	0.276
P-32	131+05		P-33	134+23	326	30	DI		P-32	227	1364	0.040	0.233
P-33	134+23		P-34	139+06	483	24	DI		P-33	227	1136	0.108	0.193
P-34	139+06		P-35	142+57	351	24	DI		P-34	227	909	0.055	0.084
P-35	142+57		P-35A	143+53	96	24	DI		P-35	227	682	0.014	0.029
P-35A	143+53		P-36	146+31	278	24	DI		P-35A	227	455	0.013	0.015
P-36	146+31		P-37	148+33	202	24	DI		P-36	227	227	0.002	0.002