

Appendix I

Sanitary Sewer Analysis

Preliminary Sanitary Sewer Analysis

TTM 82390
1515 W. 178th Street
Gardena, CA 90248

Prepared for:

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I. Purpose:

The purpose of this study is to analyze the existing public sanitary sewer system capacity and to determine if the additional sewer flows generated by the proposed development will require upgrades to the existing public sanitary sewer system and downstream sanitary sewer lift station.

II. Introduction:

The proposed development site is approximately 5.63 acres and is located at 1515 W. 178th Street, in the City of Gardena, California. The site is bounded by W. 178th Street and existing commercial to the south, existing multi-family residential mobile home facility to the west, Southern California Edison easement to the north and existing commercial to the east. Refer to Figure 1 for site location information.

The existing site is currently occupied by a large commercial building with asphalt pavement. The site is currently occupied by many storage containers and semi-trucks. Majority of the site is impervious with landscaping located adjacent to the public right-of-way on W. 178th Street.

Melia Homes is proposing to construction a residential development consisting of approximately 120 condominium units with twenty-two (22) 3-story buildings consisting of 3-4 bedroom floor plans. The proposed development will have a primary recreational area with a pool/ spa with connecting open space areas.

III. Existing Conditions:

Manhole #1 (2018.09 178th Street US MH) – 1599 W. 178th Street, Gardena, CA 90248 Sta. 6+77.68

There is an existing 8" sewer main flowing westerly in W. 178th Street located approximately 5' north of the street centerline. At the southwest corner of the site, the existing 8" sewer main connects to an existing sewer manhole (Manhole #1), located approximately 2' south of the northerly right-of-way. Flows from the existing site, the commercial buildings to the south and the mobile home facility to the west of the site are all tributary to this existing manhole. Flows continue to drain in the westerly direction to an existing sanitary sewer lift station located near the northwest corner of W. 178th Street and La Salle Avenue. The existing sewer lift station discharges flows via an existing 6" ductile iron pipe to an existing Los Angeles County Sanitation Districts' (LACSD) 57" trunk sewer (Joint Outfall "D", Unit 2, Section 3) that continues to flow in the southerly direction within La Salle Avenue.

Manhole #1, located near the southwest corner of the site, was selected as the monitoring location based on the existing City of Gardena Sewer As-Built Plan (Drawing No. 7-307-A, dated January 1961). Per this as-built plan is a Key Map that indicates the entire mobile home facility, including the portion on the westerly side of Western Avenue is tributary to this existing manhole. The

available as-built plan does not show any other existing sewer laterals and/ or stubs connecting to the existing sewer main between the monitored manhole and the existing sewer lift station.

The proposed development project flows tributary to this manhole will consist of approximately 114 residential dwelling units.

The sewer monitoring data collected at Manhole #1 by Utility Systems Science & Software (US³), the existing peak flow rate was measured at 0.0727 cfs (cubic feet per second) (47,000 gallons per day (gpd)) with a peak depth flow of 1.41" (d/D = 0.1763).

With a peaking factor of 2.5, the proposed development project flows tributary to Manhole #1 have been calculated at 0.1323 cfs (85,500 gpd), with an overall total future peak flow rate of 0.2050 cfs (132,500 gpd) at a peak depth flow of 2.37" (d/D = 0.2963).

As a result, flows at Manhole #1 will increase by approximately 68.1%.

**Manhole #2 (178th Street DS MH) – 178th Street at Alley
Sta. 8+90.00**

There is an existing 8" sewer main flowing westerly in W. 178th Street located approximately 2' south of the northerly right-of-way. Existing flows from Manhole #1 and 71 existing single family residential dwellings to the south and southeast are all tributary to this existing manhole. Flows continue to drain in the westerly direction to an existing sanitary sewer lift station located near the northwest corner of W. 178th Street and La Salle Avenue. Refer Section V for the existing lift station discharge flow information.

At the time of the sewer monitoring was conducted, Manhole #2 could not be field located as it was covered by debris and dense vegetation. Existing as-built information per Drawing No. 7-307-A does not indicate any additional tributary flows to this existing manhole, therefore Manhole #1 was selected for the monitoring. The City of Gardena provided a Sewer Atlas Map exhibit identifying the tributary areas discharging to Manhole #2. It was assumed that the existing commercial parcels fronting W. 178th Street discharge to the existing 8" sewer main that connects to Manhole #1. The City of Gardena, Zoning Map dated January 2018 was also utilized to verify the number of existing single family residential dwelling units tributary to Manhole #2.

With a peaking factor of 2.5, the existing single family dwellings tributary Manhole #2 have been calculated at 0.1160 cfs (75,000 gpd). By utilizing the same calculated Manning's n for Manhole #1 and the downstream pipe slope from Manhole #2, the existing peak depth flow for Manhole #2 is approximately 2.34" (d/D = 0.2925).

When combining the monitoring data of the existing peak flows and the proposed development project flows from Manhole #1 with the existing upstream tributary flows to Manhole #2, the overall total future peak flow rate has been calculated as 0.3210 cfs (207,500 gpd) with a peak depth flow of 3.10" (d/D=0.3875).

As a result, flows at Manhole #2 will increase by approximately 32.5%.

Refer to the Manhole #2 Tributary Areas Exhibit and Zoning Map located within Appendix A of this analysis for additional information. Refer to the existing City of Gardena as-built and atlas map information within Appendix E of this analysis for additional information.

**Sewer Lift Station – 178th Street at La Salle Avenue
Sta. 10+66.19**

Existing flows from Manhole #1 and #2 are tributary to an existing 8" sewer main flowing westerly in W. 178th Street located approximately 2' south of the northerly right-of-way and discharge into an existing sewer lift station. Per the Sewer Pump Station Renovation As-Built (Dwg. No. 7-515) dated February 1992, the existing pump well is approximately 25' deep designed with two (2) 5 horsepower (HP) submersible pumps with a 3-level flow system. Both pump systems connect to an existing 6" steel pipe that discharges effluent to an existing LACSD 57" trunk sewer (Joint Outfall "D", Unit 2, Section 3) that continues to flow in the southerly direction within La Salle Avenue.

The sewer lift station was initially constructed per the Pump Station and Details As-Built (Dwg. No. 7-307B) dated March 1961. The pump design criteria listed within the as-built indicate a discharge flow rate of 230 gallons per minute (gpm) with a corresponding total dynamic head of 26.0'. It is assumed as the pump system was upgraded that the initial design pump criteria was maintained.

Per coordination with City Staff, Jimni Systems, Inc., a pump maintenance contractor was engaged by the City to evaluate the condition of the existing lift station. Jimni Systems, Inc. indicated that the existing pump system consisted of two (2) 4" Reliance/ Essco Submersible Pumps (Motor ID # P18G2709K, 5hp, 1150rpm, X1280TY frame) supported via 3-phase electrical panel.

In order to confirm the existing lift station's capacity, the City requested that flow monitoring be conducted to determine the amount of effluent discharging from the existing 8" inflow pipe to the lift station. Based on the inflow data, the maximum recorded discharge rate was 164.50 gpm (or 236,880 gpd (gallons per day)).

The equipment installed to measure the inflow pipe was inserted within the pipe, therefore utilizing the ultimate maximum and/ or average flow rate may not represent actual conditions. Therefore, an average of the top 10% maximum recorded discharges was analyzed at approximately 142.05 gpm (204,552 gpd). These values represent actual data, therefore no peaking factor was applied.

Refer to the Appendix F of this analysis for additional information and data regarding the pump inflow pipe monitoring. Refer to the existing City of Gardena as-built and atlas map information within Appendix E of this analysis for additional information.

IV. Methodology/Rational:

Per email correspondence with Melia Homes and City of Gardena, the Los Angeles County Department of Public Works (LACDPW), Estimated Average Daily Sewage Flows for Various Occupancies was utilized to determine the proposed development's average sewer peak flow rates. Refer to Appendix D for a copy of referenced design criteria.

The proposed development and existing single family residential sewer peak flow rates were based on residential sewer generation rates for 3-bedroom or more dwelling units at 300 gpd (gallons per day)/ DU (dwelling unit). A peaking factor of 2.5 was utilized within all calculations. To be conservative, the existing calculated peak flows tributary to Manhole #2 was increased to 100 single family residential dwellings.

In order to approximate the real-world conditions of the pipe, a new calculated Manning's n-value based on the maximum flow rate and depth of flow observed is utilized to support the calculations. This new Manning's n-value is then used to calculate the depth of flow for the combined proposed and existing flow rates that represents the proposed post-development conditions.

Refer to the Sanitary Sewer Analysis Calculation Table in Appendix B for additional information.

Manhole Monitoring

To support the future project development, one (1) sanitary sewer manhole was selected to be monitored. Manhole #2 was the preferred manhole to be monitored, however this manhole was unable to be field located due to debris and dense vegetation surrounding the manhole. Refer to the Exhibits within Appendix A of this analysis for manhole location information. The proposed peak development flows were added to the monitored existing peak flows at Manhole #1 and applied to the existing calculated peak flows at Manhole #2.

A 7-day duration at 15-minute intervals was utilized for sewer manhole monitoring data. Sewer Monitoring was performed by Utility Systems Science & Software (US³) utilizing Radar-Based Velocity/ Area Flow Meter placed within the downstream line to ensure all tributary flows to the manhole were monitored. When the monitoring equipment is installed, point velocity measurements are taken to provide equipment calibration prior to the start of the monitoring. Radar-based flow meter equipment does not come into contact with the flow, therefore eliminates accuracy problems that are inherent with submerged conventional sensor type equipment. Refer to the Sewer Monitoring Data and US³ information located within Appendix C of this analysis.

Based on sewer monitoring data collected by US³, Manhole #1 indicated good flow, even hydraulics and no surcharge conditions.

Refer to Appendix C for the manhole monitoring data.

Pump Inflow Pipe Monitoring

At the request of the City, "in" pipe flow monitoring was conducted to determine the amount of effluent entering the existing sewer lift station which as a result would confirm any assumptions on the existing pump capacity.

A 7-day duration at 15-minute intervals was utilized to monitor the inflow pipe. Sewer inflow pipe monitoring was performed by National Plant Services, Inc. (NPS) utilizing a submerged Electromagnetic Velocity and Differential Pressure Transducer (Model 460 Flo-Tote 3) to measure (record) velocity and depth of flow (level) within the pipe. Each meter is pre-calibrated to verify precision velocity and depth measurements prior to installation. The reported accuracy is approximately +/- 2% for each transducer.

NPS provided the raw data for the 15-minute intervals with a corresponding 15-minute and 1-hour chart showing the relationship between the average velocity, depth (level) and flow. When referring to the 1-hour average chart, there are specific instances where the velocity and flow significantly decrease, however the depth (level) remains constant. This appears to occur between the hours of 10-11:00pm daily. In addition, there are other minor instances where velocity and flow simultaneously decrease, while depth remains constant at the 10-11:00am hours. This is a direct result of the existing pump well filling and when the float elevations are activated to turn on the pumps. During the evening hours, it is assumed that the pump well completely empties, however during the morning hours the pump well only partially empties. The data represented within the inflow pipe monitoring indicates that the depth of flow (level) is directly impacted when the pump well is full.

Therefore, by utilizing a clean manning's ($n=0.014$) for vitrified clay pipe, existing as-built pipe size and slope, and the maximum recorded discharge rate was 164.50 gpm (0.37 cfs), the existing depth of flow within the inflow pipe is approximately 4.39" ($d/D = 0.5484$).

Based on the calculations provided per Appendix B, the proposed development peak flow rate is approximately 59.39 gpm (0.1323 cfs), therefore the total tributary peak flow rate is approximately 223.89 gpm (0.5023 cfs) and the future depth of flow within the inflow pipe is approximately 5.37" ($d/D = 0.6712$).

Refer to Appendix F for the pump inflow pipe monitoring data.

V. Sanitary Sewer Pump Station:

The existing Sanitary Sewer Pump Station located at W. 178th Street and La Salle Avenue was built in 1961 based on existing City of Gardena As-Built Plans (Drawing No. 7-307-B) with a WEMCO submersible pump, Model 451 with 24140 – 7 ½" impeller with 5 HP, 1735 RPM with 220 volts, 3-phase power. Based on this as-built, the pump station's discharge rate was designed at 230 gpm (gallons per minute) (or equivalent 0.5124 cfs) with a total dynamic head of 26.0' and 100% standby. The pump well consisted of an approximate 25' deep 66" reinforced concrete pipe (RCP) manhole type system with a poured in placed concrete base.

Per the City of Gardena As-Built Plans (Drawing No. 7-484, dated October 1977), the WEMCO submersible pump system was replaced with a Smith & Loveless Wet Well Mounted Lift Stations with Duplex Sewage pumps. The existing concrete wet well was reutilized. The pump consisted of a suction type system with two (2) 6" suction pipes located 6-9" above the bottom of the wet well. A series of float switches and alarms were installed to support the suction pump system and a new duplex motor system installed. Sewer effluent was suctioned to the top of the wet well and discharged through an 8" steel force main, approximately 10.85' below existing grade. Information regarding the suction pump system discharge rate was not provided on the as-builts.

Per the City of Gardena As-Built Plans (Drawing No. 7-515, dated February 1992), the existing suction duplex pump system was replaced with two (2) 5 HP submersible pumps with associated float switches and alarms. The existing concrete wet well was reutilized. All new electrical components were also upgraded during this renovation. Sewer effluent is currently discharged through a 6" steel force main.

Since there is no information regarding current lift station discharge rate, it is assumed that the discharge rate was maintained from the original 1961 pump system design per As-Built Drawing No. 7-307-B.

Based on the As-Built Plans (Drawing No. 7-515) for the existing pump system, actual total dynamic head is approximately 14.93' from the bottom of the well to the discharge pipe invert. The actual total dynamic head was analyzed by utilizing the Hazen-Williams Head Loss and Minor Loss Equations for friction losses within the pipe and bends. Estimated distance of 50 linear feet from the well to the LACSD trunk manhole, as-built invert elevations and discharge pipe material were referenced from the As-Built plans and utilized within the head loss calculations. Refer to Appendix B for head loss calculations.

When combining the existing recorded maximum peak flows of 164.50 gpm (236,880 gpd) and the proposed peak flows from the future development is approximately 59.39 gpm (85,500 gpd), therefore the total peak flow rate tributary to the existing pump system is approximately 223.89 gpm (322,380 gpd). An applied peaking factor of 1.5 is required for pump system capacity design, therefore the tributary total peak flow rate is approximately 335.84 gpm (483,570 gpd).

Essco Pumps (pump manufacturer) provided an estimated pump performance curve based on the specific pump specifications at 5 HP and impeller diameter of 8.25" with a calculated total dynamic head of 15' based on as-built plans. Per these conditions, it was determined the maximum pump discharge rate is approximately 475 gpm at 4.5 HP, which exceeds the factored design flow rate of 335 gpm.

Refer to Appendix G for the existing pump performance curve information and Appendix E for referenced as-built plans.

VI. Conclusions:

The results from this Preliminary Sanitary Sewer Analysis using methods provided by the Los Angeles County Department of Public Works (LACDPW) and Manning's equation demonstrate that the proposed development peak flows in addition to the monitored and calculated existing peak flow rates indicate that there is an increased impact to the downstream existing sanitary sewer system, however the potential increase is within acceptable agency standards.

A combination of the manhole monitoring and sewer generation rate based on tributary area/ land use calculations determined that the overall total future peak flow rate, including the proposed development is approximately 0.3210 cfs (207,500 gpd).

The pump inflow pipe monitoring data determined that the existing maximum peak flow rate discharging to the pump well is approximately 0.3700 cfs (or 236,552 gpd). The pump inflow pipe monitoring data represents increased peak flow rates, therefore have governed within this study.

The initial pump design criteria per as-built information indicates a discharge rate of 230 gallons per minute (gpm) or approximately 0.5124 cfs (331,200 gpd) which utilizes an exaggerated total dynamic head of 26'. By analyzing the existing conditions of the pump well and 6" steel discharge pipe, the total dynamic head is approximately 10' less, therefore requiring pump system to use less power resulting in an increased overall discharge rate. Therefore, the increased overall future peak flow rate with an applied factor of safety, approximately 335.89 gpm of (0.7583 cfs) can be maintained within the existing pump systems operating capacity at varying total dynamic head elevations of 15' to 20'.

The existing capacity within the downstream 8" pipe with a slope of 0.32%, using a clean Manning's $n=0.014$ for VCP between Manhole #2 and the pump well is approximately 54.8% and the proposed capacity is approximately 67.1%, an approximate 22.4% overall increase. Although, the proposed development increases the overall downstream pipe capacity, the existing pipe capacity is currently over the typical 50% maximum capacity requirement. Note, the pump inflow pipe monitoring data does not exclude any outliers or data points that may alter the results and/ or accounts for the +/- 2% accuracy correction. The maximum peak flow rate only occurred one time during a 7-day duration.

Essco Pumps indicated that the pump performance is directly related to the impeller diameter, condition of pump and equipment. If the impeller is under sized and/ or worn down due to wear and tear, then the pump system will not operate at the desired discharge rate and will tend to burn out the motors more quickly. Although the existing pump system's capacity is within acceptable range based on a good conditional pump system, additional investigation by the City on the impeller size, pump motor and overall condition of the pump system is recommended.

The results of this study indicate that the future peak flow rates produced by the proposed development should not significantly impact or exceed the maximum pump capacity within the downstream existing sewer lift station.

Sanitary Sewer Analysis

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1515 W. 178th Street
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October 2018

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APPENDICIES

- A. Existing & Proposed Flows – Sanitary Sewer Analysis Exhibit
- B. Calculations
- C. Monitoring Data
- D. Sewer As-Builts
- E. Design Criteria

I. Purpose:

The purpose of this study is to analyze the existing sewer capacity and to determine if the additional sewer flows generated by this proposed development will require upgrades to the existing public sewer system and downstream sanitary sewer lift station.

II. Introduction:

The proposed development site is approximately 5.63 acres and is located at 1515 W. 178th Street, in the City of Gardena, California. The site is bounded by W. 178th Street and existing commercial to the south, existing multi-family residential consisting of a mobile home facility to the west, Southern California Edison easement to the north and existing commercial to the east. Refer to Figure 1 for site location information.

The existing site is currently occupied by a large commercial building with asphalt pavement. The site is currently occupied by many storage containers and semi-trucks. Majority of the site is impervious with landscaping located adjacent to the public right-of-way on W. 178th Street.

Melia Homes is proposing to construction a residential development consisting of approximately 120 condominium units, 22 3-story buildings, consisting of 3-4 bedroom floor plans. The proposed development will have a primary recreational area with a pool/ spa with connecting open space areas.

III. Existing Conditions:

Manhole #1 (2018.09 178th Street US MH) – 1599 W. 178th Street, Gardena, CA 90248

There is an existing 8” sewer main flowing westerly in W. 178th Street located approximately 5’ north of the street centerline. At the southwest corner of the site, the existing 8” sewer main connects to an existing sewer manhole (Manhole #1), located approximately 2’ south of the right-of-way. Flows from the existing site, the commercial buildings to the south and the mobile home facility to the west are all tributary to this existing manhole. Flows continue to drain in the westerly direction to an existing sanitary sewer pump station located near the northwest corner of W. 178th Street and La Salle Avenue. The lift station discharges flows via an existing 6” Schedule 40 pipe to an existing Los Angeles County Sanitation Districts’ (LACSD) 57” trunk sewer (Joint Outfall “D”, Unit 2, Section 3) that continues to flow in the southerly direction within La Salle Avenue.

Manhole #1, located near the southwest corner of the site, was selected as the monitoring location based on the existing City of Gardena Sewer As-Built Plan (Drawing No. 7-307-A, dated January 1961). Per this as-built plan is a Key Map that indicates the entire mobile home facility, including the portion on the westerly side of Western Avenue is tributary to the existing manhole. This as-built does not show any other exiting sewer laterals and/ or stubs connecting to the existing sewer main between the monitored manhole and the lift station.

The proposed development project flows tributary to this manhole will consist of approximately 120 26 residential dwelling units.

Based on the monitoring data collected by Utility Systems Science & Software (US³), existing peak flow was measured at 0.0727 cfs (cubic feet per second) with a peak depth flow of 1.41” (d/D = 0.1763).

With a peaking factor of 2.5, the proposed development project flows tributary to Manhole #1 have been calculated at 0.1393 cfs (overall total future peak flow rate of 0.2120 cfs) with a peak depth flow of 2.41” (d/D = 0.3013).

As a result, flows at Manhole #1 will increase by approximately 41.5%.

IV. Methodology/Rational:

Per email correspondence with Melia Homes and City of Gardena, the Los Angeles County Department of Public Works (LACDPW), Estimated Average Daily Sewage Flows for Various Occupancies was utilized to determine the proposed development’s average sewer peak flow rates. Refer to Appendix D for a copy of referenced design criteria. A 7-day monitoring duration was utilized within the calculations.

The proposed development sewer peak flow rates were based on Condominiums with 3-bedroom or more dwelling units at 300 gpd (gallons per day)/ DU (dwelling unit). An assumed peaking factor of 2.5 was utilized within the calculations. Refer to the Sanitary Sewer Analysis Calculation Table in Appendix A for additional information.

