ROUTE 6 SEWER PRELIMINARY DESIGN
TOWN OF WESTPORT, MASSACHUSETTS
KLEINFELDER PROJECT #20203101.001A

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A Report Prepared for:

Mr. James Hartnett
Town Planner
Town of Westport, MA
856 Main Road
Westport, MA 02790

TOWN OF WESTPORT, MASSACHUSETTS
ROUTE 6 SEWER PRELIMINARY DESIGN

Prepared by:

Alex Silveri, EIT
Staff Professional I

Reviewed by:

David Peterson, PE
Project Manager

KLEINFELDER
One Beacon Street, Suite 8100
Boston, MA 02108
Phone: 617-497-7800

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TOWN OF WESTPORT, MA

1 EXECUTIVE SUMMARY

The installation of sewer along Route 6 was recommended in the Town's 2019 Targeted-Integrated Water Resource Management Plan as an action to provide opportunities for economic development, reduce nutrient loading to nearby water bodies from existing septic systems and reduce public health concerns related to existing septic systems.

Kleinfelder developed a preliminary sewer design for the portion of Route 6 from the Town's boundary with the City of Fall River to the Massachusetts Route 88 interchange (referred to as Phase 1A). Kleinfelder determined that the existing privately-owned pump station at White's of Westport, currently servicing several businesses, has the capacity to receive peak wastewater flow for all of Phase 1A including under projected future development conditions. Further expansion of the sewer beyond Phase 1A will require the installation of a new pump station and force main.

Kleinfelder's preliminary sewer design consists of approximately 2,400 feet of conventional gravity sewer installed within the grass median and turning lanes of Route 6 from the elevation high point at Sanford Road to the existing downstream White's pump station. The gravity sewer was sized to accommodate peak wastewater flow from potential future phases of sewer including under projected future development conditions. Utility line tracing performed as part of the preliminary design indicates that approximately 400 feet of existing water main will require bypass and relocation to accommodate the installation of the proposed gravity sewer.

For the portion of proposed sewer east of the intersection with Sanford Road, Kleinfelder evaluated two wastewater conveyance alternatives: 1) low pressure sewer and 2) conventional gravity sewer with a new downstream pump station and force main. Kleinfelder prepared a preliminary opinion of probable cost for each alternative. After discussing the benefits and drawbacks of each alternative with the Town, Kleinfelder's preliminary design recommends the installation of approximately 4,500 feet of low pressure sewer east of the intersection with Sanford Road.

Kleinfelder identified major and minor utility crossings within Route 6 based on utility record information to inform the preliminary design and cost estimate. Kleinfelder identified one major drain crossing potentially requiring alteration at the intersection with Old Bedford Road.

Kleinfelder developed 50% design drawings included as an attachment to this report. Kleinfelder's preliminary opinion of probable cost for the recommended low pressure sewer alternative is $3,557,700.

This report details the Route 6 preliminary sewer design including the project background, existing conditions, future development projections, design considerations, recommendations and next steps. A list of anticipated permits required for the proposed work is included. Potential options for project funding as well as ownership and operation of the proposed sewer are listed at the end of the report.

2 BACKGROUND

2.1 PROJECT PURPOSE

The purpose of this report is to provide the Town of Westport (Town) with a preliminary design for a new wastewater collection system along U.S. Route 6 (State Road) from the Town's boundary with the City of Fall River to the Massachusetts Route 88 interchange, including a preliminary engineer's opinion of probable construction cost.

2.2 PREVIOUS STUDIES

The benefits and needs for a public sewer along Route 6 have been studied previously. Information from prior studies have been reviewed and included in the development of this preliminary design. A brief summary of each previous study is included below.

- An initial municipal water and sewer concept plan for Westport was completed in 2004 by CDM Smith[1]. This plan included four phases of water and sewer infrastructure servicing a large portion of northern Westport. This plan was referenced as part of this preliminary design which focuses solely on the Phase 1 sewer area identified in the CDM Smith report.

- An economic development analysis was completed in 2018 by the Southeastern Regional Planning and Economic Development District (SRPEDD) for the project area of Route 6 from the Town's boundary with the City of Fall River to the Route 88 interchange[2]. The study analyzed multiple future buildout scenarios for the project area following the installation of sewer with varying levels of development. For the mixed development scenario, created with input from the Town Planning Board, the study estimated a 138% increase in commercial floor area resulting in approximately 772 new jobs and $423,288 of incremental tax revenue. SRPEDD also completed a town wide buildout analysis in 2015 that identified 1,365 parcels with buildout potential and a total of 3,633 buildable lots in Westport at the time of the study[3].

[1] Route 6 and Route 177 Water and Sewer Concept Plans Technical memorandum, Prepared by CDM, April 2004.
[2] Route 6 Sewer Extension and Economic Development Analysis, Prepared by SRPEDD, December 2018.
[3] Westport Build-out Methodology Report, Prepared by SRPEDD, November 2015.

- The installation of sewer along Route 6 was recently recommended by Kleinfelder in the Town's 2019 Targeted-Integrated Water Resource Management Plan[4] as an action to:
  - Provide opportunities for increased economic development along Route 6.
  - Reduce nutrient loading to the East Branch of the Westport River and to South Watuppa Pond from existing septic systems.
  - Address public health concerns related to private well contamination from existing septic systems.

2.3 PROJECT AREA

The project area includes approximately 1.5 miles of U.S. Route 6 (State Road) located between the Town of Westport's boundary with the City of Fall River and the Massachusetts Route 88 interchange (Figure 1). The project evaluated installation of sewers in side streets such as Adirondack Lane, Senechal Street, Herbert Terrace, Borden Street and portions of Old Bedford Road and Sandford Road as optional additions to the sewer in Route 6. The project area will be referred to throughout this report as Phase 1A.

The project area includes the 106 parcels evaluated in the SRPEDD economic development analysis of which 21 parcels were identified as potential candidates for new development or redevelopment and connection to the proposed sewer. The project area also includes an existing privately-owned wastewater pump station, which currently receives wastewater flows from three commercial parcels and is planned to receive flow from a proposed Marriott Hotel currently under construction. Refer to Section 3.1 of this report for further information on the existing sewer infrastructure within the project area.

[4] Targeted-Integrated Water Resource Management Plan, Prepared by Kleinfelder and Pare, January 2020.

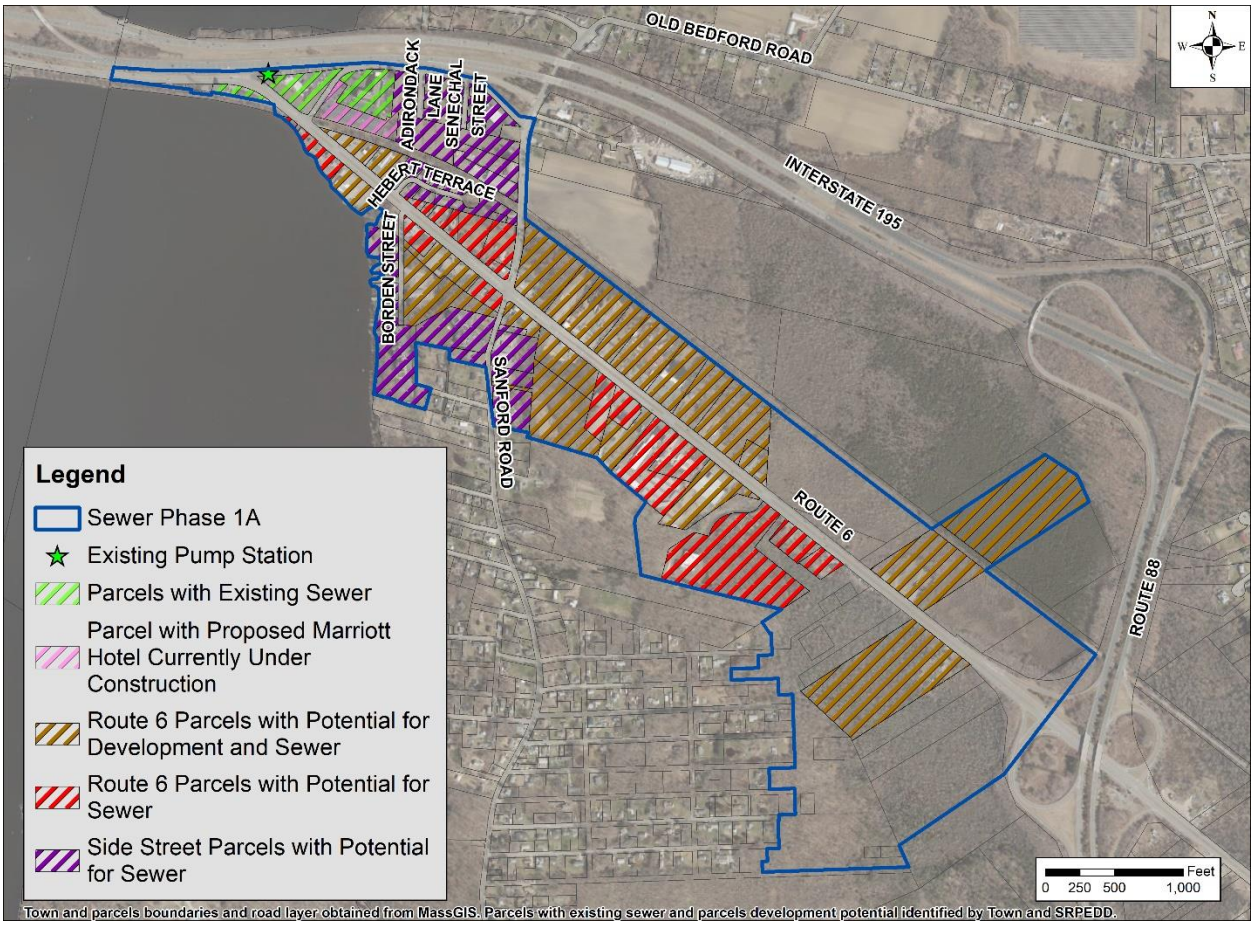


Figure 1 – Phase 1A Project Area

The preliminary design of the main sewer in Route 6 considered potential future flows from additional expansions to Phase 1A, described below, and illustrated in Figure 2.

- Phase 1B – This phase would include Sanford Road (south of Route 6) and the residential neighborhoods that feed into Sanford Road. Phase 1B, in particular, would provide sewer to homes that have septic system issues and are contributing to contamination issues in South Watuppa Pond. This phase of sewer was included in the 2004 CDM Smith study.
- Phase 1C – This phase proposes to sewer the remainder of Route 6 to the east of the Phase 1A area along with a variety of neighborhoods. The Phase 1C area is substantially larger than either Phase 1A or Phase 1B areas. This phase of sewer was included in the 2004 CDM Smith study.
- Phase 1D – This phase is located north of the Phase 1A project area and north of I-195. It was identified by the Town and Kleinfelder during this study. The need for sewer and potential benefits for this specific area has not been studied. The potential flow from this area was considered strictly as a means for reserving flow capacity from this relatively small area.

Note that Phases 1B, 1C and 1D could be implemented in any order following Phase 1A. Estimates of wastewater flows from Phases 1B, 1C and 1D were determined in order to accurately size sewer pipes in Phase 1A to accommodate potential future wastewater flows from these additional phases. Specific sewering recommendations for Phases 1B, 1C and 1D were not evaluated as a part of this study.

In addition to Phases 1B, 1C and 1D, the Town has also created a Science and Technology Overlay District (STOD) in the area west of Route 88 and south of Route 6. This overlay district is described in further detail in Section 3.6.

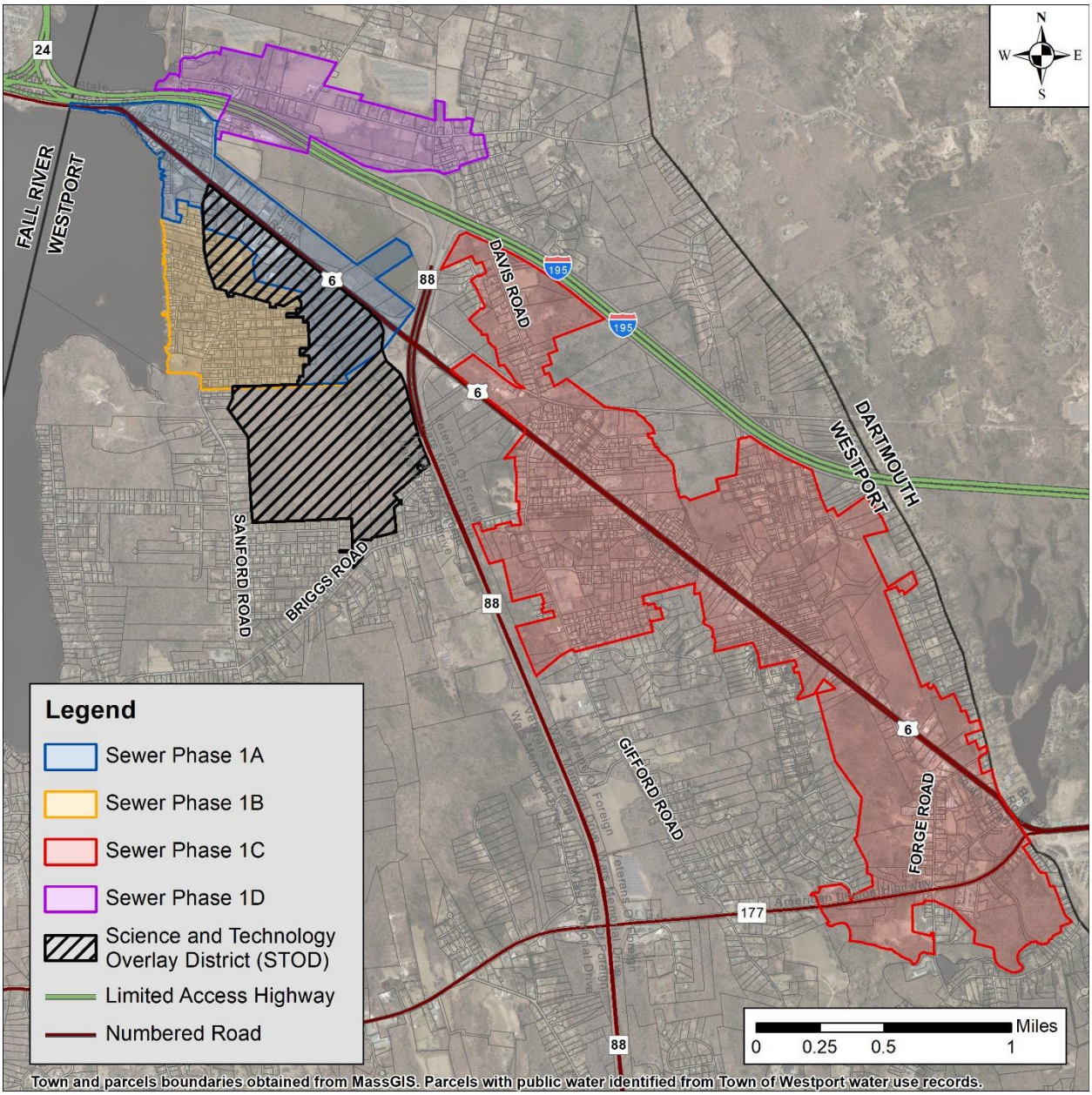


Figure 2 – All Phase 1 Project Area

3 EXISTING CONDITIONS AND FUTURE DEVELOPMENT

3.1 EXISTING ROUTE 6 SEWER

An existing privately-owned wastewater pump station, located at 60-66 State Road, currently receives wastewater flows from three commercial parcels in Westport near the border with Fall River. This pump station receives wastewater flow from White's of Westport, the Hampton Inn Fall River/Westport and the businesses at 35 State Road. Additionally, the existing pump station is planned to receive wastewater flow from a proposed Marriott hotel currently under construction (Figure 3). The existing pump station is referred to as White's Pump Station.

Figure 3 – Parcels Currently with Sewer Service

According to records provided by the owner, Sean LaFrance and the current operating firm, Boydco Inc., the existing pump station was initially installed in 1983 and upgraded in 1992 and 2018. The existing pump station utilizes submersible pumps that are situated in a wet well underneath a subgrade access chamber (Figure 4).

The station has two submersible pumps, each with a pumping capacity of 250 gallons per minute (gpm). The pumps were recently replaced in 2018 when the station was upgraded a second time with new pumps and control equipment. The pump station wet well volume is approximately 1,400 gallons considering the full height from the bottom of the wet well to the invert of the incoming inlet pipe.

The pump station discharges wastewater approximately 5,000 linear feet through a 6" diameter PVC force main into the City of Fall River. Refer to Sheet C-11 of Attachment 1 – 50% Design Drawings for additional information on the existing pumps and pump station.

Figure 4 – White's Pump Station Exterior Access Hatch (left) and Connection of Submersible Pumps to 6" Force Main (right)

3.2 ROADWAY AND EXISTING UTILITIES

Available utility and roadway construction records were obtained from the Town and the Massachusetts Department of Transportation (MassDOT) to inform the preliminary design of the sewer within the Phase 1A area. Utility records show existing water and drain utilities located in the median between the eastbound and westbound lanes of Route 6. Additionally, Town records show an abandoned water main aqueduct ranging in diameter from 30" to 42" within the median of Route 6. The water main aqueduct is owned

by the City of Fall River and is no longer in use. The aqueduct formerly transported water from Noquochoke Lake to South Watuppa Pond.

Utility records show overhead electric and telecommunication; underground natural gas and drain utilities in the westbound road shoulder of Route 6; and underground natural gas and drain utilities in the eastbound road shoulder of Route 6. Records also show existing water main within all side streets in Phase 1A except for the length of Sanford Road south of Route 6. Existing gas utilities are identified in Old Bedford Road, Adirondack Lane, and Borden Street. Additionally, underground telecommunication ducts are identified in Old Bedford Road and drain utilities are identified in Old Bedford Road and Herbert Terrace. Records indicate that there are several large drain conduits and culverts in Phase 1A that cross perpendicular to Route 6 and require crossing by the proposed sewer.

MassDOT records of the original 1927 roadway construction indicate that the roadway construction consisted of an 8" reinforced concrete layer above a 12" gravel subbase for the majority of Route 6 within Westport. Since the original construction of the roadway, subsurface and surface improvements have been made throughout Route 6 that have superseded this construction with a more traditional pavement base and overlay. It is likely that the original concrete roadway construction is still intact for a significant portion of the roadway. The original concrete construction is less likely to be encountered in the roadway shoulder and median breaks where subsurface utilities have been installed.

3.3 UTILITY LINE TRACING

Utility line tracing was completed in June 2020 by GPRS, a specialist in utility line tracing, to locate the existing utilities within the Route 6 median between White's of Westport and the intersection with Sanford Road. The purpose of the tracing was to independently identify and approximate the location of the existing utilities within the median of Route 6 and inform the preliminary sewer design and cost estimate. The utility line tracing improved our understanding of the horizontal clearance between the existing water main and drain within the Route 6 median to better assess the constructability of a new sewer between the two existing utilities.

The preliminary design of the sewer and the construction cost estimate, herein, include the findings from the utility line tracing. The tracing identified one section of Route 6 where bypass and relocation of the existing water main will likely be required to accommodate the installation of the proposed sewer. Refer to Sheets C-1 through C-3 of Attachment 1 – 50% Design Drawings for plan and profile drawings along Route 6 including utility locations identified from tracing.

3.4 ELEVATION DATA

LiDAR elevation data representing 2011 conditions was obtained from the National Oceanic and Atmospheric Administration (NOAA). This was the most recent, readily

available LiDAR elevation dataset and was used for this preliminary design as an approximation of existing grade conditions without needing to perform a detailed topographic field survey of a large area. Topographic field survey of the Phase 1A area is recommended for final design of the sewer.

LiDAR elevation data was used to generate contours and elevation profiles representing the existing ground surface of Route 6 and side streets within Phase 1A. Within the Phase 1A project area, the existing grade elevation of Route 6 reaches a high point at approximately elevation 163 feet (NAVD88) at the intersection of Route 6 and Sanford Road. The grade elevation of Route 6 west of this high point descends steadily to an elevation of approximately 140 feet at White's Pump Station. East of the high point at Sanford Road, Route 6 descends steadily to an elevation of approximately 142 feet at the Route 88 interchange. Side streets within the project are generally sloped such that grade elevations decrease as the side streets approach Route 6. Refer to Sheets C-1 through C-7 of Attachment 1 – 50% Design Drawings for plan and profile drawings along Route 6.

3.5 FUTURE DEVELOPMENT

The economic development analysis completed in 2018 by SRPEDD evaluated the following four future buildout scenarios for the Phase 1A project area with varying densities of development:

- Low Density,
- Medium Density,
- High Density, and
- Mixed.

SPREDD further developed the "Mixed" scenario into a conceptual buildout through GIS analysis, site visits, and working sessions with the Westport Town Planner and Planning Board (Figure 5). This conceptual buildout yielded future development and sewer flow estimates.

A future town wide buildout analysis was also completed in 2015 by SPREDD. This analysis identified 1,365 parcels with buildout potential and a total of 3,633 buildable lots assuming some parcels could be divided into multiple lots (Figure 6).

Kleinfelder considered both SPREDD buildout analyses (2015 and 2018) to estimate future wastewater flows within the project area to ensure the proposed sewer is designed with adequate capacity to handle these flows. For the Phase 1A area, the "Mixed" development scenario from the 2018 analysis superseded the buildout presented in the 2015 analysis. For Phases 1B, 1C and 1D the 2015 buildout analysis was used to estimate future wastewater flows.

