Jackson Highway Tiny Homes

Centralia, WA

Pump Study

Fuller Designs Project No. 2030
July 20, 2021
Revised: Sept. 7, 2021

Prepared by:

FULLER DESIGNS
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Project Information

Prepared for: Jackson Highway Tiny Homes
2945 Jackson Highway
Chehalis, WA 98532

Contact: David Cosser
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Reviewing Agency

Jurisdiction: City of Chehalis
2007 Northeast Kresky Avenue
Chehalis, WA 98532

Lewis County Water and Sewer District #4
P.O. Box 1122
Chehalis, WA 98532

Contact: City Engineer, Trent Lougheed, (360) 748-0238
Sewer District Representative, Patrick Wiltzius, (360) 269-3657

References

Project Engineer

Prepared by: Fuller Designs, Inc.
1101 Kresky Ave
Centralia, WA 98531
(360) 807-4420
Contact: Aaron Fuller, PE

"I hereby certify that this Pump Study for the Jackson Highway Tiny Homes Project has been prepared by me or under my supervision.

CONTENTS

Pump Study

1. Overview

This report serves as an evaluation of the Logan Hill Lift Station along Jackson Highway between Logan Hill Road and Yates Road in Chehalis, Washington. This Pump Study will determine if the existing lift station can manage the additional effluent brought about by the proposed 62-lot Jackson Highway Tiny House Development.

2. Existing Conditions

As-built drawings provided by the City of Chehalis indicated two pumps were housed in a circular vault, and valves and pig port in a rectangular vault, Figure 2.1. Upon inspection, three vaults were present onsite, Figure 2.2.

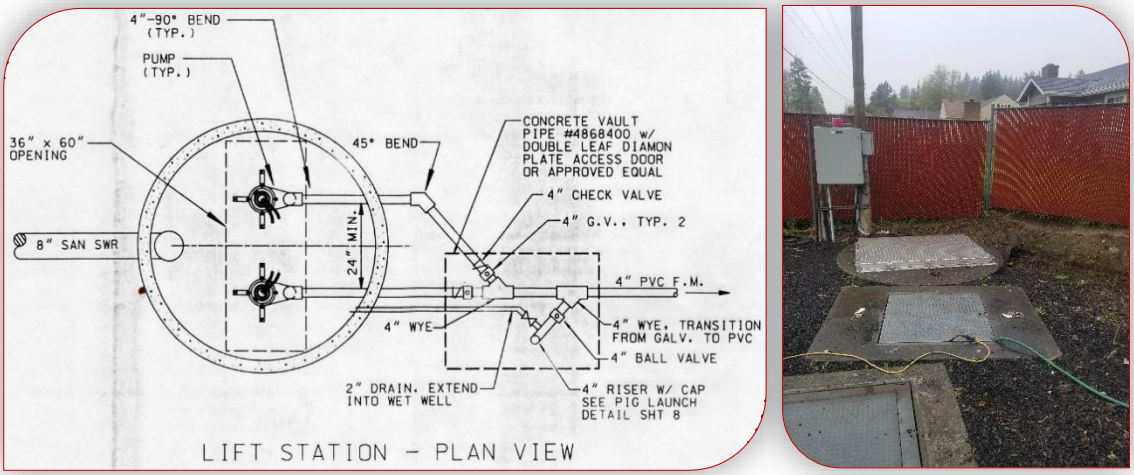


Figure 2.1(Left): Plan view of the lift station assembly showing a circular vault housing the pumps and a rectangular vault housing the valves and pig port. Figure 2.2 (Right): Site photo with three vaults present housing the pumps (farthest), valves (middle) and the pig port (partial view).

Analyzing the differing layout indicated the check-valve, gate-valve, pigging port, and tee vault had been split into two vaults. Valves in middle vault with pig port and tees in the other. While different in configuration, the system operates as shown in the asbuilt plans included in Appendix A.

An interview with District #4 Commissioner, Patrick Wiltzius, yielded information that the system had never been expanded since the lift station's installation in 1996. Onsite pumps were identified as the Myers 4VX50M4-23 Solids Handling Wastewater Pump 5.0 with a 7" impeller (Myers Pump). The pump performance curve was provided by the manufacturer and can be found in Appendix A of this report. Sometime during 2018, one of the pumps was replaced along with one of the check valves and corresponding isolation valves. The other check valve was repaired at this time as well. The City of Centralia is currently in the process of repairing the impeller on the additional pump.

Attempts to find additional information was made through phone calls and emails with Lewis County, Water/Sewer District #4 and City of Chehalis. Long term energy usage or records of existing sewage flow rates could not be acquired. Maintenance logs of the station were not available. Other than an interview with Mr. Wiltzius, additional information concerning the lift station and pumps was limited and therefore, the following assumptions were made.

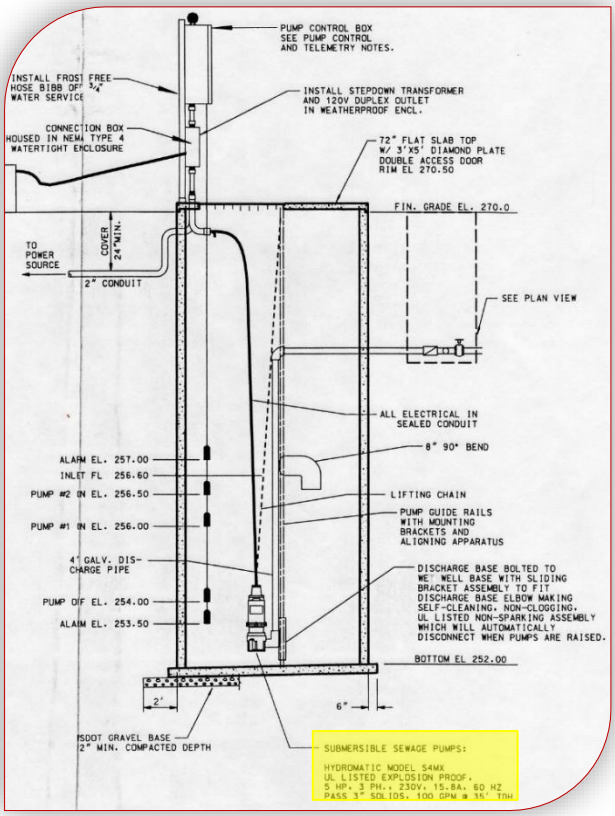


FIGURE 2.3 CROSS SECTION OF THE LOGAN HILL LIFT STATION PUMP SPECIFICATIONS HIGHLIGHTED.

Assumptions

Inflow

Information concerning the existing inflow to the lift station could not be found, however the interview with Mr. Wiltzius yielded the lift station had never been expanded. This indicated original laterals in the as-built drawings are the only service lines contributing to the lift station. A parcel map was generated, Appendix A, highlighting the 26 parcels that were serviced by the lift station in 1996. Today, the current land use of the 26 parcels includes18 residential lots, one commercial lot and seven lots that are government/ land use properties.

Average person produces between 50 to 70 gallons of wastewater per day[1]. Assuming the average home serviced by the lift station is three bedrooms with two people per room, the average daily flow from one residential home can be assumed as 360-gal/day. The average daily flow from the 18 residential parcels can be estimated as 6,480-gal/day (4.5-GPM). This is considered a reasonable value as commonly accepted septic design regulation is consistent with 360-gal/day for a standard single-family residence (120-gal/day per bedroom).

The commercial property, Creekside Event Center, serviced by the lift station has a seating capacity of 200-people. During an event each person is expected to use 10-gal of water. Assuming a peak event, it can be estimated 2,000-gal/day of effluent is entering the lift station from this commercial property. However, the US Department of Health suggests event centers have relatively small sewer usage during periods of inactivity.

The remaining seven government/ land use properties were considered to have no effects on the lift station as no buildings are present on these properties. Therefore, it can be concluded that the existing inflow into the pump is 8,480-gal/day (5.9-GPM).

[1] Benefield, Laura A. RESIDENTIAL FLOW RATES, 2002, pp. 1–18, RESIDENTIAL FLOW RATES.

3. Evaluation

This report serves to evaluate if the current lift station can accommodate an additional increase in sewage brought about by the proposed Jackson Highway Tiny Home Development (Development). The Development proposes the installment of 62 residential homes. These homes are expected to be approximately 900SF and only have 1-2 bedrooms. Assuming 2 bedrooms at 120-gal/day the proposed homes are expected to produce a sewage output of 240-gal/day from each home. This is an estimated increase of 14,880-gal/day (10.3-GPM).

As stormwater should not enter the sewer lift station, effects of storm events were not considered or evaluated in this pump study. Fuller Designs' recommendations to lessen the effects of storm events on the lift station can be found in Section 4 of this report.

Existing Peak Flow & Cycle Time

Under the existing conditions, it was determined the average per minute inflow is currently 5.9-GPM. This flow rarely happens as usage drops to minimal during the middle of the day and at night. Peak usage is usually obtained by measuring peak discharge events and comparing these values to average rates. The assumed peaking factor for this station is 4 (Section C1-3.3.2 of the DOE Sewage Works Design – Orange Book)[2]. It can be concluded the existing peak inflow to the system is approximately 23.6-GPM. This rate can be assumed to be sustained for one hour.

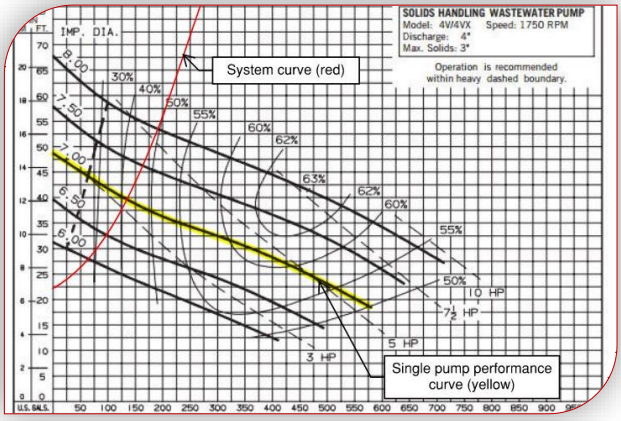


Figure 3.1 The system curve (red) and pump performance curve, when a single pump is working (yellow). An enlargement of the graph can be found in Appendix A.

Analysis of the pumping cycle assumes a beginning point with effluent at the pump off level and beginning a peak hour. After 12.5-min, with an effluent inflow rate of 23.6-GPM, Pump One switches to the on position. Pump one begins to discharge effluent from the station at a rate of 125-GPM. This rate was determined by the approximate crossing of the system curve and the single Myers pump curve, Figure 3.1. The volume of effluent in the lift station will decrease by 101.4-GPM when working at a rate of 125-GPM, Pump One switches to the off position after 2.9-min, completing the cycle at 15.4-min. During one hour of peak flow, this results in 4 cycles in a peak hour with the pump running for approximately 11.6 minutes during that timeframe. Cycles during lower flow conditions are significantly longer with extended pump off times.

