



Perna Lane Area Sewers
Stamford, Connecticut

SANITARY SEWER ALTERNATIVES EVALUATION

Stamford Water Pollution Control
Authority

October 31, 2022

Tighe & Bond
Engineers | Environmental Specialists

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Section 1

Introduction

1.1 Background

Tighe & Bond was commissioned by the Stamford Water Pollution Control Authority to analyze additional measures that would reduce the depth of sewer in local streets such that deep sewers and services are installed at shallower depths, reducing overall costs to implement the project. In some cases, initial design criteria was modified, for example, on some roads, the served residences are significantly below the street level, and basing the depth of the mainline sewer to provide gravity service to as many basements as possible was a contributor to system depth.

In general, we evaluated the following changes to the system that was bid in January 2019:

1. Considered a local pump station to serve the Perna Lane neighborhood.
2. Layout adjustments in the Perna Lane neighborhood.
3. Adjustments to the Redmont/Opper/Diamondcrest Layout.
4. Diamondcrest Layout Adjustments
5. Blue Ridge Drive Layout Adjustments
6. Pine Hill Terrace Layout Adjustments
7. Marva Lane Layout Adjustments
8. Meredith Lane Layout Adjustments
9. Willard Terrace Layout Adjustments
10. Brantwood Lane Layout Adjustments
11. Sewers North of Meredith Lane

Section 2

Alternatives Evaluated

This section discusses the evaluation of alternatives which could help to lower the expected cost of the Phase 1 Sewer Extension project.

The depth of the sewer main in High Ridge Road is largely driven by the connecting elevations of the sewers on each of the side streets. Therefore, an evaluation was conducted for each of the proposed side streets to determine if the connecting elevation could be raised at the High Ridge Road intersection prior to the evaluation of the sewer within High Ridge Road.

2.1 Gravity Service Design Modifications

The original design of the Perna Lane Sewer Extension provided gravity sewer service to the basement of each property, as directed by the City of Stamford. This design has caused the depth of the sewer mains to exceed 10 feet in most locations.

A significant savings in excavation costs can be realized by providing gravity service to the first floor elevation of each property. The extent of the impact on each street is discussed further in the sections which follow.

2.2 Perna Lane Pump Station Alternatives

The proposed gravity sewer on Perna Lane connects to High Ridge Road at a depth that is 19 feet below the existing grade. One alternative to eliminate this deep connection and help raise the High Ridge Road sewer is to install a small pump station on Perna Lane. This pump station would provide service to Perna Lane, Hampton Lane, Somerset Lane and Dzamba Grove. All flow would be pumped up to High Ridge Road, connecting at a depth that is 9 feet below grade (this depth is necessary to cross underneath the existing 36" diameter water main).

Two potential locations were evaluated for the siting of a new pump station:

2.2.1 Pump Station in Easement Area

As part of the 2019 Alternative Evaluation Report, various locations were considered for a pump station on Perna Lane. The first was the site initially considered in the early stages of the project within the Perna Lane cul-de-sac. The primary benefit of locating a station at the cul-de-sac is that Perna Lane slopes from west to east, so the gravity sewer in Perna Lane could be installed following grade down to the cul-de-sac. This site was determined not to be feasible because it was located within the floodplain of the Rippowam River, and it is difficult to locate a pump station in the cul-de-sac without having an overly detrimental visual impact to the neighboring properties. Given the elevation of the floodplain, the top of the wet well at this location would be significantly above grade to comply with current design standards.

A second pump station location evaluated is at the rear of the property of 1415 High Ridge Road. This proposed location is on a far corner of the property and can be screened from view from adjacent properties. It is also outside the floodplain. Since the property is

located on the west end of Perna Lane, the gravity sewer in Perna Lane would have to flow westward toward the pump station, bucking grade, and as a result, the gravity sewer would be deeper where it connects to the pump station. Siting the pump station at the west end of Perna Lane is still a better option because it is outside of the flood plain.

Installing a pump station in 1415 High Ridge Road is only feasible if the property owner is willing to grant an easement to the City.