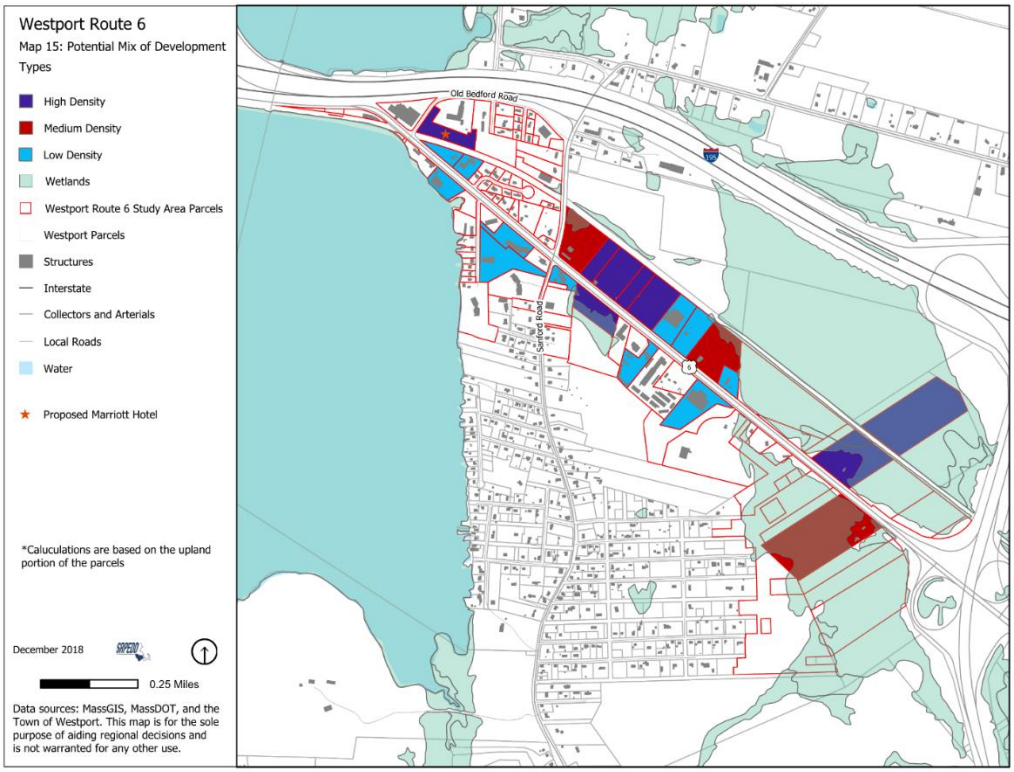
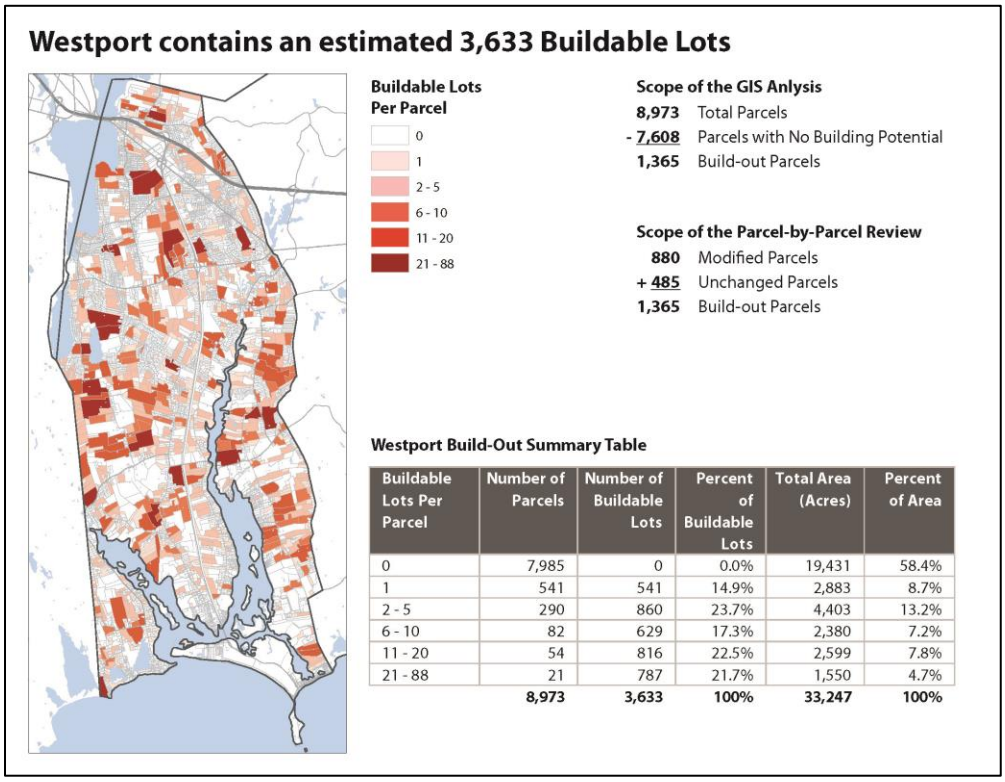


Figure 5 – Mixed Development Buildout Scenario for Phase 1A Area



Buildable Lots Per Parcel	Number of Parcels	Number of Buildable Lots	Percent of Buildable Lots	Total Area (Acres)	Percent of Area
0	7,985	0	0.0%	19,431	58.4%
1	541	541	14.9%	2,883	8.7%
2 - 5	290	860	23.7%	4,403	13.2%
6 - 10	82	629	17.3%	2,380	7.2%
11 - 20	54	816	22.5%	2,599	7.8%
21 - 88	21	787	21.7%	1,550	4.7%
	8,973	**3,633**	**100%**	**33,247**	**100%**

Figure 6 – Summary of Townwide Builtout Parcels and Buildable Lots

3.6 EXISTING ZONING

Current Town zoning includes two major zoning classifications and several overlay districts (Figure 7). Most of the Phase 1A project area is within the Town's Business zone. Some of the parcels within Phases 1A and 1B are also within the Science and Technology Overlay District (STOD). This district allows for development in the area around the Route 6 and Route 88 interchange. The limits of this overlay district extend further south than the overall Phase 1 project area including several large parcels identified as having buildable lots. These parcels represent another potential source of future wastewater flow.

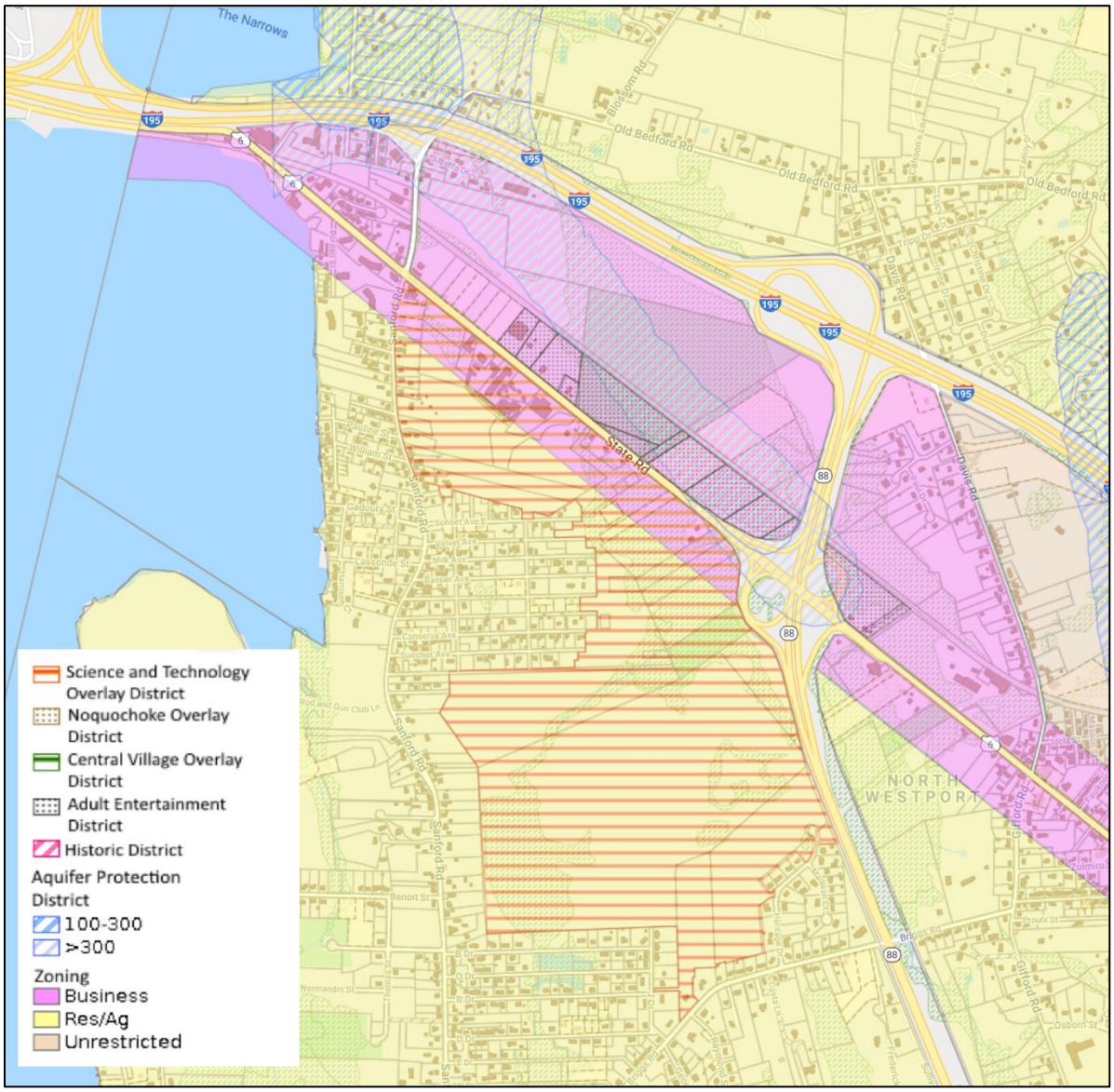


Figure 7 – Town Zoning and Overlay Districts

3.7 WASTEWATER FLOW ESTIMATES

Estimated wastewater flows within the project area are generated primarily from residential and commercial land use. Wastewater flows were estimated separately for Phase 1A and for potential future Phases 1B, 1C and 1D as identified in Figure 2. Peaking factors were applied to average daily flow estimates to estimate maximum daily flow and the peak instantaneous flow on a day of maximum flow. Wastewater flows from potential future infiltration and inflow were estimated to be negligible for the anticipated lengths and diameters of sewer pipe installed for each phase.

Table 1 summarizes estimated wastewater flows for existing and future development conditions, for average day, maximum day and peak instantaneous flow conditions, and for individual sewer phases as well as collectively for all of Phase 1. Table 2 summarizes peaking factors used to calculate flows.

Sources of information to assist with wastewater flow estimates include actual water consumption data, Title V guidelines for septic system design, and previous estimates completed by CDM Smith and SPREDD.

Wastewater flows were estimated based on measured water use data provided by the Town for areas with public water supply. It was assumed that 90% of water use would be converted to wastewater flow to account for water uses such as irrigation where wastewater would not be generated.

For areas without public water supply, wastewater flows were estimated from flow assumptions based on land use and informed by Title V guidelines. Design flows specified in Title V are meant to be used for designing septic systems and tend to overestimate typical wastewater flows. For example, Title V guidelines specify a design flow for residential wastewater of 110 gallons per day per capita. However, based on water consumption data available for Westport, a more realistic design flow of 68 gallons per day per capita or approximately 180 gallons per day (gpd) for an average single-family residential unit is a more appropriate design basis. This is consistent with wastewater flow estimates presented in the initial water and sewer concept plan completed in 2004 by CDM Smith.

Wastewater flows were estimated for existing development conditions and future development conditions as informed by the SRPEDD buildout analyses. Flows under future development conditions for Phase 1A include estimated flows from the new Marriott hotel and flows estimated by SRPEDD for the Mixed development scenario with a modification to ensure flows from the hotel were not double counted.

Table 1 – Estimated Wastewater Flows[5]

Sewer Phase	Existing Development Design Flows		
	Average day (gpd)*	**Maximum day (gpd)***	**Peak flow on maximum day (gpd)***
Phase 1A	30,000	81,000	144,000
Phase 1B	44,100	119,100	211,700
Phase 1C	161,900	437,200	777,300
Phase 1D	35,400	95,500	169,800
All Phase 1	**271,400**	**732,800**	**1,302,800**
Sewer Phase	**Future Development Design Flows**		
	Average day (gpd)*	**Maximum day (gpd)***	**Peak flow on maximum day (gpd)***
Phase 1A	55,100	148,700	264,300
Phase 1B	47,900	129,200	229,800
Phase 1C	203,000	548,100	974,500
Phase 1D	44,600	120,500	214,200
All Phase 1	**350,600**	**946,500**	**1,682,800**

*Flows rounded to the nearest 100 gpd

[5] Peaking factors for maximum day and peak flow on maximum day from TR-16 Guides for the Design of Wastewater Treatment Works

4 DESIGN CONSIDERATIONS

4.1 WASTEWATER CONVEYANCE

As described in Section 3.4, the proposed sewer alignment in Route 6 has a high point at the intersection of Sanford Road. The grade slopes favorably from Sanford Road to the White's Pump Station, such that conventionally gravity sewer can be readily installed between these points.

The grade similarly slopes downward from Sanford Road to the east towards the Route 88 interchange. This slope is not favorable for gravity sewer since it would flow away from White's Pump Station. In order to sewer the eastern segment of sewer between Sanford Road and the terminus of the sewer to the east, wastewater flows would need to be pumped through some form of pressure piping to Sanford Road and then flow by gravity to White's Pump Station.

Kleinfelder evaluated low pressure sewer and conventional gravity sewer with a new force main and pump station as two options for wastewater conveyance for the area of Phase 1A east of the intersection of Route 6 and Sanford Road.

4.1.1 Low Pressure Sewer

Low pressure sewer would require individual property owners to install a grinder pump on their property which would receive, and pump wastewater flows through small diameter pressure piping to a downstream discharge location. Low pressure sewer has the benefits of easier installation in the median (buried just below frost depth), less construction impact, options for ownership and operation of grinder pumps and lower costs. However, low pressure sewer also has the drawbacks of increased up-front connection costs to property owners for grinder pumps, additional controls and operation required for individual grinder pumps, the potential for sewer backups during power outages and limitations to flow capacity and future expansion of the conveyance system.

Kleinfelder worked with FR Mahoney, a manufacturer's representative for the E-One grinder pump product, to create a preliminary design of a low pressure sewer system. The design consists of approximately 4,500 feet of 3" SDR11 HDPE mainline low pressure sewer installed at a depth of approximately 4.5 feet below grade. The design includes 7 in-line cleanout manholes including one manhole with an air and vacuum release valve. Manholes are spaced approximately 600 feet apart on the mainline. The design was sized approximately to accommodate wastewater flows along Route 6 from the "Mixed" future development scenario developed by SPREDD. The design includes 13 simplex grinder pumps for most development parcels (rated to flows up to 700 gpd) and 3 duplex grinder pumps for some of the higher density parcels (rated up to flows of 3,000

gpd). Low pressure sewer services consist of 1.25” SDR11 HDPE low pressure sewer pipe with a corporation stop at the mainline and a separate stainless steel curb stop assembly. This preliminary low pressure sewer design will require further refinement and coordination with the manufacturer in the final design phase including potentially adjusting the number of manholes, air and vacuum release valves and grinder pumps.

4.1.2 Gravity Sewer and Pump Station

Conventional gravity sewer would involve wastewater flowing east along Route 6 to a new downstream pump station located somewhere near the Route 88 interchange. This pump station would then pump wastewater back west along Route 6 through a new force main to be discharged at the high point of Route 6.

This option has the drawbacks of increased cost and construction impact compared to low pressure sewer. Under this option the gravity sewer is larger in diameter (8” versus 3”) and deeper (8-10 feet minimum versus 4-5 feet), which would make construction more difficult in the median due to other utilities. This option would also require a force main to be installed, which likely would not fit in portions of the median and would require installation of the force main in the road shoulder where there is room or relocation of the existing water main in the median to accommodate the proposed gravity sewer and force main. The increased construction complexity, the fact that there are two pipes required (gravity and force main) and the fact a new pump station is required will cause this option to be considerably more expensive than the low pressure sewer options.

Benefits of this option include centralizing operation and maintenance to a new pump station instead of individual grinder pumps, less up-front connection costs to property owners, and greater flexibility in terms of flow capacity and future expansion of the conveyance system.

4.1.3 Sewer Alignment and Depth

Two options were considered for the alignment of the proposed sewer within Route 6: installation within the median and installation within the travel lanes. The installation of the proposed sewer within the roadway median would be favorable in terms of limiting traffic impacts and required roadway restoration and providing better access to the sewer in the future for operations and maintenance. Based on the results of the utility line tracing installation of sewer within the median would require temporarily bypassing and relocating approximately 400 feet of the existing 12” water main.

Installation of the proposed sewer within the travel lanes would be favorable in terms of limiting utility conflicts and the need for temporary bypass and replacement of water infrastructure. However, this option would increase traffic impacts, roadway restoration requirements and cost, and would require additional permitting and coordination with MassDOT.

Due to the drawbacks of installation within the travel lanes, the median was chosen for the horizontal alignment of the proposed sewer. This alignment still requires installation of sewer infrastructure in portions of the roadway including within the turning lanes at the intersection of Route 6 and Sanford Road, within median breaks and within the travel lanes for sewer service connections.

Installation of the proposed sewer within the median requires less than 10 feet of horizontal clearance between the proposed sewer and existing water main. MassDEP guidelines recommend that when 10 feet of horizontal clearance cannot be obtained that the sewer should be installed such that the top of the sewer is at least 18” below the bottom of the water main. Records and the utility line tracing indicate that the existing 12” water main was installed at a depth of approximately 4-6 feet below grade indicating that the proposed sewer should installed at a minimum depth of 6.5-8.5 feet below grade to maintain the recommended 18” vertical clearance. This minimum depth will be greater in some locations to accommodate utility crossings, changes in the existing grade elevation, minimum pipe slopes and potential future side street and service connections to the mainline sewer within Route 6.

The installation of gravity sewer along side streets was evaluated within the Phase 1A project area. Due to the limited potential for economic development on these side streets, the installation of sewer on these streets was not included in the preliminary design. However, Kleinfelder recommends the installation sewer manholes and pipe stubs along the proposed Route 6 mainline sewer to accommodate potential future side street sewer connections.

The minimum sewer depth could potentially be reduced in the case of low pressure sewer which can be installed at a shallower depth than gravity sewer and is less dependent on the existing grade elevation. Installation of low pressure sewer in the vicinity of an existing water main may require sewer piping with a greater wall thickness that is rated to a higher pressures or additional encasement of low pressure sewer piping with concrete or controlled density fill.

4.1.4 Sewer Sizing

Wastewater flow estimates were used to determine appropriate pipe sizing for gravity sewer and low pressure sewer (to the east of Sanford Road).

The gravity sewer starting at Sanford Road and ending at White’s Pump Station are proposed to range from 12” diameter to 15” diameter to accommodate future peak flows from sewer Phases 1B, 1C and 1D.

The gravity sewer starting at Sandford and draining eastward to a new pump station new Route 88 is proposed to be 8” diameter gravity sewer. If the low pressure sewer option is installed, then the sewer would be 3” diameter and individual property connections would be 1.25” diameter.

All potential future side street connections could be serviced with 8” gravity sewer except for Sanford Road where 12” gravity sewer would be needed to accommodate future peak flows.

Preliminary cost estimates for both conveyance options are presented in Section 4.4 of this report. Attachment 1 – 50% Design Drawings presents the recommended design with low pressure sewer for the area of Phase 1A east of the intersection of Route 6 and Sanford Road.

4.2 PUMP STATION CONSIDERATIONS

4.2.1 Existing Pump Station Capacity

The design capacity of the existing pump station is 250 gpm which according to Boydco, the pump station operator, was verified by a pump drawdown test conducted in 2018 when the new pumps were installed. This pump capacity would allow the existing station to handle the calculated peak flows for Phase 1A (peak flow of 181 gpm). The existing pump station may also accommodate additional flow from a portion of another sewer phase; however, this assertion should be confirmed at a future time.

4.2.2 Future Pump Station Options

Sewer expansions beyond Phase 1A are estimated to eventually exceed the existing capacity of White’s Pump Station (approximately 250 gpm). When this is expected to happen, the Town has options for how to provide additional pump station capacity to discharge flows to the City of Fall River.

4.2.2.1 Option 1 - Expansion of White’s Pump Station

The Town could expand the existing pump station. This would involve increasing the existing pump station wet well volume and replacing the existing pumps. This option would allow for the reuse of the existing pump station and force main infrastructure. However, construction of this option would be complex as the existing pump station service and structure would need to be maintained during construction. Increasing the flow through the existing 6” PVC force main would also increase the friction headloss in the force main requiring new pumps designed to operate at the increased head condition. Ultimately, the friction head from the existing force main would limit the maximum flow that can practically be put through the force main.

4.2.2.2 Option 2 - Construction of New Pump Station

The Town could replace the existing pump station with a new pump station and force main to accommodate flows greater than what could be accommodated by modifying the existing pump station as described above. It is most likely that construction of Phase 1C would necessitate the second pump station option presented due to significantly greater flows.

Two locations have been identified as potential sites for a future downstream pump station. The first location is adjacent to the existing White's Pump Station. This location is closest to the border with Fall River and would allow for the easiest transfer of wastewater flows from the existing pump station to the new pump station. This pump station location would require an easement or land acquisition from the property owner or MassDOT. The new pump station would need to be designed to minimize disruption to White's of Westport with the station being constructed on existing parking space. Additionally, this station location would require coordination and potential relocation of existing utilities including water, sewer, gas and telecom infrastructure. The second location is a parcel along Route 6 and adjacent to Borden Street that is owned by Fall River. This parcel is undeveloped and contains an abandoned 42" water aqueduct discharge line. This location would require less utility coordination and have less of a construction impact. However, this location would require approximately 1,500 linear feet of new force main and would require existing and proposed sewer flows west of this location to be conveyed to the new pump station against favorable grade conditions for gravity sewer.

The preferred location for a new pump station would be adjacent to the existing pump station. This would maximize the gravity sewer layout designed by this preliminary design. It would also facilitate construction sequencing. Sheet C-1 of Attachment 1 – 50% Design Drawings display a potential future pump station configuration at the preferred location.

Several types of pump stations are available as options for a new pump station:

- **Above ground suction lift pump stations** are a common type of wastewater pump stations used for flow and head conditions in the ranges estimated for this project. These pump stations have pumps located above ground with inlet suction piping extending below ground into a wet well. These pump stations have the benefit of easy access to the pumps and controls for operation and maintenance but are limited to a depth of approximately 20 feet where pump suction is feasible. Modular, package pump stations of this type, including pump control equipment and above ground enclosures are available from multiple pump manufacturers.