Under the current conditions, it was concluded that Pump Two only comes on as an emergency backup.

[2] Criteria for Sewage Works Design, Aug 2008, pp. C1-7, Fig C1-1, Dep. of Ecology.

Proposed Peak Flow & Cycle Time

The proposed development is expected to increase the total effluent into the system by an additional 10.3 GPM. The flow is expected to be a total of 16.2-GPM. Under the same peaking factor of 4, it is expected the resulting effluent during an hourly peak event will be 64.8-GPM.

Assuming the conditions remain as existing inside the lift station except for the increased effluent flow, during peak flow events it is expected Pump One will switch on after 4.53-min. Discharging at a rate of 125-GPM, the effluent is expected to discharge from the lift station at a rate of 60.2-GPM. Pump One is expected to switch off after 4.9-min of pumping. The results in a 9.4-min pump cycle. In this proposed condition peak hour scenario, the pump is expected to cycle approximately 6 times during this timeframe. Cycles during lower flow conditions are significantly longer with extended pump off times.

Similarly, to the existing conditions, in this proposed scenario, Pump Two would work as a full backup and only expected to be used in an emergency.

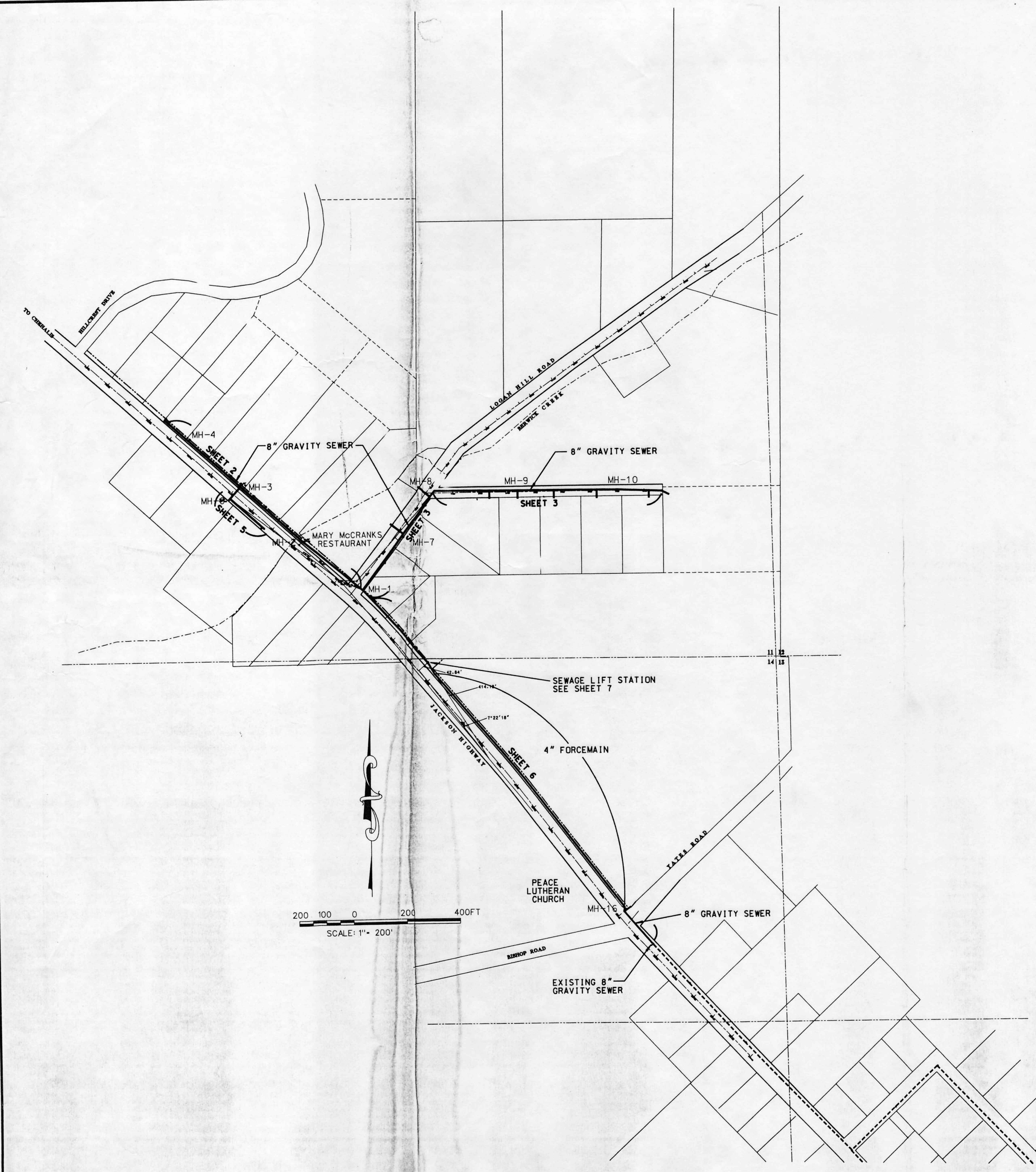
4. Recommendations

It is Fuller Designs' recommendation that the existing pumps may serve the proposed development without significant improvement. With increased pumping cycles, it is expected Pump maintenance intervals will also increase. As new developments are implemented and continue to tax this station, the cycles will slowly decrease and pump on time will also increase.

It is recommended these pumps be serviced in a standard fashion in line with manufactures recommendations, checking for wear periodically. Depending on timeframe of the last pump check, Fuller Designs recommends a check including removal, disassembly, and visually checking impeller and volute (pump housing) for wear. If significant wear is observed a rebuild or replacement may be in order. Consideration to extend the maintenance interval of these pumps may be periodically switched between Pump One and Pump Two communication and power leads. This will change the primary pump, split wear between the pumps, and extend the life of the station.

Fuller Designs also recommends the use of watertight lids and additional stormwater separation techniques. Specifically rerouting the stormwater ditch that runs through the pump station. These actions will help alleviate the effects of stormwater entering the lift station during large storm events.

Appendix A



GENERAL NOTES

1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE WSDOT STANDARD SPECIFICATIONS FOR ROADS, BRIDGES AND MUNICIPAL CONSTRUCTION AND LEWIS COUNTY STANDARDS.

2. EROSION CONTROL MEASURES SHALL BE TAKEN DURING CONSTRUCTION TO PREVENT SILTATION OF EXISTING AND PROPOSED FACILITIES.

GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION)

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH LEWIS COUNTY AND CITY OF CHEHALIS STANDARDS ALONG WITH THE MOST CURRENT EDITION OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (WSDOT/APWA).

2. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

3. SIDE SEWER SERVICES SHALL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS SHALL BE MADE BY A SADDLE TAP TO AN EXISTING MAIN OR A WYE BRANCH FROM A NEW MAIN.

4. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT ONCE BY THE OWNER OR HIS REPRESENTATIVE. ADDITIONAL STAKING SHALL BE AT THE CONTRACTORS EXPENSE.

5. ALL PLASTIC PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE PROPOSED FINISHED SUBGRADE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING, WHICH CAN BE DETECTED BY A STANDARD METAL DETECTOR. IN ADDITION, FOREC-MAINS SHALL BE INSTALLED WITH 14 GAUGE COATED COPPER WIRE WRAPPED AROUND ALL PLASTIC PIPE AND BROUGHT UP AND TIED OFF AT THE VALVE BODY. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL. THE TAPE AND WIRE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.

6. ALL BURIED POWER FOR FORCEMAINS SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" ABOVE THE BURIED POWER. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE BACKING MARKED "POWER". TAPE SHALL BE FURNISHED BY CONTRACTOR.

7. BEDDING OF THE SEWER MAIN AND COMPACTION OF THE BACKFILL MATERIAL SHALL BE REQUIRED IN ACCORDANCE WITH THE ABOVE MENTIONED SPECIFICATION (SEE NOTE 1).

8. A 3 FOOT SQUARE x 4 INCH THICK ASPHALT OR CONCRETE PAD SHALL BE INSTALLED AROUND ALL CLEAN OUTS THAT ARE NOT IN A PAVEMENT AREA.

9. ALL LINES SHALL BE CLEANED AND PRESSURE TESTED IN CONFORMANCE WITH THE ABOVE REFERENCED SPECIFICATIONS (SEE NOTE 1). TESTING SAHLL COMMENCE AFTER ALL UNDERGROUND UTILITIES ARE INSTALLED AND COMPACTION OF THE ROADWAY SUBGRADE IS COMPLETED. TEST FORCEMAIN PER 7-11.3(11).

10. PRIOR TO BACKFILL, ALL MAINS AND APPURTENANCES SHALL BE INSPECTED AND APPROVED BY THE OWNER, LEWIS COUNTY, AND CHEHALIS INSPECTORS. APPROVAL SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR CORRECTION OF ANY DEFICIENCIES AND/OR FAILURES FOUND BY SUBSEQUENT TESTING OR INSPECTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNER, COUNTY, AND CITY OF THE TIME FOR THE REQUIRED INSPECTIONS.

11. THE END OF ALL LATERALS SHALL BE MARKED WITH A 2 X 4 WOODEN STAKE FOUR FEET LONG (MIN.) BURIED IN THE GROUND A DEPTH OF THREE FEET (MIN.). THE LOWER END SHALL HAVE A 2 X 4 CLEAT NAILED TO IT TO PREVENT WITHDRAWAL OF THE STAKE. THE EXPOSED ONE FOOT SHALL BE PAINTED WHITE AND THE DEPTH TO THE LATERAL SHALL BE INDICATED IN BLACK PAINT. IN ADDITION, A LENGTH OF 12 GAGE GALVANIZED WIRE SHALL EXTEND FROM THE PLUGGED END OF THE LATERAL. THE UPPER END SHALL EMERGE AT THE STAKE BUT SHALL NOT BE FASTENED TO IT.

12. ALL LATERALS SHALL BE LAID AT 2% MINIMUM EXCEPT WHERE NOTED.

13. THE OWNER, LEWIS COUNTY SEWER DISTRICT #1, HAS CONTRACTED WITH AN INDEPENDANT INSPECTOR TO MONITOR THE CONSTRUCTION OF THE THE FACILITIES INCLUDED IN THIS PROJECT. PROPER INSTALLATION, INCLUDING BEDDING, BACKFILLING, AND COMPACTION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. INSPECTION BY THE OWNER OR PERIODIC INSPECTIONS BY THE CITY OF CHEHALIS OR LEWIS COUNTY SHALL NOT RELIEVE THE CONTRACTOR OF HIS REPSONSIBILITY.