To support future project development, one (1) sanitary sewer manhole was selected to be monitored. Refer to the Exhibit within Appendix C of this analysis for location information. The proposed peak development flows were then added to the existing peak flows to obtain the proposed post-development conditions. Data is shown in Appendix A.

In order to approximate the real-world conditions of the pipe, a new calculated Manning’s n-value based on the maximum flow rate and depth of flow observed is utilized to support the calculations. This new Manning’s n-value is then used to calculate the depth of flow for the combined proposed and existing flow rates that represents the proposed post-development conditions.

V. Sanitary Sewer Pump Station:

The existing Sanitary Sewer Pump Station located at W. 178th Street and La Salle Avenue was built in 1961 based on existing City of Gardena As-Built Plans (Drawing No. 7-307-B) with a WEMCO submersible pump, Model 451 with 24140 – 7 ½” impeller with 5 horsepower, 1735 RPM with 220 volts, 3-phase power. Based on this as-built, the pump station’s discharge rate was designed at 230 gpm (gallons per minute) (or equivalent 0.5124 cfs) with a total dynamic head of 26.0’ and 100% standby. The pump well consisted of an approximate 25.2’ deep 66” reinforced concrete pipe (RCP) manhole type system with a poured in placed concrete base.

Per the City of Gardena As-Built Plans (Drawing No. 7-484, dated October 1977), the WEMCO submersible pump system was replaced with a Smith & Loveless Wet Well Mounted Lift Stations with Duplex Sewage pumps. The existing concrete wet well was reutilized. The pump consisted of a suction type system with two (2) 6" suction pipes located 6-9" above the bottom of the wet well. A series of float switches and alarms were installed to support the suction pump system and a new duplex motor system installed. Sewer effluent was suctioned to the top of the wet well and discharged through an 8" steel force main, approximately 10.85' below existing grade. Information regarding the suction pump system discharge rate was not provided on the as-builts.

Per the City of Gardena As-Built Plans (Drawing No. 7-515, dated February 1992), the existing suction duplex pump system was replaced with two (2) 5 horsepower submersible pumps with associated float switches and alarms. The existing concrete wet well was reutilized. All new electrical components were also upgraded during this renovation. Sewer effluent is currently discharged through a 6" steel force main. Information regarding the suction pump system discharge rate was not provided on the as-builts.

Since information regarding current pump station discharge rates, it is assumed that the discharge rate was maintained from the original 1961 pump system design per As-Built Drawing No. 7-307-B. This information should be confirmed with this City of Gardena. It is highly recommended to engage a Pump System Specialist to inspect the existing pump system and wet well to determine any deficiencies and/or required upgrades needed.

VI. Conclusions:

The results from this Sanitary Sewer Analysis using methods provided by the Uniform Plumbing Code and Manning's equation to demonstrate that the proposed development peak flows in addition to the observed existing flows create a proposed depth of flow that does not impact the existing surrounding sanitary sewer systems.

Based on sewer monitoring data collected by US³, the sewer systems located in W. 178th Street, indicated good flow, even hydraulics and no surcharge conditions.

The proposed development's onsite sewer system flows will increase the overall downstream system by approximately 41.7% at peak flow rates, however the overall volume of flow does not exceed 50% of the capacity of the downstream pipes. As-built information available for the existing sanitary sewer pump station indicates a discharge rate of 230 gpm (0.5124 cfs) more than the overall total future peak flow rate of 0.2120 cfs.

Therefore, we conclude that effluent peak flow rates and volumes produced by the proposed development should not significantly impact or exceed the existing sewer capacity in the public sewer system or the existing sanitary sewer pump station.

APPENDIX A
Sanitary Sewer Analysis Exhibit

APPENDIX B

Calculations

Sanitary Sewer Analysis Calculation Table

Monitor	As-Built Sta	Averaged Metered Flow		Existing Peak Flow		Downstream Pipeline		Existing Peak Flow Depth		Calculated Manning's n	With Project Peak Flow (cfs)				% Increase
		MGD	cfs	Metered (MGD)	Calc (cfs)	Diameter (in)	Slope (ft/ft)	Metered (in)	d/D		Delta (cfs)	Future (cfs)	Calc (in)	d/D	
178th St US MH	6+77.68	0.0264	0.0408	0.0470	0.0727	8	0.0036	1.41	0.1763	0.0088	0.1393	0.2120	2.41	0.3013	41.5%

Project Peak Flow Calculations

County of Los Angeles Department of Public Works - Apartment, 3bd = 300 gpd/ DU

Peaking Factor = 2.5

Conversion gpd/cfs 1.54723E-06

178th ST US MH

DU = 120 units

Residential Peak Flow = (120 DU)(300 gpd/DU)(1.54723E-06 cfs/1 gpd)(2.5) = 0.1393 cfs

Total Peal Flow = 0.1393 cfs

Calculations

0.139250577

Manning's n.txt

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Manning's n
Diameter	8.0000 in
Depth	1.4100 in
Flowrate	0.0727 cfs
Slope	0.0036 ft/ft

Computed Results:

Manning's n	0.0088
Area	0.3491 ft2
Wetted Area	0.0415 ft2
Wetted Perimeter	6.9320 in
Perimeter	25.1327 in
Velocity	1.7539 fps
Hydraulic Radius	0.8611 in
Percent Full	17.6250 %
Full flow Flowrate	1.0737 cfs
Full flow velocity	3.0760 fps

Depth of flow.txt

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	8.0000 in
Flowrate	0.2120 cfs
Slope	0.0036 ft/ft
Manning's n	0.0088

Computed Results:

Depth	2.4132 in
Area	0.3491 ft2
Wetted Area	0.0887 ft2
Wetted Perimeter	9.3031 in
Perimeter	25.1327 in
Velocity	2.3887 fps
Hydraulic Radius	1.3737 in
Percent Full	30.1656 %
Full flow Flowrate	1.0711 cfs
Full flow velocity	3.0685 fps

APPENDIX C
Monitoring Data



C&V Consulting

~1599 W 178th St, Gardena, CA 90248

2018.09 178th St US MH

One MH US from originally selected MH

Access:

MH on northern sidewalk at intersection w/Denker Av

System Type:

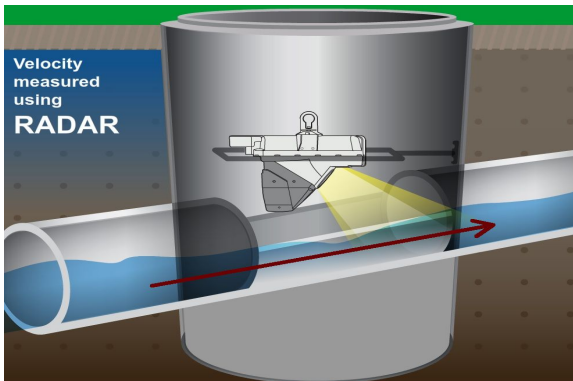
Sanitary Storm

Install Date: 9/19/2018

Map



Technology



Sewer Plan



Flow Meter

Meter Depth: 72"

MH Coordinates: 33.869284, -118.304810

Moderate open channel hydraulics with some turbulence due to inflow from lateral

Avg Velocity	Avg Measured Level	Multiplier
1.5 fps	1.0"	1

Gas

O2	H2S	CO	LEL
20.9	0	0	0

Notes

One lateral from north; monitored downstream line to get total flow; some structural issues with trough can be seen in photos.

Traffic Safety

No pedestrian traffic during install or removal, but used cones to delineate work zone.

Land Use

Residential	Commercial	Industrial	Trunk
X	X		

Manhole Depth	88"
Monitored Pipe Size	8"
Inner Pipe Size (In/Out)	8"/8"
Pipe Shape	Round
Pipe Condition	Fair
Manhole Material	Brick
Silt	0
Velocity Profile Data	*
Velocity Profile Taken	0.4 2-D
Sensor Offset	16.18"
Sensor Dist. to Crown	8.18"
Sensor Direction	Downstream
Flow Heading	West



Meter Site Document

C&V Consulting

2018.09 178th St US MH

~1599 W 178th St, Gardena, CA

Site



Manhole Before Install



Installation Process



Installed



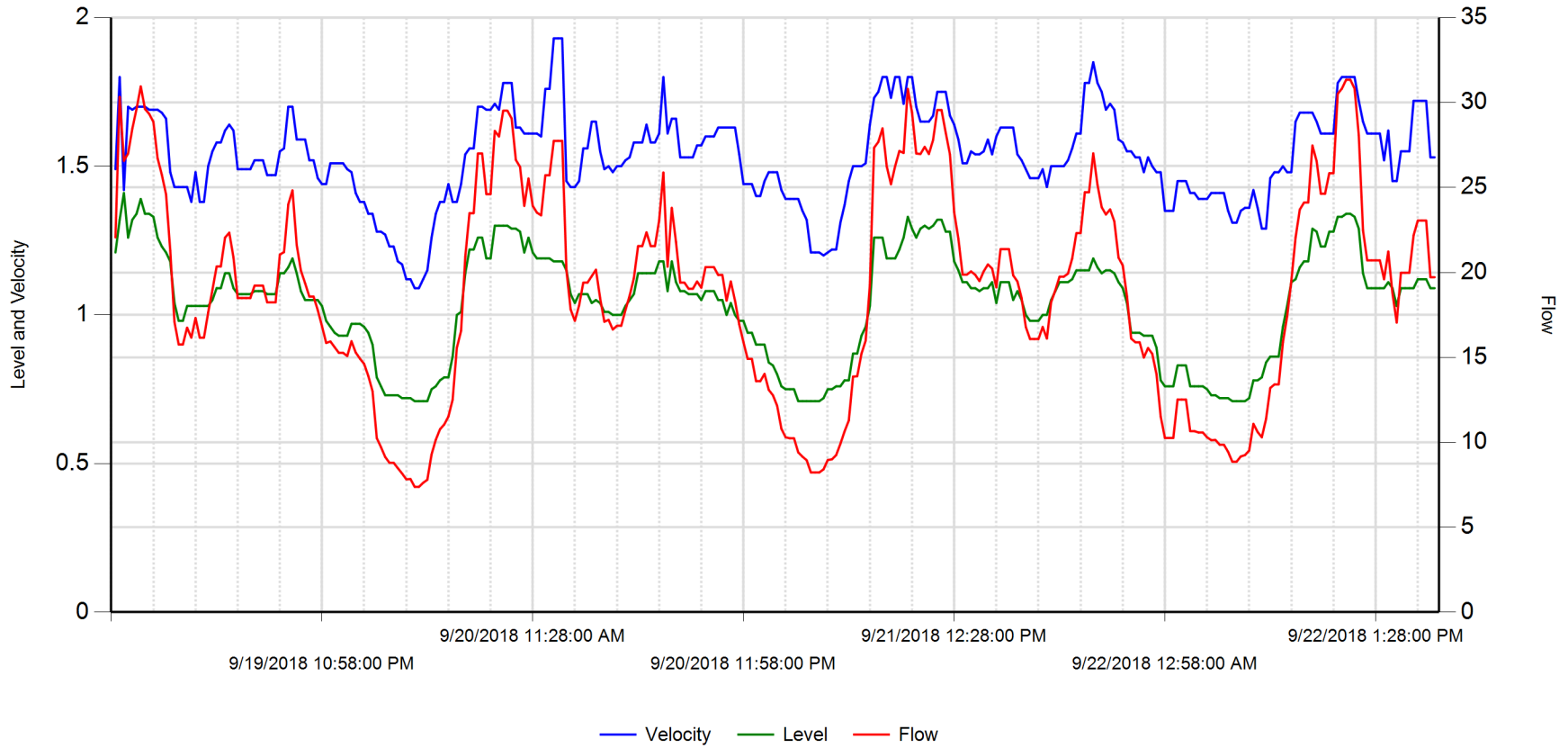
Monitored Pipe Size




Downstream



2018.09 178th St US MH

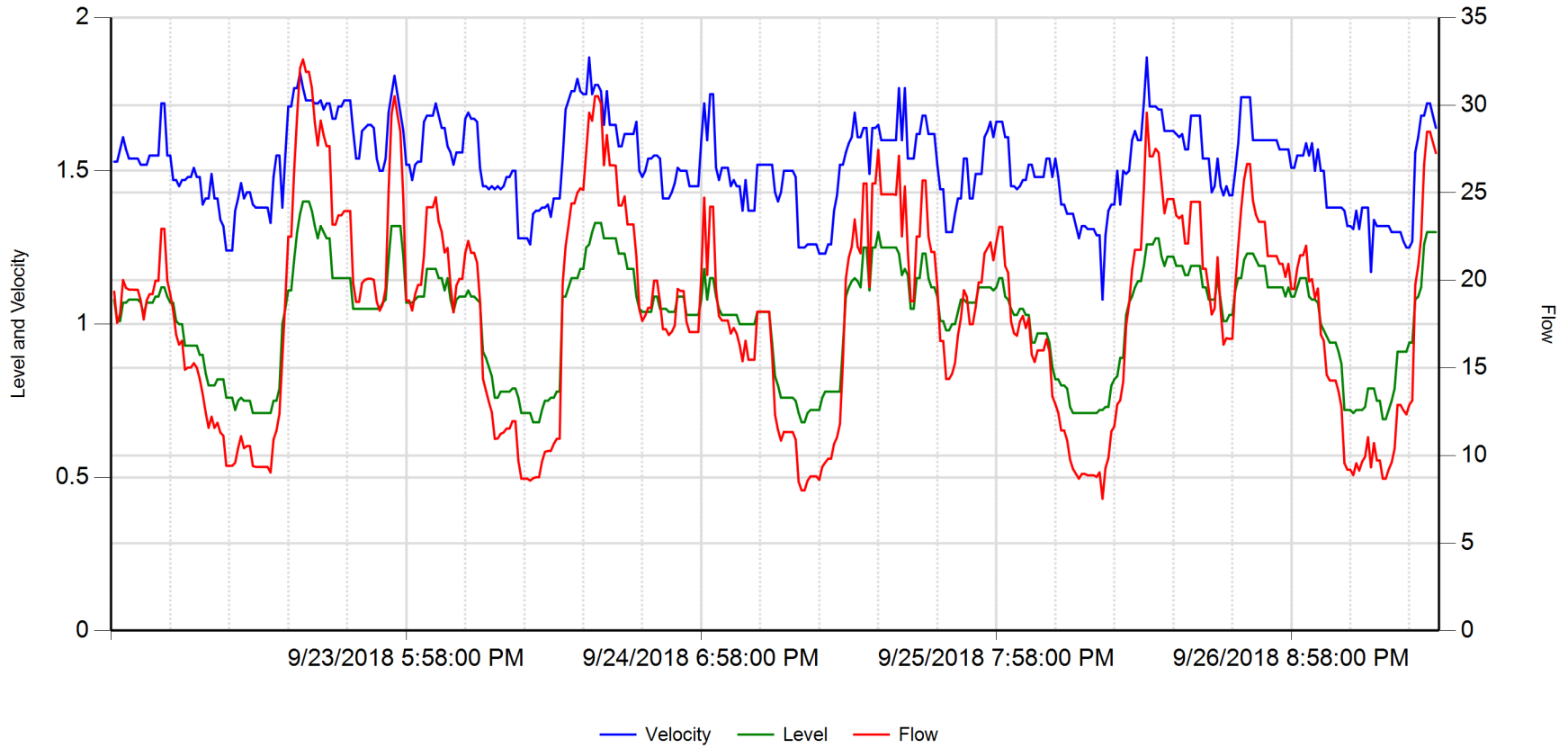


	Velocity (fps)	Level (in)	Flow (gpm)		
Average	1.534	1.038	18.879	RainFall	Inches
Maximum	1.930	1.410	31.340		
Minimum	1.090	0.710	7.380		



9/28/2018 9:24:22 AM

2018.09 178th St US MH

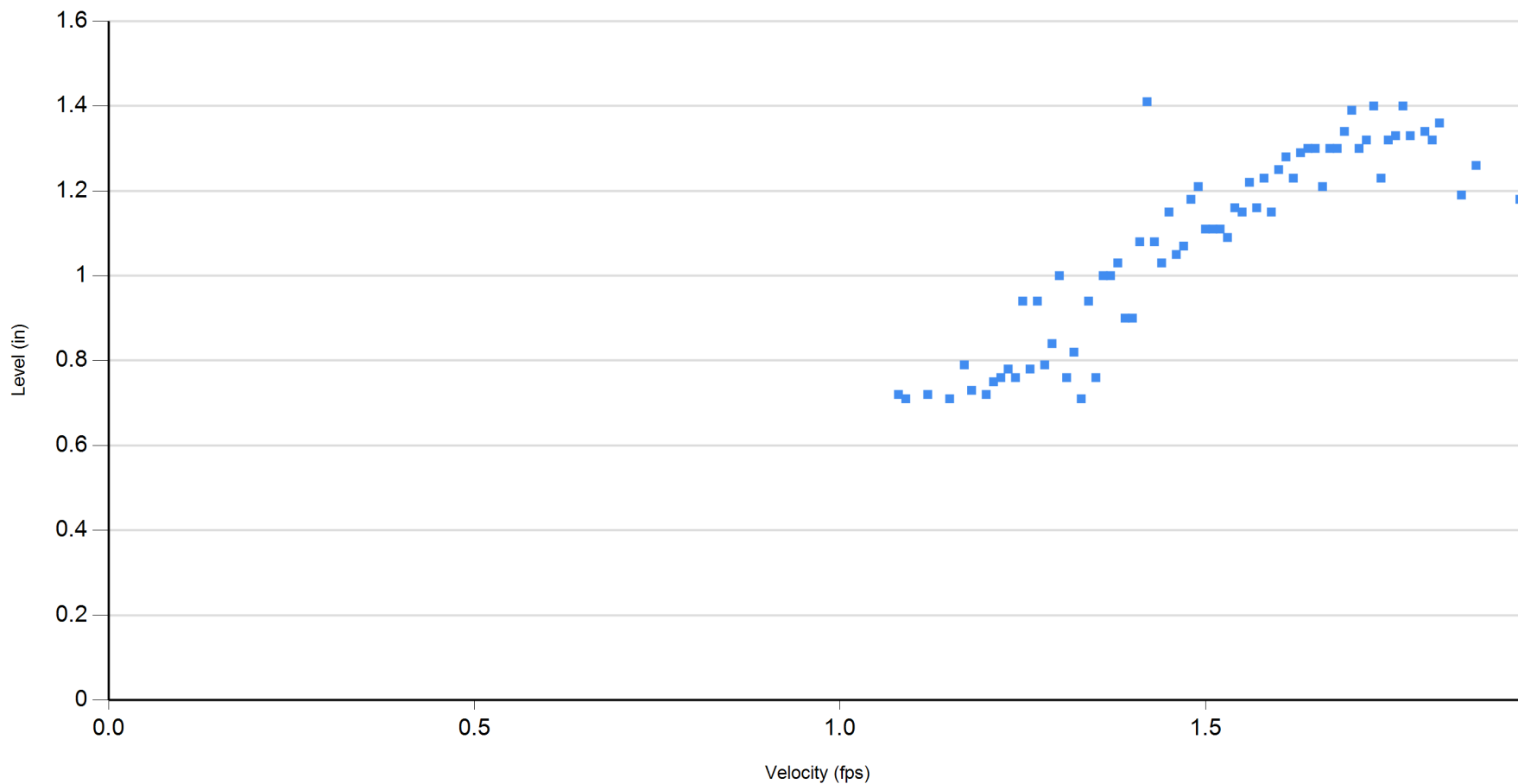


	Velocity (fps)	Level (in)	Flow (gpm)		
Average	1.521	1.019	18.201	RainFall	Inches
Maximum	1.870	1.400	32.610		
Minimum	1.080	0.680	7.530		



9/28/2018 9:24:22 AM

2018.09 178th St US MH



9/19/2018 thru 9/27/2018



9/28/2018 9:24:22 AM



Utility Systems Science and Software

Report Date: 09/28/2018
 Customer: C&V Consulting
 Group: Gardena
 SiteID: 3230

Statistics for 2018.09 178th St US MH: 09/19/2018 thru 09/27/2018

Date	Flow (GPM)			Flow (MGD)			Velocity (FPS)			Level (inches)			Total Gal	Rain
	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min		
9/19/18	20.89	30.95	15.27	0.03	0.04	0.02	1.55	1.80	1.38	1.12	1.41	0.93	30,075	
9/20/18	18.62	29.52	7.38	0.03	0.04	0.01	1.52	1.93	1.09	1.03	1.30	0.71	26,814	
9/21/18	18.90	30.80	8.23	0.03	0.04	0.01	1.55	1.85	1.20	1.03	1.33	0.71	27,223	
9/22/18	17.89	31.34	8.86	0.03	0.05	0.01	1.53	1.80	1.29	1.00	1.34	0.71	25,760	
9/23/18	19.53	32.61	9.03	0.03	0.05	0.01	1.57	1.82	1.24	1.04	1.40	0.71	28,116	
Week:	19.17	32.61	7.38	0.03	0.05	0.01	1.54	1.93	1.09	1.05	1.41	0.71	137,988	
9/24/18	18.11	30.51	8.57	0.03	0.04	0.01	1.52	1.87	1.26	1.02	1.33	0.68	26,077	
9/25/18	17.89	27.44	8.01	0.03	0.04	0.01	1.50	1.77	1.23	1.02	1.30	0.68	25,764	
9/26/18	18.77	29.57	7.53	0.03	0.04	0.01	1.53	1.87	1.08	1.04	1.28	0.71	27,031	
9/27/18	14.05	28.48	8.68	0.02	0.04	0.01	1.40	1.72	1.17	0.90	1.30	0.69	20,233	
Week:	17.21	30.51	7.53	0.02	0.04	0.01	1.49	1.87	1.08	0.99	1.33	0.68	99,106	
Totals:	18.29	32.61	7.38	0.03	0.05	0.01	1.52	1.93	1.08	1.02	1.41	0.68	237,094	

Methods & Procedures & Equipment

Methods and Procedures

Utility Systems Science & Software provided the C&V Consulting Group with an off the shelf, non-proprietary flow monitoring solution that included one state of the art Hach Flo-Dar® AV Sensor system. The project course of action is listed below. The US³ team:

- Assessed permitting and traffic control at the site on 178th St in Gardena, CA.
- Could not locate the specified manhole within the fence line of the Garden West Estates. Since the next downstream structure was a pump station with a force main into the next downstream manhole, the upstream manhole (US MH) was selected.
- Validated the US MH for suitability for sewer flow monitoring.
- Installed and calibrated the flow monitoring equipment per manufacturer recommendations.
- Since there was a lateral entering the US MH from the mobile home park, the downstream line was monitored to get total flow.
- Removed the equipment, validated the data and prepared the data reports.