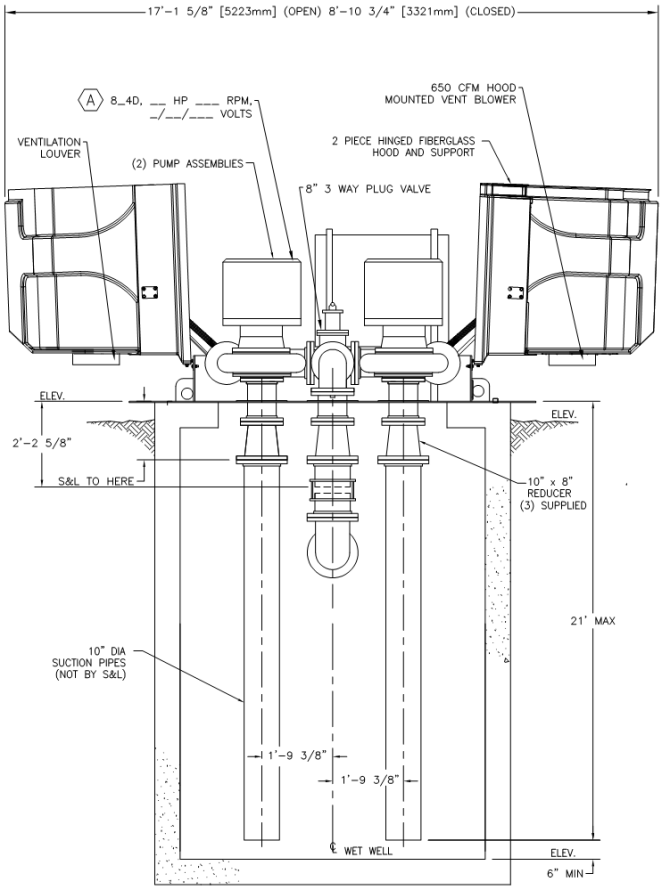


Figure 8 – Detail Drawing of Above Ground Suction Lift Pump Station

- **Submersible pump station** is another typical pump arrangement considered this is like the existing pump station. This pump station could be entirely below ground with pumps located in wet well. These pump stations are less constrained by depth but require pumps be removed from the wet well for operation and maintenance.

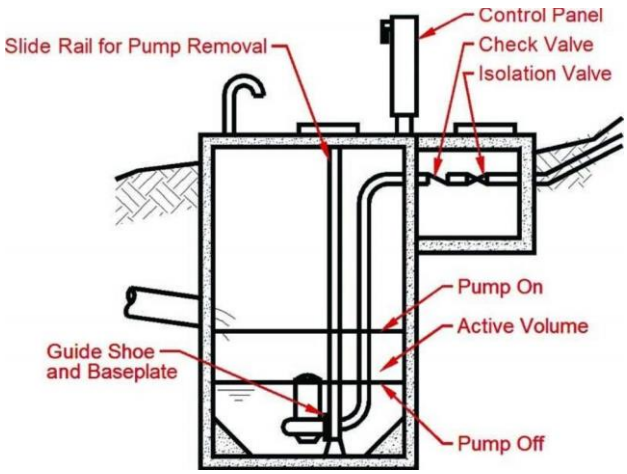


Figure 9 – Schematic Drawing of Submersible Pump Station

- A third typical pump station arrangement would be a subgrade structure with **separated wet well and dry pump pit**. The pumps are typically situated lower than the wet well operating elevation to ensure a flooded suction to the pumps. This type of pump station typically offers better pump efficiencies but can cost more upfront due to a larger excavation and larger overall pump station.

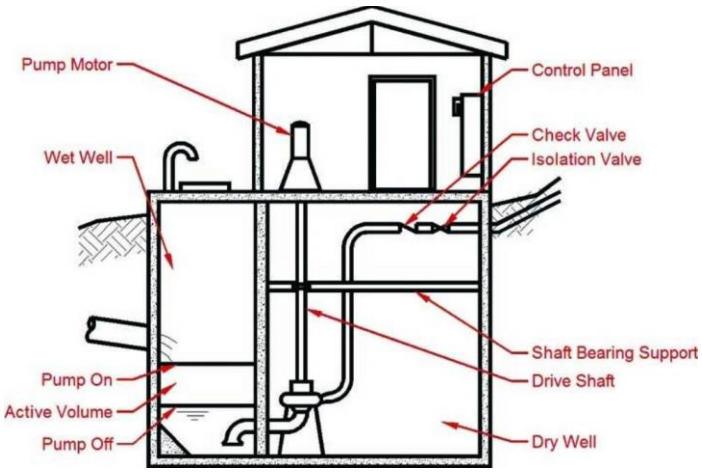


Figure 10 – Schematic Drawing of Separated Wet Well and Dry Pit Pump Station

4.3 CONSTRUCTION CONSIDERATIONS

This section of the report details design considerations related to construction of sewer infrastructure within the project area. A summary of preliminary design recommendations is presented in Section 4.6 of this report.

4.3.1 Subsurface Conditions

No borings or test pits were advanced as a part of this preliminary design. USGS soil maps indicate that subsurface soils in the project area are primarily thin glacial till comprised of sand, silt and clay with some gravel and large boulders. Ledge (bedrock) is anticipated to be present at approximately 10 feet below the existing grade elevation. It is more likely that ledge will be encountered at locations where the trench excavation for the proposed sewer will be greater than 10 feet deep. The cost associated with excavation of ledge is estimated in the preliminary opinion of probable cost.

The project area is adjacent to South Watuppa Pond and includes wetland areas adjacent to Route 6. High groundwater levels are anticipated in the project area given the proximity to a large water body and wetlands. High groundwater levels will require dewatering of trench excavations during construction of the proposed sewer, increasing the overall construction cost.

The advancement of borings is recommended for the next phase of design. Borings will provide a better understanding of the subsurface conditions within the project area and offer this information to prospective bidders to construct the sewer.

4.3.2 Water Main Bypass and Relocation

The existing water 12" water main in the Route 6 median runs from the Town's boundary with Fall River to just before the intersection of East Briggs Road and Route 6. Connected to this 12" water main in Route 6 are several branching water mains ranging in diameter from 6"-12" and servicing Adirondack Lane, Senechal Street, Herbert Terrace, Borden Street, Alberto Drive, Old Bedford Road, Davis Road and Idola Street. All water mains in the distribution system are ductile iron installed between 1989-1998.

The installation of the proposed sewer within the Route 6 median introduces the risk of damaging the existing 12" water main within the median. Trench excavation in the vicinity of the water main could cause undermining of the main and result in a water main break if adequate precautions are not taken and adequate horizontal clearance is not maintained.

The results of the utility line tracing indicate that a section of the existing 12" water main near the intersection with Old Bedford Road will require bypass and relocation to accommodate the installation of the proposed gravity sewer (approximately STA 1+75 to STA 5+75 on Sheet C-1 of Attachment 1 – 50% Design Drawings). The horizontal clearance between the existing drain and water main decreases to less than 5 feet in this section which would not allow for the use of a trench box to install the proposed gravity sewer without relocation of the water main.

The installation of low pressure sewer east of Sanford Road is not anticipated to require bypass and relocation of the existing 12" water main. Low pressure sewer requires less excavation than gravity sewer and can be installed at a lower minimum depth, lessening the concern with undermining of the existing water main.

The water distribution system in Westport is not a looped system. Temporary bypass of a portion of the water main would require an additional connection to the existing water main to ensure that continued water service would be maintained for areas further along the water main not requiring temporary bypass. One potential option for temporary bypass of the Route 6 water main west of the Sanford Road intersection would be to install a new connection between the Route 6 water main and the 8" water main on Old Bedford Road in the vicinity of White's of Westport. This would allow water service east of Sanford Road to be maintained but would result in a reduction in pipe diameter and water demand capacity that would need to be evaluated.

4.3.3 Abandoned Water Main Aqueduct

The abandoned water main aqueduct within the Route 6 median is owned by the City of Fall River and formerly transported water from Noquochoke Lake to South Watuppa Pond. Records indicate that the aqueduct was originally installed in 1942. The original installation date would indicate that the aqueduct is likely cast iron, however, it is not entirely clear what material the abandoned aqueduct consists of with one set of record plans referring to the material as “stone” and another set of record plans referring to the material as “R.C.” potentially indicating reinforced concrete. Records indicate there are two manhole structures located on the aqueduct line. Access into these manholes could not be obtained during the utility line tracing. Records also indicate that the aqueduct is 42” in diameter for the section that is east of the manhole structure at the intersection with Borden Street. For the section that is west of this manhole structure records indicate the aqueduct is 30” in diameter.

Installation of the proposed gravity sewer in the median will generally follow the alignment of the aqueduct. Where the proposed gravity sewer conflicts with the aqueduct, in terms of depth, then the aqueduct will require either selective demolition or complete removal. The utility line tracing and records indicate that the aqueduct was installed generally at a depth of 4-6 feet with the exception of a portion of the aqueduct centered on the intersection with Sanford Road that was installed at a greater depth.

Installation of low pressure sewer east of Sanford Road is not anticipated to require significant demolition or removal of the aqueduct. Demolition or removal of the aqueduct is only anticipated potentially around proposed manhole structures and around service connections that must cross the aqueduct.

4.3.4 Utility Coordination and Crossings

Kleinfelder identified all major and minor utilities anticipated to require crossing by the proposed sewer. Anticipated utility crossing locations were identified from records and utility line tracing and were used to inform the design of the proposed sewer and the preliminary opinion of probable cost.

A 60” diameter RCP drain crossing at the intersection with Old Bedford Road is anticipated to conflict with the proposed gravity sewer and may require alteration to resolve this conflict and maintain the current flow capacity of the drain. Installing the sewer below the drain is not feasible considering the depth that the sewer would need to be installed and the elevation of the existing pump station wet well that the proposed sewer needs to connect to downstream. Installing the sewer above the drain would not be favorable due to the limited cover above the proposed sewer and the desire to maintain 18” of vertical separation with the adjacent water main. Records indicate that the upstream portion of the 60” drain may have been abandoned, thus rendering the drain to be oversized. This may permit the drain to be reduced in diameter to eliminate the conflict with the sewer. Further investigation would be needed to confirm whether the drain is

oversized and if crossing through the drain with the proposed sewer would be a feasible option. The construction cost of altering the existing drain would be significant. Kleinfelder included an allowance of $250,000 in the preliminary opinion of probable cost for the alteration of the 60” drain.

In addition to the 60” drain crossing, the proposed gravity and low pressure sewer will need to cross existing water mains and water services, smaller drain lines and laterals, gas mains, electric lines, traffic lines and telecommunication lines. Permanent relocation of these crossing utilities is not anticipated to be necessary in order to accommodate installation of the proposed sewer. Kleinfelder included an allowance of $10,000 in the preliminary opinion of probably cost for support and coordination of each minor utility crossing. Refer to Sheets C-1 through C-7 of Attachment 1 – 50% Design Drawings for the locations of all major and minor utility crossings anticipated along Route 6.

4.3.5 Roadway Restoration

Roadway restoration will be required for portions of the proposed mainline sewer and sewer services installed within the roadway, median breaks and turning lanes. Roadway restoration is anticipated to require controlled density fill for a portion of the trench backfill and a 1 feet cutback on both sides of the trench limits. Final roadway restoration requirements will need to be coordinated with MassDOT in a future design phase. MassDOT may require restoration of the entire Route 6 roadway within the Phase 1A project area, which would significantly increase the overall construction cost. For the preliminary opinion of probable cost, roadway restoration was only assumed for portions of the roadway where proposed mainline sewer and sewer services would be installed. Average pavement binder widths of 10 feet were assumed for installation of the mainline gravity sewer and 9 feet for gravity services to account for the anticipated trench widths and a 1 feet cutback on both sides of the trench limits. Reduced pavement binder widths of 7 feet and 6 feet were assumed for installation of the mainline low pressure sewer and low pressure services, respectively. Pavement overlay widths were assumed to match pavement binder widths for the installation of sewer services. A pavement overlay width of 13 feet was assumed for installation of mainline sewer within median breaks and turning lanes to account for full lane restoration. Refer to Sheet C-12 of Attachment 1 – 50% Design Drawings for trench and pavement details.

4.3.6 Traffic Impacts

Installation of the proposed sewer within the Route 6 median will require temporary closure of at least one of the travel lanes adjacent to the median. Additional coordination and closures will be required for the installation of sewer services and for the proposed work within the Sanford Road intersection. Traffic management plans will need to be developed in a future design phase and coordinated and approved with MassDOT. Police details will be required throughout the duration of the work to coordinate traffic and facilitate the installation of the sewer. Kleinfelder accounted for the cost of police details in the preliminary opinion of probable cost.

4.4 COST CONSIDERATIONS

Kleinfelder prepared an opinion of probable cost for the two conveyance alternatives evaluated (low pressure sewer versus gravity sewer) for the eastern portion of the Route 6 sewer. The opinion of probable cost is separated into two parts. Part A consists of only the installation of gravity sewer from the elevation high point at Sanford Road to the existing White's pump station. The cost estimated for Part A does not vary between the two conveyance alternatives. Part B consists of the remaining sewer installation east of Sanford Road. The cost estimated for Part B varies between the two conveyance alternatives evaluated.

Kleinfelder's preliminary opinion of probable cost for the low pressure sewer alternative is $3,557,700. Kleinfelder's preliminary opinion of probable cost is for the gravity sewer alternative is $6,887,900. The opinion of probable cost for each alternative includes cost allowances for construction mobilization, engineering design costs and construction contingency. The cost for individual parts of the project are presented in Table 3.

The cost for an optional Part C is included for reference. Part C consists of the installation of gravity sewer along side streets within the project area. Refer to Attachment 3 – Preliminary Opinion of Probable Cost for more detail on individual cost items, quantities, unit prices and assumptions used to obtain this estimate.

Table 2 – Opinion of Probable Cost for Two Conveyance Alternatives

	Phase 1A with LPS (Recommended)	**Phase 1A with Conventional Gravity (Not Recommended)**
Construction Costs		
Part A - Route 6 West, Gravity	$ 1,690,550	$ 1,690,550
Part B - Route 6 East (LPS)	$ 729,640	-
Part B - Route 6 East (Gravity)	-	$ 2,995,000
5% Mobilization	$ 121,000	$ 234,300
Construction Cost Subtotal	*$ 2,541,200*	*$ 4,919,900*
Project Costs (Including Engineering and Construction Contingency)	**$ 3,557,700**	**$ 6,887,900**
LF of Mainline Sewer Installed	6,900	6,900
$ per Foot of Mainline Sewer Installed (Construction Cost Only)	$ 516	$ 998
Part C - Side Roads, Gravity (Optional)	$ 1,327,600	$ 1,327,600

4.5 OTHER CONSIDERATIONS

This section of the report details other considerations that were assessed as part of the preliminary design. A summary of preliminary design recommendations is presented in Section 4.6 of this report.

4.5.1 Permitting

The project is anticipated to be subject to the following permitting requirements and regulations:

- Massachusetts Water Resources Commission (WRC) Interbasin Transfer Act and Regulations
    - The project can likely be exempt from these regulations through a Determination of Insignificance as the anticipated wastewater flows for Phase 1A are less than 1,000,000 gpd.
- MassDEP Wetlands Protection Act Regulations
- MassDEP Sewer System Extension and Connection Permit Program
    - The project can likely be exempt from these regulations according to the regulation section 7.05 Activities Not Requiring a Permit
- MassDOT State Highway Access Permit

The project activities do not exceed Massachusetts Environmental Policy Act (MEPA) review thresholds and the project is not anticipated to be subject to MEPA regulations. The final design will require approval from the permitting agencies prior to bidding and construction.

4.5.2 Funding

The following funding sources could potentially be used to fund this project:

- State Revolving Fund (SRF)
- MassWorks Infrastructure Program
- United States Department of Agriculture (USDA) Rural Utilities Service
    - The Town is over the 10,000 population limit but sewer area may be considered separate community
- Betterments and Town general funds

4.5.3 Ownership, Operation and Maintenance

The existing White's pump station is currently privately owned with operation and maintenance of the pump station handled by a private contractor. Acquisition of the pump station by the Town would be required to implement the proposed sewer design. The operation and maintenance of the proposed sewer could be handled by a private contractor or by the Town through a newly formed public works department.

Grinder pumps installed as part of the low pressure sewer system option would typically be owned and maintained by each individual property owner. However, each situation is different, and the ownership structure should be considered by the Town.

4.5.4 Intermunicipal Agreement with Fall River

Implementation of the proposed sewer design would require modification to the existing intermunicipal agreement with Fall River including increasing the current flow allocations. Further coordination would be required to determine whether increased wastewater discharge into the Fall River system would result in any capacity issues. The demolition and removal of the abandoned water main aqueduct owned by Fall River would also require additional coordination and approval.

4.6 SUMMARY OF RECOMMENDATIONS

Kleinfelder recommends the installation of approximately 2,400 feet of gravity sewer within the median and turning lanes of Route 6 from the elevation high point at Sanford Road to the existing White's pump station. Kleinfelder determined that the existing pump station has the capacity to handle the estimated wastewater flows for Phase 1A including under future development projections. The gravity sewer has been sized to accommodate wastewater flow from future phases of sewer including future development projections. The recommended design includes bypass and relocation of approximately 400 feet of existing 12" water main and alteration of an existing 60" drain crossing to accommodate the installation of the gravity sewer.

Kleinfelder recommends the installation of approximately 4,500 feet of low pressure sewer extending east from the elevation high point at Sanford Road. The estimated cost to install low pressure sewer for this portion of Route 6 is significantly less than the estimated cost to install gravity sewer.

The project will require compliance with the applicable MassDEP and MassDOT permits and approval from both regulatory agencies. Potential options for project funding and for operation and maintenance of the recommended design have been identified.

4.7 PROJECT IMPLEMENTATION

Implementation of the project will require completion of the following actions as next steps. Actions are categorized as administrative, permitting or final design actions. This list of actions may be expanded, as necessary.

Administrative Actions

- Present the findings of this report to Town residents and businesses with project area

- Begin negotiations with the City of Fall River to modify the existing intermunicipal agreement
- Begin negotiations with owner of the existing White's pump station
- Determine operation and maintenance of the proposed sewer
- Determine funding source(s) for project implementation

Permitting Actions

- Determine applicability of Interbasin Transfer Act Regulations and coordinate accordingly with Massachusetts Water Resources Commission
- Coordinate with MassDOT to obtain State Highway Access permit and approval of final design including traffic management and roadway restoration
- Coordinate with MassDEP to obtain required permits for project activities regulated under the Wetlands Protection Act and approval of final design

Final Design Actions

- Perform survey of the project area
- Consider potential for environmental contamination
- Perform subsurface investigations, including environmental sampling (if warranted)
- Design water main bypass and relocation
- Design 60" drain crossing
- Coordination with low pressure sewer vendor and finalization of low pressure sewer design
- Determination of final number and location of sewer service connections
- Design final roadway restoration
- Development of traffic management plans
- Development of final design plans, specifications and cost estimate

ATTACHMENT 1 – 50% DESIGN DRAWINGS

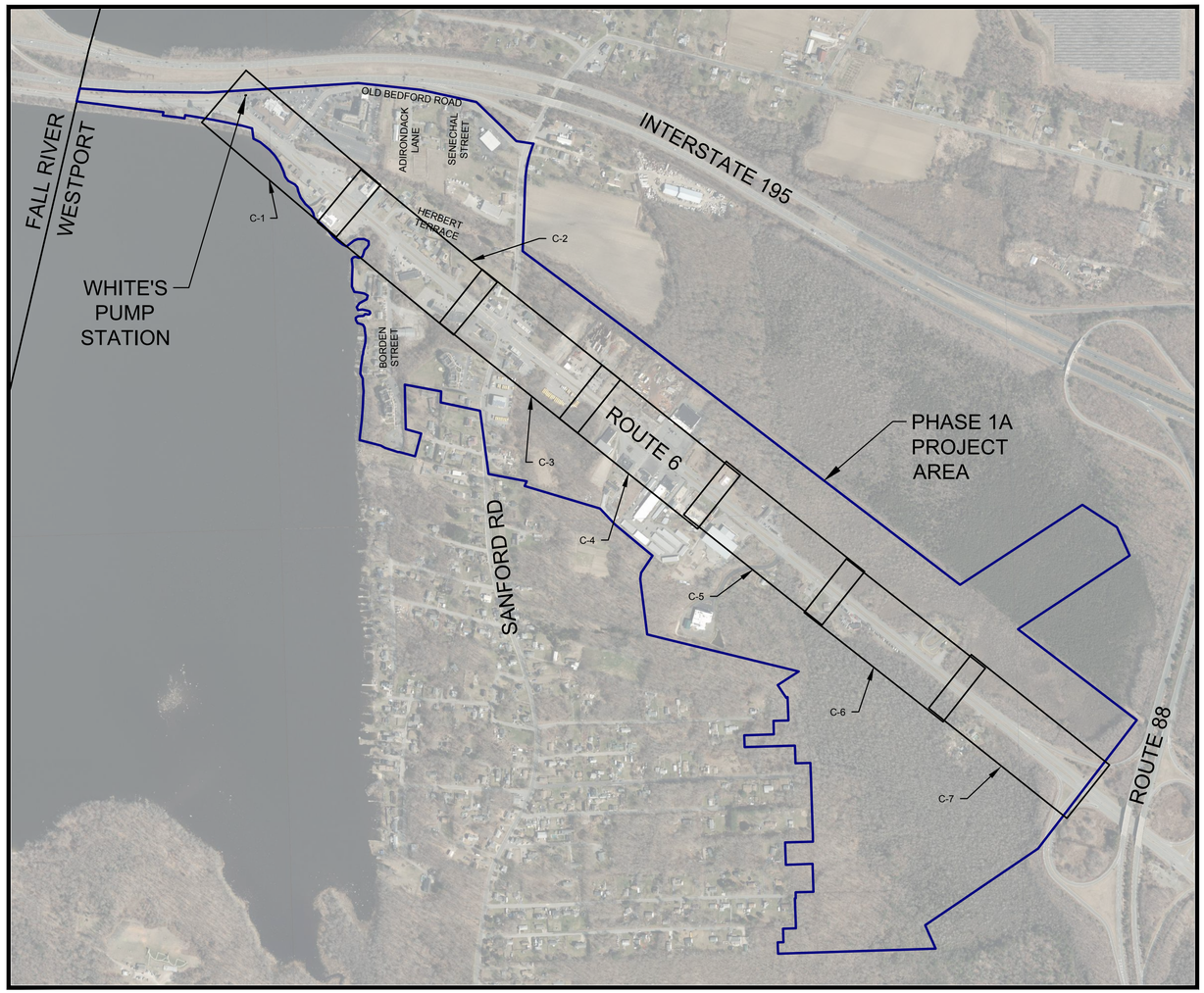
TOWN OF WESTPORT, MASSACHUSETTS
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

JULY 2020

KLEINFELDER
Bright People. Right Solutions.