INDEX TO DRAWINGS

AS-BUILT DRAWING

3-28-96

11-21-97

DESIGNED BY: SDH
DRAWN BY: SDH
CHECKED BY: HNG
DATE: OCTOBER 1992
SCALE: H 1" = 200'
V

HOWARD GODAT & ASSOCIATES
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FAX: 357-6299

REVISIONS:	DATE:
REV1. SDH	12-28-93
REV2. SDH	7-8-94
REV3. SDH	2-10-95
REV4. SDH	4-10-95
3-28-96 AS-BUILT (JQ)	

LEWIS CO. SEWER DIST. #1

LOGAN HILL SEWAGE COLLECTOR

SITE AND GENERAL NOTES

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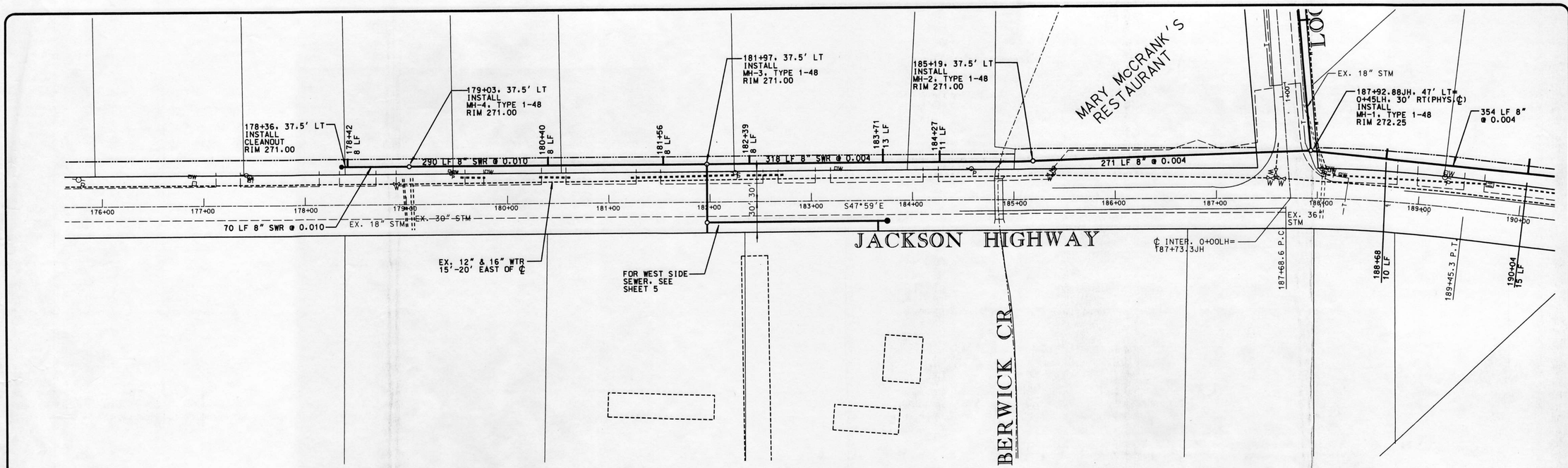
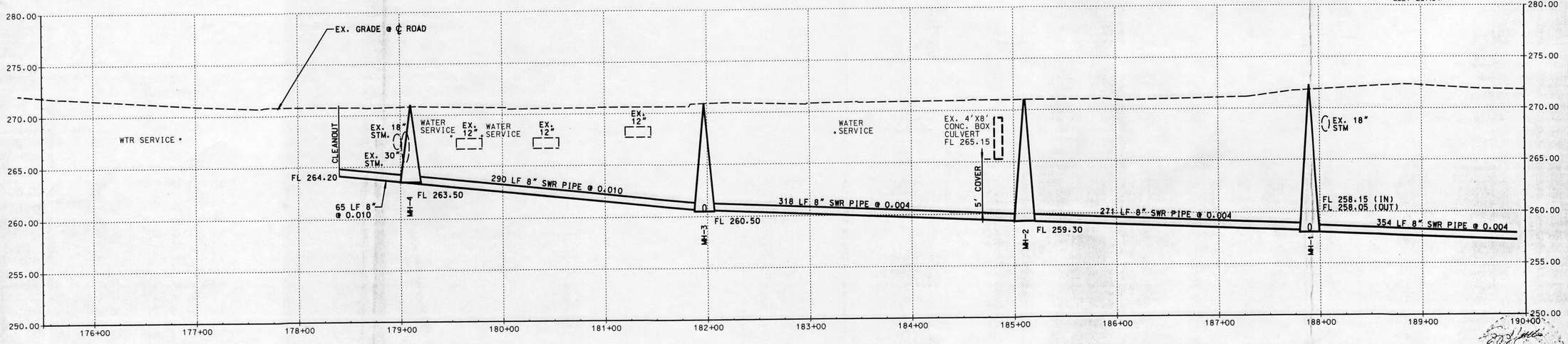
JOB: 2973



NOTE: VISIBLE WATER SERVICES ARE SHOWN BELOW FOR INFORMATION ONLY. OTHER SERVICES MAY EXIST. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION OF ALL SERVICES AND OTHER UTILTIES.

50 25 0 50 100FT
SCALE: 1"= 50'

T.B.M.
BRIDGE SPIKE IN P.P. @
N.E.COR INT OF JACKSON HWY
& BISHOP(W)/YATES(E)
ELEV 287.34



AS-BUILT DRAWING

APPROVED 11-27-97

9-28-96 AS-BUILT (JC)

DESIGNED BY: S.H.
DRAWN BY: S.H.
CHECKED BY: H.G.
DATE: AUG 1992
SCALE: H 1" = 50'
V 1" = 5'

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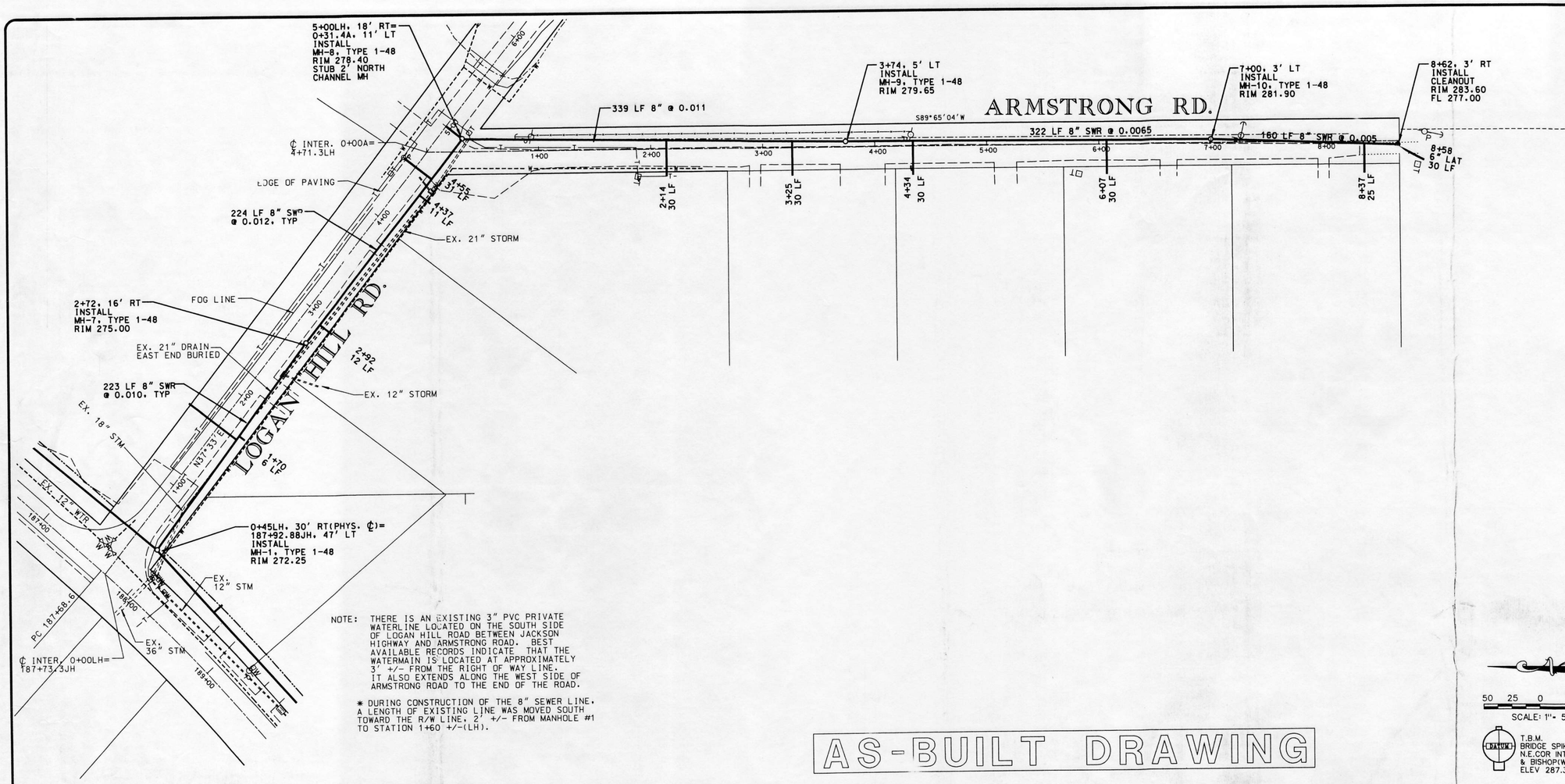
FAX: 357-6299

REVISIONS: DATE:
REV1: SDH 12-28-93
REV2: SDH 1-30-94
REV3: SDH 2-8-94
REV4: SDH 7-8-94
REV5: SDH 2-10-95
REV6: SDH 4-10-95