2.2.2. Pump Station in Road Right of Way

An evaluation was conducted to determine if a new pump station could be constructed within the right. The contract drawings show a 9-foot wide strip of land available between the edge of the proposed pavement and road right of way. It would be feasible, but not optimal, to install a small submersible pump station within this area. This station would consist of a 6-foot diameter precast concrete wet well, valve vault for the pump discharge piping, and a free standing electrical panel. The final layout would be somewhat similar to the City's Saddle Rock Road pump station. Concerns over the construction of a pump station at this location include the following:

- Protecting above ground components from potential traffic damage
- Protecting the pump station components from plows/snow during the winter months
- The lack of an on-site generator will require a portable unit to be brought to the site during power outages.
- There would be no parking area available for City crews when visits to the site are made for maintenance purposes

It should be noted that a construction easement will likely have to be obtained from the property owner at 1415 High Ridge Road to allow a pump station within the road right of way to be constructed.

It is recommended that if a pump station on Perna Lane is constructed, it be located within an easement on 1415 High Ridge Road.



Photograph 2-1. Perna Lane right-of-way at 1415 High Ridge Road.

2.3 Perna Lane Area Layout Adjustments

A review of the proposed sewer mains within Perna Lane, Hampton Lane, Somerset Lane and Dzamba Grove shows that a large majority of the sewer mains are proposed to be installed at minimum slopes, with fairly shallow sewer mains at the end of the runs on each street. Therefore, there are no significant adjustments to the pipeline depths that can be made to raise the sewers in this area.

If a pump station is constructed on Perna Lane, it will help to raise the invert of the connecting pipe at the intersection of High Ridge Road approximately 10'. The connection is just under 10 feet below grade due to the fact that it must cross underneath an existing 36-inch diameter water main at the High Ridge Road intersection.

2.4 Redmont/Opper/Diamoncrest Layout Adjustments

The intersection of Opper and Redmont Roads lies 8 feet below the intersection of Opper and High Ridge Roads and the current design provides for gravity service for the entire area. As a result, the Bid Drawings show that the Opper / High Ridge Road intersection has the deepest sewer in the entire project.

Suggested layout adjustments to raise the grade in this area include the following:

- Provide gravity service to the first floor elevation of each property. This raises the sewer elevation at the Opper/High Ridge Road intersection by approximately five feet.
- Re-route the lateral for 42 Opper Road to connect between MH OPP-01 and MH OPP-02.
- Install a low pressure sewer from MH OPP-03 and OPP-02. This will require grinder pump connections for 45 and 50 Opper Road. This will allow the sewer main to be approximately 5 feet higher in the Opper/Redmont intersection. Note that the property at 50 Opper Road is shown to have a pumped connection in the current set of bid documents.
- Revising the sewer layout on Redmont Road, while considered part of Phase 2, could also allow the depth of the sewer main to be raised significantly.
- MH DCR-02 is currently shown to be almost 15 feet deep. This depth is necessary to provide gravity sewer service to 86 Diamondcrest Lane. Providing a grinder pump for this property will allow the depth of the sewer to be raised by more than six feet.

It should be noted that a review of the feasibility of connecting the sewer on Redmont Road to the proposed Marva Lane gravity main was conducted during the preparation of this report. This connection was determined to not be feasible for the following reasons:

- An easement would be required to be obtained from the property owner. This could be difficult to obtain given that a route within the roadway is feasible.

- The existing plans show a number of mature trees on the property of 69 Redmont Road which would have to be removed to allow for the sewer construction.
- Limited space exists between House 69 Opper Road and 55 Opper Road to allow for construction of a sewer main, especially given the fact that power lines are already located within this easement area.

2.5 Diamoncrest Layout Adjustments

The intersection of Diamoncrest Lane and High Ridge Road is approximately 10 feet below existing grade. No changes to the pipe depth at this intersection are feasible given the need to maintain adequate clearance between the new sewer and existing 24" water main.

While the sewer on this street is part of Phase 2, suggested layout adjustments to raise the grade on this street include the following:

- Provide gravity service to the first floor elevation of each property. This raises the sewer elevation throughout the street anywhere from four to six feet.
- Change the lateral connection for 86 Diamondcrest Road from a gravity to a grinder pump connection, which will allow the new sewer main to be raised six feet higher than currently shown.

2.6 Blue Ridge Drive Layout Adjustments

The intersection of Blue Ridge Drive and High Ridge Road is approximately 8 feet below existing grade. No changes to the pipe depth at this intersection are feasible given the need to maintain adequate clearance between the new sewer and existing 24" water main.

A suggested layout adjustment to raise the grade on this street would be to provide gravity service to the first floor elevation of each property. This raises the sewer elevation throughout the street anywhere from two to four feet.