TOWN PLANNER

JAMES K. HARTNETT



PLAN
SCALE: 1" = 500'

0 500 1000
SCALE: 1" = 500' SCALE IN FEET

N

SHEET LIST	
S□eet Num□er	S□eet Title
GENERAL	
G-1	COVER AND LOCUS PLAN
G-2	GENERAL NOTES AND LEGEND
CIVIL	
C-1	PLAN AND PROFILE STA 0+00 TO 10+50
C-2	PLAN AND PROFILE STA 10+50 TO 21+00
C-3	PLAN AND PROFILE STA 21+00 TO 31+50
C-4	PLAN AND PROFILE STA 31+50 TO 42+00
C-5	PLAN AND PROFILE STA 42+00 TO 52+50
C-6	PLAN AND PROFILE STA 52+50 TO 63+00
C-7	PLAN AND PROFILE STA 63+00 TO 73+50
C-8	SECTION - I
C-9	DETAILS - I
C-10	DETAILS - II
C-11	DETAILS - III
C-12	DETAILS - IV

50% DESIGN NOT FOR CONSTRUCTION

LEGEND

140	MAJOR CONTOUR (FEET NAVD88)
141	MINOR CONTOUR (FEET NAVD88)
S S S	EXISTING GRAVITY SEWER
W W W	EXISTING WATER MAIN
G G G	EXISTING GAS UTILITY
T T T	EXISTING TELECOMMUNICATION UTILITY
E E E	EXISTING ELECTRIC OR TRAFFIC CONDUIT
W W W	EXISTING WATER MAIN TO BE BYPASSED, REMOVED AND REPLACED TO ACCOMMODATE SEWER INSTALLATION
D D D	EXISTING DRAIN (24" DIAMETER OR SMALLER)
D D D	EXISTING DRAIN (LARGER THAN 24" DIAMETER)
	EXISTING ABANDONED WATER AQUEDUCT
S S S	PROPOSED GRAVITY SEWER (8" DIAMETER OR SMALLER)
	PROPOSED GRAVITY SEWER (LARGER THAN 8" DIAMETER)
LPS LPS	PROPOSED LOW PRESSURE SEWER
	EXISTING SEWER MANHOLE
WV	EXISTING WATER GATE VALVE
	EXISTING HYDRANT
WV	EXISTING WATER GATE VALVE TO BE BYPASSED, REMOVED AND REPLACED FOLLOWING SEWER INSTALLATION
	EXISTING HYDRANT TO BE BYPASSED, REMOVED AND REPLACED FOLLOWING SEWER INSTALLATION
	EXISTING DRAIN MANHOLE
	EXISTING DRAIN CATCH BASIN
	EXISTING DRAIN HEADWALL OR OUTFALL
	EXISTING ABANDONED WATER AQUEDUCT JUNCTION STRUCTURE
	PROPOSED SEWER MANHOLE
5+00	PROPOSED SEWER ALIGNMENT
	ASSESSOR'S PARCEL BOUNDARY
	EXISTING PUMP STATION
	POTENTIAL FUTURE PUMP STATION

ABBREVIATIONS

APPROX.	APPROXIMATE
CONC.	CONCRETE
Ø	DIAMETER
DI	DUCTILE IRON
EL	ELEVATION
EXIST.	EXISTING
HDPE	HIGH DENSITY POLYETHYLENE
INV	INVERT
L	LEFT
LPS	LOW PRESSURE SEWER
MH	MANHOLE
MAX.	MAXIMUM
MIN.	MINIMUM
O.C.	ON CENTER
OFF	OFFSET
PVC	POLYVINYL CHLORIDE
PROP.	PROPOSED
R	RIGHT
RCP	REINFORCED CONCRETE PIPE
SDR	STANDARD DIMENSIONAL RATIO
STA	STATION
TELECOM	TELECOMMUNICATION

GENERAL NOTES

1. THE UTILITY INFORMATION SHOWN WAS COMPILED BASED ON AVAILABLE RECORD INFORMATION, TIE MEASUREMENTS TO EXISTING FEATURES, USGS ORTHO COLOR IMAGERY AND UTILITY LINE TRACING CONDUCTED FOR A PORTION OF THE PROJECT AREA. THE LOCATIONS OF UNDERGROUND UTILITIES HAVE BEEN ESTABLISHED FROM SURFACE FEATURES OBSERVED ON RECORD PLANS AND USGS ORTHO COLOR IMAGERY AND FROM UTILITY LINE TRACING CONDUCTED FOR A PORTION OF THE PROJECT AREA. THE LOCATION OF UNDERGROUND STRUCTURES ARE APPROXIMATE ONLY AND MAY VARY FROM THE LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES AND/OR STRUCTURES MAY BE ENCOUNTERED. SIZE, MATERIAL, AND LOCATION OF EXISTING UTILITIES IN PROJECT VICINITY SHALL BE FIELD VERIFIED BY THE CONTRACTOR. RECORD DRAWINGS PREPARED BY THE CONTRACTOR FOR THIS PROJECT SHALL INCLUDE THIS FIELD VERIFIED INFORMATION. THE TOWN ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE EXISTING UTILITY INFORMATION.
2. UTILITY LINE TRACING WAS CONDUCTED IN JUNE 2020 BY GPRS, INC. UTILITY LINE TRACING WAS CONDUCTED ONLY WITHIN THE MEDIAN AND TURNING LANES OF ROUTE 6 FROM APPROXIMATELY STATION 1+75 TO STATION 24+50. THE LOCATION OF UNDERGROUND STRUCTURES ARE APPROXIMATE ONLY AND MAY VARY FROM THE LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES AND/OR STRUCTURES MAY BE ENCOUNTERED. SIZE, MATERIAL, AND LOCATION OF EXISTING UTILITIES IN PROJECT VICINITY SHALL BE FIELD VERIFIED BY THE CONTRACTOR. RECORD DRAWINGS PREPARED BY THE CONTRACTOR FOR THIS PROJECT SHALL INCLUDE THIS FIELD VERIFIED INFORMATION. THE TOWN ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE EXISTING UTILITY INFORMATION.
3. THE HORIZONTAL COORDINATE SYSTEM IS THE NORTH AMERICAN DATUM 1983 STATE PLANE MASSACHUSETTS MAINLAND FIPS 2001 FEET COORDINATE SYSTEM. ELEVATIONS SHOWN REFLECT NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
4. USGS ORTHO COLOR IMAGERY SHOWN WAS OBTAINED FROM MASSGIS AND REFLECTS SPRING 2019 CONDITIONS.
5. ELEVATION CONTOURS WERE GENERATED FROM THE MOST RECENT PUBLICLY AVAILABLE LIDAR ELEVATION DATA COLLECTED IN 2011. LIDAR ELEVATION DATA WERE OBTAINED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA).
6. UNLESS OTHERWISE INDICATED, PROPERTY LINES AND LAYOUT LINES SHOWN WERE TAKEN FROM TOWN ASSESSOR'S MAPS AND GIS AND ARE APPROXIMATE. PARCELS WITH AN EXISTING PUBLIC WATER SUPPLY CONNECTION WERE IDENTIFIED FROM WATER USE RECORDS OBTAINED FROM THE TOWN AND ARE INDICATED ON PLANS.
7. PRE-CONSTRUCTION SURVEYS SHALL BE COMPLETED FOR EXTERIOR AREAS OF THE ADJACENT STRUCTURES, BUILDINGS, AND AREAS AFFECTED BY THE WORK. SURVEY SHALL BE PERFORMED BY AN INDEPENDENT CONSULTANT NOT LESS THAN FOUR WEEKS PRIOR TO CONSTRUCTION ACTIVITIES. COSTS SHALL BE INCIDENTAL TO CONTRACTOR'S OVERALL BID.
8. CONTRACTOR SHALL LIMIT CONSTRUCTION ACTIVITIES INCLUDING STOCKPILING AND STORAGE OF MATERIALS AND VEHICLES TO THE BOUNDARY OF THE PROJECT LIMIT. IF CHANGES TO THESE LIMITS MUST BE MADE TO ACCOMMODATE PROPOSED WORK, CONTRACTOR MUST RECEIVE PRIOR OWNER APPROVAL.
9. CONTRACTOR SHALL PROVIDE TEMPORARY FENCING AND CONCRETE BARRIERS TO SHIELD OPEN EXCAVATIONS FROM VEHICLES AND PASSERSBY.
10. CONTRACTOR IS REQUIRED TO COORDINATE WITH THE POLICE AND FIRE DEPARTMENTS IN ORDER TO MAINTAIN EMERGENCY VEHICLE ACCESS THROUGHOUT PROJECT DURATION.
11. CONTRACTOR SHALL REMOVE AND REPLACE SIDEWALKS, DRIVEWAYS, AND BIT. CONC. BERMS, AND RESET GRANITE CURB WHERE NECESSARY TO CONSTRUCT THE PROPOSED ITEMS OF WORK, AT HIS OR HER COST, EXCEPT WHERE DESIGNATED AS PART OF THE WORK OF THIS CONTRACT.
12. EXISTING UTILITY POLES THAT FALL WITHIN 5FEET OF THE PROPOSED EDGE OF EXCAVATION SHALL BE SUPPORTED BY THE UTILITY OWNER DURING EXCAVATION OF THE TRENCH. CONTRACTOR SHALL COORDINATE SUPPORT AND BE RESPONSIBLE FOR COSTS AND FEES.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING TEST PITS TO LOCATE AND CONFIRM UTILITY SIZING AND MATERIAL AT ALL LOCATIONS, AND FOR LOCATING POTENTIAL UTILITY CONFLICTS. TEST PITS SHALL BE PERFORMED WELL IN ADVANCE OF CONSTRUCTION OPERATIONS SO THAT ANY CHANGES IN ALIGNMENT AND/OR GRADE OF THE PROPOSED WORK OR UTILITY LOCATIONS MAY BE DETERMINED.
14. WHERE EXISTING GAS, ELECTRIC AND TELECOM UTILITIES CROSS THE PROPOSED TRENCH LIMITS, CONTRACTOR SHALL COORDINATE WITH THE UTILITY OWNER TO SUPPORT AND BE RESPONSIBLE FOR COSTS AND FEES. CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORTING THE EXISTING UTILITY IN ACCORDANCE WITH THE UTILITY OWNER'S REQUIREMENTS.
15. WHERE TEMPORARY OR PERMANENT UTILITY RELOCATION IS REQUIRED, THE CONTRACTOR SHALL NOTIFY THE TOWN 14 DAYS IN ADVANCE OF CONSTRUCTION AND SHALL COORDINATE THE NEW WORK WITH THE UTILITY RELOCATION.
16. CONTROLLED DENSITY FILL (CDF) SHALL BE REQUIRED FOR ALL EXCAVATION WITHIN THE STATE ROADWAY TRAVEL LANES AND FOR ALL UTILITY CROSSINGS WITH CLEARANCES LESS THAN 12 INCHES. CDF SHALL NOT BE REQUIRED FOR EXCAVATION WITHIN THE STATE ROADWAY MEDIAN.
17. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT OF ANY SEWER, WATER OR DRAIN PIPING, OR STRUCTURE HE OR SHE DAMAGES. ALL COSTS OF REPLACEMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. INTERMEDIATE COUPLINGS SHALL BE ALLOWED ON A TEMPORARY BASIS ONLY.
18. PRIOR TO BEGINNING WORK, CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND REPORT ANY DISCREPANCIES BETWEEN THE PLANS AND THE ACTUAL CONDITIONS TO THE ENGINEER.
19. CONSTRUCTION TRAILER(S), STOCKPILING LOCATIONS, AND EQUIPMENT STORAGE AREAS ARE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE COORDINATED WITH THE OWNER.
20. THE CONTRACTOR SHALL CALL DIG-SAFE AT 1-888-344-7233 A MINIMUM OF 72 HOURS PRIOR TO ANY EXCAVATION, INCLUDING TEST PITS, TO LOCATE UNDERGROUND UTILITIES IN THE FIELD AND NOTIFY UTILITIES OF CONSTRUCTION.
21. UPON COMPLETION OF THE WORK, ALL DISTURBED AREAS SHALL BE RESTORED TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO CONSTRUCTION.
22. FENCES, WALLS, LANDSCAPING, TREES AND BUSHES ARE NOT ALL SHOWN ON THE PLANS. THE CONTRACTOR SHALL TAKE EXTRA CARE TO PRESERVE SUCH EXISTING FEATURES AT ALL TIMES DURING CONSTRUCTION PER THE SPECIFICATIONS. ALL EXISTING FEATURES IN CONFLICT WITH PROPOSED WORK SHALL BE RELOCATED OR REPLACED AS INDICATED ON THE CONTRACT DRAWINGS OR AS DIRECTED BY THE ENGINEER. ALL EXISTING FEATURES AND ALL ADJACENT AREAS DAMAGED, DESTROYED OR DISTURBED SHALL BE REPAIRED OR REPLACED. PAYMENT FOR THIS WORK IS TO BE INCLUDED IN THE GENERAL COST OF THE CONTRACT.
23. DRAIN AND CULVERT CROSSINGS SHALL BE PROTECTED AND IN WORKING ORDER THROUGHOUT CONSTRUCTION. DIVERSION OF THE STREAM OR TEMPORARY RELOCATION OF THE CULVERT IS NOT ALLOWED.
24. THE CONTRACTOR SHALL PROVIDE FOR THE SAFE AND ORDERLY PASSAGE OF PEDESTRIANS AND VEHICLES AT ALL TIMES IN AREAS UNDER CONSTRUCTION.
25. THERE SHALL BE NO PHYSICAL CONNECTION BETWEEN PUBLIC OR PRIVATE POTABLE WATER SUPPLY SYSTEM AND A SEWER, OR APPURTENANCE THERETO WHICH WOULD PERMIT THE PASSAGE OF ANY WASTEWATER OR POLLUTED WATER SUPPLY.
26. ALL EXCAVATIONS SHALL BE COMPLETELY CLOSED AT THE END OF EACH WORKING DAY BY BACKFILLING AND TEMPORARY PAVING OR BY COVERING WITH STEEL PLATES WHEN APPROVED BY THE OWNER.
27. LANDSCAPED AREAS, FEATURES, AND PLANTINGS THAT ARE IMPACTED BY THE PROPOSED WORK SHALL BE REMOVED AND RESET TO MATCH THE EXISTING CONDITIONS. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.
28. THE CONTRACTOR SHALL TAKE CARE NOT TO DISTURB ANY PROPERTY BOUNDS OR LAYOUT BOUNDS. ANY BOUNDS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE REPLACED BY A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF MASSACHUSETTS AT NO ADDITIONAL COST TO THE TOWN.
29. RETAIN EXISTING CASTINGS, HYDRANTS AND BOLLARDS WITHIN THE LIMITS OF WORK.
30. THE CONTRACTOR SHALL EMPLOY A LICENSED SURVEYOR TO LAYOUT AND STAKE ALL OFF ROAD PIPELINES AND EASEMENTS.
31. ALL DISTURBED TRAFFIC MARKINGS ARE TO BE REPLACED BY THE CONTRACTOR AND SHALL MATCH EXISTING.
32. CONTRACTOR SHALL SEQUENCE THE INSTALLATION OF SEWER, STORM DRAIN, AND WATER MAIN MAINLINES AND SERVICES SUCH THAT RECENTLY INSTALLED INFRASTRUCTURE IS PROTECTED AND UNDERMINING OF PIPES IS AVOIDED.
33. THE OWNER RESERVES THE RIGHT TO ELIMINATE ANY PORTION OF THE CONTRACT AT ANY TIME. FINAL PAYMENT WILL BE MADE BASED UPON ACTUAL QUANTITIES AT THE BID UNIT PRICE. NO CLAIM WILL BE ALLOWED FOR ADDITIONAL COMPENSATION OR ANTICIPATED PROFIT ON ITEMS THAT HAVE BEEN DECREASED OR ELIMINATED.

SOIL AND EROSION CONTROL NOTES

1. CONTRACTOR SHALL PROVIDE ALL EROSION AND SEDIMENT CONTROL DEVICES AS INDICATED ON THE PLANS, OR AS DIRECTED BY THE ENGINEER.
2. STOCKPILED MATERIALS SHALL BE LOCATED AND MAINTAINED SO AS TO MINIMIZE THE POTENTIAL FOR EROSION.
3. SILT SACKS SHALL BE FURNISHED, INSTALLED AND MAINTAINED ALL CATCH BASINS WITHIN THE PROJECT AREA. THROUGHOUT PROJECT DURATION, DEBRIS COLLECTED IN SILT SACKS SHALL BE REMOVED AND LEGALLY DISPOSED OF OFF-SITE ON A WEEKLY BASIS OR MORE FREQUENTLY IF NECESSARY TO MAINTAIN FLOW THROUGH THE SILK SACKS. UPON COMPLETION OF THE PROJECT AND AS DIRECTED BY THE ENGINEER, THE CONTRACTOR IS RESPONSIBLE FOR REMOVING AND LEGALLY DISPOSING OF THE SILT SACKS AND DEBRIS OFF-SITE.
4. SEDIMENTATION BARRIERS SHALL BE FURNISHED, INSTALLED, AND MAINTAINED ALONG ALL WETLAND CORRIDORS ADJACENT TO PROJECT ACTIVITIES WHERE THE CONSTRUCTION IS NOT SEPARATED FROM THE WETLAND BY CURBING.
5. CONTRACTOR SHALL STOCKPILE SUFFICIENT SOIL EROSION AND SEDIMENT CONTROL MATERIALS ON SITE TO REPAIR ANY AND ALL DAMAGE TO SOIL EROSION AND SEDIMENT CONTROL MEASURES.

GEOTECHNICAL NOTES

1. NO BORINGS WERE ADVANCED AS A PART OF THIS PRELIMINARY DESIGN.

SEWER AND STORM DRAIN INSTALLATION NOTES

1. WHEREVER FEASIBLE, SEWERS SHALL BE LAID AT A MINIMUM OF 10 FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED WATER MAIN. WHEN THIS REQUIREMENT CANNOT BE MET, THE SEWER SHOULD BE LAID AT SUCH AN ELEVATION THAT THE CROWN OF THE SEWER IS AT LEAST 18 INCHES BELOW THE BOTTOM OF THE WATER MAIN.
2. WHENEVER SEWERS MUST CROSS UNDER WATER MAINS, THE SEWER SHOULD BE LAID AT SUCH AN ELEVATION THAT THE CROWN OF THE SEWER IS AT LEAST 18 INCHES BELOW THE BOTTOM OF THE WATER MAIN. WHEN THE ELEVATION OF THE SEWER CANNOT BE VARIED TO MEET THIS REQUIREMENT, THE WATER MAIN SHOULD BE RELOCATED TO PROVIDE THIS SEPARATION OR CONSTRUCTED WITH MECHANICAL-JOINT PIPE FOR A DISTANCE OF 10'-0" ON EITHER SIDE OF THE SEWER. WHERE A WATER MAIN CROSSES THE SEWER, ONE FULL LENGTH OF WATER MAIN SHOULD BE CENTERED OVER THE SEWER SO THAT BOTH JOINTS WILL BE AS FAR FROM THE SEWER AS POSSIBLE. THE WATER MAIN SHALL BE CONSTRUCTED WITH MECHANICAL-JOINT, DOUBLE CEMENT-LINED DUCTILE IRON PIPE. JOINTS FOR BOTH SEWER AND WATER MAIN SHALL BE RESTRAINED. PIPES SHALL BE PRESSURE TESTED TO 150 PSI TO ENSURE WATER TIGHTNESS.
3. ALL EXISTING SEWER SERVICES AND EXISTING SEWER PUMP STATION SHALL REMAIN OPERATIONAL THROUGHOUT CONSTRUCTION. CONTRACTOR SHALL PREPARE A CONSTRUCTION SEQUENCE PLAN TO ENSURE THAT ALL SEWER CUSTOMERS HAVE CONTINUOUS SEWER SERVICE DURING CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH PROPERTY OWNERS AS NECESSARY TO COORDINATE CONSTRUCTION DURING LOW FLOW TIMES. CONTRACTOR IS RESPONSIBLE FOR ALL BYPASS PUMPING TO MAINTAIN CONTINUOUS SERVICE. CONTRACTOR SHALL SET UP BYPASS PUMPING PIPING TO ALLOW PROPERTY OWNER ACCESS TO THEIR DRIVEWAYS. CONSTRUCTION SEQUENCE AND BYPASS PUMPING PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ANY EXCAVATION.
4. DEWATERING IS REQUIRED DURING CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A DEWATERING PLAN TO THE ENGINEER FOR APPROVAL AS SPECIFIED.
5. SUPPORT OF EXCAVATION IS REQUIRED DURING CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT A SUPPORT OF EXCAVATION PLAN TO THE ENGINEER FOR APPROVAL AS SPECIFIED.
6. DIVERSION, BYPASS, AND CONTROL OF SANITARY SEWER, STORM DRAIN AND DEWATERING FLOWS ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR'S INTENDED DIVERSION, BYPASS, AND CONTROL AND DEWATERING PLANS SHALL BE SUBMITTED TO THE OWNER AND ENGINEER FOR REVIEW AT LEAST 7 DAYS PRIOR TO ANY EXCAVATION.
7. THE CONTRACTOR SHALL MATCH EXISTING GRADING. ANY CHANGES IN GRADING, WHICH WOULD RESULT IN AN INCREASE OF STORMWATER RUNOFF TO THE CITY OF CAMBRIDGE SYSTEM, SHALL NOT BE PERMITTED.
8. ALL NEW AND RECONNECTED GRAVITY SANITARY SEWER SERVICES SHALL BE MIN. 6" PVC OR SHALL MATCH THE EXISTING SERVICE SIZE. WHERE THE EXISTING SERVICE IS 5" OR SMALLER, CONTRACTOR SHALL TRANSITION TO 6" PVC. REMOVE AND DISPOSE OF SECTIONS OF SERVICES REPLACED.