LEWIS CO. SEWER DIST. #1
LOGAN HILL SEWAGE COLLECTOR
JACKSON HIGHWAY 176+00-190+00

SHEET: 2 OF 8
INDEX: (2973) 2973IN-1.DGN
JOB: 2973



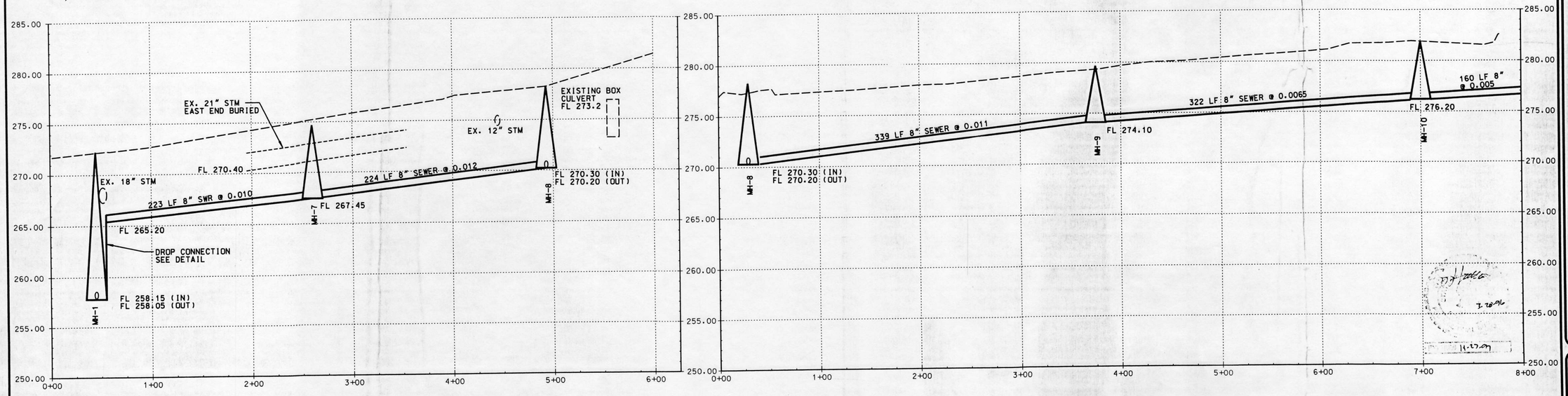
NOTE: THERE IS AN EXISTING 3" PVC PRIVATE WATERLINE LOCATED ON THE SOUTH SIDE OF LOGAN HILL ROAD BETWEEN JACKSON HIGHWAY AND ARMSTRONG ROAD. BEST AVAILABLE RECORDS INDICATE THAT THE WATERMAIN IS LOCATED AT APPROXIMATELY 3' +/- FROM THE RIGHT OF WAY LINE. IT ALSO EXTENDS ALONG THE WEST SIDE OF ARMSTRONG ROAD TO THE END OF THE ROAD.

* DURING CONSTRUCTION OF THE 8" SEWER LINE, A LENGTH OF EXISTING LINE WAS MOVED SOUTH TOWARD THE R/W LINE, 2' +/- FROM MANHOLE #1 TO STATION 1+60 +/-(LH).

50 25 0 50 100FT
SCALE: 1"= 50'

DATUM
T.B.M.
BRIDGE SPIKE IN P.P. ℄
N.E.COR INT OF JACKSON HWY
& BISHOP(W)/YATES(E)
ELEV 287.34

AS-BUILT DRAWING



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CHECKED BY: hng
DATE: AUGUST 1992
SCALE: H 1" = 50'
V

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FAX: 357-6299

REVISIONS: DATE:
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REV3.- SDH 6-17-94
REV5.- SDH 2-10-95
REV6.- SDH 4-10-95
3-29-39 AS-BUILT (JO)

LEWIS CO. SEWER DIST. #1
LOGAN HILL SEWAGE COLLECTOR
LOGAN HILL 0+00-5+00

SHEET: 3 OF 8
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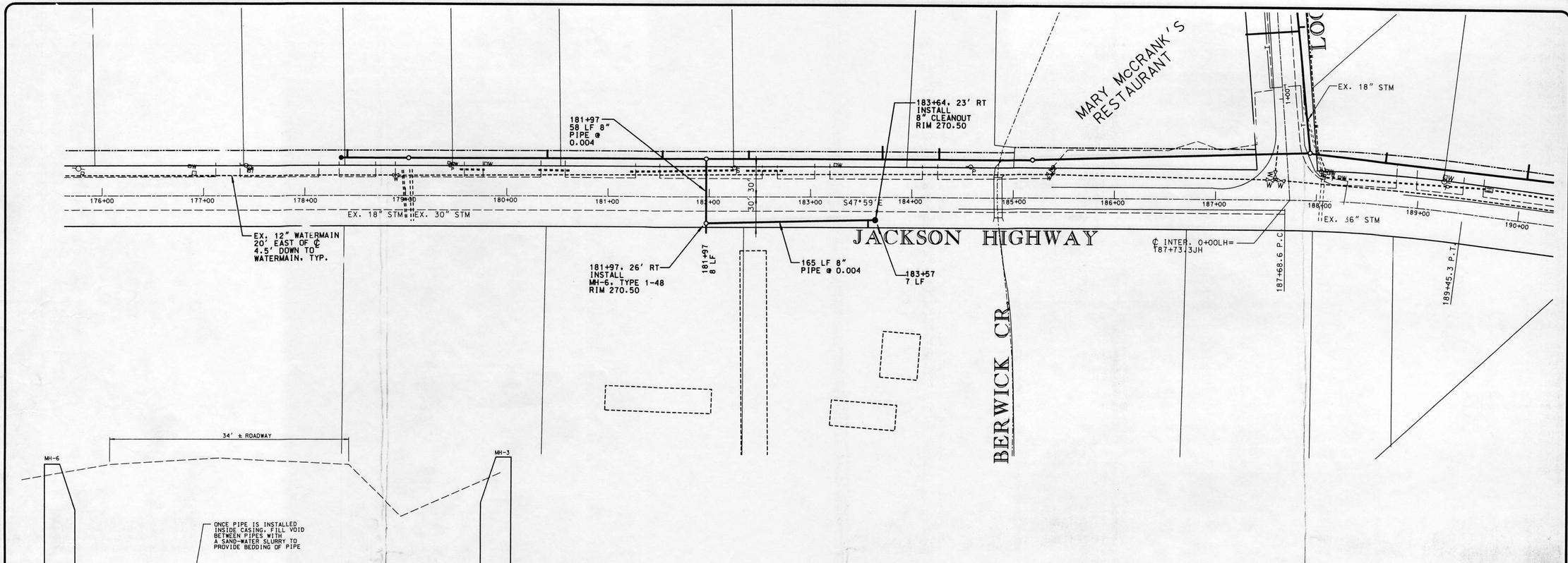
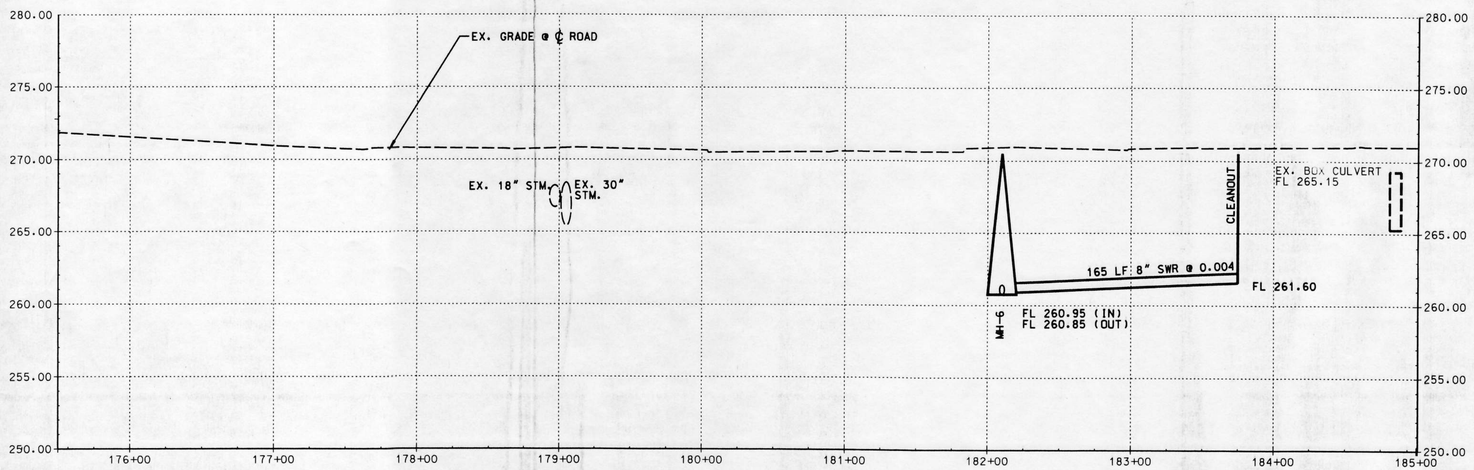
JOB: 2973

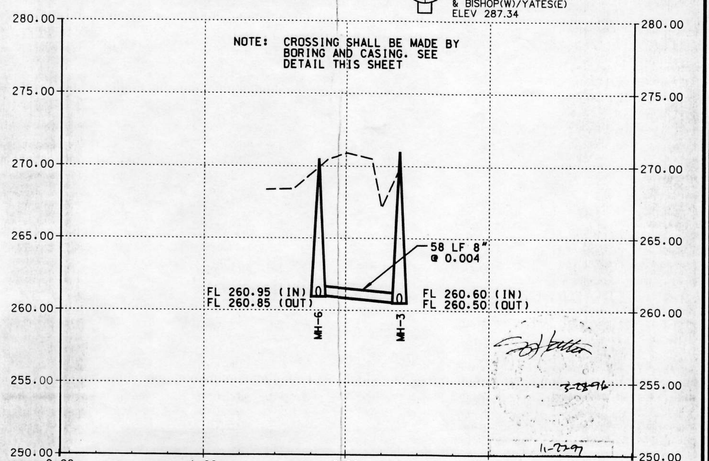


JACKSON HIGHWAY CROSSING

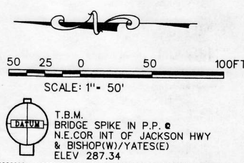
NOTE: ALL OTHER CROSSINGS WHICH CANNOT BE OPEN CUT, SIMILAR.