2.7 Pine Hill Terrace Layout Adjustments

The intersection of Pine Hill Terrace and High Ridge Road is approximately 10 feet below existing grade. No changes to the pipe depth at this intersection are feasible given the need to maintain adequate clearance between the new sewer and existing 24" water main.

A suggested layout adjustment to raise the grade on this street would be to provide gravity service to the first floor elevation of each property. This raises the sewer elevation throughout the street anywhere from two to four feet. This alternate layout would require the addition of one gravity sewer manhole and relocation of one manhole.

2.8 Marva Lane Layout Adjustments

The intersection of Marva Lane and High Ridge Road is approximately 8 feet below existing grade. No changes to the pipe depth at this intersection are feasible given the need to maintain adequate clearance between the new sewer and existing 24" water main.

Some improvement on the depth of the sewer is possible by providing gravity service to the first floor elevation of each property. This raises the sewer elevation on the downstream end of the street, however, the sewer from the end of Marva Lane, through the easement and within Blue Ridge Road is generally shallow and no adjustments to the sewer design in this section are recommended.

2.9 Meredith Lane Adjustments

The Meredith Lane connection at High Ridge Road is currently 16 feet deep. The depth of the Meredith Lane sewers is driven by the topography of the area, as Meredith Lane slopes away from High Ridge Road, with the low point halfway along the roadway alignment and at the end of the cul-de-sac being nearly ten feet lower than High Ridge Road.

Therefore, the system in Meredith Lane cannot be raised, and the system's deep depth dictates the depth along the northern end of High Ridge Road.

There is a wide right of way on the southeast corner of the intersection of Meredith and High Ridge that could support an ejector type pump station, though temporary construction rights may be needed from the adjoining property due to the proximity of an underground electric duct.

We also investigated locating the pump station further east at the end of Meredith Lane, but found that location to be less suitable because it would double the length of piping, since the force main would have to pump all the way from the end of Meredith Lane, and in the event of a 100-year flood, the location would be under water, as would the middle section of Meredith Lane, making the station less accessible.

If a pump station or low pressure sewer system with grinder pumps is constructed on Meredith Lane, it will help to raise the invert of the sewer main in High Ridge Road approximately 6 feet, and would simplify the crossing of the 30 inch water that runs along the east side of High Ridge Road.

2.10 Grinder Pumps on Willard/Chimneys at Willard

Many of the residences on the east side of Willard Terrace are located below the street elevation. The original design aimed to serve as many basements as possible. Since the basement levels of these homes are significantly below the street elevation, they dictate the depth of the sewer in Willard Terrace, which is as deep as 23 feet with 9 feet in rock. The January 2019 drawings had a select few homes on Willard Terrace proposed to have grinder pumps to prevent the main line sewer from getting any deeper.

We recommend the following be considered to decrease the depth of sewers on Willard Terrace:

1. **Additional Grinder Pumps.** We recommend two additional residences on Willard be placed on grinder pumps, 107 and 116 Willard. The sill elevations of both homes are approximately 7 feet below the roadway elevation. The two new grinder pumps would be in addition to the two already proposed at 87 and 95 Willard Terrace.

2. **Eliminate Basement Service.** If the sewer were raised to provide service to the first floor of a residence instead of the basement, there will be significant savings in system depth.

If the two recommendations above for Willard Terrace are adopted, the entire sewer main would be lifted out of rock, and all chimneys would be eliminated. For example, at Manhole WIL-06, where the sewer depth is 23 feet, with approximately 9 feet in rock, adoption of the two above recommendations would decrease the sewer depth to approximately 9.5 feet, and no rock.

A third alternative for this street would be to convert Willard Terrace to a low pressure sewer would further raise the connection point at High Ridge and Willard Terrace by three feet downstream to the next manhole, approximately 120 feet downstream. If this suggestion were adopted, we suggest a new manhole be added between SMH HR-02 and SMH HR-03, to reduce the depth of the run between SMH HR-02 and SMH HR-03, whose depth is dictated by the depth of the existing 24" water main. This alternative was not moved forward into the cost development phase due to the higher number of grinder pumps that would be required.

2.11 Brantwood Lane Adjustments

Some of the residences on the south side of Brantwood Lane are located below the street elevation. As previously discussed, the original design aimed to serve as many basements as possible. Since the basement levels of these homes are significantly below the street elevation, they dictate the depth of the sewer in the roadway, which is as deep as 18 feet.

We recommend eliminating basement service for a select few lower elevation residences on Brantwood, specifically 17, 25 and 35. If basement service were eliminated, the depth of the sewer would be reduced. For example, at Manhole BW-03, the depth would be reduced from 18 feet to 9 feet.