Equipment

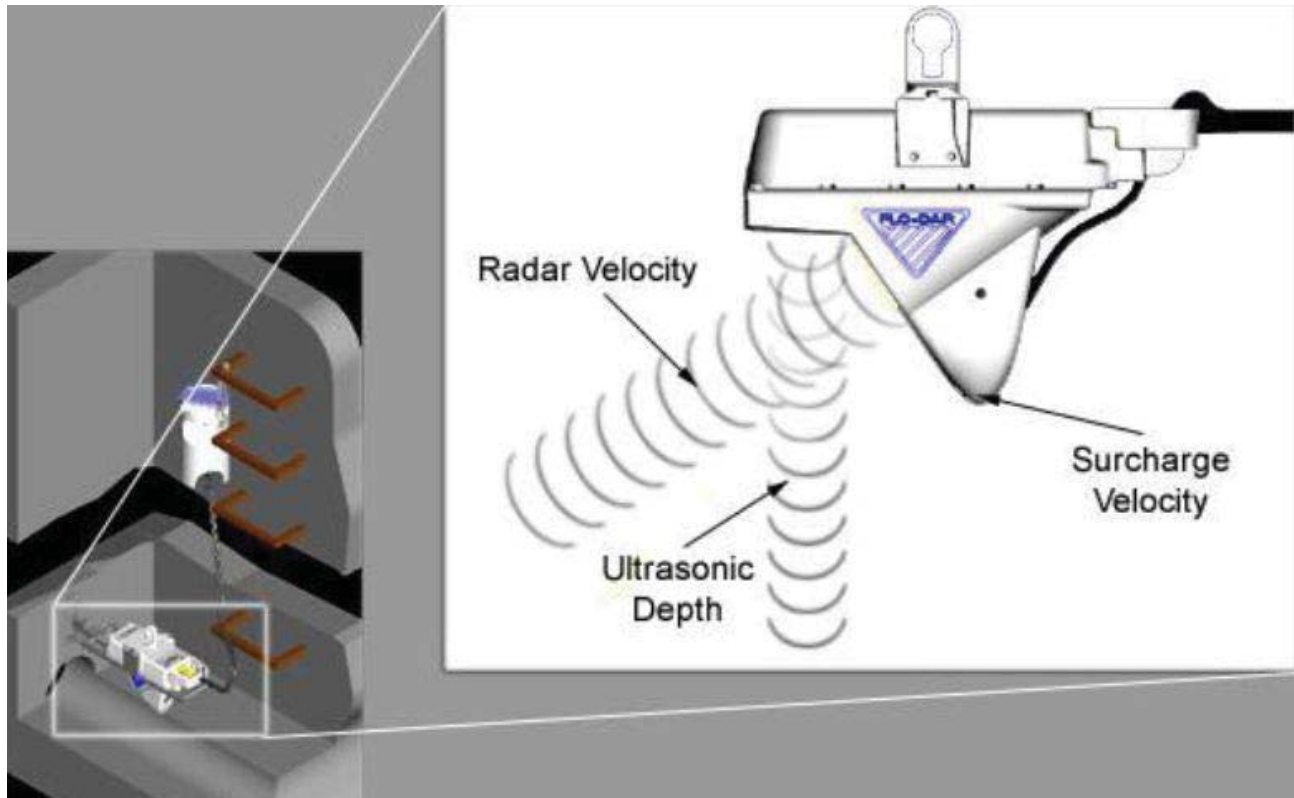


Figure: Equipment installed as part of the Sewer Flow Monitoring Study



Figure: Web-Enabled Flo-Dar® AV Sensor, Radar-Based Velocity/Area Flow Meter

SPECIFICATIONS

- **Enclosure**
 - IP68 Waterproof rating, Polystyrene
- **Dimensions**
 - 160.5 W x 432.2 L x 297 D mm (6.32 x 16.66 x 11.7 in.),
 - With SVS, D = 387 mm (15.2 in.)
- **Weight**
 - 4.8 kg (10.5 lbs.)
- **Operating Temperature**
 - -10 to 50°C (14 to 122°F)
- **Storage Temperature**
 - -40 to 60°C (-40 to 140°F)
- **Power Requirements**
 - Supplied by FL900 Flow Logger, Flo-Logger, or Flo-Station

- **Interconnecting Cable**
 - Disconnect available at both sensor and logger or Flo-Station
 - Polyurethane, 0.400 (± 0.015) in. diameter; IP68
 - Standard length 9 m (30 ft), maximum 305 m (1000 ft)
- **Cables – available in two styles:**
 - connectors at both ends
 - connector from sensor with open leads to desiccant hub, desiccant hub with connector to logger. A potting/sealant kit will be included. This can be used to run the cable through conduit.
- **Certification**
 - Certified to: FCC Part 15.245: FCC ID: VIC-FLODAR24
 - Industry Canada Spec. RSS210. v7: IC No.: 6149A-FLODAR24

SURCHARGE DEPTH MEASUREMENT

- Auto zero function maintains zero error below 0.5 cm (0.2 in.)
- **Method**
 - Piezo-resistive pressure transducer with stainless steel diaphragm
- **Range**
 - 3.5 m (138 in.), overpressure rating 2.5 x full scale

VELOCITY MEASUREMENT

- **Method**
 - Radar
- **Range**
 - 0.23 to 6.10 m/s (0.75 to 20 ft/s)
- **Frequency Range**
 - 24.075 to 24.175 GHz, 15.2 mW (max.)
- **Accuracy**
 - $\pm 0.5\%$; ± 0.03 m/s (± 0.1 ft/s)

DEPTH MEASUREMENT

- **Method**
 - Ultrasonic
- **Standard Operating Range from Flo-Dar® Housing to Liquid**
 - 0 to 152.4 cm (0 to 60 in.)
- **Optional Extended Level Operating Range from Transducer Face to Liquid**
 - 0 to 6.1 m (0 to 20 ft.) with 43.18 cm (17 in.) dead band, temperature compensated.
- **Accuracy**
 - $\pm 1\%$; ± 0.25 cm (± 0.1 in.)

FLOW MEASUREMENT

- **Method**
 - Based on Continuity Equation
- **Accuracy**
 - $\pm 5\%$ of reading typical where flow is in a channel with uniform flow conditions and is not surcharged, $\pm 1\%$ full scale max.

SURCHARGE CONDITIONS DEPTH/VELOCITY DEPTH (Std with Flo-Dar® Sensor)

- **Surcharge depth supplied by Flo-Dar® sensor.**

VELOCITY (Optional Surcharge Velocity Sensor)

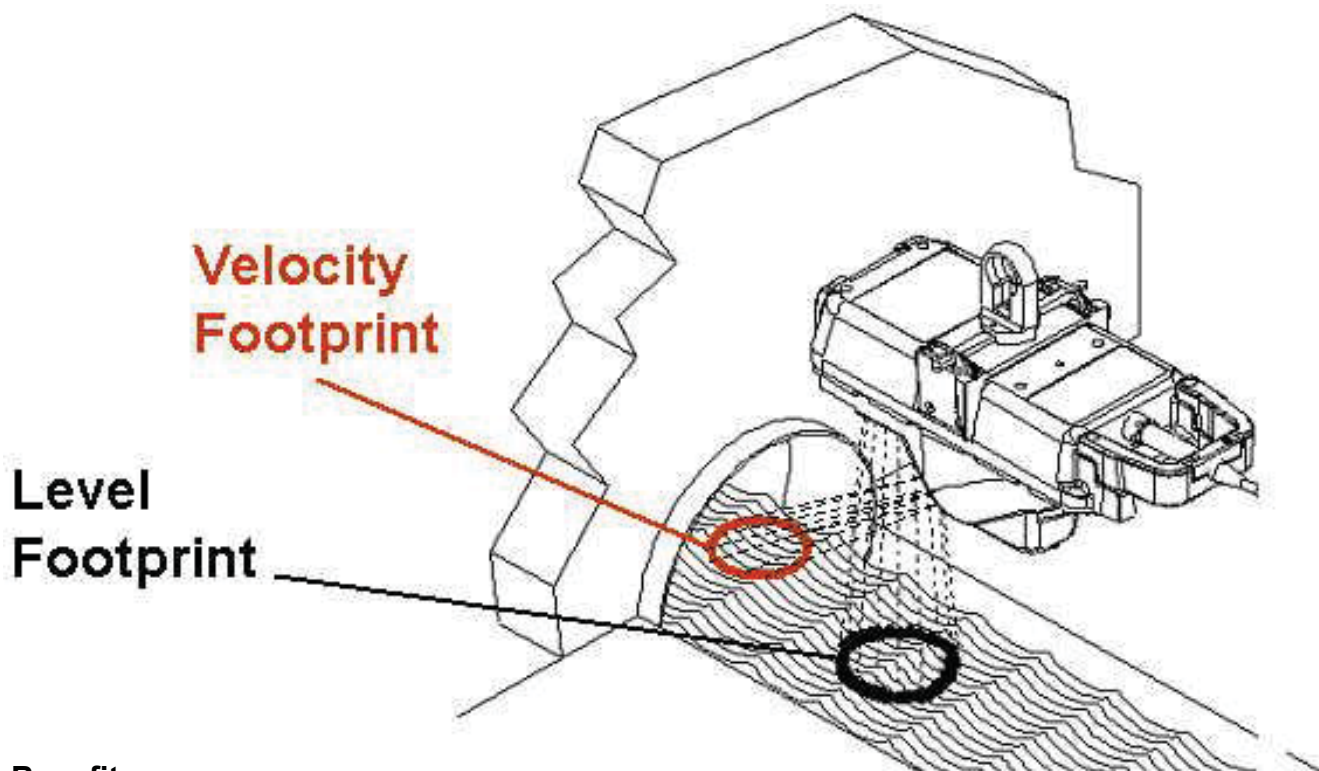
- **Method**
 - Electromagnetic
- **Range**
 - ± 4.8 m/s (± 16 ft/s)
- **Accuracy**
 - ± 0.15 ft/s or 4% of reading, whichever is greater.
- **Zero Stability**
 - ± 0.05 ft/s

The Flo-Dar® Open Channel Flow Meters provide an innovative approach to open channel flow monitoring. Combining digital Doppler radar velocity sensing with ultrasonic pulse echo level sensing Flo-Dar® provides accurate open channel flow monitoring without the fouling problems associated with submerged sensors.

Perfect solution for Difficult Flow Conditions:

- Flows with High Solids Content
- High Temperature Flows
- Caustic Flows
- Large Man-Made Channel
- High Velocities
- Shallow Flows





Benefits

1. Personnel have no contact with the flow during installation.
2. Maintenance caused by sensor fouling is eliminated
3. Field Replaceable/Interchangeable Sensors and Monitors

How It Works

Flo-Dar® transmits a digital Doppler radar beam that interacts with the fluid and reflects back signals at a different frequency than that which was transmitted. These reflected signals are compared with the transmitted frequency. The resulting frequency shift provides an accurate measure of the velocity and the direction of the flow. Level is detected by ultrasonic pulse echo. Flow is then calculated based on the Continuity Equation:

$$Q = V \times A, \text{ Where } Q = \text{Flow}, V = \text{Average Velocity and } A = \text{Area}$$

Accurate Flow Measurements

Flo-Dar® provides the user with highly accurate flow measurements under a wide range of flows and site conditions. By measuring the velocity of the fluid from above, Flo-Dar® eliminates accuracy problems inherent with submerged sensors including sensor disturbances, high solids content and distribution of reflectors.

US³ Company Information

US³ is a California Corporation **Federal ID No. 33-0729605** and qualifies as a Minority Business Enterprise. US³ has certified as an MBE with the California Public Utility Commission's authorized clearinghouse, **Verification Number: 97ES0008**.

US³ is a specialty service company for the Water & Waste Water industry, providing monitoring and control for Utilities since 1996. US³ is in the forefront of this industry by taking the proven technological approaches developed in other high-tech industries and applying them to protect one of our most precious natural resources - our water.

US³ engineers and technical personnel have applied advanced instrumentation system technology to water/wastewater open channel flow monitoring, pipeline evaluation, engineering, and data analysis, all coupled to the power of the Internet. This unique integrated systems approach allows the company to bring greater insight and intelligence to gathering information about water/wastewater system performance of our clients, and in turn, to support the fulfillment of their commitments to manage and cost effectively design, operate, and maintain these systems.

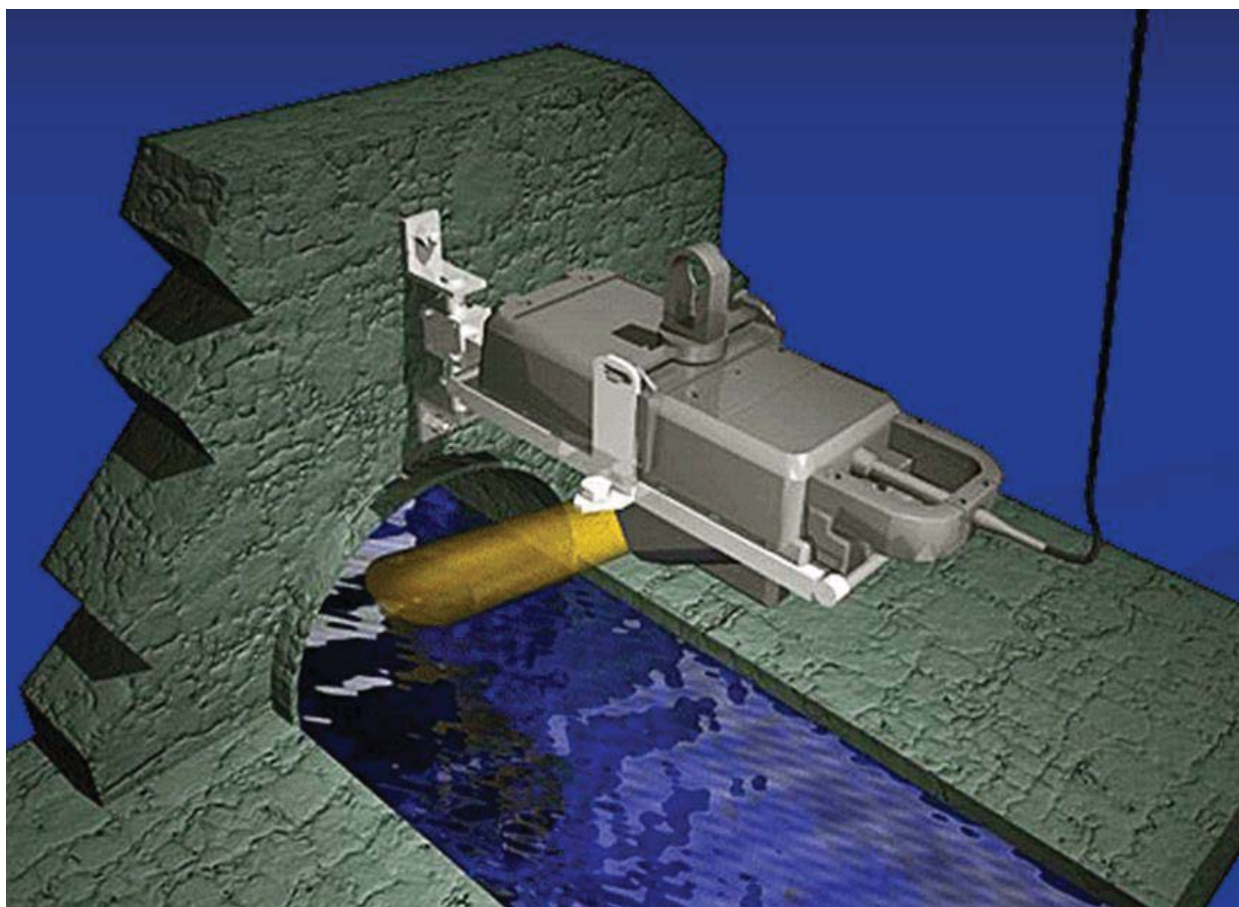


Figure: US³ utilizes exclusively Hach March-McBirney Flo-Dar® Meters

Moreover, **US³** supports Municipalities, Consulting Engineering firms and other water/waste water systems integrators by providing temporary technical services for engineering, software programming and technical site maintenance and calibration site support work, primarily in the Water and Waste Water industries.



Figure: All technicians are certified for Confined Space Entry.

Name, Title, Address and Telephone numbers of persons to contact concerning this report.

Darlene Szczublewski, PE
Senior Civil Engineer
darlene.szczublewski@uscubed.com

1250 Pioneer Way, Suite F
El Cajon, CA 92020
619-546-4281 (work)
619-246-5304 (cell)

Tom Williams
Engineering Manager
tom.williams@uscubed.com

1250 Pioneer Way, Suite F
El Cajon, CA 92020
619-546-4281 (work)
619-398-7799 (cell)

APPENDIX D
Design Criteria

Estimated Average Daily Sewage Flows for Various Occupancies

Occupancy	Abbreviation	*Average daily flow	
Apartment Buildings:			
Bachelor or Single dwelling units	Apt	100	gal/D.U. → 150
1 bedroom dwelling units	Apt	150	gal/D.U. → 200
2 bedroom dwelling units	Apt	200	gal/D.U. → 250
3 bedroom or more dwelling units	Apt	250	gal/D.U. → use 300 GPD per SMD
Auditoriums, churches, etc.	Aud	5	gal/seat
Automobile parking	P	25	gal/1000 sq ft gross floor area
Bars, cocktails lounges, etc.	Bar	20	gal/seat
Commercial Shops & Stores	CS	100	gal/1000 sq ft gross floor area
Hospitals (surgical)	HS	500	gal/bed
Hospitals (convalescent)	HC	85	gal/bed
Hotels	H	150	gal/room
Medical Buildings	MB	300	gal/1000 sq ft gross floor area
Motels	M	150	gal/unit
Office Buildings	Off	200	gal/1000 sq ft gross floor area
Restaurants, cafeterias, etc.	R	50	gal/seat
Schools:			
Elementary or Jr. High	S	10	gal/student
High Schools	HS	15	gal/student
Universities or Colleges	U	20	gal/student
College Dormitories	CD	85	gal/student