AS-BUILT DRAWING





HIGHWAY CROSSING - STA 182+10



DESIGNED BY: S.H.
DRAWN BY: S.H.
CHECKED BY: H.G.
DATE: AUG 1992
SCALE: H 1" = 50'
V 1" = 5'

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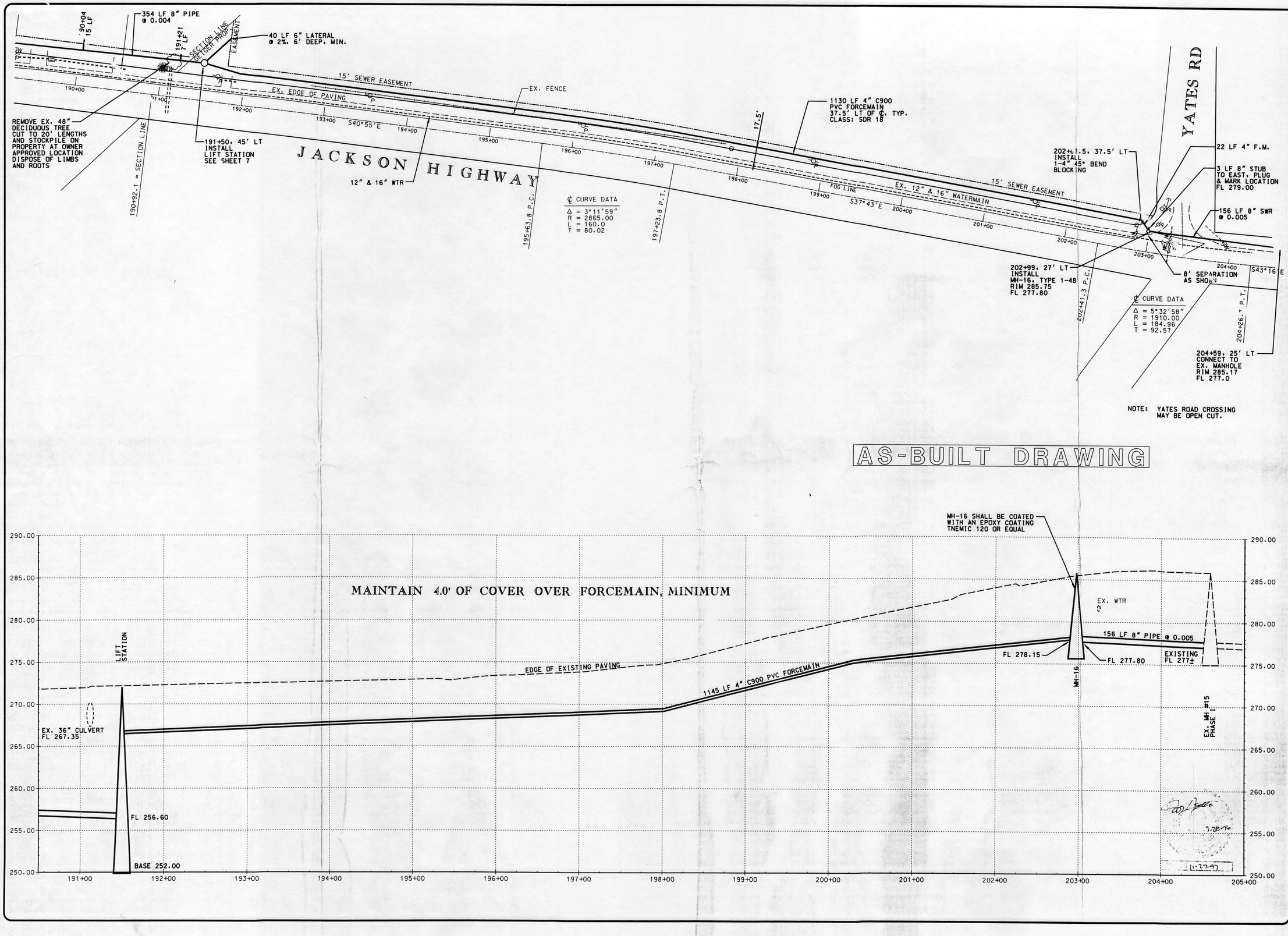
REV1. SDH 1-30-94
REV2. SDH 2-8-94
REV3. SDH 6-17-94
REV4. SDH 7-8-94
REV5. SDH 2-10-95
REV6. SDH 4-10-95

3-29-96 AS-BUILT(JO)

LEWIS CO. SEWER DIST. #1
LOGAN HILL SEWAGE COLLECTOR
JACKSON HIGHWAY - WEST SIDE

SHEET: 5 OF 8
INDEX:(2973) 2973in-1a.DGN
JOB: 2973



AS-BUILT DRAWING

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CHECKED BY: H.G.
DATE: AUG 1992
SCALE: H 1" = 50'
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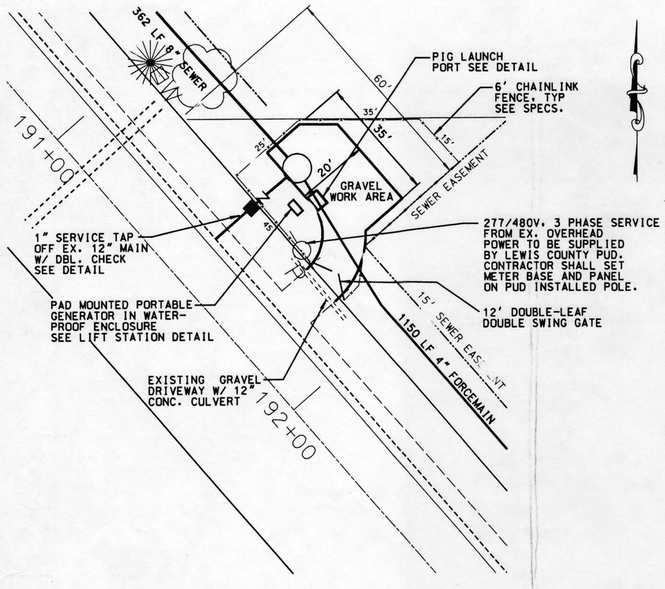
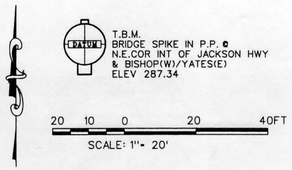
REV1. SDH 1-30-94
REV2. SDH 2-8-94
REV3. SDH 2-10-95
REV4. SDH 4-10-95
3-29-96 AS-BUILT(JO)

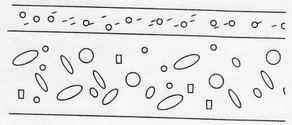
LEWIS CO. SEWER DIST. #1
LOGAN HILL SEWAGE COLLECTOR
JACKSON HIGHWAY 190+00-205+00

SHEET: 6 OF 8
INDEX: (2973) 2973jh-2.DGN
JOB: 2973

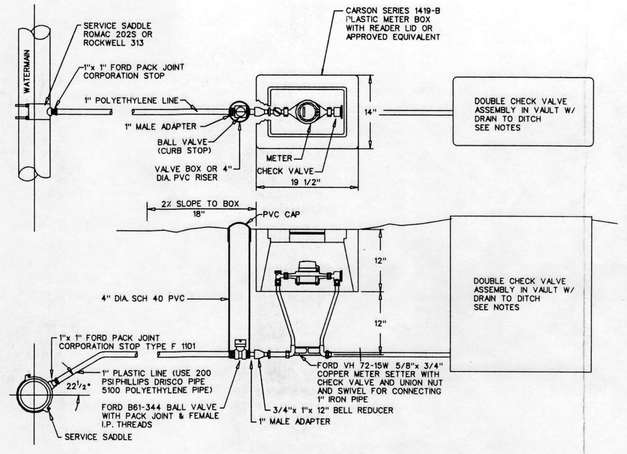


LIFT STATION - SITE PLAN





WORK AREA SURFACING DETAIL



NOTES:
1. STAINLESS STEEL INSERTS REQUIRED FOR ALL PACK JOINTS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.

5/8" SINGLE METER SERVICE

NOTES:

(1) DOUBLE CHECK VALVE ASSEMBLY (DCVA) SHALL COMPLY WITH WASHINGTON STATE DEPT. OF SOCIAL AND HEALTH SERVICES "APPROVED CROSS-CONNECTION CONTROL DEVICES" LISTINGS AND SHALL BE INSTALLED PER MANUFACTURERS SPECIFICATIONS AND INSTRUCTIONS FOR THE TYPE INSTALLED, UNLESS MODIFIED IN SPECIAL PROVISIONS.

(2) THE DCVA SHALL BE INSTALLED IN A LOCATION APPROVED BY THE CITY OF CHEHALIS, LEWIS COUNTY, THE OWNER, AND THE ENGINEER.

(3) TEST COCKS SHALL BE PROVIDED.

(4) A MINIMUM 12" CLEARANCE FROM ALL STRUCTURES TOP, BOTTOM AND SIDES SHALL BE PROVIDED FOR ASSEMBLY. PROVIDE SUPPORT BLOCKING AS SHOWN.

(5) APPROVED VAULT W/POSITIVE DRAINAGE SYSTEM. REMOVABLE LID (TRAFFIC OR NON-TRAFFIC) SO THAT CHECK VALVE ASSEMBLY CAN BE REMOVED

PUMP CONTROL NOTES:

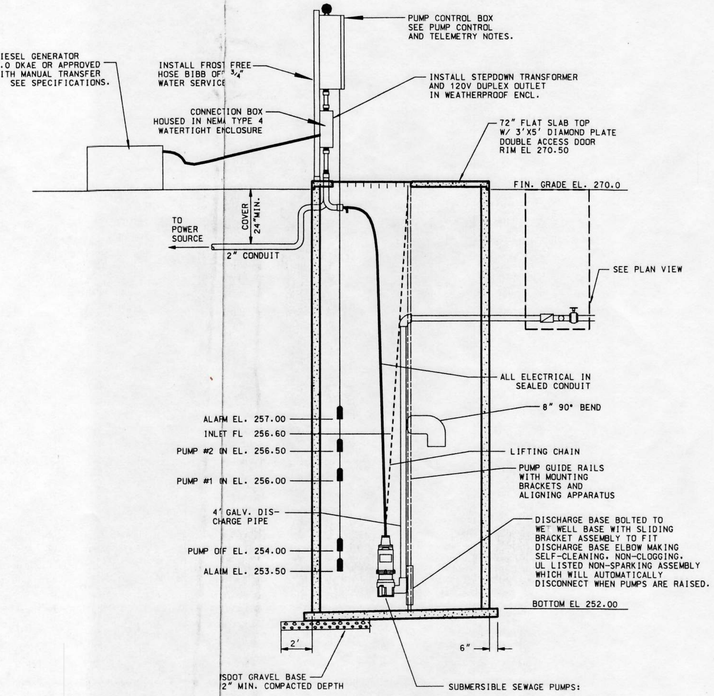
1. INSTALL SPECIFIED PUMP IN A DUPLEX INSTALLATION. INSTALL ALTERNATING CONTROLLER IN LEAD/LAG CONFIGURATION. ALTERNATOR SHALL INCLUDE POSISTION 1, POSITION 2, AND ALTERNATE SELECTIONS.
2. INSTALL SEPARATE RUNTIME METERS FOR EACH PUMP.
3. ALL INSTALLATIONS SHALL BE EXPLOSION PROOF.
4. INSTALL ALL EXTERIOR CONTROLS, PANELS, ETC. IN NEMA 4 ENCLOSURES.
5. PUMP CONTROL PANEL SHALL OPERATE SEWAGE PUMPS AND SHALL PROVIDE THE FOLLOWING:

PUMP #2 ON - EL 256.50
PUMP #1 ON - EL 256.00
PUMPS OFF - EL 254.00
LOW WATER ALARM - EL 253.50
HIGH WATER ALARM - EL 257.00

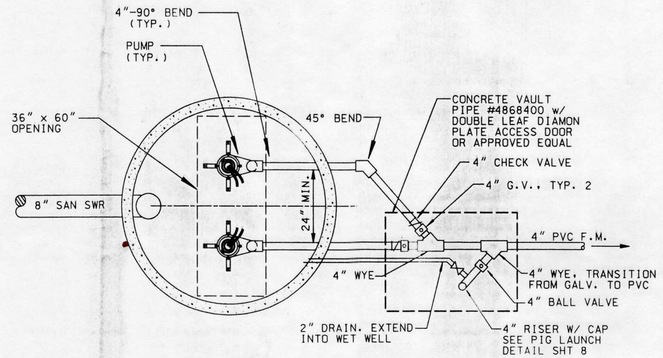
6. PUMP CONTROLS SHALL BE ACTUATED BY MERCURY FLOATS, PRESSURE TRANSDUCER OR OTHER APPROVED METHOD COMPATIBLE WITH PUMP CONTROL AND TELEMETRY EQUIPMENT. WITH APPROPRIATE CABLING AND CONNECTORS.
7. PUMP CONTROL PANEL SHALL BE EQUIPPED WITH TERMINAL BLOCKS FOR THE ADDITION OF THE TELEMETRY EQUIPMENT SPECIFIED BELOW. SAID CONNECTION POINTS SHALL BE ENCLOSED IN WEATHERTIGHT ENCLOSURES IN THE EVENT THAT THE TELEMETRY ADDITIVE BID IS NOT SELECTED.

TELEMETRY NOTES (ADDITIVE BID ITEM):

1. PROVIDE ADDITIVE BID TO PROVIDE CONNECTION OF STATUS MONITORING TERMINAL BLOCKS SPECIFIED ABOVE TO THE FOLLOWING TELEMETRY EQUIPMENT.
2. PROVIDE AND INSTALL A TRANSFORMER AND TELEPHONE MODEM AND AN APPROPRIATE SIGNAL SENDING TELEMETRY UNIT. TELEMETRY UNIT SHALL SEND LIFT STATION STATUS AND ALARM INFORMATION TO A RECEIVING UNIT AT THE TREATMENT PLANT. ENCLOSE IN WEATHERPROOF ENCLOSURE.
3. LIFT STATION STATUS SHALL BE RELAYED VIA THE MODEM TO THE CITY OF CHEHALIS TREATMENT PLANT. CONTRACTOR SHALL COORDINATE CONNECTION OF TELEMETRY UNITS TO US WEST PHONE LINES. APPLICATION FOR PHONE SERVICE HAS BEEN MADE BY THE OWNER.
4. INSTALL AT THE TREATMENT PLANT A SECOND MODEM AND TELEMETRY UNIT TO RECEIVE INCOMING STATUS DATA - UNIT SHALL BE EQUIPPED WITH VISUAL AND AUDIBLE ALARM, CIRCUIT BREAKER, AND SURGE PROTECTOR. CONSOLIDATED ELECTRIC D630/E685 MASTER TELEMETRY UNIT WITH MODEM AND 120/12V TRANSFORMER.
5. PROVIDE CONFIGURATION OF EXISTING WONDERWARE "INTOUCH" SOFTWARE TO DISPLAY STATUS AND ALARM INFORMATION. INCLUDE DATA TAGNAME INPUT AND DATA BASE CONFIGURATION AND A SCREEN LAYOUT FOR PUMP STATION WITH DYNAMIC DATA DISPLAY. PROVIDE AND INSTALL INTERFACE TO EXISTING TREATMENT PLANT SOFTWARE, WONDERWARE "INTOUCH". INSTALL CONSOLIDATED ELECTRIC "WINDOWS" BASED DDE DRIVER AND 50 LF RS232 CABLE AND CONNECTORS.
6. ALL TELEMETRY AND CONTROLS SHALL BE COMPATIBLE WITH EXISTING CITY OF CHEHALIS EQUIPMENT. EXISTING AND SPECIFIED EQUIPMENT IS MANUFACTURED BY CONSOLIDATED ELECTRIC AND CAN BE OBTAINED FROM GRANICH ENGINEERING, BELLEVUE, WA. (206)451-9696. EQUIVALENT EQUIPMENT MAY BE ACCEPTABLE UPON APPROVAL BY OWNER.



LIFT STATION MANHOLE - TYPE 2-72"



LIFT STATION - PLAN VIEW

AS-BUILT DRAWING

7-28-96

11-7-97

DESIGNED BY: sdh
DRAWN BY: sdh
CHECKED BY: hng
DATE: AUGUST 1992
SCALE: H 1" = 20'
V

REVISIONS: DATE:
REV1. SDH 2-8-94
REV2. SDH 2-10-95
REV3. SDH 4-10-95
3-28-96 AS-BUILT (JO)

HOWARD GODAT & ASSOCIATES
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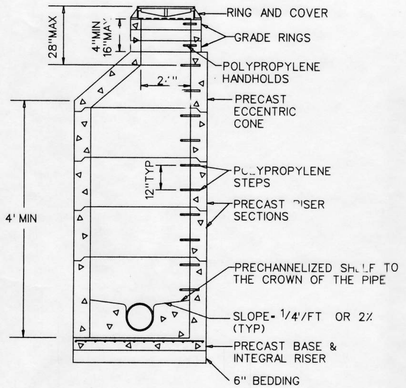
2708 WESTMOOR COURT
OLYMPIA, WA. 98502
(360) 943-1599
FAX: 357-6299

LEWIS CO. SEWER DIST. #1
LOGAN HILL SEWAGE COLLECTOR
SEWAGE LIFT STATION

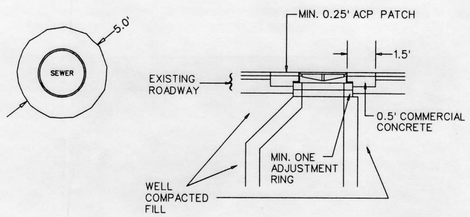
SHEET: 7 OF 8
INDEX: 2973/2973le.dgn
JOB: 2973



NOTES:

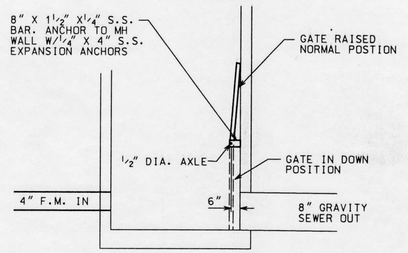
1. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM C478. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C443 AND SHALL BE GROUTED FROM THE INSIDE. LIFT HOLES SHALL BE GROUTED FROM THE OUTSIDE AND INSIDE OF THE MANHOLE.
2. STEPS IN MANHOLE SHALL HAVE 6" MINIMUM CLEARANCE. HANDHOLES IN ADJUSTMENT SECTION SHALL HAVE 3" MINIMUM CLEARANCE THE FIRST STEP OR HANDHOLD SHALL BE A MAXIMUM OF 12" FROM THE TOP OF THE COVER.
3. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM.
4. CONNECTION TO MANHOLE SHALL BE MADE BY KOR-N-SEAL BOOT. SAND COLLAR MAY BE USED FOR CONNECTION TO EXISTING MH.
5. SEE DETAIL 7-3 FOR MANHOLE COLLAR INSTALLATION.
6. A SEWER GUARD SHALL BE INSTALLED IN MANHOLES MH-7 & MH-10.

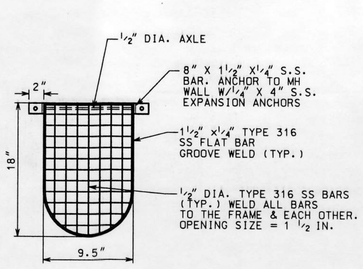
TYPE 1 MANHOLE

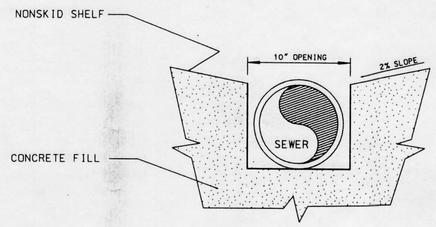


NOTE:
1. ON MANHOLE OUTSIDE ASPHALT ADD REINFORCING STEEL AS SHOWN ABOVE. DEFORMED BAR TO MEET ASTM A615 GRADE 60 FY-60,000 P.S.I.

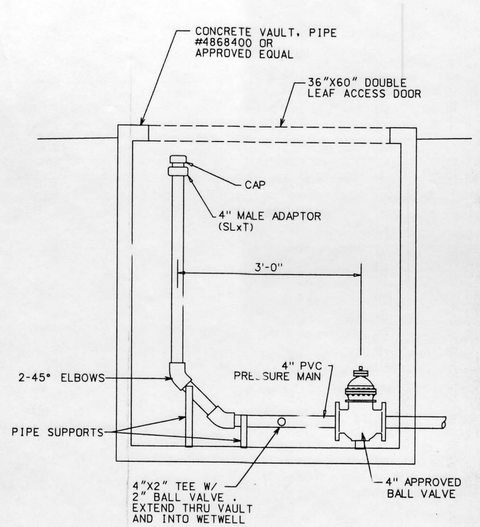
MANHOLE COLLAR



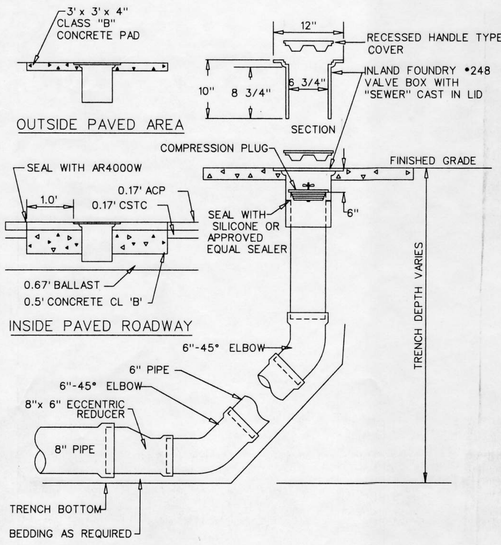




PIG CATCHING DEVICE



TERMINUS PIG LAUNCH PORT

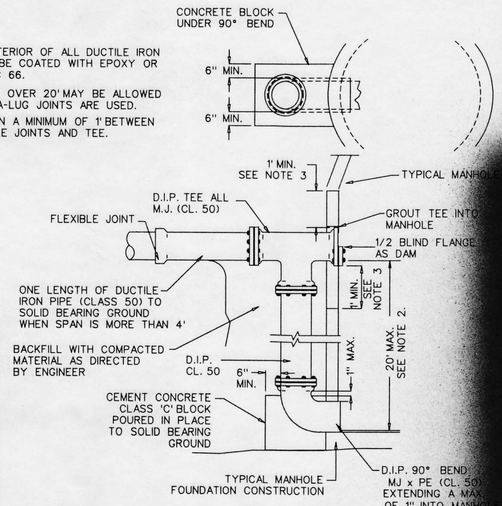


NOTE:

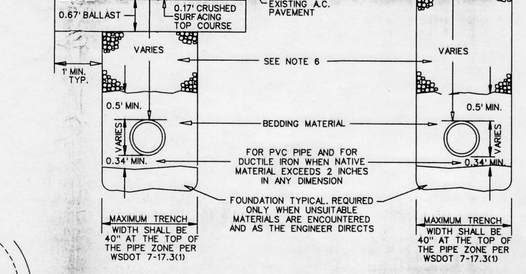
ALL SEWER PIPE SHALL BE ASTM 3034 SDR 35.