WATER INSTALLATION NOTES

1. ALL WATER MAIN DISINFECTION PROCEDURES SHALL BE IN ACCORDANCE WITH AWWA STANDARDS.
2. ALL WATER LINES INSTALLED UNDER THIS CONTRACT SHALL BE AT A DEPTH OF NO LESS THAN 4.5 FEET AS MEASURED FROM THE TOP OF THE PIPE TO THE FINISHED GRADE, UNLESS SPECIFICALLY IDENTIFIED OR WITH THE OWNER'S APPROVAL.
3. APPROXIMATE DEPTHS OF CROSSING UTILITIES ARE PROVIDED ON THE DRAWINGS. CONTRACTOR SHALL VERIFY SUBSURFACE SEWER AND DRAIN INVERTS AND EXISTING UTILITY DEPTHS AND ADJUST WATER MAIN BURY DEPTHS TO CLEAR EXISTING UTILITIES WITH ADEQUATE SEPARATION. FITTINGS AND MECHANICAL JOINT RESTRAINTS USED FOR CLEARING DRAINS OR OTHER OBSTACLES SHALL BE PAID FOR WHEN NECESSARY UNDER THE APPROPRIATE BID ITEMS.
4. WHENEVER WATER MAINS MUST CROSS SEWERS, THE WATER MAIN SHALL BE LAID OUT AT SUCH AN ELEVATION THAT THE CROWN OF THE SEWER IS AT LEAST 18-INCHES BELOW THE INVERT OF THE WATER MAIN. ONE FULL LENGTH OF WATER MAIN SHOULD BE CENTERED OVER THE SEWER SO THAT BOTH JOINTS WILL BE AS FAR FROM THE SEWER AS POSSIBLE.
5. WHEN IT IS IMPOSSIBLE TO OBTAIN 18-INCHES VERTICAL SEPARATION OVER A SEWER MAIN AS STIPULATED ABOVE, THE WATER MAIN SHALL BE WRAPPED IN 8 MIL POLY WRAP FOR 10 FEET ON EITHER SIDE OF THE CROSSING, AND CONCRETE ENCASED PER THE UTILITY CROSSING DETAIL. SEE SHEET GC-4.
6. ALL MECHANICAL JOINT FITTINGS, HYDRANTS, AND VALVES SHALL BE RESTRAINED. PUSH-ON JOINTS ADJACENT TO RESTRAINED MECHANICAL JOINTS TO BE RESTRAINED AS SPECIFIED IN SECTION 02615 AND SHOWN ON THE WATER MAIN MINIMUM RESTRAINED LENGTHS TABLE ON SHEET G-2 FOR RESTRAINED LENGTH REQUIREMENTS.
7. WATER GATE VALVE BOXES AND WATER SERVICE BOXES SHALL BE ADJUSTED TO MATCH THE LINE AND GRADE OF THE FINISHED SURFACE DURING TEMPORARY AND FINAL PAVING AS DIRECTED BY THE ENGINEER.
8. CONTRACTOR SHALL FURNISH AND INSTALL BYPASS PIPING FOR ALL WATER SERVICES WITHIN THE LIMITS OF WATER MAIN PROPOSED TO BE REPLACED AS INDICATED BY THE ENGINEER. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION, TESTING, MAINTENANCE AND REMOVAL OF BYPASS PIPING.
9. THE CONTRACTOR SHALL REPLACE ALL NON-COPPER WATER SERVICES AND SERVICES LESS THAN ¾" WITH A NEW COPPER WATER SERVICE TO THE CURB STOP, IN ACCORDANCE WITH THE TYPICAL WATER SERVICE DETAIL. NEW WATER SERVICE SHALL MATCH EXISTING DIAMETER, OR BE ¾", WHICHEVER IS GREATER.
10. ALL TEMPORARY SERVICE CONNECTIONS SHALL BE CONNECTED TO HOSE BIBB OR INSIDE STRUCTURE.
11. ROADWAY, DRIVEWAY, AND SIDEWALK CROSSINGS OF TEMPORARY MAIN AND SERVICES SHALL BE BURIED BELOW GRADE. FURNISH AND INSTALL TEMPORARY PAVEMENT TO MATCH EXISTING GRADE.
12. THE CONTRACTOR SHALL RESTRAIN ALL COUPLING CONNECTIONS TO EXISTING DI WATER MAIN WITH FRICTION CLAMPS AND THREADED RODS.
13. CONTRACTOR TO COORDINATE WITH THE TOWN FOR OPENING AND CLOSING OF EXISTING WATER VALVES.
14. CONTRACTOR TO COORDINATE WITH OWNER FOR SINGLE SHIFT SHUT DOWN OF WATER MAIN OUTSIDE OF BYPASS AREA WHEN INSTALLING VALVES FOR BYPASS ISOLATION OR CONNECTING TO EXISTING WATER MAIN AND VALVES. WATER MAINS OUTSIDE OF BYPASS AREA SHALL BE MAINTAINED IN OPERATION. VALVES USED FOR ISOLATION OF BYPASS SHALL BE ADEQUATELY RESTRAINED WHILE ACCESSING WATER MAIN.

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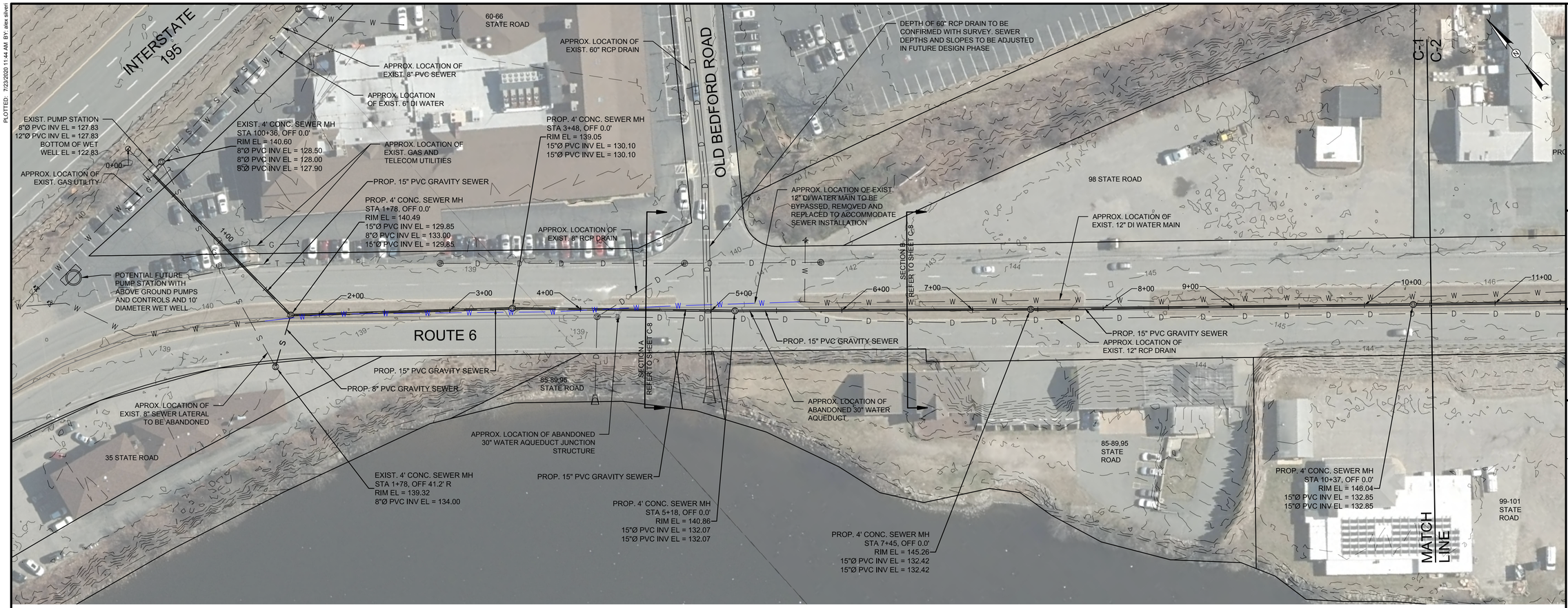
GENERAL
GENERAL NOTES AND LEGEND

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
G-2

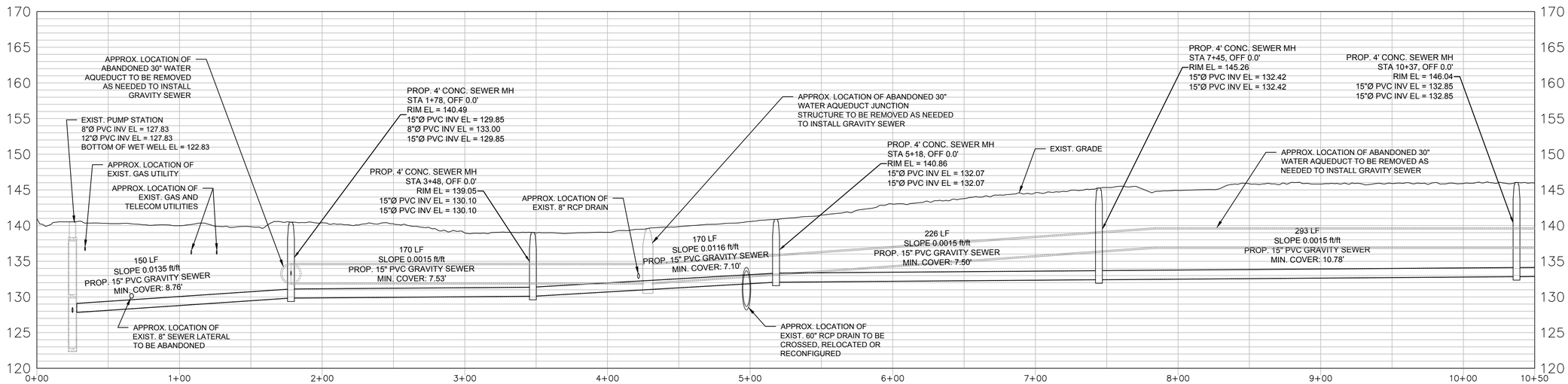


PLAN

SCALE: 1" = 40'

0 40 80

SCALE: 1" = 40' SCALE IN FEET



PROFILE

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1"=2'

HORIZONTAL SCALE: 1" = 40'

40 20 0 40 80

8 4 0 8 16

VERTICAL SCALE: 1"=8'

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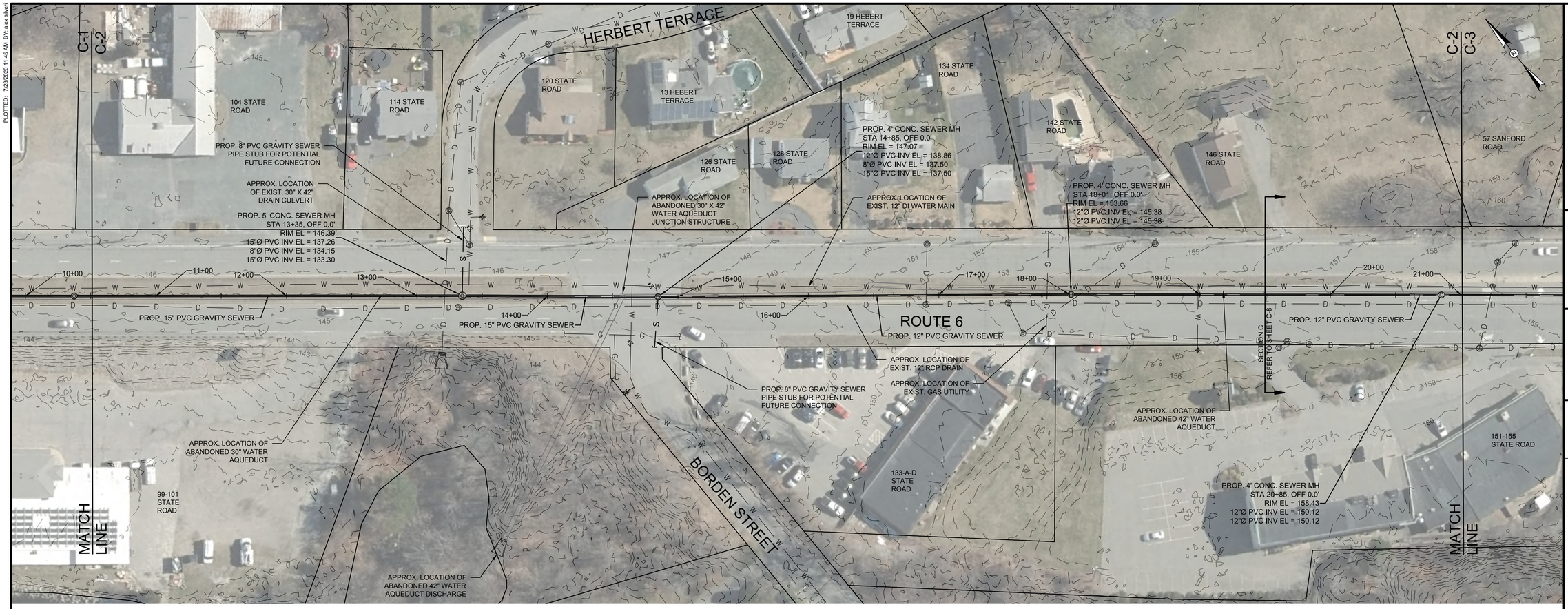
CIVIL
PLAN AND PROFILE STA 0+00 TO 10+50

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

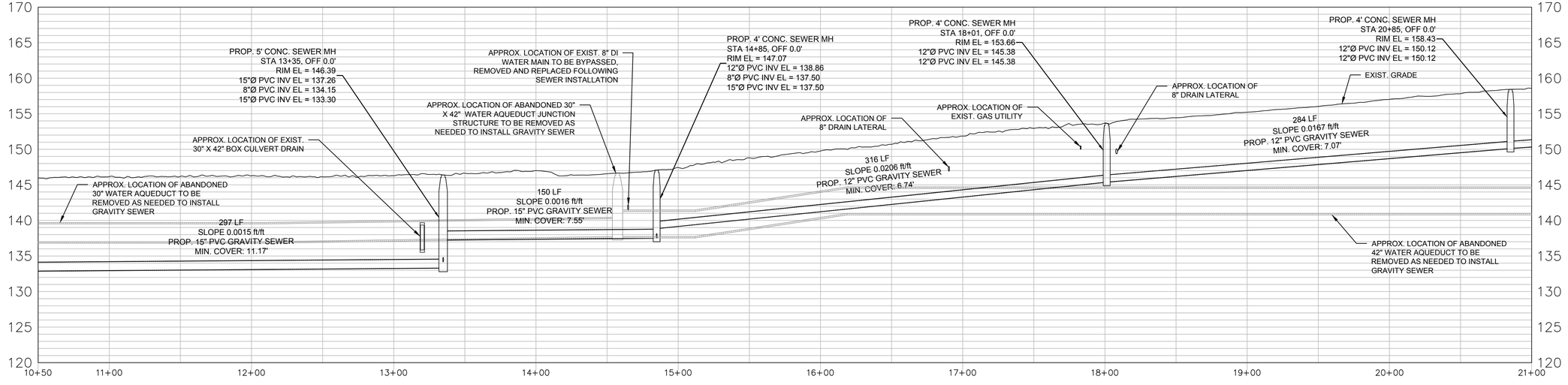
SHEET
C-1



PLAN

SCALE: 1" = 40'

0 40 80
SCALE: 1" = 40' SCALE IN FEET



PROFILE

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1"=2'

HORIZONTAL SCALE: 1" = 40'
40 20 0 40 80
8 4 0 8 16
VERTICAL SCALE: 1"=8'

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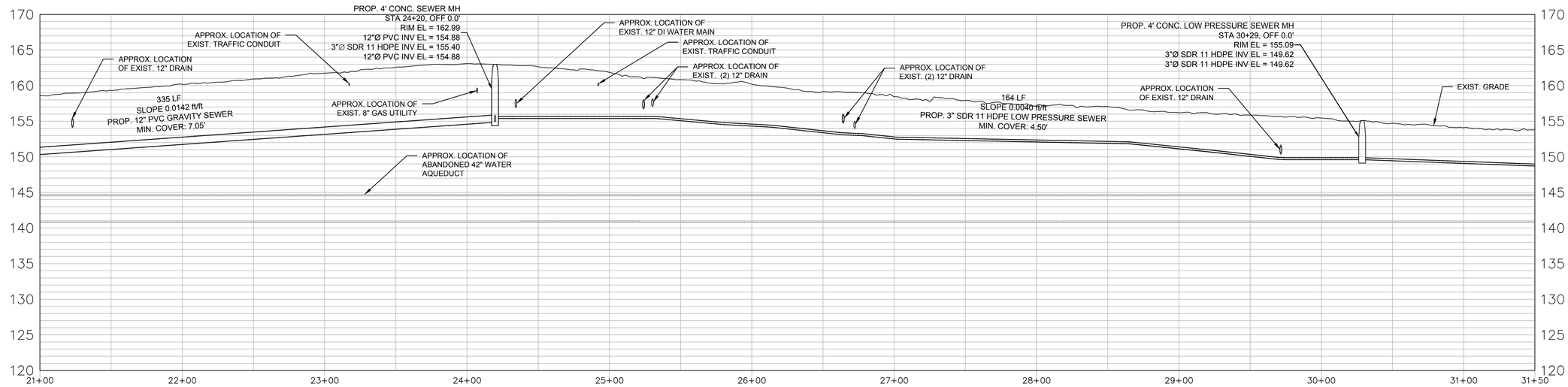
CIVIL
PLAN AND PROFILE STA 10+50 TO 21+00

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-2

PLAN
SCALE: 1" = 40'

0 40 80
SCALE: 1" = 40' SCALE IN FEET



PROFILE
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1"=2'

HORIZONTAL SCALE: 1" = 40'
40 20 0 40 80
8 4 0 8 16
VERTICAL SCALE: 1"=8'

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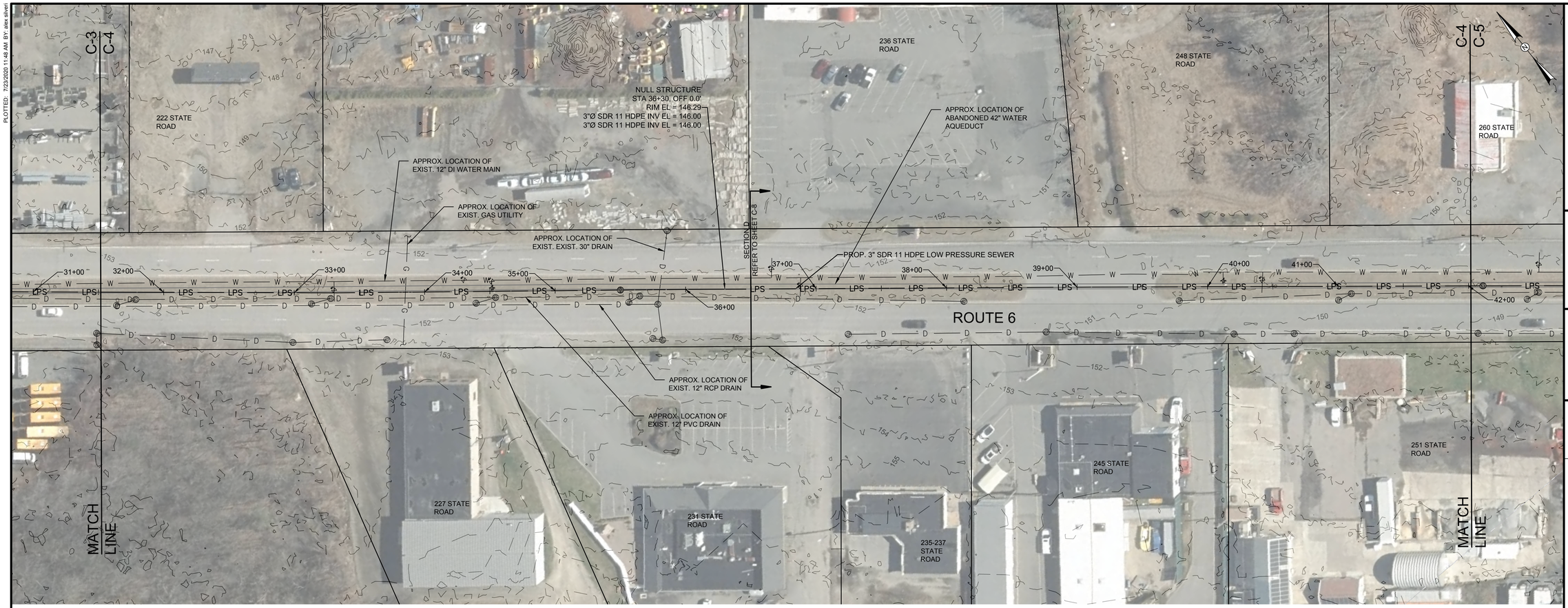
CIVIL
PLAN AND PROFILE STA 21+00 TO 31+50

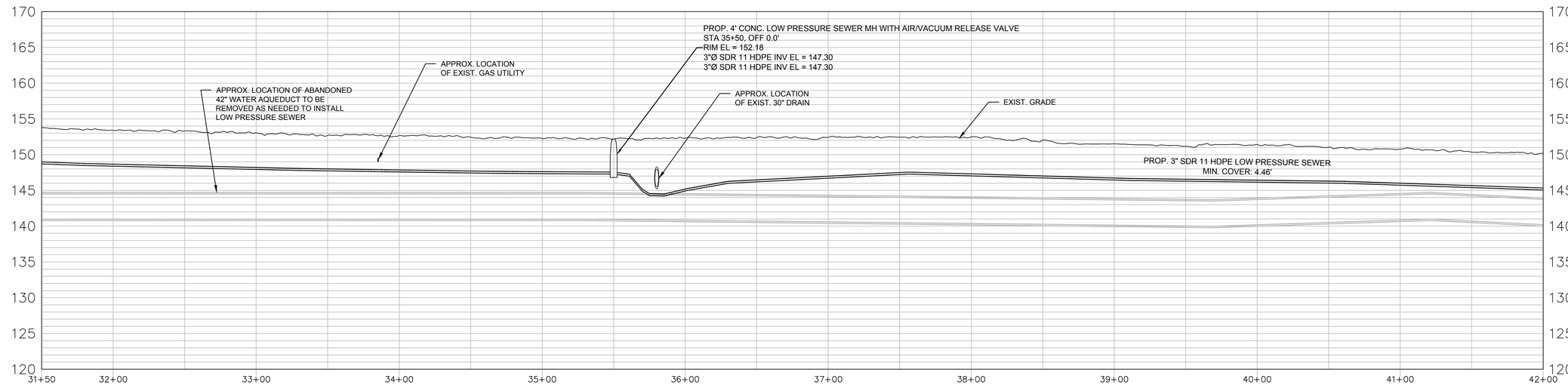
TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-3