*Multiply the average daily flow by 2.5 to obtain the peak flow

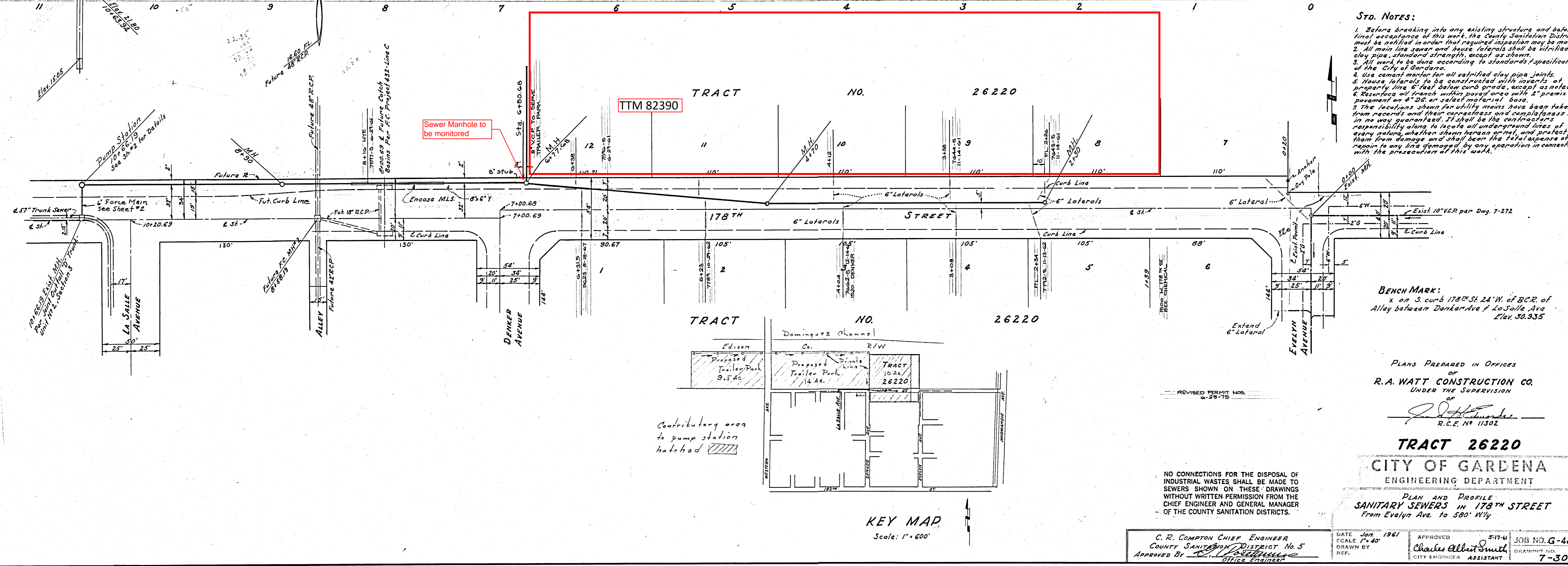
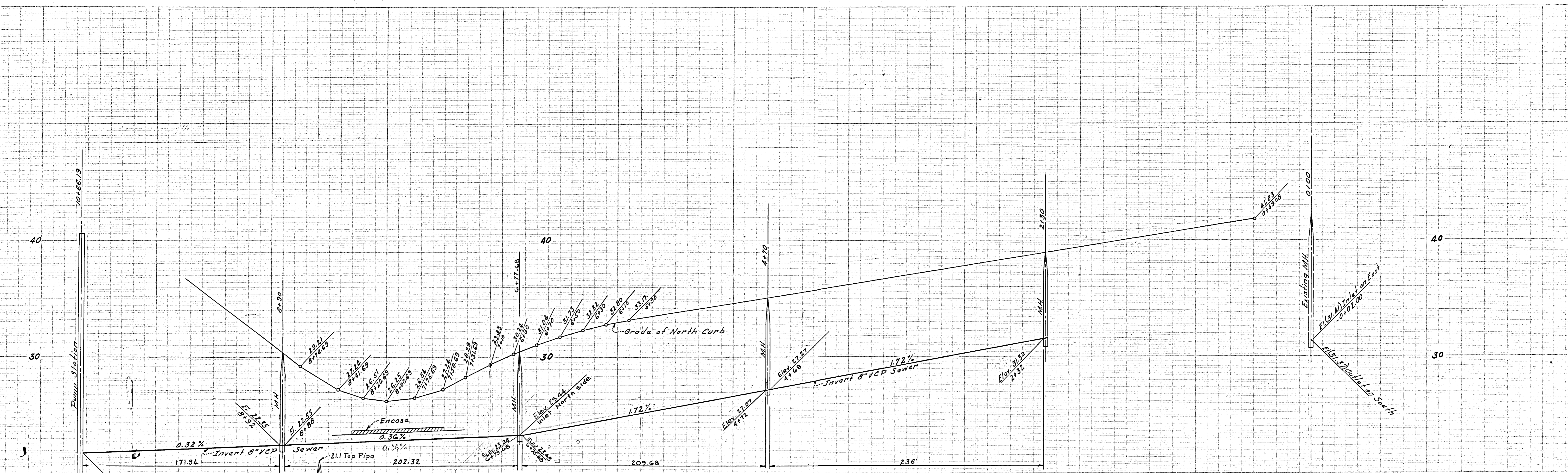
Zoning Coefficients

Zone	Coefficient (cfs/Acre)
Agriculture -----	0.001
Residential ⁺ :	
R-1 -----	0.004
R-2 -----	0.008
R-3 -----	0.012
R-4 -----	0.016*
Commercial:	
C-1 through C-4 -----	0.015*
Heavy Industrial:	
M1 through M-4 -----	0.021*

*Individual building, commercial or industrial plant capacities shall be the determining factor when they exceed the coefficients shown

+ Use 0.001 (cfs/unit) for condominiums only

APPENDIX E
Existing As-Built Plans



- STD. NOTES:**
1. Before breaking into any existing structure and before final acceptance of this work, the County Sanitation District must be notified in order that required inspection may be made.
 2. All main line sewer and house laterals shall be vitrified clay pipe, standard strength, except as shown.
 3. All work to be done according to standards/specifications of the City of Gardena.
 4. Use cement mortar for all vitrified clay pipe joints.
 5. House laterals to be constructed with inverts at properly line 8' feet below curb grade, except as noted.
 6. Resurface all trench within paved area with 2" premix pavement on 4" DG or select material base.
 7. The locations shown for utility means have been taken from records and their correctness and completeness is in no way guaranteed. It shall be the contractor's responsibility along to locate all underground lines of every nature, whether shown hereon or not, and protect them from damage and shall bear the total expense of repair to any line damaged by any operation in connection with the prosecution of this work.

BENCH MARK:
 x on S. curb 178th St 24' W. of B.C.R. of Alley between Dankan Ave & LaSalle Ave
 Elev. 30.935

PLANS PREPARED IN OFFICES
R.A. WATT CONSTRUCTION CO.
 UNDER THE SUPERVISION
 OF
J. J. [Signature]
 R.C.E. No. 11302

TRACT 26220
CITY OF GARDENA
 ENGINEERING DEPARTMENT
 PLAN AND PROFILE
SANITARY SEWERS IN 178TH STREET
 From Evelyn Ave. to 580' Wly

NO CONNECTIONS FOR THE DISPOSAL OF INDUSTRIAL WASTES SHALL BE MADE TO SEWERS SHOWN ON THESE DRAWINGS WITHOUT WRITTEN PERMISSION FROM THE CHIEF ENGINEER AND GENERAL MANAGER OF THE COUNTY SANITATION DISTRICTS.

C. R. COMPTON CHIEF ENGINEER
 COUNTY SANITATION DISTRICT No. 5
 APPROVED BY: *[Signature]* OFFICE ENGINEER

DATE: Jan 1961
 SCALE: 1" = 40'
 DRAWN BY: *[Signature]* REF.

APPROVED: *[Signature]* 5-17-61
 CHARLES ALBERT SMITH
 CITY ENGINEER ASSISTANT

JOB NO. G-488
 DRAWING NO. 7-307A

Contributory area to pump station hatched

KEY MAP
 Scale: 1" = 600'

PUMP DESIGN CRITERIA
 Q = 230 gpm. Δ 66'
 H_t = 26.0' Total Dynamic Head Δ 66'
 100% Standby

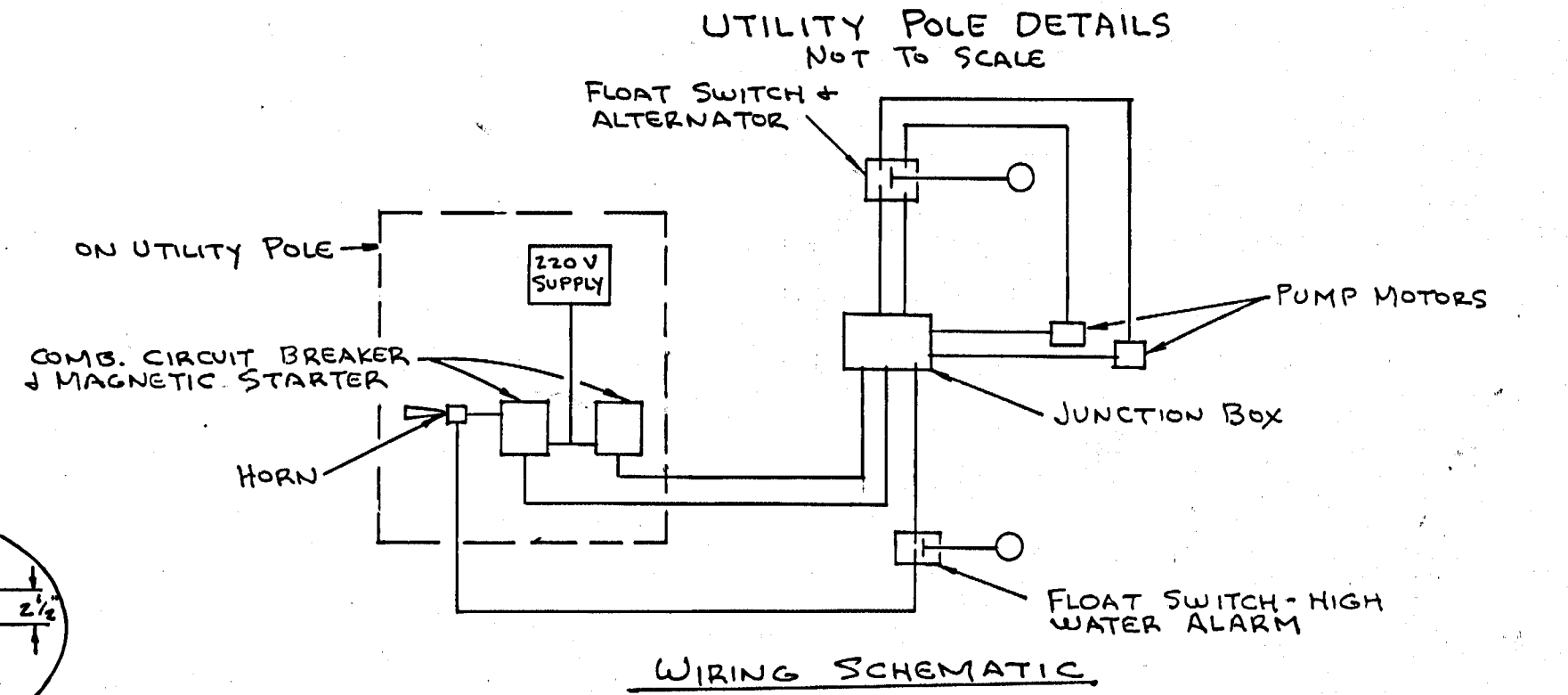
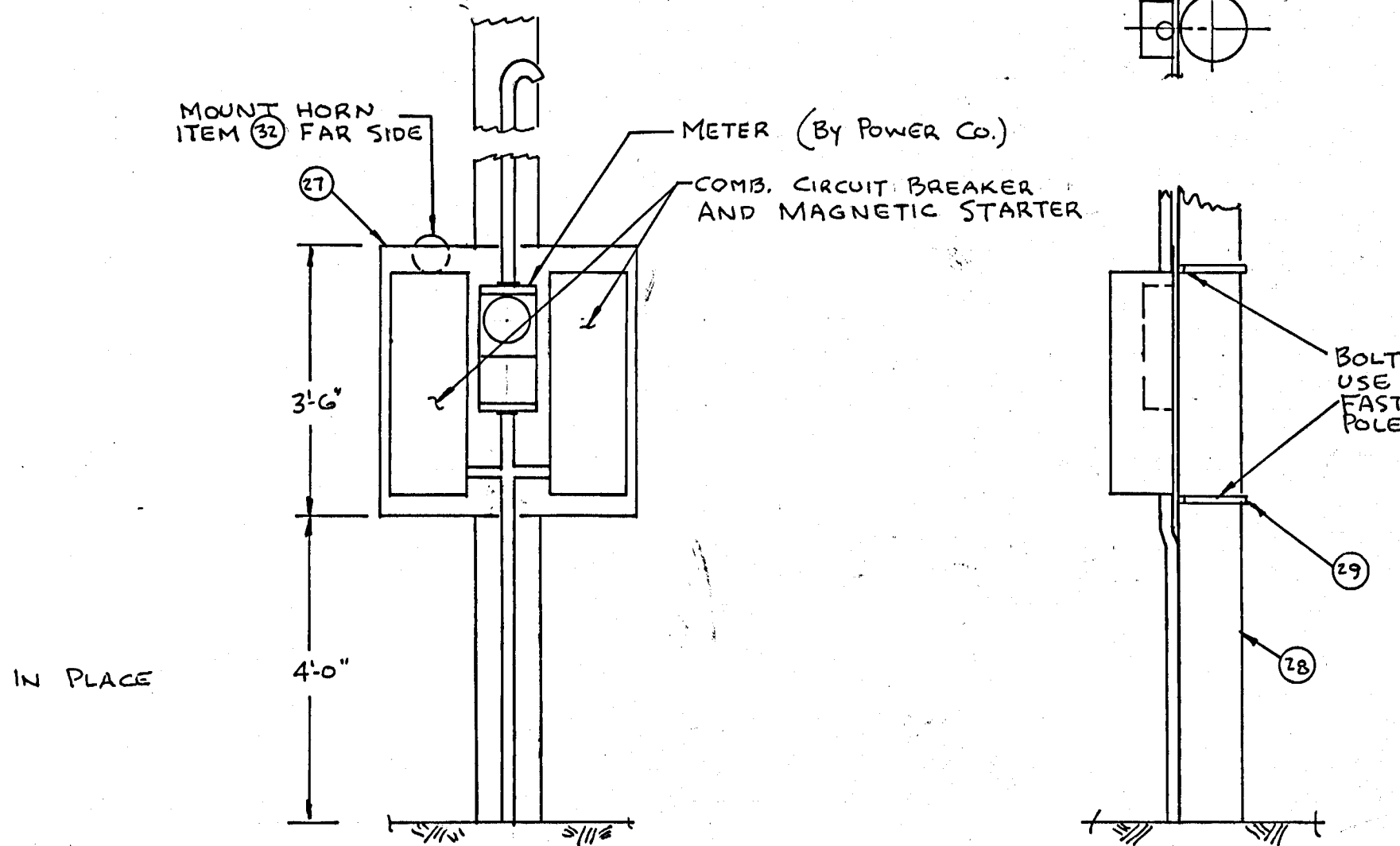
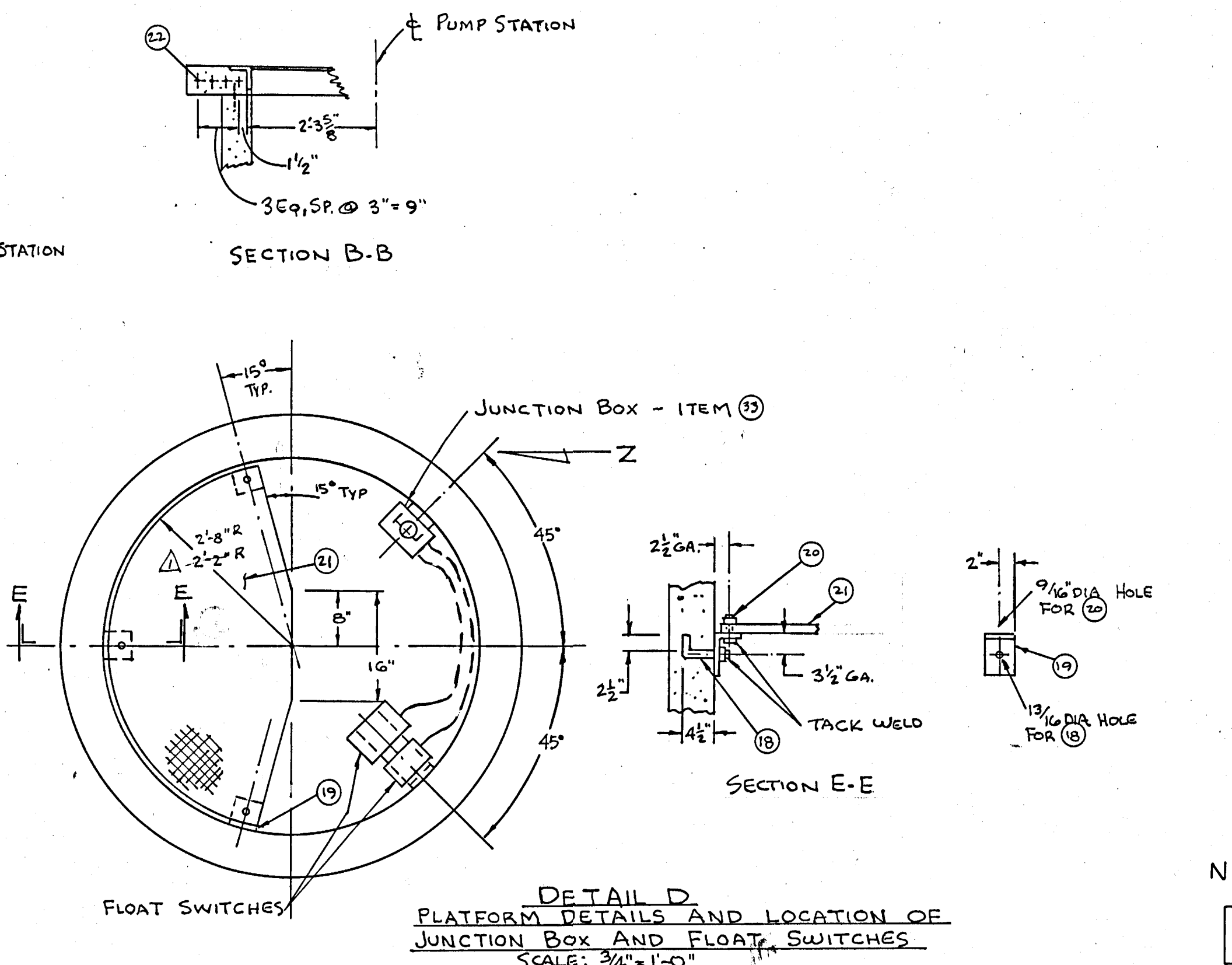
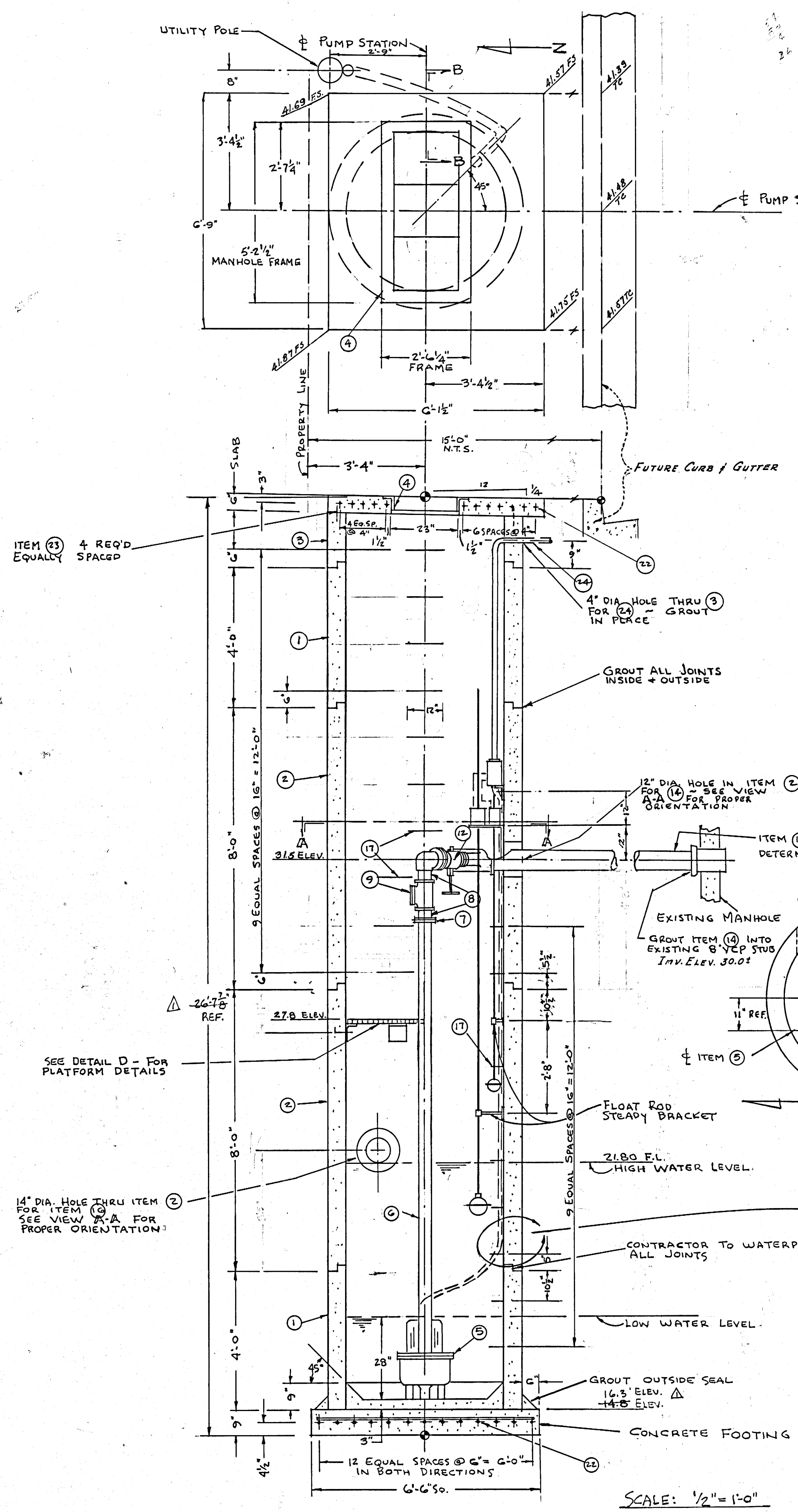
BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	2	54" RCP 1750-D x 4'-0" LG.
2	2	54" RCP 1750-D x 8'-0" LG.
3		CONCRETE POURED IN PLACE
4	1	L. A. COUNTY ROAD DEPT. FRAME AND COVER NO. 5 (3) 18"x22" COVERS
5	2	WEMCO SUBMERSIBLE PUMP - MODEL 451 w/ 24140-7 1/2" IMPELLER w/ 5 HP 1735 RPM U.S. 220V. 3 PH. 60 CY MOTOR COMPLETE w/ CABLES, WALL MOUNTED TEXP COMBINATION FLOAT SWITCH + MECHANICAL ALTERNATOR w/ S.S. FLOAT ROD AND COPPER FLOAT WITH TWO COC-1 COMBINATION CIRCUIT BREAKERS AND MAGNETIC STARTERS FOR POLE MOUNTING.
Δ 6	2	4" SCH. 40 PIPE x 13'-10 1/2" LG. T.B.E. STL.
Δ 7	4	4" STD FLANGE UNION
Δ 8	8	4" SCH. 40 NIPPLE x 4' LG. T.B.E. STL.
9	2	4" SWING CHECK VALVE CRANE #372 OR EQUAL
Δ 10	2	4" SCH. 40 90° ELBOW STD M.I.
Δ 11	2	4" SCH. 40 NIPPLE x 6 1/2" LG. T.B.E. STL.
12	2	4" CLAMP GATE VALVE CRANE #490 OR EQUAL
Δ 13	1	DOUBLE 45° Y 6"x6"x4" CAST IRON
Δ 14	1	6" SCH. 40 PIPE x 21" LG. T.O.E. STL.
Δ 15	1	6" BAR PLUG CAST IRON
16	1	8" V.C.P. STUB x 1'-3" LG.
Δ 17	20	STEP 3/4" DIA. x 3'-0" LG - STL
Δ 18	3	BAR 3/4" DIA. x 8 1/2" LG. T.O.E. w/ F.W. NUT - STL.
Δ 19	3	ANGLE 6"x4"x 1/2" x 4" LG STL.
Δ 20	3	BOLT 1/2" BNC x 3 1/2" LG. w/ F.W. NUT - STL.
Δ 21	1	RY-WELD OPEN STEEL GRATING SYMBOL 150
22	40	RE-BAR #4 x 6'-3" LG STL
23	4	RE-BAR #4 x 6" LG STL
Δ 24		2" ELECTRICAL CONDUIT
27	1	3/4" THK. x 40" x 42" MARINE PLYWOOD
28	1	UTILITY POLE 8" DIA. x 25' LG CREOSOTED
Δ 29	8	STRAPS 3/16" THK x 2" x 30" LG
Δ 30	4	BOLT 3/8" DIA. x 1 3/4" LG
Δ 31	6	WOOD SCREWS 3/8" DIA x 1" LG
32	1	HORN N 8546-7" OUTDOOR GROWLER 220V.
33	1	JUNCTION BOX VAPOR TIGHT 50" D' 12 1/2-45 OR EQUAL