CLEANOUT

NOTE:
1. THE INTERIOR OF ALL DUCTILE IRON SHALL BE COATED WITH EPOXY OR TNEMEC 66.
2. DEPTHS OVER 20' MAY BE ALLOWED IF MEGA-LUG JOINTS ARE USED.
3. MAINTAIN A MINIMUM OF 1' BETWEEN MANHOLE JOINTS AND TEE.



DROP CONNECTION



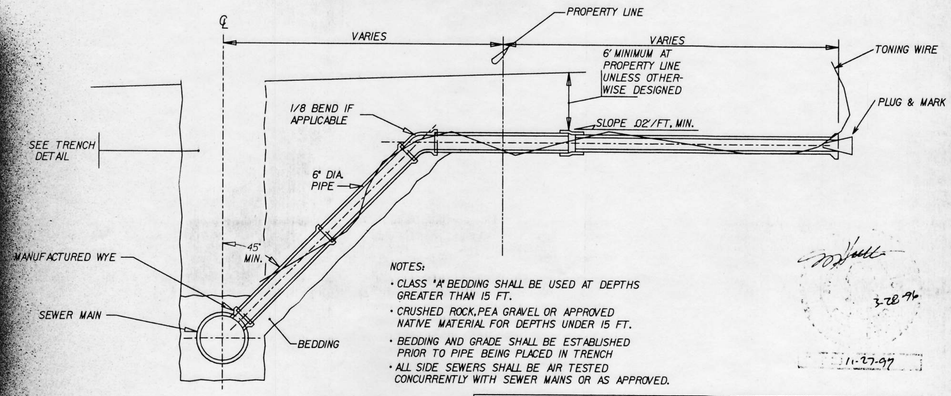
TRENCH & PAVEMENT RESTORATION DETAIL

ARMSTRONG ROAD RESTORATION - ADDITIVE BID ITEM:

ADDITIVE BID ITEM SHALL INCLUDE BACKFILLING OF TRENCH WITH SELECT NATIVE OR IMPORTED MATERIAL IN ACCORDANCE THE SPECIFICATIONS. TO WITHIN 0.50 FEET OF FINISH GRADE. BRING TRENCH TO TOP OF EXISTING GRADE WITH CRUSHED SURFACING TOP COURSE. OVERLAY ROADWAY WITH 0.10 FEET OF CLASS "B" ASPHALT, 16 FEET IN WIDTH, OVER THE LENGTH OF THE ROAD.

NOTES:
1. ALL MATERIALS EXCEPT A.C.P. AND BEDDING MATERIAL SHALL BE COMPACTED IN 8-INCH MAXIMUM LIFTS TO SPECIFIED DENSITY.
2. BEDDING SHALL CONFORM TO SECTION 9-30.7A OF STANDARD SPECIFICATIONS.
3. COMPACTION: BEDDING SHALL BE COMPACTED TO 95% MAX. AS DETERMINED BY ASTM D698. BACKFILL SHALL BE COMPACTED TO 85% IN UNPAVED AREAS, AND 95% IN PAVED OR SHOULDER AREAS AS DETERMINED BY ASTM D698.
4. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION.
5. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. A BELL JOINT SHALL BE REQUIRED AT EACH JOINT FOR PROPER SUPPORT. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.
6. BACKFILL MATERIAL SHALL BE BANK RUN GRAVEL OR SELECT NATIVE MATERIAL AS REQUIRED TO MEET THE COMPACTION DENSITIES SPECIFIED. FOR ALL OPEN CUTS ACROSS ROADWAYS, BACKFILL AND BALLAST SHALL BE REPLACED WITH LEAN CONCRETE CONTROLLED DENSITY FILL.

ADDITIONAL REQUIREMENTS BERWICK CREEK CROSSING



NOTES:
- CLASS 'A' BEDDING SHALL BE USED AT DEPTHS GREATER THAN 15 FT.
- CRUSHED ROCK, PEA GRAVEL OR APPROVED NATIVE MATERIAL FOR DEPTHS UNDER 15 FT.
- BEDDING AND GRADE SHALL BE ESTABLISHED PRIOR TO PIPE BEING PLACED IN TRENCH
- ALL SIDE SEWERS SHALL BE AIR TESTED CONCURRENTLY WITH SEWER MAINS OR AS APPROVED.

SANITARY SEWER LATERAL SERVICE CONNECTION

3-28-96

1-27-97

AS-BUILT DRAWING

DESIGNED BY: sdh
DRAWN BY: sdh
CHECKED BY: hng
DATE: AUGUST 1992
SCALE: H 1" = 20'
V

HOWARD GODAT & ASSOCIATES
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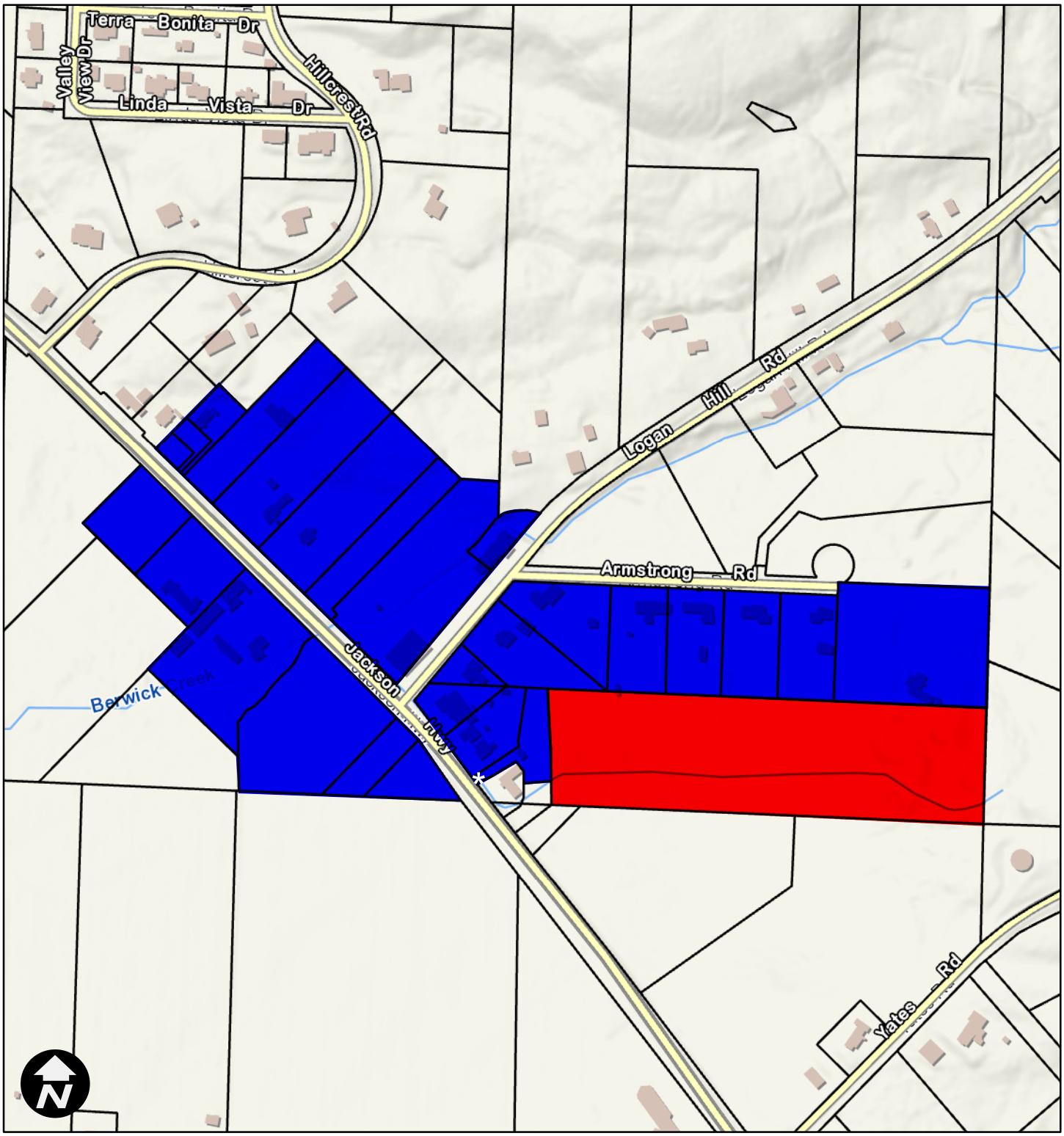
3-28-96 AS-BUILT (JQ)

LEWIS CO. SEWER DIST. #1
LOGAN HILL SEWAGE COLLECTOR
SANITARY SEWER DETAILS

SHEET: 8 OF 8
INDEX: 2873/2873d.dgn
JOB: 2873

Lewis County GIS Web Map



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- Parcels
- Proposed Development Location
- Parcels Contributing to Lift Station
- Lift Station Location