2.13 Sewers North of Meredith Lane

As High Ridge Road approaches the northern limit of the project at Scofieldtown Road, the topography reaches a high point at the intersection of Meredith Lane and then descends 8 to 9 feet at the last manhole of the project located 100 feet north of the Scofieldtown Road intersection.

The last two manhole sections provide service to three facilities: Hoyt School, the Stamford Nature Center and a private residence at 1525 High Ridge Road. 1525 High Ridge Road is already shown to require a pumped connection. If the Hoyt School connects at the existing discharge manhole for the Northeast school and the Nature Center is provided with a grinder pump connection, a low pressure sewer main can be constructed and connected at Manhole #19 near the intersection of High Ridge and Meredith. This will reduce the depth of the sewer main by approximately 9 feet.

Section 3

Summary and Conclusions

3.1 Impacts of Layout Revisions on High Ridge Road

A summary of potential revisions to the connection points along High Ridge Road is as follows:

- Willard Lane: Sewer elevation raised by 3 feet
- Brantwood Lane: Sewer elevation raised by 4 feet
- Opper Road: Sewer elevation raised by 6 feet
- Marva Lane: Sewer elevation raised by 7 feet
- Pine Hill Terrace: Sewer elevation raised by 7 feet
- Perna Lane: Sewer elevation raised by 10 feet (with pump station)
- Blue Ridge Drive: Sewer elevation raised by 7 feet
- Diamondcrest Lane: Sewer elevation raised by 8 feet.
- Meredith Lane: Sewer elevation raised by 6 feet (with pumped connection)
- Sewers north of Meredith Lane: Sewer elevation raised by 9 feet by converting gravity main to a low pressure sewer line.

With the revisions noted above, the gravity sewer in High Ridge Road can be raised, on average, by a depth of six feet from what is currently shown. This layout change not only decreases the depth of excavation, but also allows the sewer main to be installed above bedrock in many cases

3.2 Disclaimer

The costs presented are an engineer's Opinion of Probable Construction Cost. Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the estimates of probable construction costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Probable Construction Cost.

3.3 Assumptions

In preparing the opinions of probable cost (OPCC), the following assumptions were made:

1. The extent of roadway restoration work required would be the same. Local roadways will be milled and overlaid curb-to-curb, and the extent of milling and paving in High Ridge Road at the conclusion of pipeline installation would be the same for all alternatives.
2. All drainage improvements proposed as part of the original design contract would be required and constructed for all alternatives.
3. A unit cost of \$12,000 was used for each grinder pump required. It was assumed that the cost of the grinder pump installation would be the homeowner's responsibility.
4. An allowance of 4% was applied for the maintenance and protection of traffic.
5. Allowances of 6% for mobilization/demobilization and 2% clearing/grubbing were added.
6. Hourly estimates were also made for uniformed officers expected to be required for traffic control when sewer construction is taking place. We assumed that 2 officers will be required on all streets where sewer construction takes place.
7. A 25 percent construction contingency was applied.
8. The Opinion of Probable Construction Cost as presented covers Phase 1 only.

3.4 Opinion of Probable Construction Cost

We escalated unit prices from 2019 using R. S. Means data, and took unit bid prices from two recent sewer projects in Westport into consideration when establishing new unit costs. The total estimated WPCA Share for Phase 1 is \$8,154,300.00.

Please refer to **Appendix A** for the updated opinion of probable cost and **Appendix B** for drawings schematically showing the proposed revisions.