ITEMS MARKED Δ TO BE GALVANIZED
 ITEM ③ TO BE POURED IN PLACE BY CONTRACTOR.
 GALVANIZED STEEL LADDERS ARE OPTIONAL TO STEPS,
 ITEM ①

GENERAL NOTES
 1 CLASS A CONCRETE IS TO BE USED ON ALL STRUCTURES
 2 USE INTERMEDIATE GRADE REINFORCING BARS (20000 PSI)
 3 THE CONTRACTOR SHALL CONTACT AND MAKE ARRANGEMENTS WITH THE UTILITY CO. FOR POWER SERVICE.
 4 OVERLOAD PROTECTION FOR ELECTRICAL EQUIPMENT SHALL BE PROVIDED THROUGH CIRCUIT BREAKERS.
 5 ALL MATERIAL USED ON THIS PROJECT SHALL BE NEW AND UNUSED PRIOR TO INSTALLATION.
 6 THE CONTRACTOR IS TO SUPPLY FRESH WATER IN SUFFICIENT QUANTITY TO THE PUMP STATION UNTIL THE PUMP STATION IS ACCEPTED BY THE CITY ENGINEER.
 7 ELECTRICAL INSTALLATION TO MEET REQUIREMENTS OF STATE AND LOCAL APPLICABLE CODES.
 8 ALL CONDUIT AND PIPING ADJACENT TO THE PUMP STATION SHALL BE SECURELY FASTENED WITH APPROVED GALVANIZED PIPE STRAPS, HANGERS OR CLAMPS.

BENCH MARK:
 X ON S CURB 178TH ST. 24" W. OF B.C.R. OF ALLEY BETWEEN DENKER AVE. + LA SALLE AVE
 ELEV. 30.935

PLANS PREPARED IN THE OFFICES OF
 R. A. WATT CONSTRUCTION CO.
 UNDER THE SUPERVISION OF
Charles A. Smith
 R.E.C. No. 11302



REV.	DESCRIPTION	APPROVED
Δ	DIA. OF PUMP STATION CHANGES TO 66" DIA. ~	
	RAISED BOTTOM OF PUMP STATION 1.5'	COB 6-16-61

CITY OF GARDENA
 ENGINEERING DEPARTMENT
SANITARY SEWERS IN 178TH STREET, PUMP STATION AND DETAILS

C. R. COMPTON CHIEF ENGINEER
 COUNTY SANITATION DISTRICT NO. 5
 APPROVED BY: *Charles A. Smith* OFFICE ENGINEER
 DATE: March 1961
 SCALE: As Shown
 DRAWN BY: G.M.
 REF.
 APPROVED: *Charles A. Smith* CITY ENGINEER ASSISTANT
 JOB NO. G-488
 DRAWING NO. 17-307-B
 SHEET 2 OF 2 SHEETS

CITY OF GARDENA

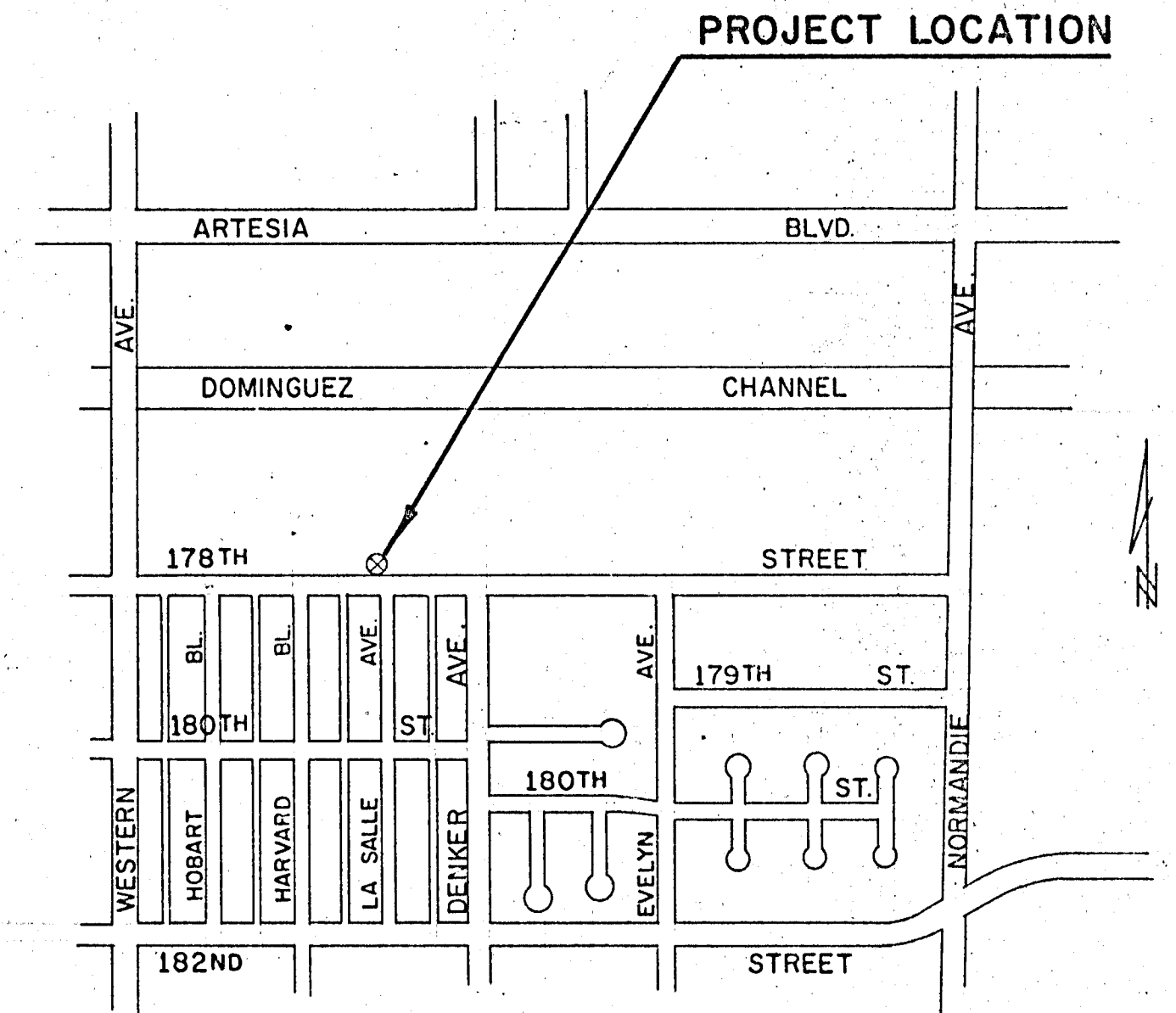
SANITARY SEWER PROJECT

PUMP STATION

178TH STREET AT LA SALLE AVENUE

CASH CONTRACT 420

OCTOBER 1977



VICINITY MAP
NO SCALE

Topographic Symbols

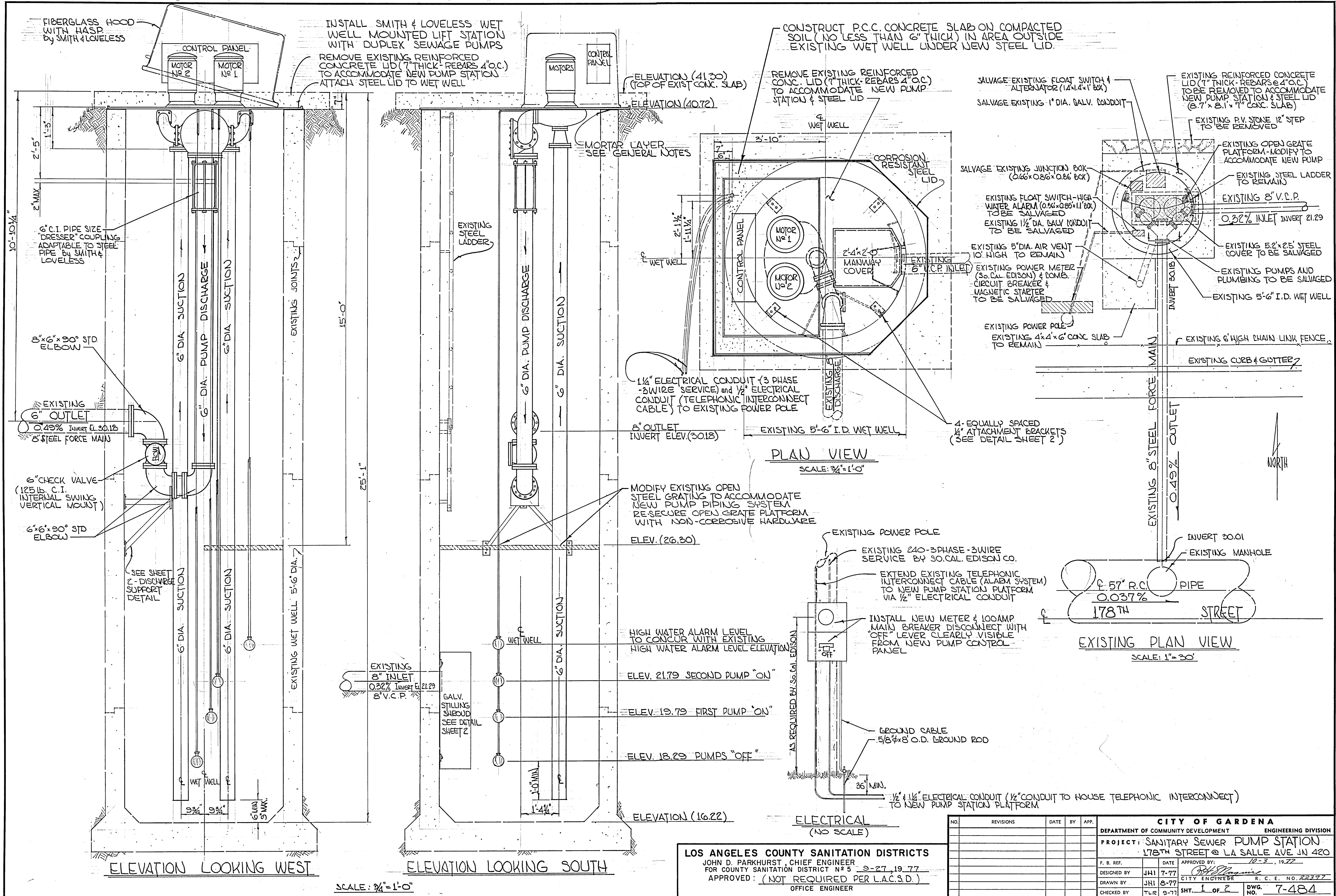
ITEM	EXISTING	PROPOSED
CURB & GUTTER		
DRIVEWAY		
SIDEWALK		
'X' GUTTER		
MANHOLE		
UTILITY VALVE		
UTILITY METER		
FIRE HYDRANT		
POWER POLE		
POWER POLE WITH GUY WIRE		
STANDARD, POLE, OR POST		
STREET LIGHT		
VEHICLE SIGNAL		
VEHICLE SIGNAL WITH BACK PLATE		
VEHICLE SIGNAL WITH TURN ARROW		
VEHICLE SIGNAL WITH OPTICOM DETECTOR		
MAST ARM SIGNAL		
PEDESTRIAN SIGNAL		
PULL BOX		
SIGNAL CONDUIT		
TRAFFIC SIGNAL CONTROLLER		
ILLUMINATED SIGN		
PEDESTRIAN PUSH BUTTON		
BUILDING		
FENCE		
WALL		
TREE WELL		

DEPARTMENT OF COMMUNITY DEVELOPMENT
ENGINEERING DIVISION

DWG. NO. 7-484

7-484

7-484 SEWER PUMP STATION - 178 ST. at LA SALLE AVE.



FIBERGLASS HOOD WITH HASP BY SMITH & LOVELESS

INSTALL SMITH & LOVELESS WET WELL MOUNTED LIFT STATION WITH DUPLEX SEWAGE PUMPS
 REMOVE EXISTING REINFORCED CONCRETE LID (7" THICK - REBARS 4" O.C.) TO ACCOMMODATE NEW PUMP STATION ATTACH STEEL LID TO WET WELL

CONSTRUCT P.C.C. CONCRETE SLAB ON COMPACTED SOIL (NO LESS THAN 6" THICK) IN AREA OUTSIDE EXISTING WET WELL UNDER NEW STEEL LID.

REMOVE EXISTING REINFORCED CONC. LID (7" THICK - REBARS 4" O.C.) TO ACCOMMODATE NEW PUMP STATION & STEEL LID

SALVAGE EXISTING FLOAT SWITCH & ALTERNATOR (14"x14"x1" BOX)
 SALVAGE EXISTING 1" DIA. BALV. RODDIT

EXISTING REINFORCED CONCRETE LID (7" THICK - REBARS @ 4" O.C.) TO BE REMOVED TO ACCOMMODATE NEW PUMP STATION & STEEL LID (8.7' x 8.1' x 7" CONC. SLAB)

6" C.I. PIPE SIZE DRESSER COUPLING ADAPTABLE TO STEEL PIPE BY SMITH & LOVELESS

8"x6"x90° STD ELBOW

EXISTING 6" OUTLET
 0.49% Invert El. 30.18
 8" STEEL FORCE MAIN

6" CHECK VALVE (125 LB. C.I. INTERNAL SWING VERTICAL MOUNT)

6"x6"x90° STD ELBOW

SEE SHEET 2 - DISCHARGE SUPPORT DETAIL

1 1/2" ELECTRICAL CONDUIT (3 PHASE - 3 WIRE SERVICE) and 1/2" ELECTRICAL CONDUIT (TELEPHONIC INTERCONNECT CABLE) TO EXISTING POWER POLE

8" OUTLET
 INVERT ELEV. (30.18)

EXISTING 5'-6" I.D. WET WELL

SALVAGE EXISTING JUNCTION BOX (0.66' x 0.86' x 0.86' BOX)
 EXISTING FLOAT SWITCH - HIGH WATER ALARM (0.56' x 0.85' x 1.1' BOX) TO BE SALVAGED
 EXISTING 1/2" DIA. BALV. RODDIT TO BE SALVAGED

EXISTING 5" DIA. AIR VENT 10' HIGH TO REMAIN
 EXISTING POWER METER (30 CAL. EDISON) & DOMB. CIRCUIT BREAKER & MAGNETIC STARTER TO BE SALVAGED

EXISTING POWER POLE
 EXISTING 4"x4"x6" CONC. SLAB TO REMAIN

EXISTING OPEN GRATE PLATFORM - MODIFY TO ACCOMMODATE NEW PUMP

EXISTING STEEL LADDER TO REMAIN
 EXISTING 8" V.C.P.

0.32% INLET INVERT 21.29

EXISTING 5.2' x 25" STEEL COVER TO BE SALVAGED

EXISTING PUMPS AND PLUMBING TO BE SALVAGED

EXISTING 5'-6" I.D. WET WELL

EXISTING 6' HIGH CHAIN LINK FENCE

EXISTING CURB & GUTTER

MODIFY EXISTING OPEN STEEL GRATING TO ACCOMMODATE NEW PUMP PIPING SYSTEM RE-SECURE OPEN GRATE PLATFORM WITH NON-CORROSIVE HARDWARE

ELEV. (26.30)

EXISTING POWER POLE

EXISTING 240-3PHASE-3WIRE SERVICE BY SO. CAL. EDISON CO.