0 205 410 820 ft

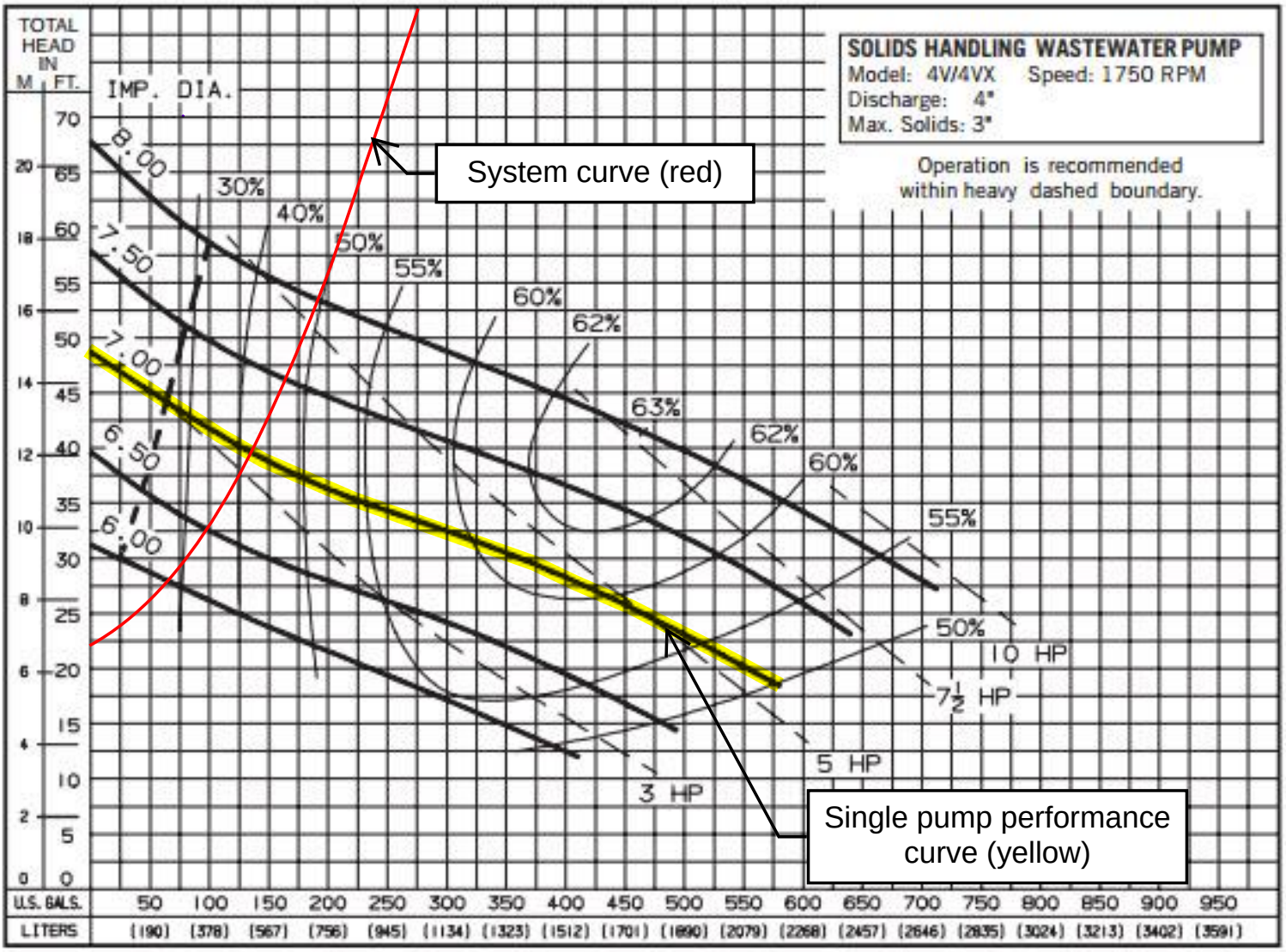
NAD 1983 StatePlane Washington South FIPS 4602 Feet

LEWIS COUNTY
— est. 1845 —

Lewis County G.I.S.

Pump Performance and System Curve:

Myers 4VX50M4-23 Hazardous 4" Solids Handling Wastewater Pump 5.0 HP 230V - yellow
System Curve (calculated) - red



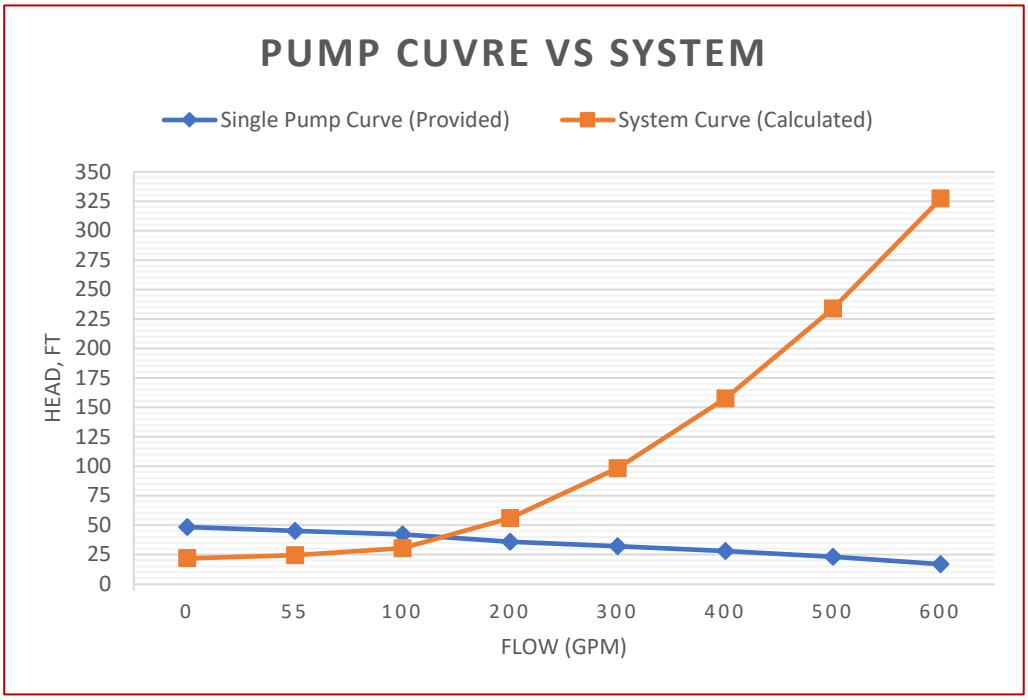
System Curve Equation:

$$h_p = \left\{(z_1 - z_2) + \left[f\left(\frac{L}{D}\right)\left(\frac{Q^2}{2gA^2}\right)\right]\right\}$$

Where:

Highest Point in system, Z_1	276
Pump Off, Z_2	254
Darcy Friction Factor, f	0.2
Pipe Length, L	1152
Inner Pipe Diameter, D	0.29
Pipe Cross Sectional Area, A	0.267

Flow (GPM)	Flow (CFS)	Single Pump Curve (Provided)	System Curve (Calculated)
0	0.00	48.5	22.00
55	0.12	45	24.57
100	0.22	42	30.48
200	0.44	36	55.92
300	0.67	32	98.33
400	0.89	28	157.69
500	1.11	23	234.02
600	1.33	17	327.31
667	1.48		399.30



FULLER DESIGNS

Job No. 2030 Sh. 1 Of 2
Project JACKSON TINY HOME
By MF Date 7/20/21

Subject Existing Conditions & Cycle Time

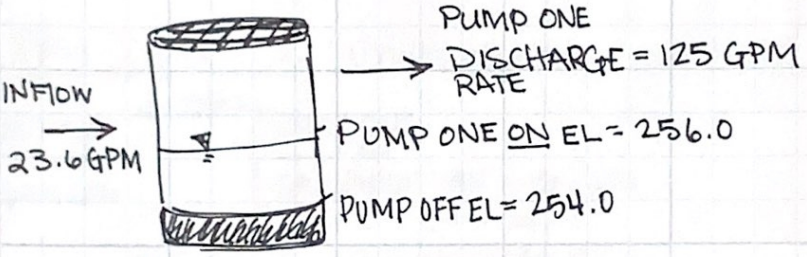
Existing Effluent

18 residential homes @ 360 gal/day ⇒ 6,480 gal/day
1 commercial Property w/ 200 person capacity @ 10 gal/person ⇒ 2,000 gal/day
Total effluent entering the Station = 6,480 gal/day + 2000 gal/day
= 8,480 gal/day
= 5.9 GPM

EXISTING Peak Flow

Peaking factor = 4
Ex flow @ Peak Flow events = 4 (5.9 GPM)
= 23.6 GPM

Ex. cycle time



Net Discharge Rate = (125 - 23.6) GPM
= 101.4 GPM

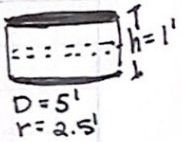
Time for pump 1 on position = 293.66 gal / 23.6 gal/min
= 12.5 min

Time for Pump 1 OFF position = 293.66 gal / 101.4 gal/min
= 2.9 min

Complete cycle time = (12.5 + 2.9) min
= 15.4 min

Total cycles in one hour = 60 min / 15.4 min = 3.89 ⇒ 4 cycles

Vol of One cubic ft
Lift Stat Dia = D = 60" = 5'
1 CF = 7.48 gal
$V = \pi r^2 h$
$= \pi (2.5)^2 (1')$
$= 19.63$ CF
$= 146.83$ gal



Vol between pump off & pump on el
256.0' - 254.0' = 2'
146.83 gal · 2' = 293.66 gal

Pump run time during Peak flow Hour
= 4 cycles · 2.9 min/cycle
= 11.6 min

FULLER DESIGNS

Job No. 2030 Sh. 2 Of 2
Project Jackson Tiny Home
By MF Date 7/20/21

Subject Proposed conditions w/ cycle time

PROPOSED EFFLUENT INCREASE

62 residential homes @ 240 gal/day ⇒ 14,880 gal/day
= 10.3 gal/MIN

PROPOSED total EFFLUENT ENTERING LIFT STATION DAILY

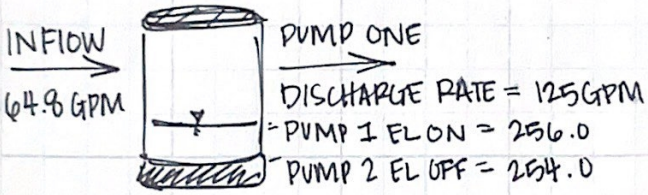
5.9 GPM + 10.3 GPM = 16.2 GPM

PROPOSED EFFLUENT FLOW AT Peak event

Peaking factor = 4

Prop. flow @ peak flow event = 4 (16.2 GPM)
= 64.8 GPM

Prop. Cycle time (Under existing conditions)



Vol effluent in 1 CF = 146.83 gal
Vol between pump 1 = 293.66 gal
on/off position
Net discharge rate = (125 GPM − 64.8 GPM)
= 60.2 GPM

Time for pump 1 on position = $\frac{293.66 \text{ gal}}{64.8 \text{ gal/min}}$
= 4.53 MIN

TIME for Pump 1 OFF Position = 293.66 gal / 60.2 GPM
= 4.9 MIN

Tot. cycles in 1 HOUR = 60 MIN / (4.53 + 4.9 MIN) = $\left(\frac{60}{9.4}\right)$ = 6.4 cycles
⇒ 6 cycles

Pump 1 run time during peak flow hour
= 6 cycles · 4.9 MIN
= 29.4 MIN