PLAN
SCALE: 1" = 40'

0 40 80
SCALE: 1" = 40' SCALE IN FEET



PROFILE
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1"=2'

HORIZONTAL SCALE: 1" = 40'
40 20 0 40 80
8 4 0 8 16
VERTICAL SCALE: 1"=8'

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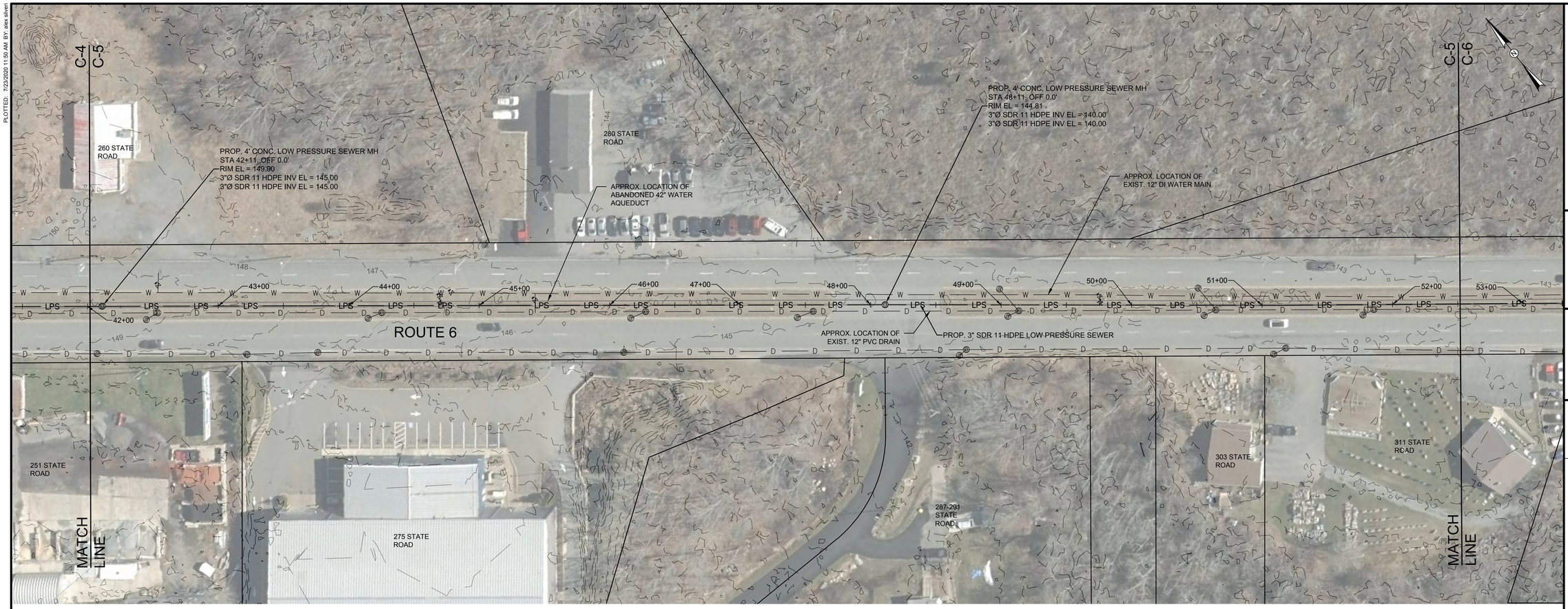
CIVIL
PLAN AND PROFILE STA 31+50 TO 42+00

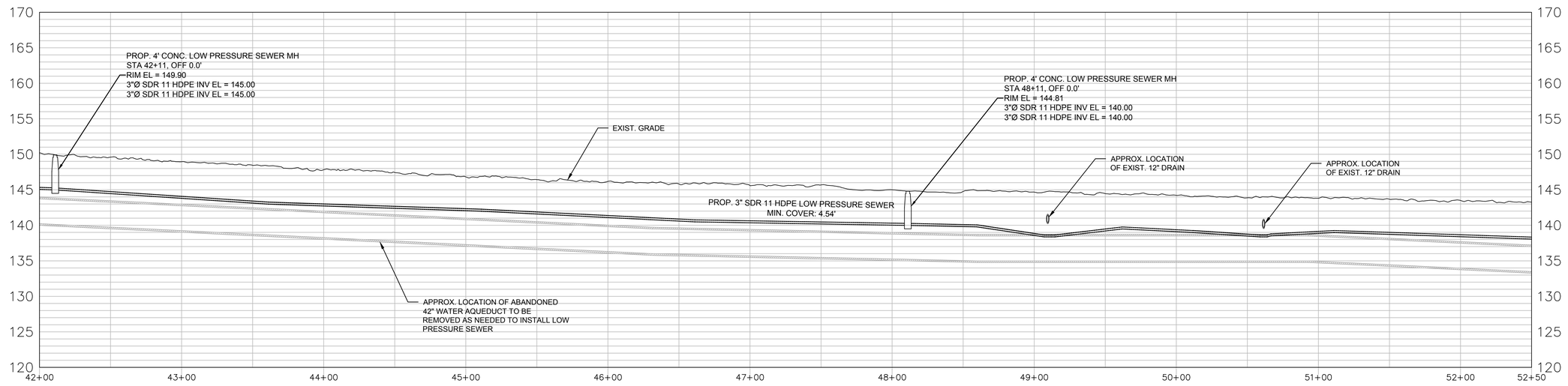
TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-4



PLAN
SCALE: 1" = 40'

0 40 80
SCALE: 1" = 40' SCALE IN FEET



PROFILE
HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1"=2'

HORIZONTAL SCALE: 1" = 40'
40 20 0 40 80
8 4 0 8 16
VERTICAL SCALE: 1"=8'

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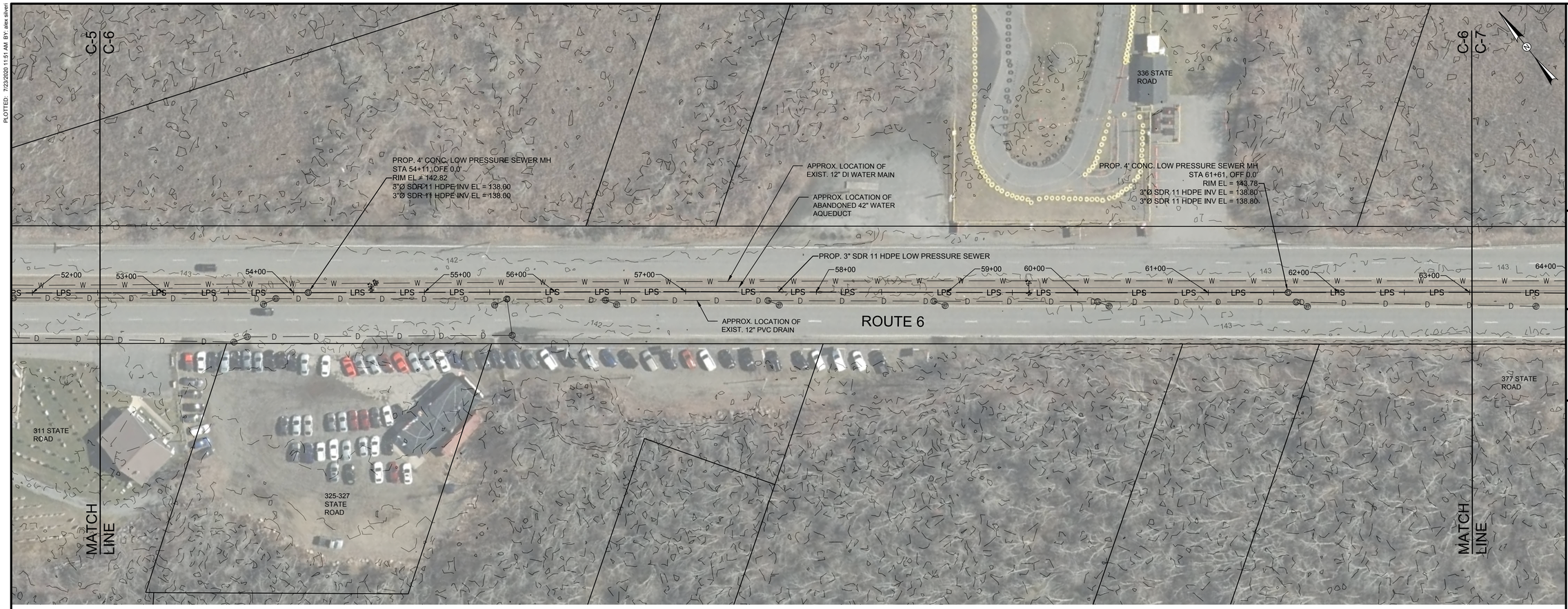
CIVIL
PLAN AND PROFILE STA 42+00 TO 52+50

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-5

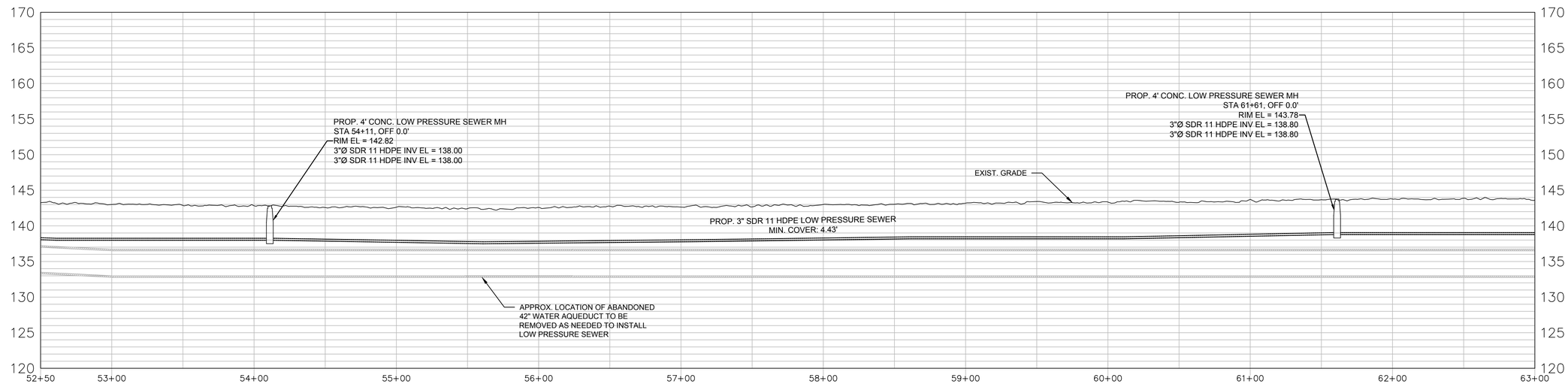


PLAN

SCALE: 1" = 40'

0 40 80

SCALE: 1" = 40' SCALE IN FEET



PROFILE

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1"=2'

HORIZONTAL SCALE: 1" = 40'

40 20 0 40 80

8 4 0 8 16

VERTICAL SCALE: 1"=8'

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CIVIL
PLAN AND PROFILE STA 52+50 TO 63+00

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-6

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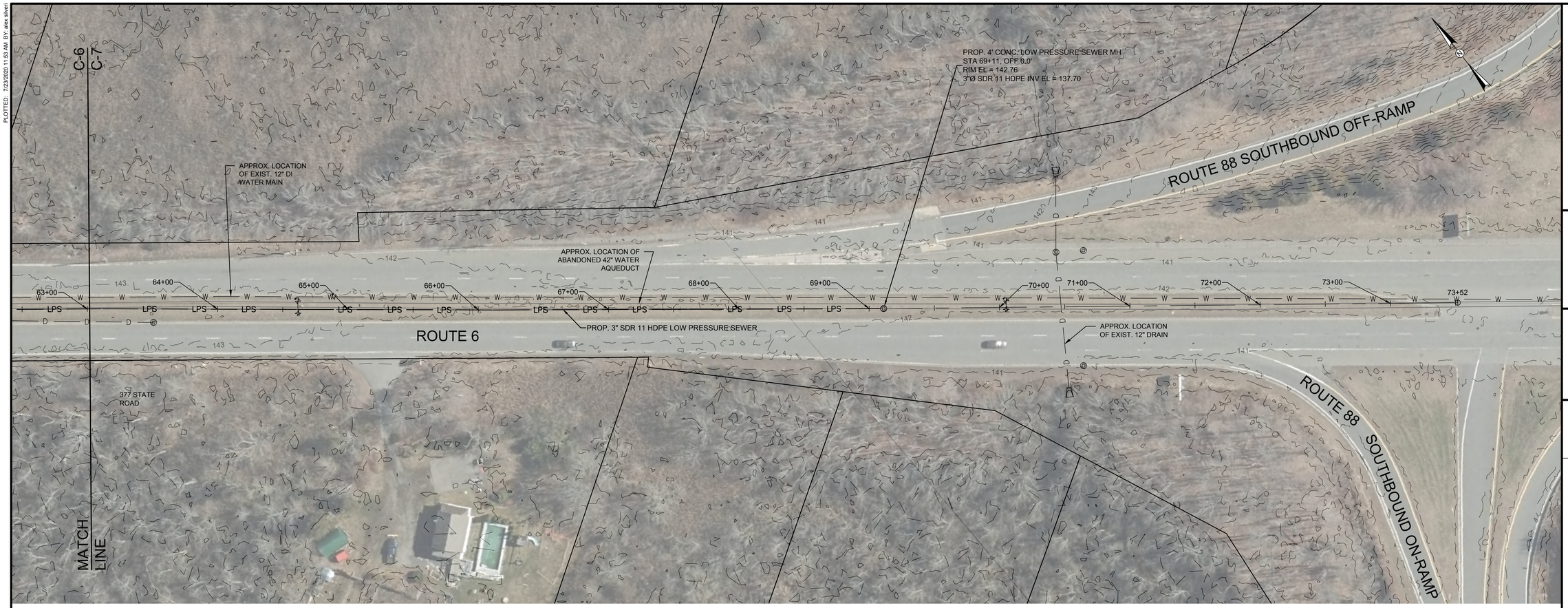
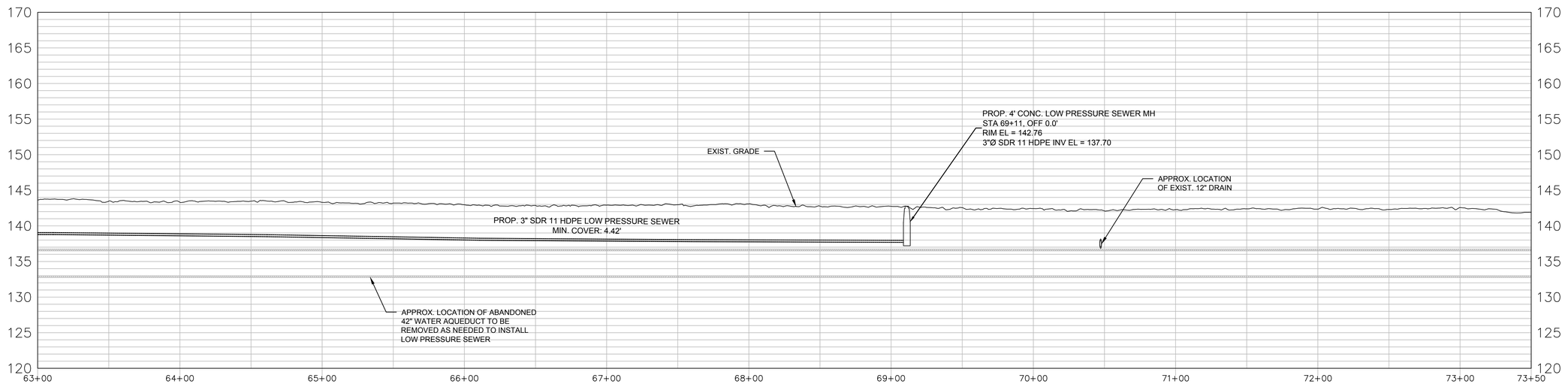


PLAN

SCALE: 1" = 40'

0 40 80
SCALE: 1" = 40' SCALE IN FEET



PROFILE

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1"=2'

HORIZONTAL SCALE: 1" = 40'
40 20 0 40 80
8 4 0 8 16
VERTICAL SCALE: 1"=8'

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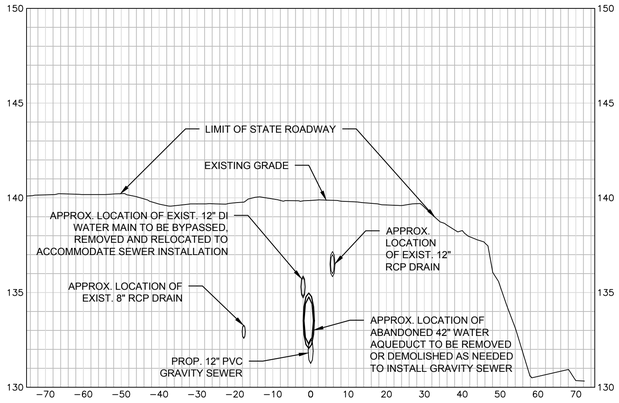
CIVIL
PLAN AND PROFILE STA 63+00 TO 73+50

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

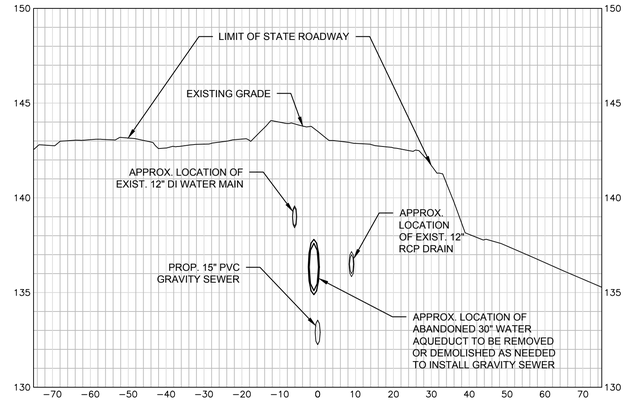
SHEET
C-7

ROUTE 6 STA 4+50.00



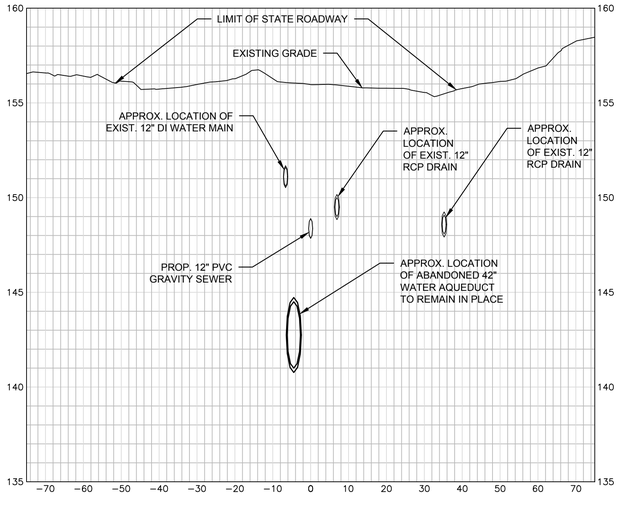
A C-1 SECTION
SCALE: 1" = 20'

ROUTE 6 STA 6+50.00



B C-1 SECTION
SCALE: 1" = 20'

ROUTE 6 STA 19+50.00



C C-2 SECTION
SCALE: 1" = 20'

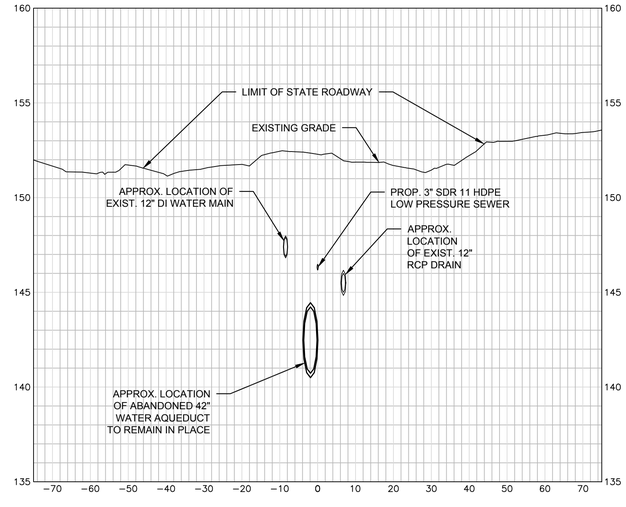
HORIZONTAL SCALE: 1" = 20'

20 10 0 20 40

VERTICAL SCALE: 1"=4'

4 2 0 4 8

ROUTE 6 STA 36+50.00



D C-4 SECTION
SCALE: 1" = 20'

50% DESIGN NOT FOR CONSTRUCTION

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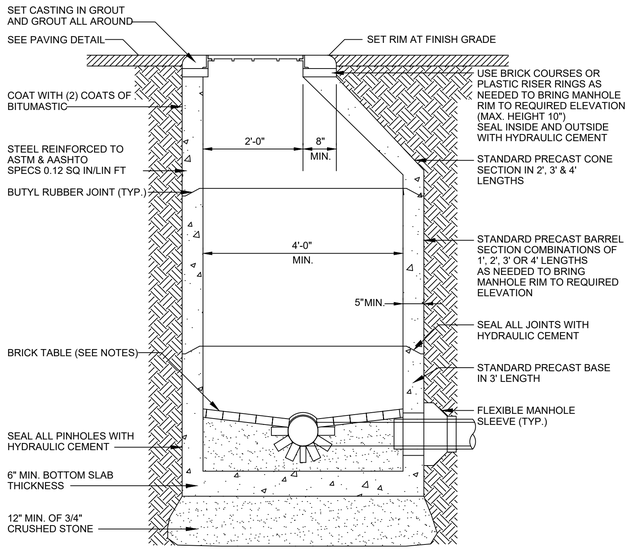
CIVIL
SECTION - I

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-8

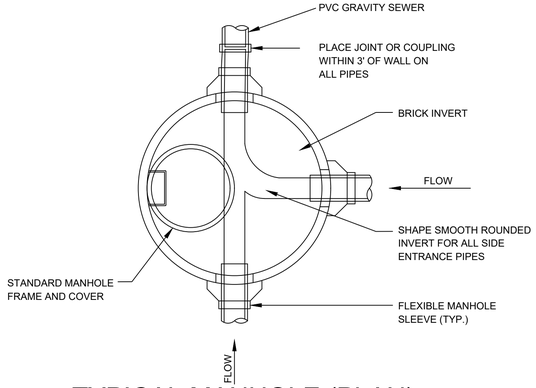


NOTES:

1. INNER EDGE OF BRICK TABLE TO BE AT ELEVATION OF CROWN OF TOP OF PIPE. TABLE TO SLOPE AT 1" PER 1' TO INSIDE OF MANHOLE BASE.
2. TYPICAL SANITARY MANHOLE TO BE 4 FOOT DIAMETER.