EXTEND EXISTING TELEPHONIC INTERCONNECT CABLE (ALARM SYSTEM) TO NEW PUMP STATION PLATFORM VIA 1/2" ELECTRICAL CONDUIT

INSTALL NEW METER & 100AMP MAIN BREAKER DISCONNECT WITH OFF LEVER CLEARLY VISIBLE FROM NEW PUMP CONTROL PANEL

HIGH WATER ALARM LEVEL TO CONCUR WITH EXISTING HIGH WATER ALARM LEVEL ELEVATION

ELEV. 21.79 SECOND PUMP "ON"

ELEV. 19.79 FIRST PUMP "ON"

ELEV. 18.29 PUMPS "OFF"

ELEVATION (16.22)

AS REQUIRED BY SO. CAL. EDISON

GROUND CABLE 5/8"x8" O.D. GROUND ROD

1/2" & 1 1/2" ELECTRICAL CONDUIT (1/2" CONDUIT TO HOUSE TELEPHONIC INTERCONNECT) TO NEW PUMP STATION PLATFORM

LOS ANGELES COUNTY SANITATION DISTRICTS
 JOHN D. PARKHURST, CHIEF ENGINEER
 FOR COUNTY SANITATION DISTRICT N° 5 9-27, 1977
 APPROVED: (NOT REQUIRED PER L.A.C.S.D.)
 OFFICE ENGINEER

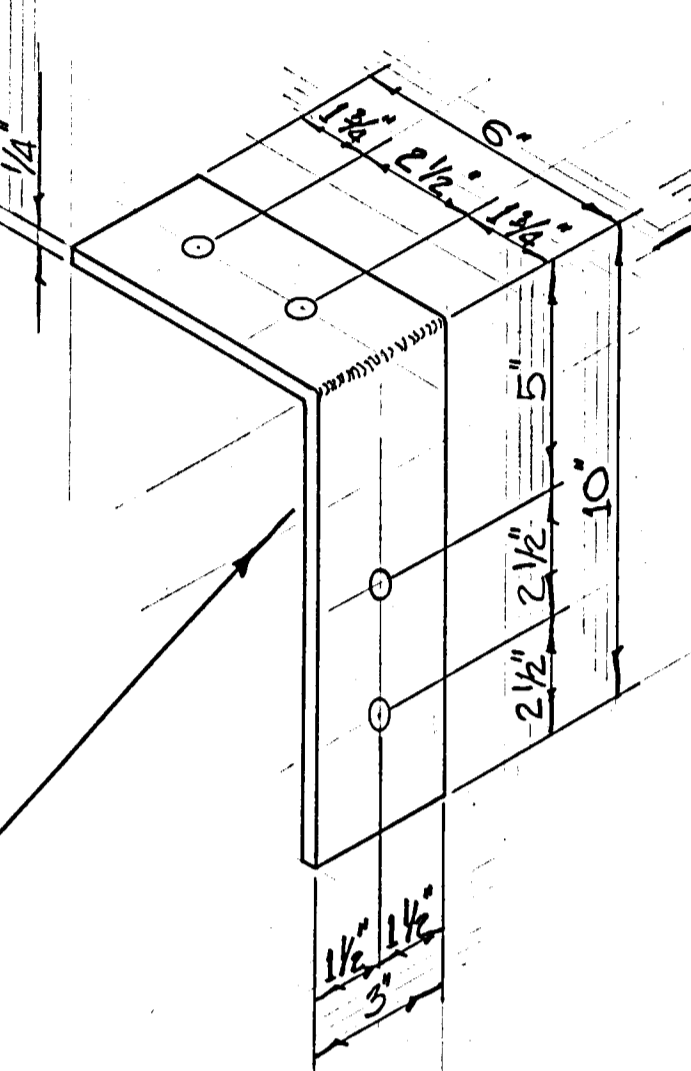
CITY OF GARDENA				
DEPARTMENT OF COMMUNITY DEVELOPMENT		ENGINEERING DIVISION		
PROJECT: SANITARY SEWER PUMP STATION 178TH STREET @ LA SALLE AVE JN 420				
F. B. REF.	DATE	APPROVED BY:	10-3, 1977	
DESIGNED BY	JHI 7-77	CITY ENGINEER	R. C. E. NO. 22397	
DRAWN BY	JHI 8-77	DWG. NO. 7-484		
CHECKED BY	TLR 9-77	SHT. 1 OF 2		

GENERAL NOTES

PUMP STATION - 178TH ST @ LA SALLE AVE

- 1 CLASS "B" CONCRETE IS TO BE USED ON ALL STRUCTURES (5 SACK MIX) PER STD. SPECIFICATIONS 200-1.1.2
- 2 ALL HARDWARE SHALL BE CORROSION RESISTANT
- 3 THE CONTRACTOR SHALL CONTACT AND MAKE ARRANGEMENTS WITH THE UTILITY COMPANY FOR POWER SERVICE
- 4 OVERLOAD PROTECTION FOR ELECTRICAL EQUIPMENT SHALL BE PROVIDED THROUGH CIRCUIT BREAKERS
- 5 THE CONTRACTOR IS TO SUPPLY FRESH WATER IN SUFFICIENT QUANTITY TO THE PUMP STATION FOR TESTING, UNTIL THE PUMP STATION IS ACCEPTED BY THE CITY.
- 6 ALL EXPOSED STEEL SURFACES NOT PAINTED OR PROTECTED BY SUPPLIER SHALL BE "HOT-DIP" GALVANIZED.
- 7 ALL CONDUITS TO BE RIGID STEEL AND ALL CONDUCTORS TO BE COPPER PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
- 8 ALL EXPOSED ENCLOSURES TO BE WEATHER PROOF AND LOCKABLE WITH APPROVAL OF CITY ENGINEER.
- 9 ELECTRICAL INSTALLATION TO MEET REQUIREMENTS OF STATE AND LOCAL APPLICABLE CODES.
- 10 ALL CONDUIT AND PIPING ON OR OVER THE PUMP STATION SHALL BE FASTENED SECURELY WITH APPROVED GALVANIZED PIPE STRAPS, HANGERS OR CLAMPS.
- 11 ALL CONSTRUCTION METHODS AND MATERIALS ARE SUBJECT TO THE CITY OF GARDENA SPECIFICATIONS AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (1976)
- 12 THE STATION SHALL BE SET ON TOP OF WET WELL ON A LAYER OF P.C.G. MORTAR. THE MORTAR LAYER WILL SERVE AS A MEANS TO BED AND PLUMB THE STATION.
- 13 ALL WELDS TO CONFORM WITH STD. SPECIFICATIONS NO. 304-1.9.
- 14 THE HIGH WATER TELEPHONIC ALARM SYSTEM (ELECTRICAL CONNECTIONS) SHALL BE A SEGREGATED SYSTEM, INDEPENDENT FROM THE PUMP STATION AUXILIARIES AND SEPERATE FROM THE PUMP STATION POWER SUPPLY.
- 15 A LETTER OF OPERATIONAL GUARANTEE SHALL BE OBTAINED BY THE CONTRACTOR FROM THE PUMP STATION SUPPLIER.
- 16 THE CONTRACTOR SHALL CLEAN UP, GRADE SMOOTH, SEED AND LANDSCAPE IN KIND.

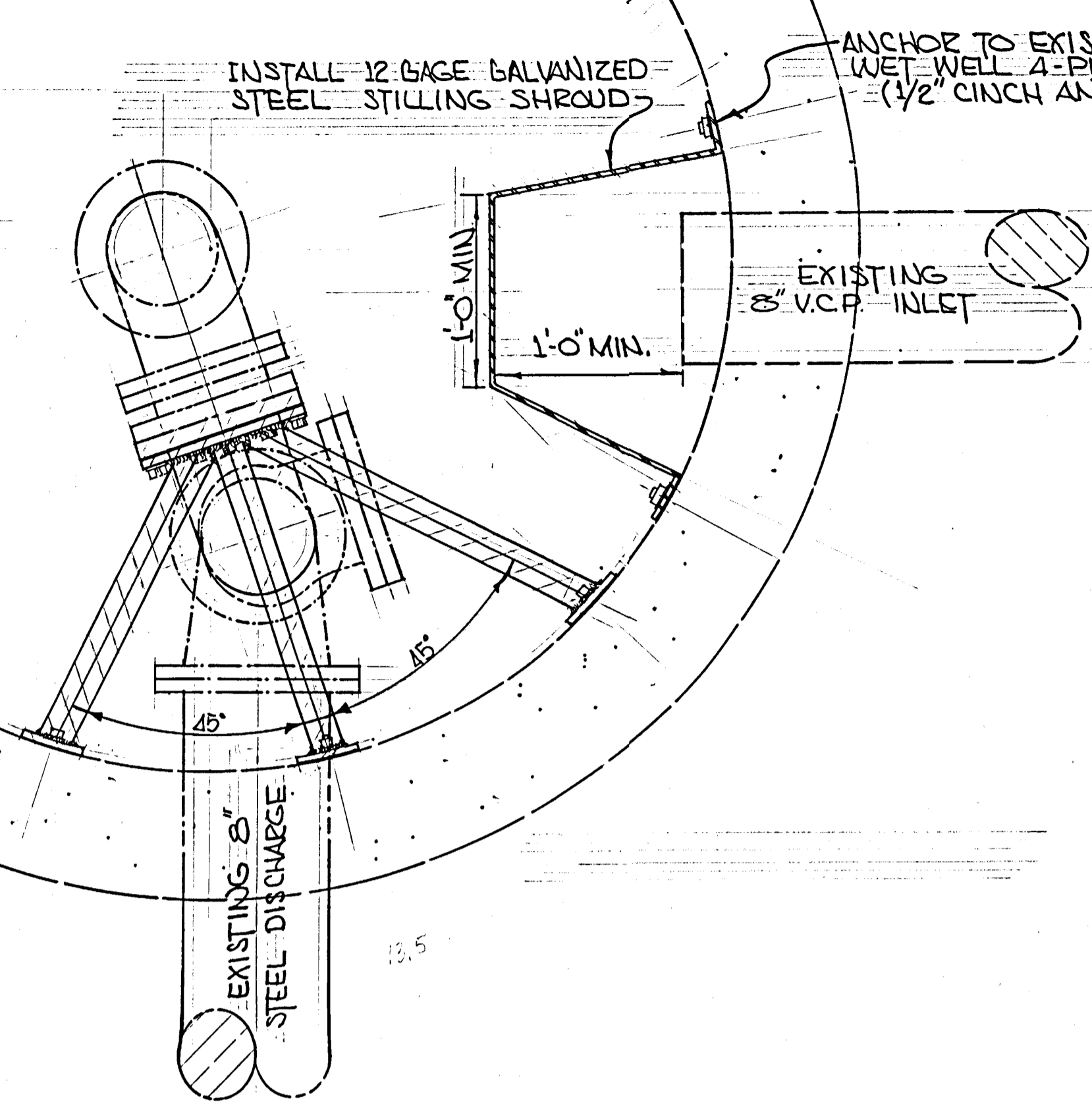
STEEL LID
 1/2" BOLTS (CORROSION RESISTANT)
 MORTAR LAYER



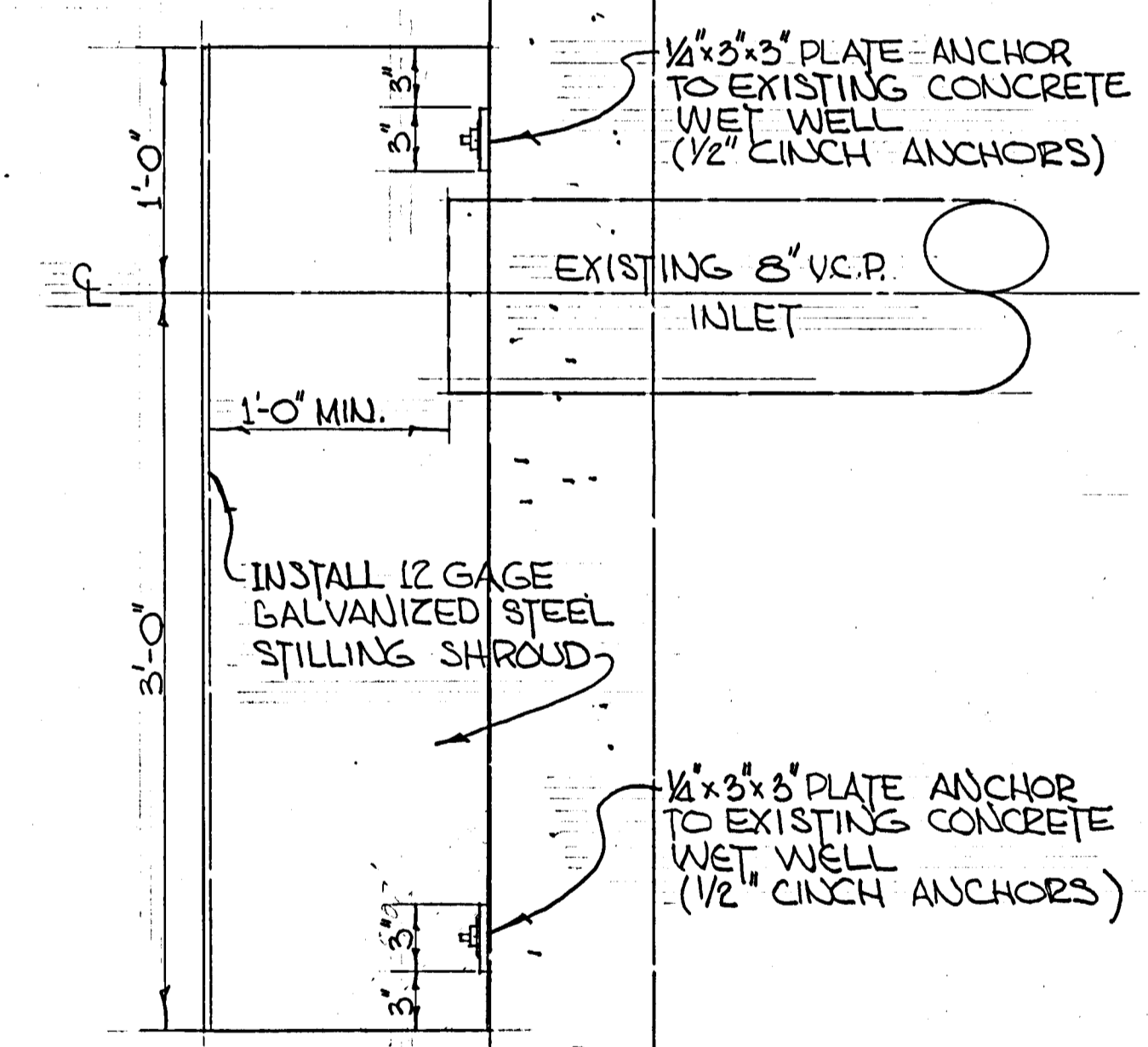
ANCHOR PLATE TO EXISTING WET WELL (1/2" CINCH ANCHORS)

DETAIL - PLAN VIEW DISCHARGE SUPPORT - STILLING SHROUD

NO SCALE

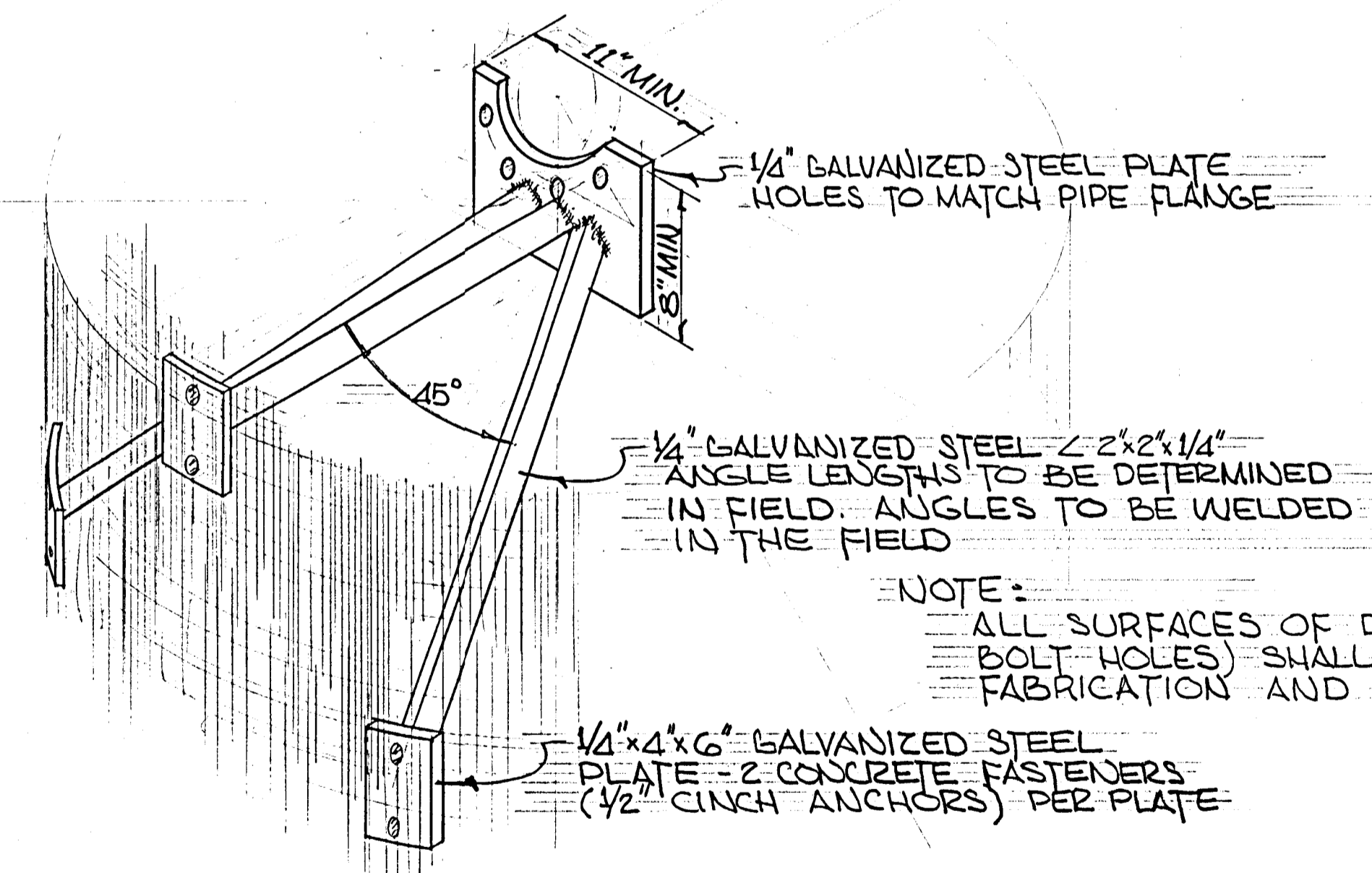


1/4" GALVANIZED STEEL ANCHOR PLATE ALL SURFACES OF PLATES (INCLUDING BOLT HOLES) SHALL BE "HOT-DIP" GALVANIZED AFTER FABRICATION AND PRIOR TO INSTALLATION.



STILLING SHROUD ELEVATION

NO SCALE

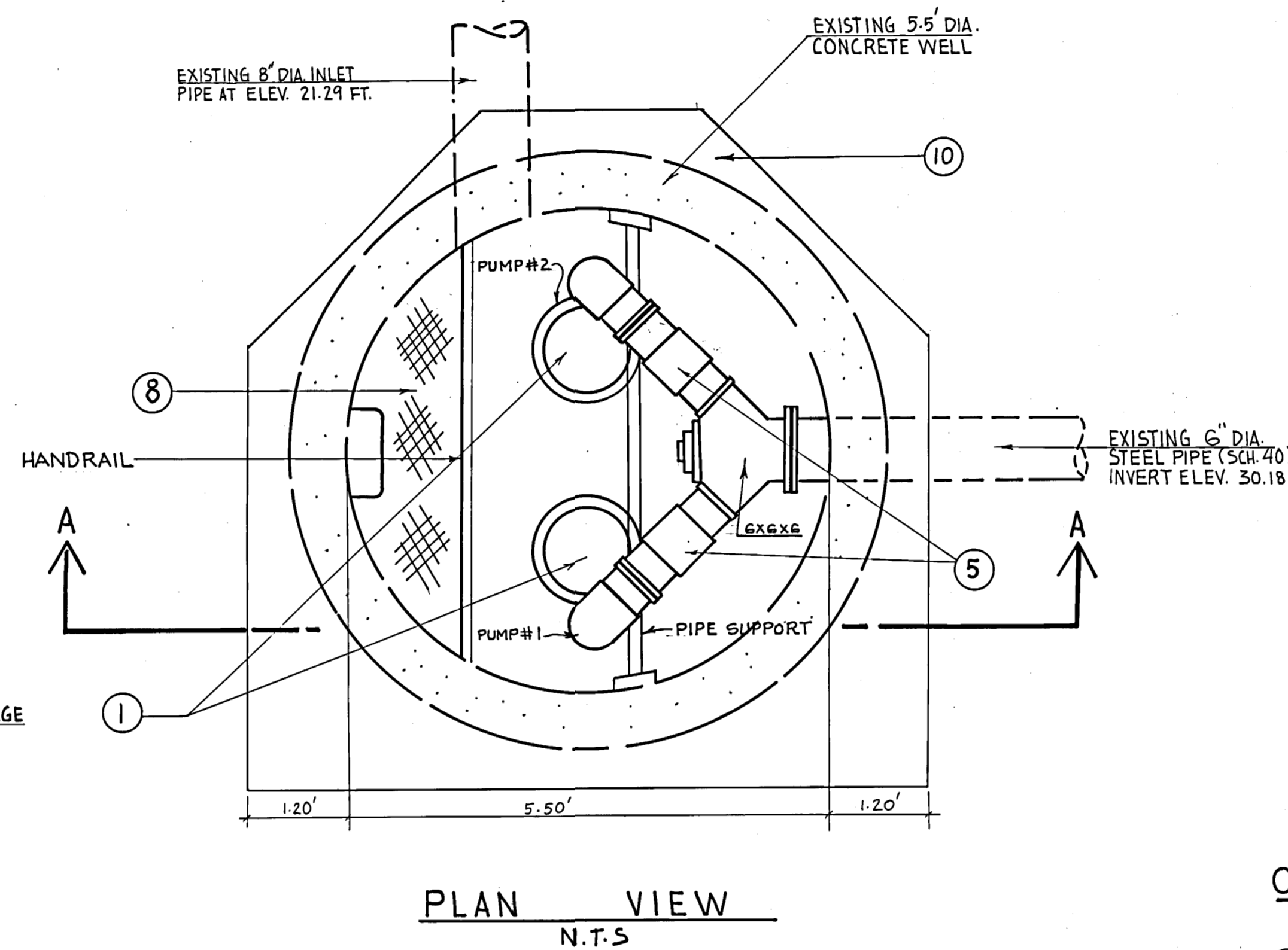
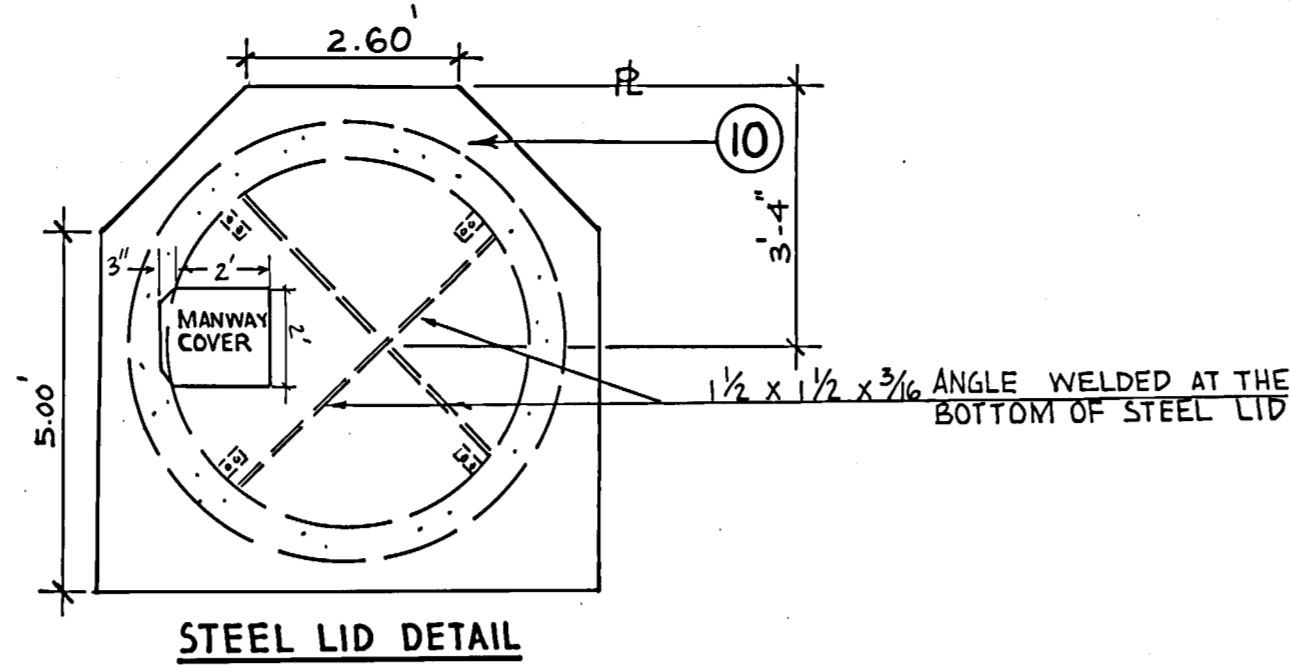


DISCHARGE SUPPORT

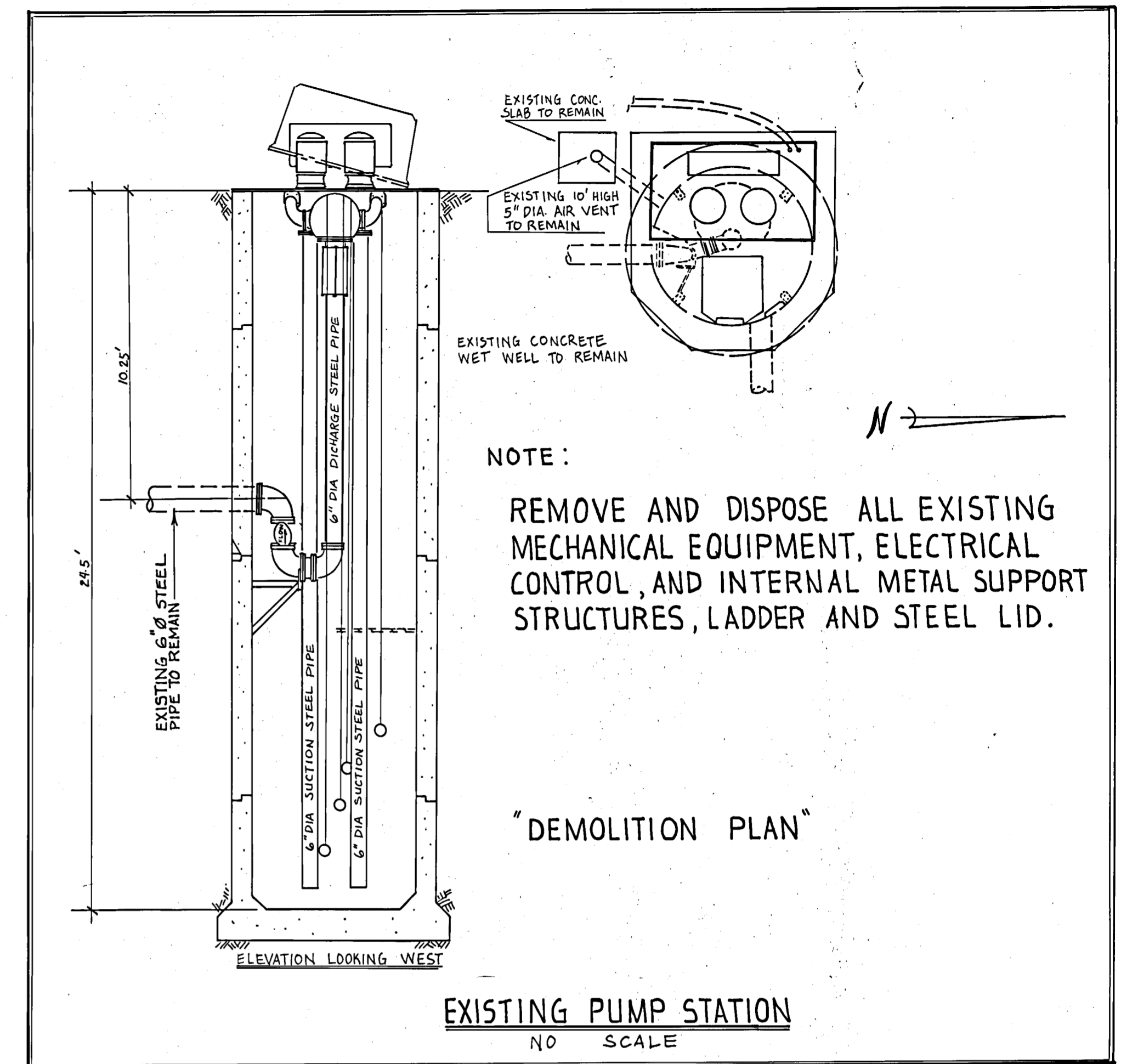
NO SCALE

NOTE:
 ALL SURFACES OF DISCHARGE SUPPORT (INCLUDING BOLT HOLES) SHALL BE "HOT-DIP" GALVANIZED AFTER FABRICATION AND PRIOR TO INSTALLATION.

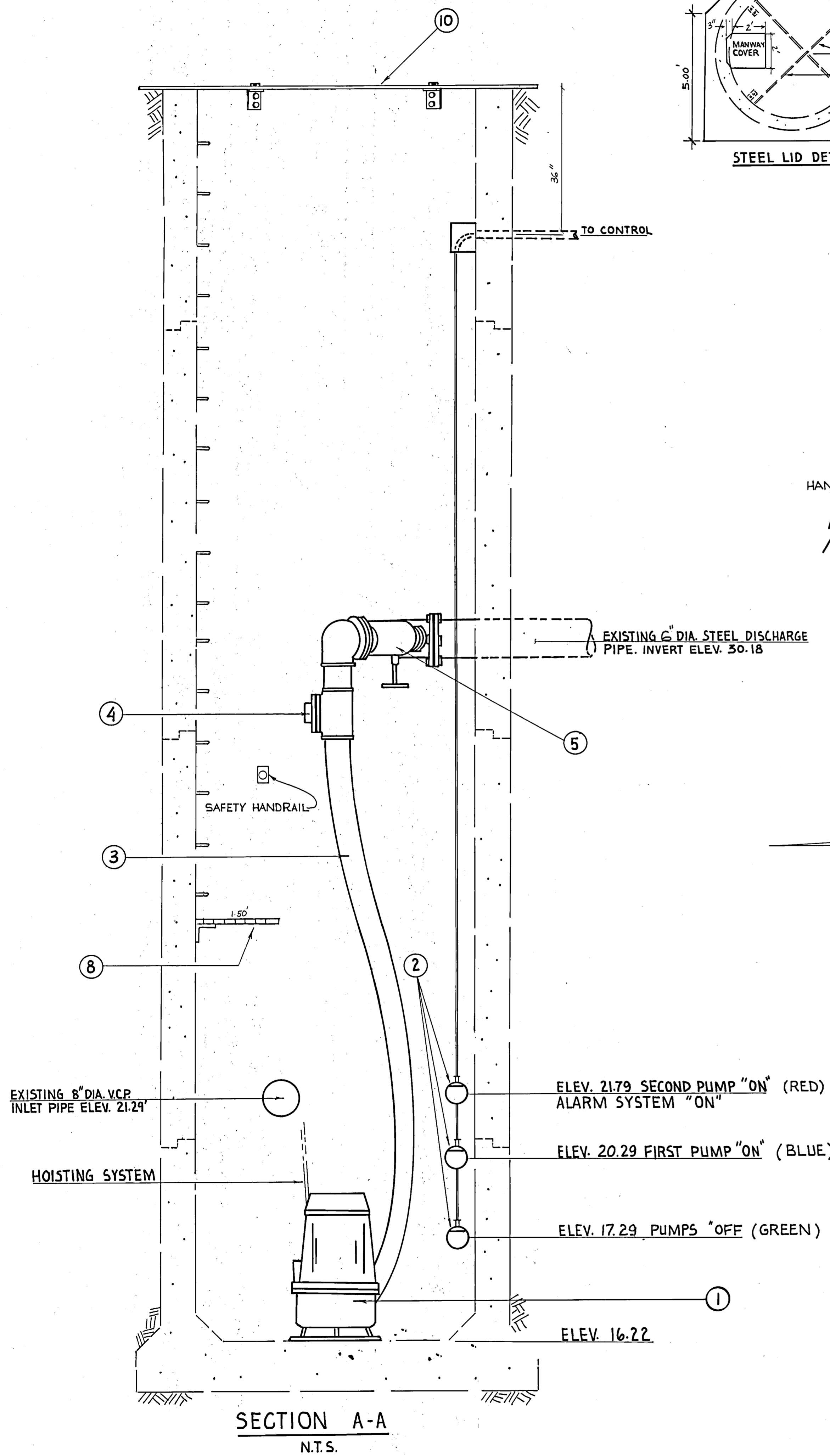
CITY OF GARDENA				
DEPARTMENT OF COMMUNITY DEVELOPMENT			ENGINEERING DIVISION	
PROJECT: SANITARY SEWER PUMP STATION				
178TH STREET @ LA SALLE AVE JN 420				
F. B. REF.	DATE	APPROVED BY:	10-3-1977	
DESIGNED BY: JHI	7-77	<i>Bob Laguerre</i>		
DRAWN BY: JHI	8-77	CITY ENGINEER	R. C. E. NO. 22397	
CHECKED BY: TLR	9-77	SHT. 2 OF 2	DWG. NO.	7-484



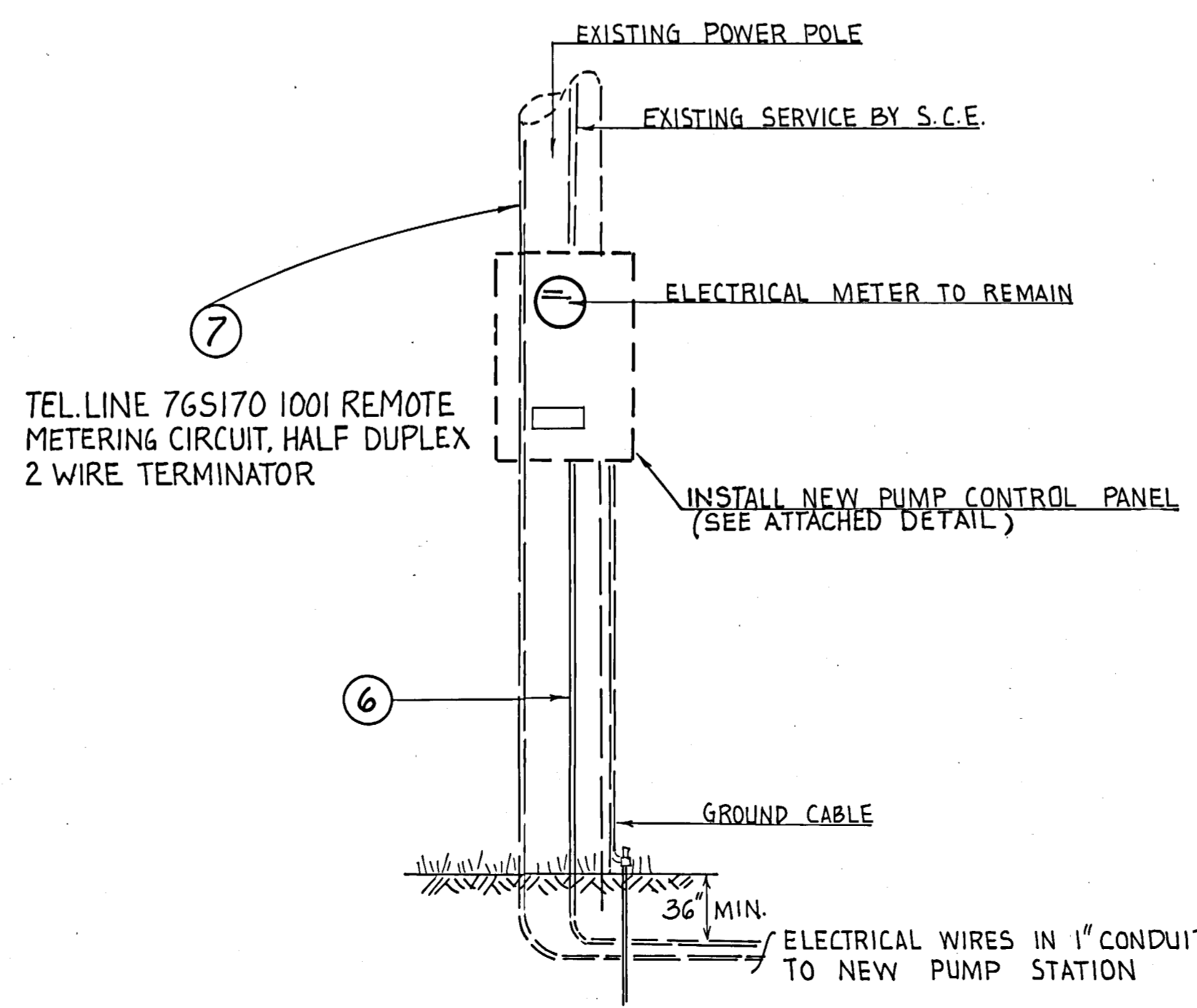
PLAN VIEW N.T.S.



EXISTING PUMP STATION NO SCALE



SECTION A-A N.T.S.



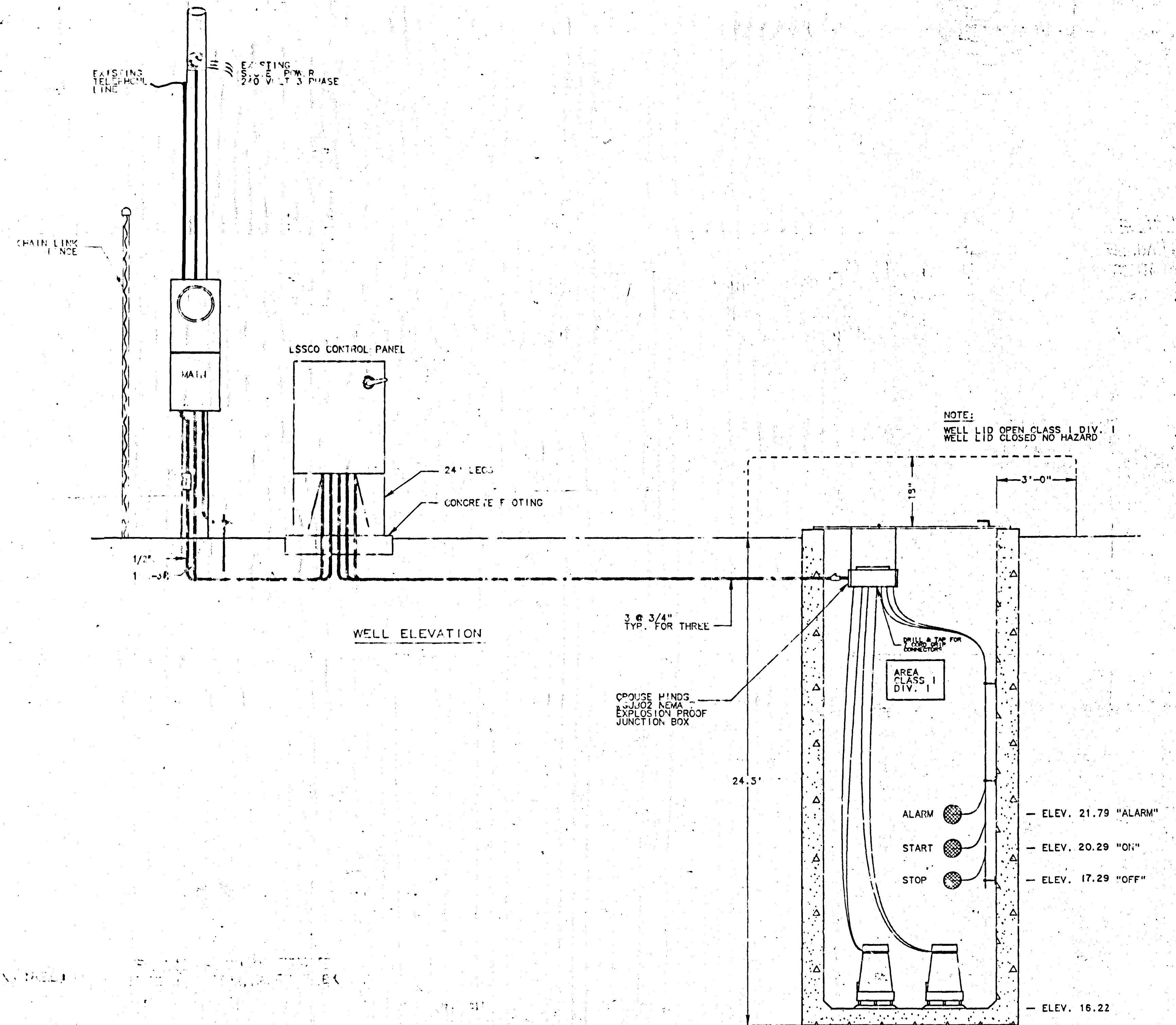
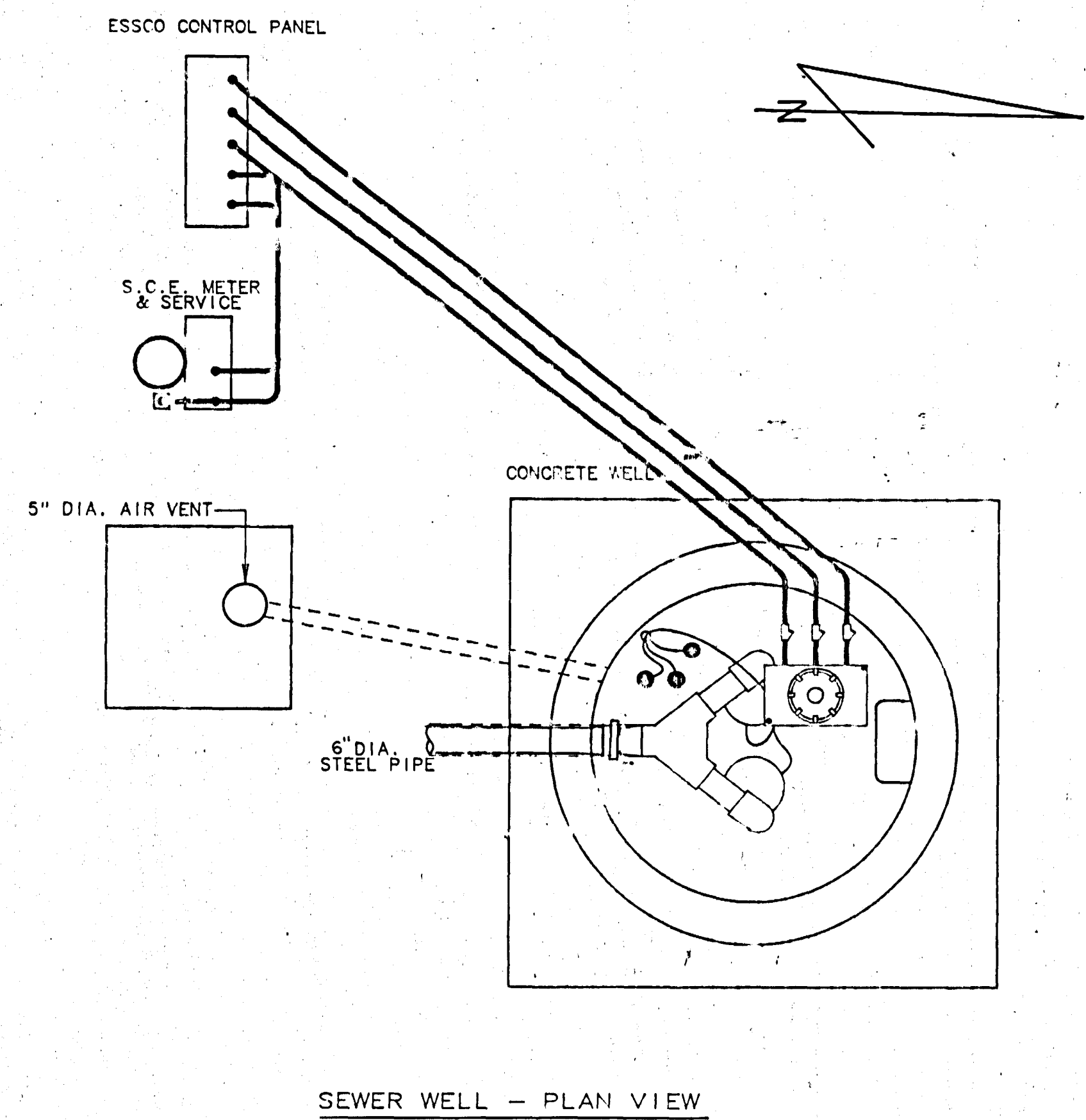
ELECTRICAL N.T.S.