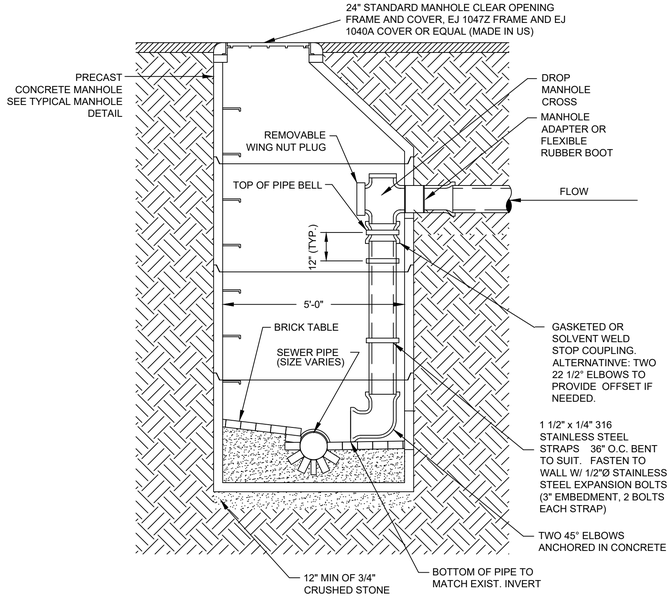
TYPICAL MANHOLE (ELEVATION)

SCALE: N.T.S.



TYPICAL MANHOLE (PLAN)

SCALE: N.T.S.

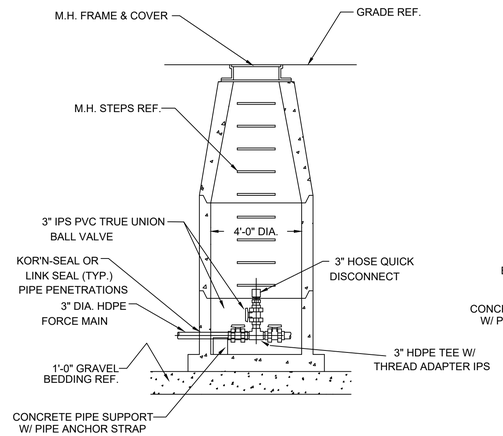


NOTES:

1. DROP MANHOLES SHALL BE USED WHEN ENTRANCE PIPE INVERTS ARE 1'-6" OR GREATER THAN MANHOLE INVERT.

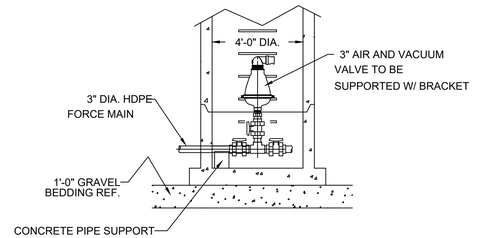
5'Ø INTERNAL DROP MANHOLE (ELEVATION)

SCALE: N.T.S.



TYPICAL ELEV. VIEW

AIR AND VACCUM RELEASE VALVES REQUIRE VENTING TO ATMOSPHERE



OPTIONAL ELEV. VIEW

AIR & VACUUM VALVE MTG. DETAIL

NOTES: SDR11 HDPE FITTINGS TO BE ELECTRO-FUSED

REV.#	DESCRIPTION	BY:	DATE
2	Added note in upper right corner	mac	08/15/16
1	Modified for ARI Air Relief Valve	arm	02/11/10

THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO F. R. MAHONY & ASSOCIATES, INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

F. R. MAHONY & associates, inc.
273 WEYMOUTH STREET
ROCKLAND, MASSACHUSETTS 02370
(781) 982-9300
Fax: (781) 982-1056

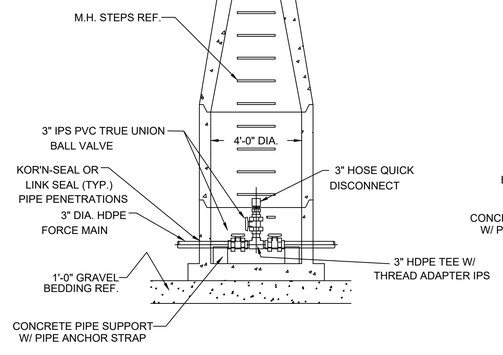
CUSTOMER/ENGINEER:

PROJECT NAME: | PROJECT NO.:

DESCRIPTION: TERMINAL FLUSHING M.H. DETAIL- HDPE SDR11 PIPING

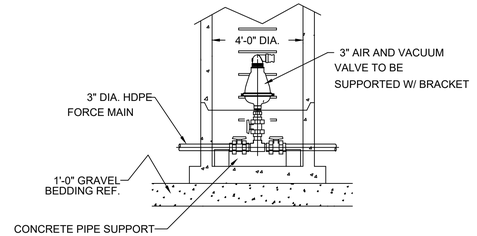
SCALE: NONE | DRAWN BY: | DRAWING NO. FRM-3A

DATE: | CHK'D BY:



TYPICAL ELEV. VIEW

AIR AND VACCUM RELEASE VALVES REQUIRE VENTING TO ATMOSPHERE



OPTIONAL ELEV. VIEW

AIR & VACUUM VALVE MTG. DETAIL

NOTES: SDR11 HDPE FITTINGS TO BE ELECTRO-FUSED

REV.#	DESCRIPTION	BY:	DATE
3	Added note in upper right corner	mac	08/15/16
2	Added 2 valves	mac	11/6/14
1	Modified for ARI Air Relief Valve	arm	02/11/10

THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO F. R. MAHONY & ASSOCIATES, INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION

F. R. MAHONY & associates, inc.
273 WEYMOUTH STREET
ROCKLAND, MASSACHUSETTS 02370
(781) 982-9300
Fax: (781) 982-1056

CUSTOMER/ENGINEER:

PROJECT NAME: | PROJECT NO.:

DESCRIPTION: IN-LINE FLUSHING M.H. DETAIL- HDPE SDR11 PIPING

SCALE: NONE | DRAWN BY: | DRAWING NO. FRM-3B

DATE: | CHK'D BY:

50% DESIGN NOT FOR CONSTRUCTION

KLEINFELDER
Bright People. Right Solutions.

REVISIONS

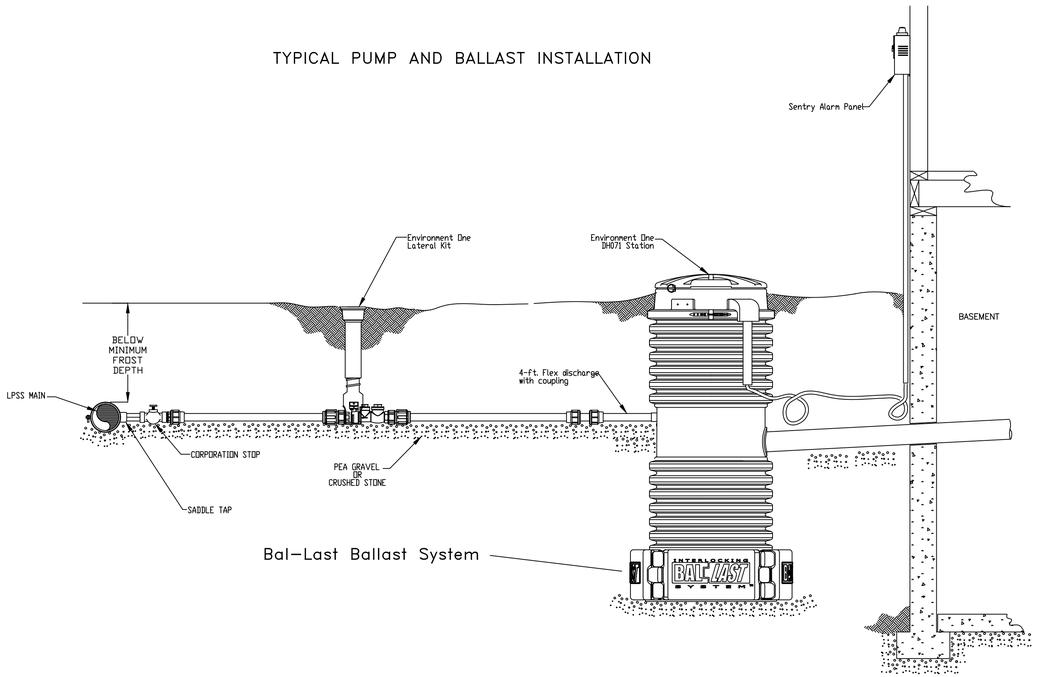
DATE: JULY 2020
PROJECT NO.: 20203101
DRAWN BY: AS
CHECKED BY: DP
FILE NAME: C-Details.dwg

CIVIL
DETAILS - I

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

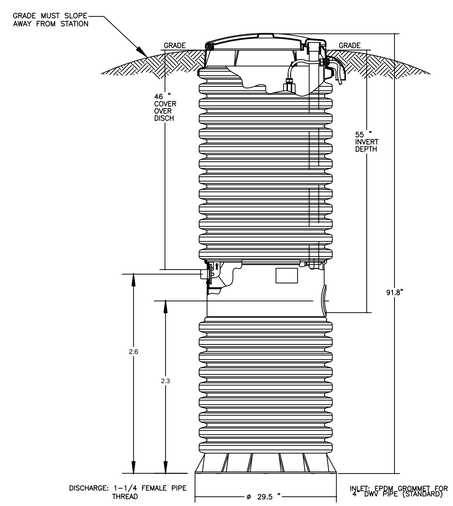
SHEET
C-9

TYPICAL PUMP AND BALLAST INSTALLATION



Bal-Last 114C

OPTIONS: ☐ DH071-93 (HARD WIRED LEVEL CONTROLS)
☐ DR071-93 (WIRELESS LEVEL CONTROLS)



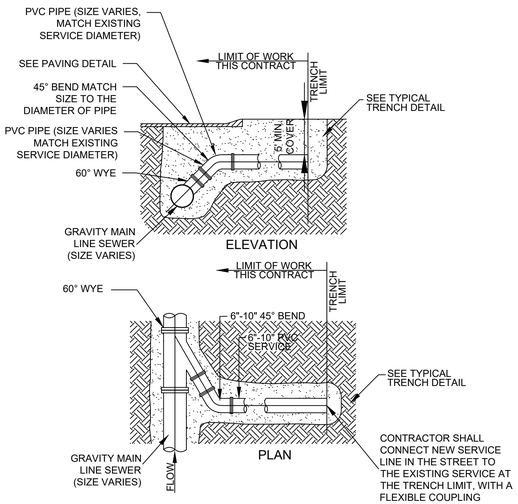
CONCRETE BALLAST MAY BE REQUIRED
SEE INSTALLATION INSTRUCTIONS
FOR DETAILS

AD	CAH	07/12/07	A	1/16
DR BY	CHK'D	DATE	ISSUE	SCALE

elone SEWER SYSTEMS

MODEL DH071-93 / DR071-93

NA0050P06



NOTES:

1. PIPE SIZES AND DEPTHS VARY. REPLACE EXISTING SIZE SERVICE.
2. CONTRACTOR SHALL RAISE THE ELEVATION OF EXISTING SERVICE PIPES IN THE ROAD AS NEEDED TO MEET THE ELEVATION OF THE NEW MAIN LINE SEWER.

TYPICAL GRAVITY SEWER SERVICE CONNECTION

SCALE: N.T.S.

50% DESIGN NOT FOR CONSTRUCTION

KLEINFELDER
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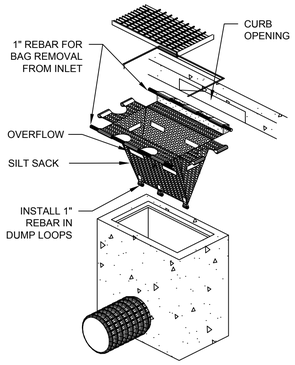
REVISIONS

DATE	JULY 2020
PROJECT NO.	20203101
DRAWN BY	AS
CHECKED BY	DP
FILE NAME	C-Details.dwg

CIVIL
DETAILS - II

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

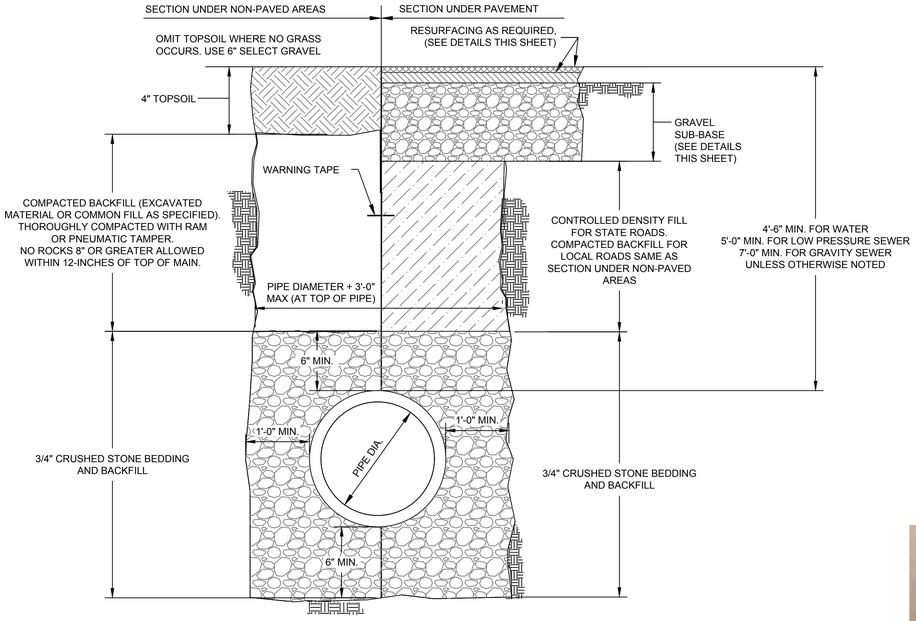
SHEET
C-10



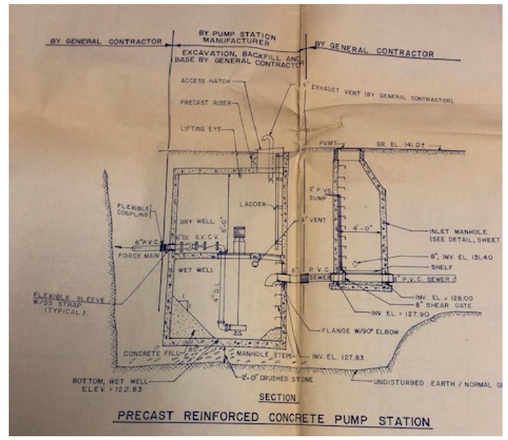
NOTES FOR EROSION CONTROL:

1. CONTRACTOR SHALL REMOVE SEDIMENT AS NECESSARY TO MAINTAIN LEVEL BELOW OVERFLOW HOLES IN SILT SACK.
2. SILT SACK SHALL BE USED ON ALL EXISTING CATCH BASINS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING SEDIMENTATION BARRIERS THROUGHOUT THE DURATION OF THE PROJECT.
4. CONTRACTOR SHALL REMOVE AND LEGALLY DISPOSE OF SEDIMENT AS REQUIRED.
5. CONTRACTOR SHALL REMOVE SILT SACKS AND STRAW WATTLES AND LEGALLY DISPOSE OF THEM OFF-SITE, UPON COMPLETION OF THE PROJECT AND AS REQUIRED.

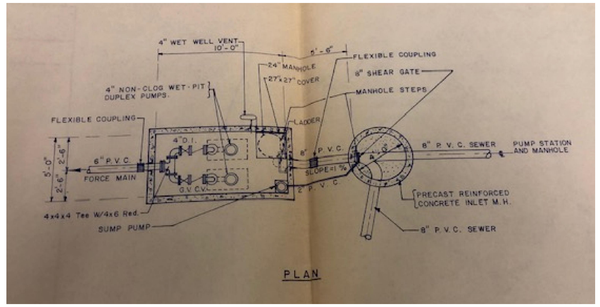
TYPICAL SILT SACK DETAIL
SCALE: N.T.S.



TYPICAL TRENCH DETAIL
SCALE: N.T.S.



EXISTING PUMP STATION (ELEVATION)
SCALE: N.T.S.



EXISTING PUMP STATION (PLAN)
SCALE: N.T.S.

NOTES:

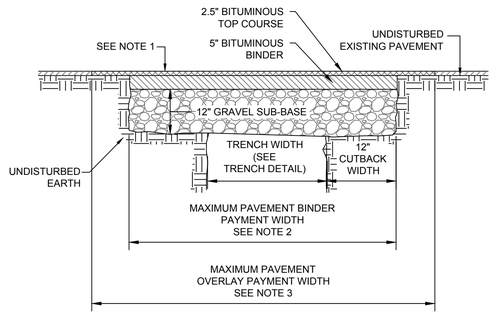
1. SEWERS SHALL BE KEPT REMOTE FROM WATER SUPPLY PIPING AND STRUCTURES. WHEREVER FEASIBLE, SEWERS SHOULD BE LAID AT A MINIMUM HORIZONTAL DISTANCE OF 10 FEET FROM WATER MAINS. IF LOCAL CONDITIONS PREVENT THIS, THE WATER MAIN SHOULD BE LAID IN A SEPARATE TRENCH, AND THE ELEVATIONS OF THE CROWN OF THE SEWER PLACED AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN.
2. WHENEVER SEWERS MUST CROSS WATER MAINS, THE CROWN OF THE SEWER SHOULD BE PLACED A MINIMUM OF 18 INCHES BELOW THE INVERT OF THE WATER MAIN. IN ADDITION, THE WATER MAIN MUST BE CONSTRUCTED WITH ONE FULL LENGTH OF PIPE CENTERED ABOUT THE SEWER CROSSING. THE WATER PIPE SHALL HAVE MECHANICAL JOINTS FOR A DISTANCE OF 9 FEET ON EACH SIDE OF THE SEWER CROSSING.
3. WHEN IT IS IMPOSSIBLE TO OBTAIN HORIZONTAL OR VERTICAL SEPARATION AS STIPULATED ABOVE, BOTH THE WATER AND THE SEWER SHOULD BE ENCASED IN CONTROLLED DENSITY FILL FOR A DISTANCE OF 10 FEET ON EITHER SIDE OF THE CROSSING.

WATER MAIN SEWER CROSSING
SCALE: N.T.S.

NOTES:

1. CONTRACTOR TO UTILIZE FITTINGS ONLY WHEN PIPE DEFLECTION CANNOT BE USED TO CLEAR OBSTRUCTION.
2. ALL CROSSINGS TO BE UNDER UTILITY UNLESS OTHERWISE NOTED.
3. FOR WATER MAIN CROSSING UNDER SEWER MAINS REFER TO SEWER CROSSING AT WATER MAIN DETAIL.
4. INSULATE ALL SMALL DIAMETER WATER MAIN HAVING LESS THAN 4'-0" COVER AND ALL LARGE DIAMETER WATER MAIN (16" OR 20") HAVING LESS THAN 3'-6" COVER.

WATER MAIN UTILITY CROSSING
SCALE: N.T.S.



NOTES :

1. AFTER SETTLEMENT PERIOD, MILL TRENCH AND OVERLAY WITH 2" BITUMINOUS TOP COURSE.
2. MAXIMUM PAVEMENT BINDER PAYMENT WIDTH SHALL BE 10' FOR GRAVITY SEWER INSTALLATION AND 7' FOR LOW PRESSURE SEWER INSTALLATION.
3. MAXIMUM PAVEMENT OVERLAY PAYMENT WIDTH SHALL BE 13' IN THE CASE OF FULL LANE RESTORATION OTHERWISE OVERLAY WIDTH SHALL MATCH PAVEMENT BINDER PAYMENT WIDTH.

PERMANENT TRENCH PAVING DETAIL (STATE ROAD)
SCALE: N.T.S.

50% DESIGN NOT FOR CONSTRUCTION

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REVISIONS

DATE	JULY 2020
PROJECT NO.	20203101
DRAWN BY	AS
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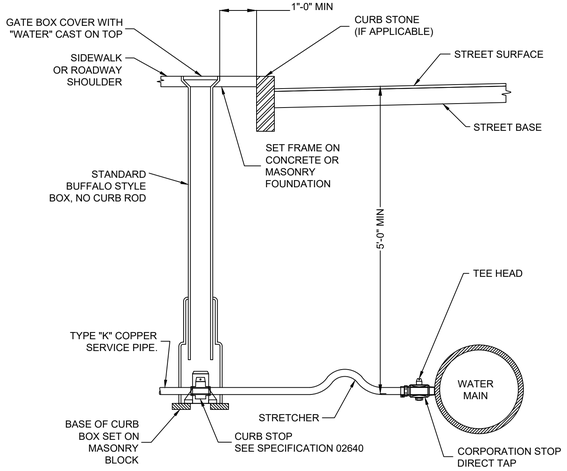
FILE NAME	C-Details.dwg

CIVIL
DETAILS - III

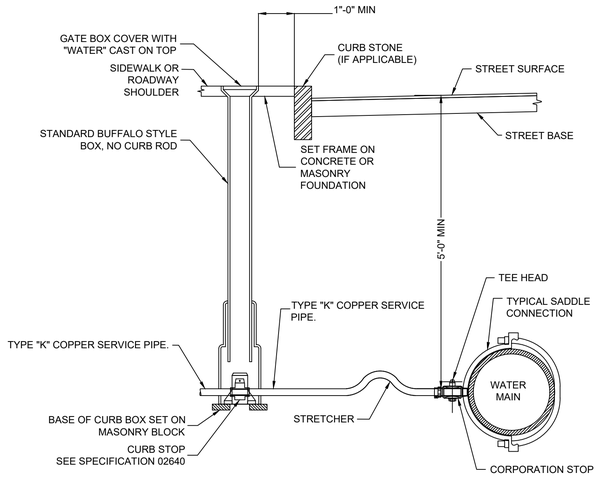
TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-11



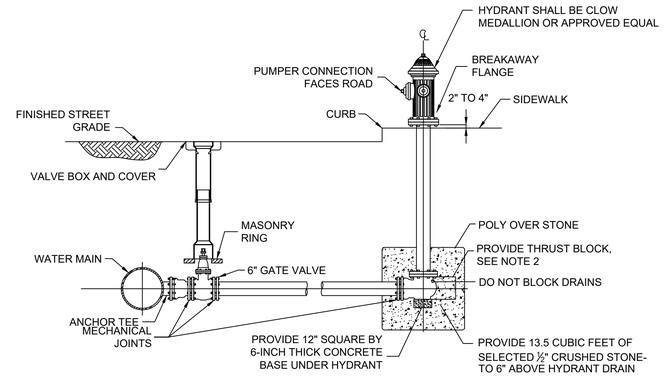
TYPICAL WATER SERVICE CONNECTION

SCALE: N.T.S.