CONSTRUCTION NOTES

- ① INSTALL 5 H.P. SUBMERSIBLE PUMPS WITH ATTACHED HOISTING SYSTEMS (2 EA.)
 - ② INSTALL MERCURY FLOAT SWITCHES (3 EA.) AT ELEVATIONS SHOWN.
 - ③ INSTALL 4 INCH DIA. FLEXIBLE DISCHARGE PIPES. (2 EA.)
 - ④ INSTALL 6 INCH DIA. SWING CHECK VALVES (2 EA.)
 - ⑤ INSTALL 6 INCH DIA. CLAMP GATE VALVES (2 EA.). PROVIDE SUPPORT STRUCTURE.
 - ⑥ INSTALL NEW 1" DIA. ELECTRICAL CONDUIT FOR ELECTRICAL SERVICE TO PUMP STATION. INSTALL NEW ELECTRICAL WIRING FROM METER TO PUMPS.
 - ⑦ RENOVATE EXISTING TELEPHONIC INTERCONNECT CABLE (ALARM SYSTEM).
 - ⑧ INSTALL NEW STEEL GRATING PLATFORM.
 - ⑨ INSTALL LADDER RUNGS 12" O.C. (16 EA.)
 - ⑩ INSTALL 1/4" CHECKERED STEEL PLATE TO EXISTING WET WELL. PROVIDE 2 FT. X 2.25 FT. MANWAY COVER & 4 EQUALLY SPACED ATTACHMENT BRACKETS.
- I. CONTRACTOR SHALL PROVIDE SEWER BYPASS DURING CONSTRUCTION.
 II. PROVIDE SHOP DRAWINGS FOR ITEMS NO. ⑤ ⑧ ⑨ & ⑩
 III. PAINT ALL EXPOSED FERROUS MATERIALS

RECORD DRAWING 9/92

CITY OF GARDENA			
DEPARTMENT OF PUBLIC WORKS		ENGINEERING DIVISION	
PROJECT: SEWER PUMP STATION RENOVATION			
LIMITS: 178 TH STREET AT LA SALLE			
F. B. REF.	DATE	APPROVED BY:	2/18/92
DESIGNED BY: S.F.	2/18/92	<i>Shannon G. Roberts</i>	
DRAWN BY: J.F.	2/18/92	CITY ENGINEER	R. C. E. NO. 19357
CHECKED BY: S.F.	2/18/92	SHT. 1 OF 2	DWG. NO. 7-515



RECORD DRAWING 9/92

NO.	REVISIONS	DATE	BY	APP.
1	RECORD DRAWING	9/92	S.E.	

CITY OF GARDENA		ENGINEERING DIVISION	
DEPARTMENT OF PUBLIC WORKS			
PROJECT: SEWER PUMP STATION RENOVATION			
LIMITS: 178 TH STREET AT LA SALLE			
F. B. REF.	DATE	APPROVED BY:	DATE
DESIGNED BY S.F.	2/18/92	<i>[Signature]</i>	2/18, 1992
DRAWN BY J.F.	2/19/92	CITY ENGINEER	R.C.E. NO. 29787
CHECKED BY S.F.	2/19/92	SHT. 2 OF 2	DWG. NO. 7-515

BEARD ELECTRIC
SANTA FE SPRINGS, CALIFORNIA

R. C. FOSTER CORPORATION
CITY OF GARDENA
SEWER PUMP STATION RENOVATION
178th ST. AT LA SALLE AVE.

AS BUILT 6/26/92

DRAWN BY: TRAVERS

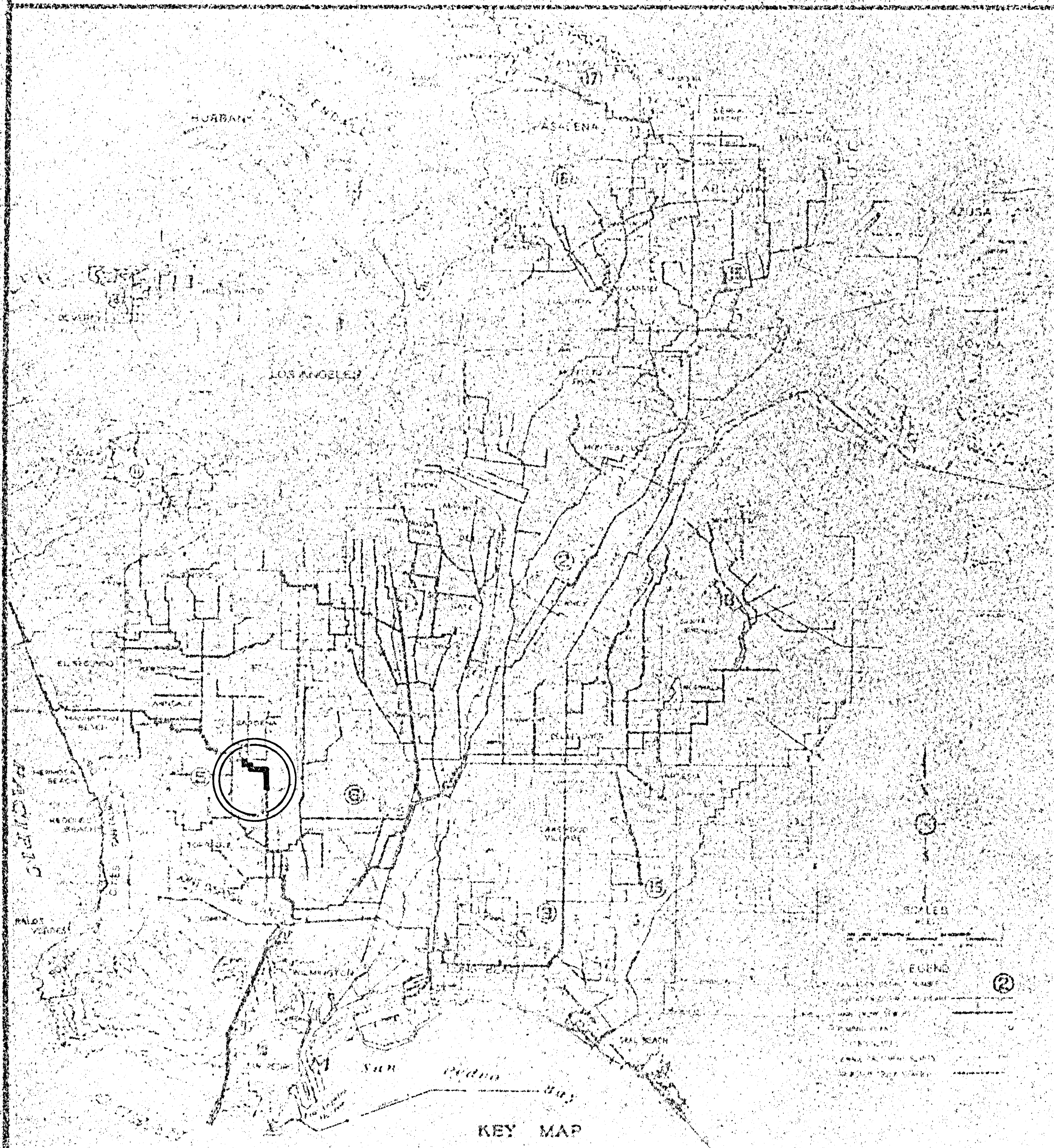
SCALE: NONE

DATE: 5/18/92

DWG. NO. BE-2477-E1

COUNTY SANITATION DISTRICT NO. 2
 OF LOS ANGELES COUNTY, CALIF.
 OFFICE OF CHIEF ENGINEER
 CONTRACT DRAWINGS
JOINT OUTFALL "D" TRUNK SEWER
UNIT 2, SECTION 3

SUBMITTED *April 10, 1952* DATED April 8, 1952
 RECOMMENDED *C. R. Compton* DATED April 8, 1952
 APPROVED *Allen* DATED April 8, 1952

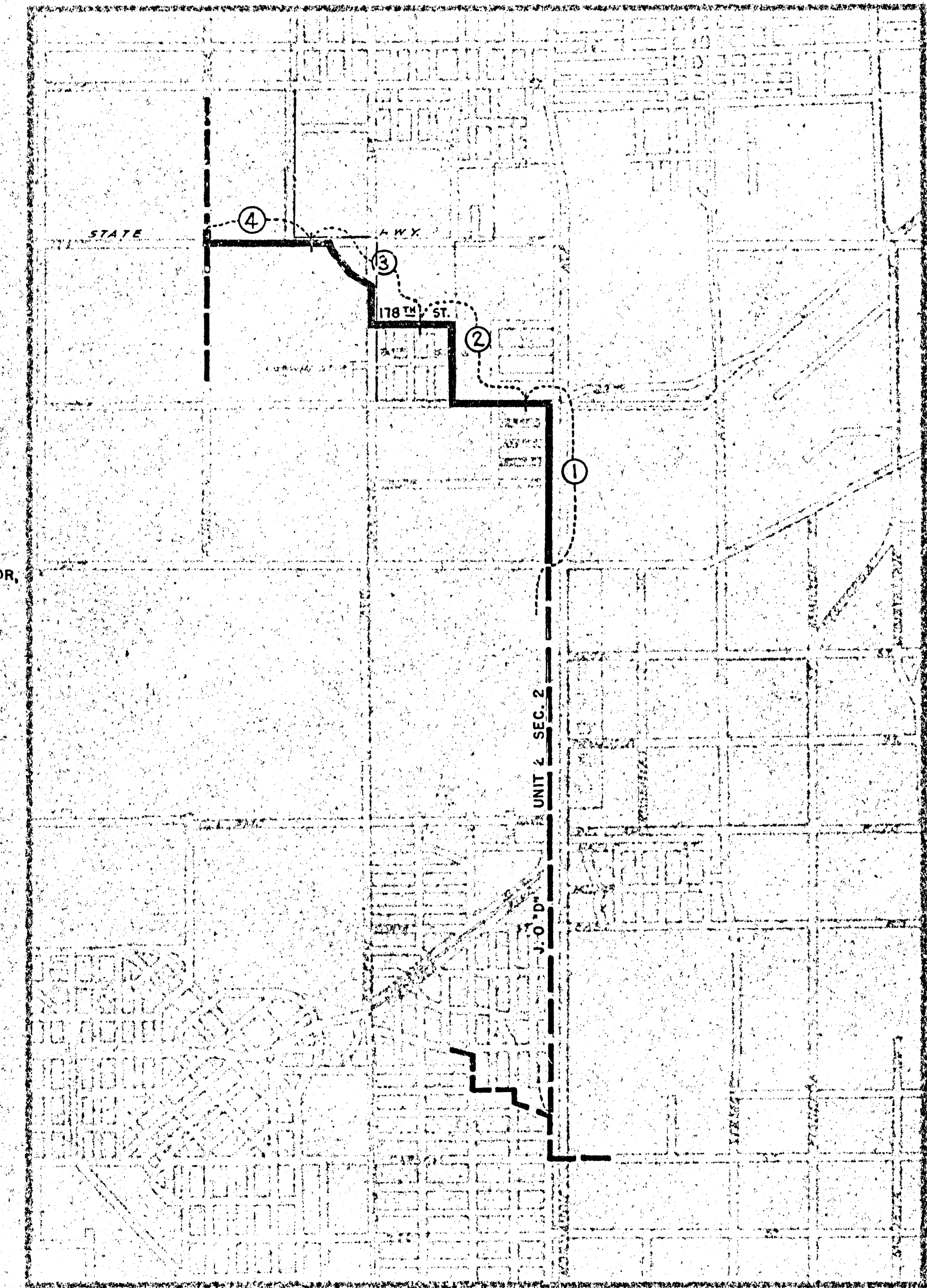


GENERAL NOTES

THESE DRAWINGS AND THE DATA HEREON ARE HEREBY MADE A PART OF THE SPECIFICATIONS. ELEVATIONS ARE IN FEET ABOVE U.S.G.S. OR MEAN SEA LEVEL DATUM. ALL UTILITIES AFFECTED BY CONSTRUCTION OF TRUNK SEWER AND APPURTENANT WORK MUST BE MAINTAINED BY THE CONTRACTOR DURING CONSTRUCTION. PERMITS FOR EXCAVATION WILL BE OBTAINED BY THE DISTRICT. INSPECTION FEES FOR REPAVING REQUIRED BY LOCAL AUTHORITIES TO BE PAID BY DISTRICT. ALL CONCRETE FOR STRUCTURES SHALL BE CLASS "A" UNLESS OTHERWISE SPECIFIED. ALL ASPHALTIC TYPE REPAVING TO BE SEALED WITH 1/2 GAL. OF SEALER PER SQUARE YARD AND COVERED WITH 18" OF R.U.P. UNLESS OTHERWISE SPECIFIED. PRIOR TO CONSTRUCTION OF TRUNK SEWER ARRANGEMENTS MUST BE MADE BETWEEN CONTRACTOR, CITY OF LOS ANGELES AND SANITATION DISTRICTS FOR INSPECTION OF CURBS AND DRIVEWAYS ALONG PROPOSED ROUTE. ALL SEWER, STORM DRAIN LINES AND LATERALS WITHIN THE CITY OF LOS ANGELES MUST BE SUPPORTED. ACROSS TRENCH WIDTH PER CITY OF LOS ANGELES STD. PLAN B-3289. THE CONTRACTOR SHALL SECURE THE EXCAVATION PERMITS REQUIRED BY THE CITY OF LOS ANGELES AND MAKE THE DEPOSITS FOR RESURFACING REQUIRED IN CONNECTION THERE WITH WHICH ARE ESTIMATED TO TOTAL \$9,200** AT CURRENT RATES. THE TOTAL DEPOSIT DOES NOT INCLUDE PAYMENT FOR THE TEMPORARY PAVEMENT REQUIRED BY THE CITY OF LOS ANGELES EXCAVATION PERMITS. A SEPARATE HOUSE CONNECTION SEWER PERMIT SHALL BE SECURED FROM THE CITY OF LOS ANGELES FOR EACH HOUSE CONNECTION SLVEF, REMODELED, SUPPORTED OR REPAIRED. THE CURRENT FEE FOR EACH PERMIT IS \$3.50. ALL DAMAGED PAVEMENT TO BE REPLACED IN THE CITY OF LOS ANGELES STREETS SHALL HAVE A TEMPORARY PAVEMENT OF NOT LESS THAN 1" PROVIDED PRIOR TO PERMANENT REPAVING BY THE CITY AND SHALL CONFORM TO MUNICIPAL CODE SECTION 62.22 OF SAID CITY. CONTRACTOR TO ARRANGE FOR OCCUPATIONAL R/W AND ACCESS. SEE ALSO STD. DRAWINGS: S-a-202 S-a-209 S-a-207 SEE ALSO STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF SEWERS AND APPURTENANCES DATED APRIL 9, 1952.

LEGEND

PROPOSED TRUNK SEWER	--- (thick solid line)
EXISTING	--- (dashed line)
FUTURE	--- (dotted line)
EXISTING LATERAL	--- (thin solid line)
DIP LINE	--- (line with arrow)
GAS	--- (line with 'X' marks)
WATER	--- (line with 'W' marks)
POWER	--- (line with 'P' marks)
TELEPHONE LINE	--- (line with 'T' marks)
CONDUIT	--- (line with 'C' marks)
FENCE	--- (line with 'F' marks)
PAVEMENT (PVMT.)	--- (hatched pattern)
CURB, PATHWAY & SIDEWALK	--- (dotted pattern)
CITY BOUNDARY	--- (line with 'C' marks)
C.S.D.	--- (line with 'S' marks)
RIGHT OF WAY	--- (line with 'R' marks)
BENCH MARK	--- (circle with 'B' marks)
PLAN & PROFILE SHEET INDEX	--- (circle with 'I' marks)



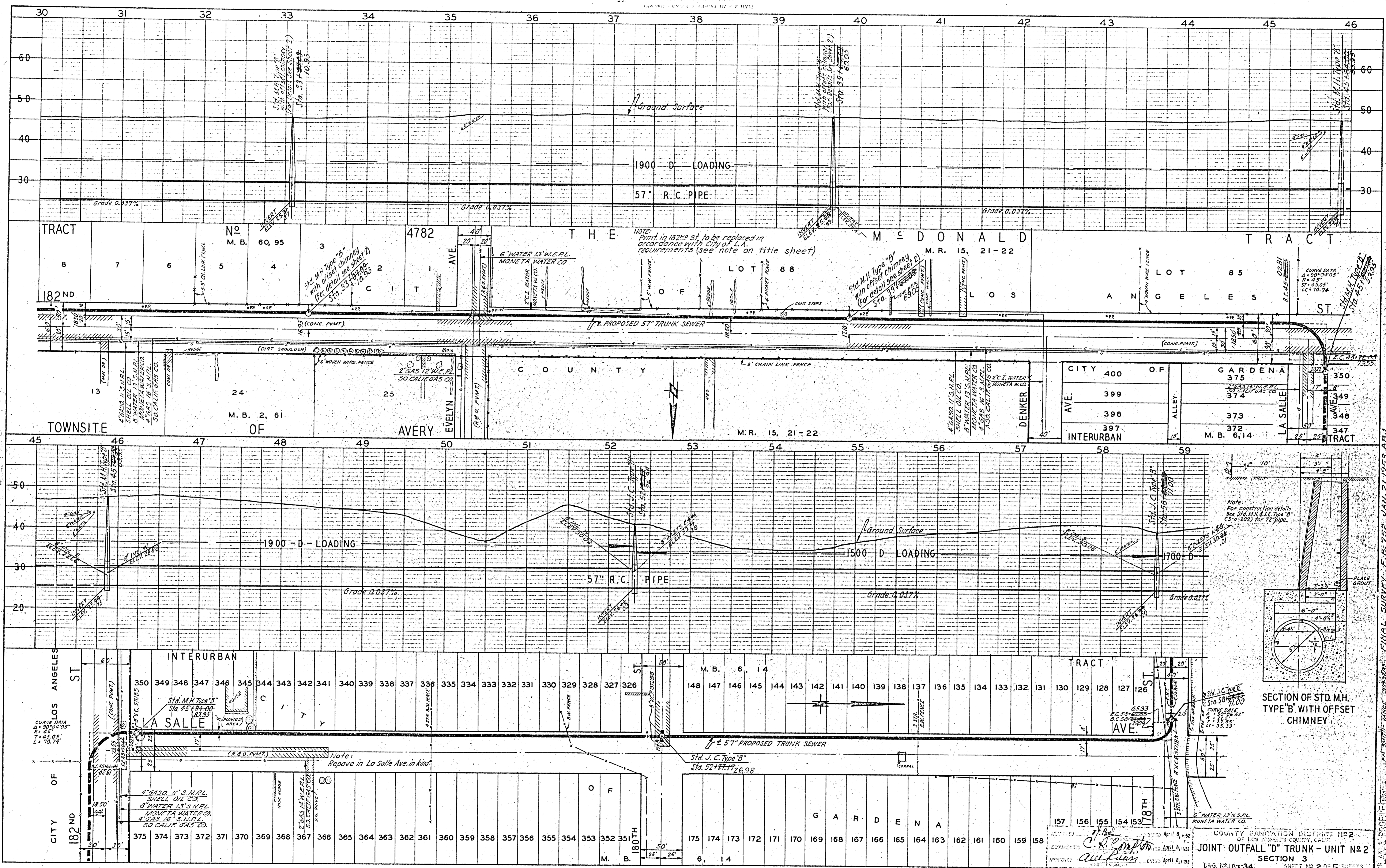
APPROVALS		
DIVISION OR DEPT.	ENGINEER	DATE
STREET OPENING		
STREET AND PATHWAY		
SANITARY SERVICES		
STORM DRAIN		
BRIDGE DESIGN		
STREET LIGHTS		
WATER DEPARTMENT		
RIGHT OF WAY & LAND		

SUBMITTED *April 10, 1952*
 BY *A. G. G. G.*
 SANITATION DISTRICT ENGINEER

APPROVED *April 17, 1952*
Allen
 CITY ENGINEER

182 ST.
J.O.-p-34

7-139



NOTE: Pmt. in 182nd St to be replaced in accordance with City of L.A. requirements (see note on title sheet)

Note: For construction details see Std. M.H. & J.C. Type "B" (S-202) for 12" pipe.

SECTION OF STD. M.H. TYPE "B" WITH OFFSET CHIMNEY

APPROVED: *C. R. Rempton* DATE: April 8, 1952
 APPROVED: *Carl P. ...* DATE: April 8, 1952
 COUNTY SANITATION DISTRICT NO. 2
 JOINT OUTFALL "D" TRUNK - UNIT NO. 2
 SECTION 3
 SHEET NO. 2 OF 5 SHEETS

182 ST.