TYPICAL WATER SERVICE CONNECTION FOR 1-1/2" TO 2" SERVICES

SCALE: N.T.S.

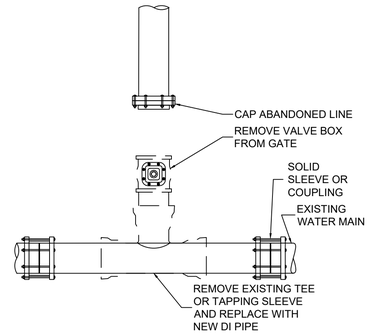


NOTES:

1. PROVIDE HYDRANT, VALVE AND TEE JOINTS WITH RESTRAINED MECHANICAL JOINTS.
2. THRUST BLOCK SHALL HAVE MINIMUM BEARING AREA OF 1.5 FEET BY 1.5 FEET

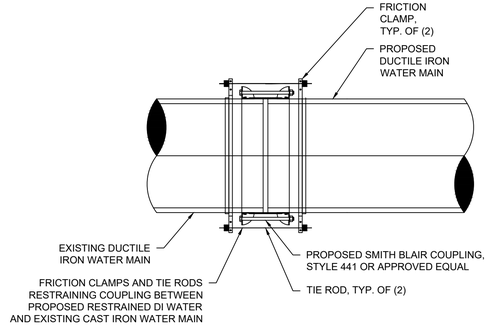
HYDRANT SETTING WITH GATE VALVE

SCALE: N.T.S.



TYPICAL 4" DIAMETER OR GREATER WATER MAIN CUT AND CAP DETAIL

SCALE: N.T.S.

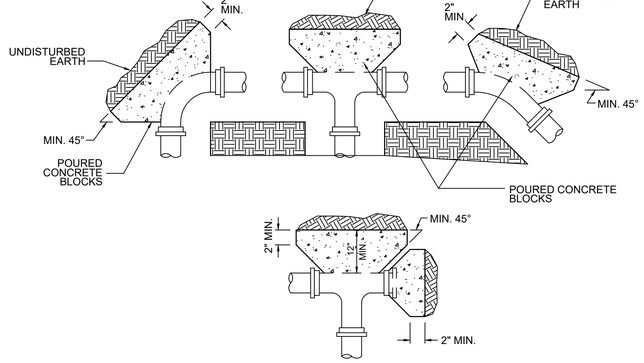


NOTE:

1. EXISTING WATER MAIN TO PROPOSED WATER MAIN CONNECTIONS SHALL BE RESTRAINED WITH TIE RODS. RODS, FRICTION CLAMP WASHERS, AND HEAVY HEX NUTS SHALL BE AISI 316 SERIES STAINLESS STEEL MANUFACTURED IN THE UNITED STATES IN ACCORDANCE WITH ASTM A193 GRADE B8M CLASS 1. WHERE 316 STAINLESS STEEL IS NOT AVAILABLE THE CONTRACTOR SHALL PROVIDE FUSION BONDED EPOXY COATED HARDWARE. TIE RODS SHALL BE DOUBLE NUTTED ON EACH END.

RESTRAINED CONNECTION TO EXISTING DUCTILE IRON WATER MAIN

SCALE: N.T.S.



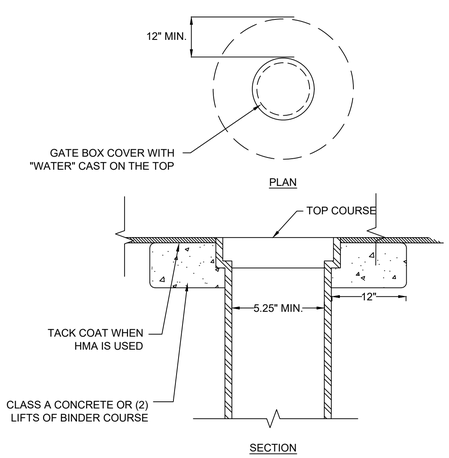
PLAN VIEWS

THRUST BLOCK NOTES:

1. SPECIFIC THRUST BLOCK DESIGN SHALL CONFORM TO AWWA GUIDELINES.
2. PLACE 4 mil. POLYETHYLENE BETWEEN CONCRETE AND FITTING (CONCRETE SHALL NOT INTERFERE WITH JOINT).
3. MINIMUM CONCRETE THICKNESS SHALL BE 12 INCHES.
4. THRUST BLOCK ORIENTATION SHALL BE SUCH THAT THE CENTER OF THE FITTING CORRESPONDS WITH THE CENTER OF THE THRUST BLOCK.
5. THE MINIMUM ALLOWABLE ANGLE (EITHER VERTICAL OR HORIZONTAL) SHALL BE 45 DEGREES.

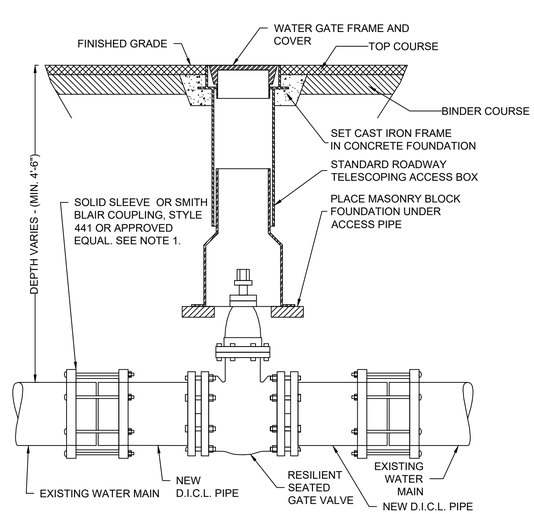
TYPICAL THRUST BLOCK DETAIL

SCALE: N.T.S.



GATE BOX SETTING

SCALE: N.T.S.



TYPICAL VALVE

SCALE: N.T.S.

50% DESIGN NOT FOR CONSTRUCTION

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REVISIONS

DATE	JULY 2020
PROJECT NO.	20203101
DRAWN BY	AS
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FILE NAME	C-Details.dwg

CIVIL
DETAILS - IV

TOWN OF WESTPORT, MA
ROUTE 6 PHASE 1A SEWER CONSTRUCTION

SHEET
C-12

ATTACHMENT 2 – OPINION OF PROBABLE COST

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
50% DESIGN MILESTONE
ROUTE 6 SEWER EXTENSIONS
WESTPORT, MA

May 4, 2020: ENR Index: 11,412.67

	Phase 1A with LPS (Recommended)	Phase 1A with Conventional Gravity (Not Recommended)
Construction Costs		
Part A - Route 6 West, Gravity	$ 1,690,550	$ 1,690,550
Part B - Route 6 East (LPS)	$ 729,640	-
Part B - Route 6 East (Gravity)	-	$ 2,995,000
5% Mobilization	$ 121,000	$ 234,300
Construction Cost SubTotal	*$ 2,541,200*	*$ 4,919,900*
Project Costs (Including Engineering and Construction Contingency)	**$ 3,557,700**	**$ 6,887,900**
LF of Mainline Sewer Installed	6,900	6,900
$ per Foot of Mainline Sewer Installed (Construction Cost Only)	$ 516	$ 998

	Phase 1A with LPS (Recommended)	Phase 1A with Conventional Gravity (Not Recommended)
Construction Costs		
Part C - Side Roads, Gravity (Optional)	$ 1,327,600	$ 1,327,600

Route 6 Preliminary Sewer Design
LOW PRESSURE SEWER ALTERNATIVE (RECOMMENDED)
Engineer's Estimate of Probable Construction Costs - CONCEPT LEVEL FOR BUDGETING PURPOSES
Westport, MA

Date:	7/24/2020

Part A - Route 6 Gravity Sewer From Sanford Road Intersection to Existing Downstream Pump Station

Item No.	Description	Unit Cost	Quantities	Units	Cost
1	Route 6 Sewer Mainline Pipe - 15" PVC	$ 160	1500	LF	$ 240,000
2	Route 6 Sewer Mainline Pipe - 12" PVC	$ 150	900	LF	$ 135,000
3	Sewer Services Pipe - 6" PVC	$ 80	680	LF	$ 54,400
4	Sewer Manhole - 4-5' Precast Concrete	$ 600	90	VF	$ 54,000
5	Exploratory Investigations	$ 20	400	CY	$ 8,000
6	Rock Excavation	$ 150	480	CY	$ 72,000
7	Excavation and Disposal of Unsuitable Material Below Grade	$ 50	200	CY	$ 10,000
8	Utility Support and Coordination	$ 10,000	6	EA	$ 60,000
9	Allowance for 60" RCP Drain Crossing	$ 250,000	1	LS	$ 250,000
10	Water Main Bypass Piping - 6-12" HDPE	$ 25	4800	LF	$ 120,000
11	Water Main Bypass Service Connections	$ 1,000	1	EA	$ 1,000
12	Water Main Bypass Below Grade Crossings (Driveways, Intersections)	$ 1,000	2	EA	$ 2,000
13	Water Main Replacement - 12" DI	$ 150	400	LF	$ 60,000
14	Water Main Fittings, Couplings, Tees and Restraints	$ 5	500	LB	$ 2,500
15	Water Main Gate Valve Replacement - 12"	$ 5,000	3	EA	$ 15,000
16	Water Service Replacement - 1-2" copper	$ 90	45	LF	$ 4,050
17	Removal/Demolition of Abandoned 42" Water Aqueduct and Junction Structures	$ 50	1500	LF	$ 75,000
18	Controlled Density Fill (CDF) for Backfill	$ 150	1800	CY	$ 270,000
19	Allowance for Connection to Existing Pump Station	$ 10,000	1	LS	$ 10,000
20	Pavement Binder Course	$ 150	630	TON	$ 94,500
21	Pavement Top Course	$ 150	210	TON	$ 31,500
22	Police Details - Main Line Crew (2 person detail)	$ 1,200	96	DAYS	$ 115,200
23	Police Details - Service Crew	$ 800	8	DAYS	$ 6,400

Part A Subtotal $ 1,690,550

Part B - Low Pressure Sewer From Route 88 Interchange to Sanford Road Intersection

Item No.	Description	Unit Cost	Quantities	Units	Cost
24	Route 6 Low Pressure Sewer Mainline Pipe - 3" HDPE	$ 55	4500	LF	$ 247,500
25	Low Pressure Sewer Services Pipe - 1.25-2" HDPE	$ 45	1080	LF	$ 48,600
26	Low Pressure Sewer Manhole - 4' Precast Concrete	$ 600	42	VF	$ 25,200
27	Air Vaccum Release Valve	$ 1,800	1	EA	$ 1,800
28	Corp Stop	$ 130	24	EA	$ 3,120
29	Lateral (Boundary) Kits	$ 305	24	EA	$ 7,320
30	Lateral (Boundary) Installation	$ 500	24	EA	$ 12,000
31	Exploratory Investigations	$ 20	750	CY	$ 15,000
32	Rock Excavation	$ 150	330	CY	$ 49,500
33	Excavation and Disposal of Unsuitable Material Below Grade	$ 50	500	CY	$ 25,000
34	Utility Support and Coordination	$ 10,000	3	EA	$ 30,000
35	Removal/Demolition of Abandoned 42" Water Aqueduct	$ 50	60	LF	$ 3,000
36	Controlled Density Fill (CDF) for Backfill	$ 150	520	CY	$ 78,000
37	Pavement Binder Course	$ 150	400	TON	$ 60,000
38	Pavement Top Course	$ 150	160	TON	$ 24,000
39	Police Details - Main Line Crew (2 person detail)	$ 1,200	75	DAYS	$ 90,000
40	Police Details - Service Crew	$ 800	12	DAYS	$ 9,600

Part B Subtotal $ 729,640

Part C - Side Street Gravity Sewer on Adirondack Lane, Senechal Street, Borden Street, Herbert Terrace and Sanford Road

Item No.	Description	Unit Cost	Quantities	Units	Cost
41	Sanford Road Mainline Sewer Pipe - 12" PVC	$ 150	750	LF	$ 112,500
42	Side Street Sewer Mainline Pipe - 8" PVC	$ 140	3400	LF	$ 406,000
43	Sewer Services Pipe - 6" PVC	$ 80	1000	LF	$ 72,000
44	Sewer Manhole - 4-5' Precast Concrete	$ 600	150	VF	$ 90,000
45	Exploratory Investigations	$ 20	700	CY	$ 14,000
46	Rock Excavation	$ 150	460	CY	$ 69,000
47	Excavation of Unsuitable Material Below Grade	$ 50	300	CY	$ 15,000
48	Utility Support and Coordination	$ 10,000	6	EA	$ 60,000
49	Water Main Bypass Piping - 6-12" HDPE	$ 25	900	LF	$ 22,500
50	Water Main Bypass Service Connections	$ 1,000	16	EA	$ 16,000
51	Water Main Bypass Below Grade Crossings (Driveways, Intersections)	$ 1,000	4	EA	$ 4,000
52	Water Main Replacement - 6" DI	$ 100	950	LF	$ 95,000
53	Water Main Fittings, Couplings, Tees and Restraints	$ 5	800	LB	$ 4,000
54	Water Main Gate Valve Replacement - 6"	$ 3,000	4	EA	$ 12,000
55	Hydrant Replacement	$ 10,000	3	EA	$ 30,000
56	Water Service Replacement - 1-2" copper	$ 90	180	LF	$ 16,200
57	Pavement Binder Course	$ 150	970	TON	$ 145,500
58	Pavement Top Course	$ 150	490	TON	$ 73,500
59	Police Details - Main Line Crew (1 detail)	$ 800	68	DAYS	$ 54,400
60	Police Details - Service Crew (1 detail)	$ 800	20	DAYS	$ 16,000

Part C Subtotal $ 1,327,600

Route 6 Preliminary Sewer Design
CONVENTIONAL SEWER ALTERNATIVE (NOT RECOMMENDED)
Engineer's Estimate of Probable Construction Costs - CONCEPT LEVEL FOR BUDGETING PURPOSES
Westport, MA

Date:	7/24/2020

Part A - Route 6 Gravity Sewer From Sanford Road Intersection to Existing Downstream Pump Station

Item No.	Description	Unit Cost	Quantities	Units	Cost
1	Route 6 Sewer Mainline Pipe - 15" PVC	$ 160	1500	LF	$ 240,000
2	Route 6 Sewer Mainline Pipe - 12" PVC	$ 150	900	LF	$ 135,000
3	Sewer Services Pipe - 6" PVC	$ 80	680	LF	$ 54,400
4	Sewer Manhole - 4-5' Precast Concrete	$ 600	90	VF	$ 54,000
5	Exploratory Investigations	$ 20	400	CY	$ 8,000
6	Rock Excavation	$ 150	480	CY	$ 72,000
7	Excavation and Disposal of Unsuitable Material Below Grade	$ 50	200	CY	$ 10,000
8	Utility Support and Coordination	$ 10,000	6	EA	$ 60,000
9	Allowance for 60" RCP Drain Crossing	$ 250,000	1	LS	$ 250,000
10	Water Main Bypass Piping - 6-12" HDPE	$ 25	4800	LF	$ 120,000
11	Water Main Bypass Service Connections	$ 1,000	1	EA	$ 1,000
12	Water Main Bypass Below Grade Crossings (Driveways, Intersections)	$ 1,000	2	EA	$ 2,000
13	Water Main Replacement - 12" DI	$ 150	400	LF	$ 60,000
14	Water Main Fittings, Couplings, Tees and Restraints	$ 5	500	LB	$ 2,500
15	Water Main Gate Valve Replacement - 12"	$ 5,000	3	EA	$ 15,000
16	Water Service Replacement - 1-2" copper	$ 90	45	LF	$ 4,050
17	Removal/Demolition of Abandoned 42" Water Aqueduct and Junction Structures	$ 50	1500	LF	$ 75,000
18	Controlled Density Fill (CDF) for Backfill	$ 150	1800	CY	$ 270,000
19	Allowance for Connection to Existing Pump Station	$ 10,000	1	LS	$ 10,000
20	Pavement Binder Course	$ 150	630	TON	$ 94,500
21	Pavement Top Course	$ 150	210	TON	$ 31,500
22	Police Details - Main Line Crew (2 person detail)	$ 1,200	96	DAYS	$ 115,200
23	Police Details - Service Crew	$ 800	8	DAYS	$ 6,400

Part A Subtotal $ 1,690,550

Part B - Route 6 Gravity Sewer and Force Main From New Pump Station at Route 88 Interchange to Sanford Road Intersection

Item No.	Description	Unit Cost	Quantities	Units	Cost
24	Small Pump Station Including Material and Installation Cost of Pumps, Wet Well, Controls, and Generator	$ 300,000	1	LS	$ 300,000
25	Route 6 Sewer Mainline Pipe - 8" PVC	$ 140	4500	LF	$ 630,000
26	Route 6 Sewer Force Main Pipe - 4-6" PVC	$ 80	4500	LF	$ 360,000
27	Sewer Services Pipe - 6" PVC	$ 80	1080	LF	$ 86,400
28	Sewer Manhole - 4' Precast Concrete	$ 600	140	VF	$ 84,000
29	Exploratory Investigations	$ 20	750	CY	$ 15,000
30	Rock Excavation	$ 150	900	CY	$ 135,000
31	Excavation and Disposal of Unsuitable Material Below Grade	$ 50	500	CY	$ 25,000
32	Utility Support and Coordination	$ 10,000	3	LS	$ 30,000
33	Water Main Bypass Piping - 6-12" HDPE	$ 25	9000	LF	$ 225,000
34	Water Main Bypass Service Connections	$ 1,000	9	EA	$ 9,000
35	Water Main Bypass Below Grade Crossings (Driveways, Median Breaks, Intersections)	$ 1,000	15	EA	$ 15,000
36	Water Main Replacement - 12" DI	$ 150	1850	LF	$ 277,500
37	Water Main Replacement - 6" DI	$ 100	120	LF	$ 12,000
38	Water Main Fittings, Couplings, Tees and Restraints	$ 5	1100	LB	$ 5,500
39	Water Main Gate Valve Replacement - 12"	$ 5,000	4	EA	$ 20,000
40	Water Main Gate Valve Replacement - 6"	$ 3,000	14	EA	$ 42,000
41	Hydrant Replacement	$ 10,000	8	EA	$ 80,000
42	Water Service Replacement and New Services - 1-2" copper	$ 90	450	LF	$ 40,500
43	Removal/Demolition of Abandoned 42" Water Aqueduct and Junction Structures	$ 50	3500	LF	$ 175,000
44	Controlled Density Fill (CDF) for Backfill	$ 150	1340	CY	$ 201,000
45	Pavement Binder Course	$ 150	580	TON	$ 87,000
46	Pavement Top Course	$ 150	190	TON	$ 28,500
47	Police Details - Main Line Crew	$ 1,200	85	DAYS	$ 102,000
48	Police Details - Service Crew	$ 800	12	DAYS	$ 9,600

Part B Subtotal $2,995,000

Part C - Side Street Gravity Sewer on Adirondack Lane, Senechal Street, Borden Street, Herbert Terrace and Sanford Road

Item No.	Description	Unit Cost	Quantities	Units	Cost
49	Sanford Road Mainline Sewer Pipe - 12" PVC	$ 150	750	LF	$ 112,500
50	Side Street Sewer Mainline Pipe - 8" PVC	$ 140	3400	LF	$ 406,000
51	Sewer Services Pipe - 6" PVC	$ 80	1000	LF	$ 72,000
52	Sewer Manhole - 4-5' Precast Concrete	$ 600	150	VF	$ 90,000
53	Exploratory Investigations	$ 20	700	CY	$ 14,000
54	Rock Excavation	$ 150	460	CY	$ 69,000
55	Excavation of Unsuitable Material Below Grade	$ 50	300	CY	$ 15,000
56	Utility Support and Coordination	$ 10,000	6	EA	$ 60,000
57	Water Main Bypass Piping - 6-12" HDPE	$ 25	900	LF	$ 22,500
58	Water Main Bypass Service Connections	$ 1,000	16	EA	$ 16,000
59	Water Main Bypass Below Grade Crossings (Driveways, Intersections)	$ 1,000	4	EA	$ 4,000
60	Water Main Replacement - 6" DI	$ 100	950	LF	$ 95,000
61	Water Main Fittings, Couplings, Tees and Restraints	$ 5	800	LB	$ 4,000
62	Water Main Gate Valve Replacement - 6"	$ 3,000	4	EA	$ 12,000
63	Hydrant Replacement	$ 10,000	3	EA	$ 30,000
64	Water Service Replacement - 1-2" copper	$ 90	180	LF	$ 16,200
65	Pavement Binder Course	$ 150	970	TON	$ 145,500
66	Pavement Top Course	$ 150	490	TON	$ 73,500
67	Police Details - Main Line Crew (1 detail)	$ 800	68	DAYS	$ 54,400
68	Police Details - Service Crew (1 detail)	$ 800	20	DAYS	$ 16,000

Part C Subtotal $ 1,327,600