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APPENDIX A

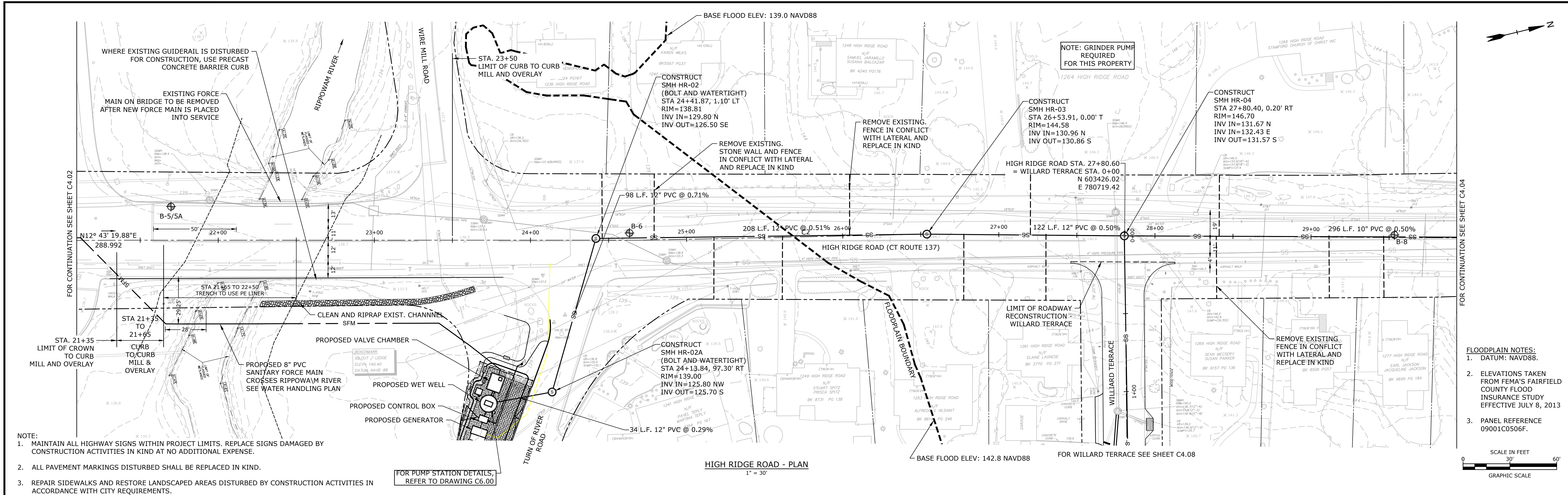
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		Phase 1 Modified Layouts			
Bid Item No.	Bid Item Description	Quantity	Unit	Estimated Unit Cost	Extended Total
1	Rock Excavation	111	CY	\$348	\$38,800
2A	Gravity Sewer Main < 10'	4115	LF	\$185	\$761,300
2B	Gravity Sewer Main 10' - 15'	2241	LF	\$270	\$605,100
2C	Gravity Sewer Main > 15'	437	LF	\$300	\$131,100
3	Low Pressure Sewer Main	213	LF	\$125	\$26,600
4	Gravity Sewer Manholes <10' deep	27	Each	\$10,000	\$270,000
4A	Gravity Sewer Manholes 10'-15' deep	18	Each	\$13,000	\$234,000
4B	Gravity Sewer Manholes >15' deep	4	Each	\$16,000	\$64,000
4C	Air Release Valve	2	Each	\$2,315	\$4,600
4D	Terminal Manhole (LPS)	1	Each	\$10,000	\$10,000
5	Low Pressure Sewer Laterals	285	LF	\$99	\$28,200
5A	Gravity Sewer Laterals	4028	LF	\$128	\$515,600
6	Sewer Grinder Pumps	17	Each	\$12,000	\$204,000
7	Submersible Pump Station - Large	1	Each	\$770,400	\$770,400
7A	Submersible Pump Station - Small	1	Each	\$335,000	\$335,000
8	Pump Station Force Main	2425	LF	\$150	\$363,800
9	Storm Drainage	1	LS	\$200,000	\$200,000
10	Topsoil + Seeding	17112	SY	\$6	\$102,700
11	Water Handling	1	LS	\$10,000	\$10,000
12	Sediment and Erosion Control	1	LS	\$25,000	\$25,000
13	EPB Landscaping	1	LS	\$33,000	\$33,000
14	Pavement	1	LS	\$1,800,000	\$1,800,000
15	Mobilization/Demobilization (6%)	1	LS	\$392,000	\$392,000
16	Maintenance + Protection of Traffic (4%)	1	LS	\$261,300	\$261,300
17	Trafficmen (High Ridge Road only)	2160	hrs	\$81	\$175,000
18	Clear + Grub (2%)	1	LS	\$130,700	\$130,700
Subtotal:					\$7,492,200
City Share of Paving/Drainage Costs:					\$1,648,800
WPCA Total:					\$5,843,400
25% Project Contingency:					\$1,460,900
Redesign/Bidding/Construction Engineering:					\$850,000
WPCA Total:					\$8,154,300
Estimated Average Cost Per Property (based on 40% WPCA cost and 150 properties):					\$21,700

This is an Engineer's Opinion of Probable Construction Cost (OPCC). Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the estimates of probable construction costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Probable Construction Cost

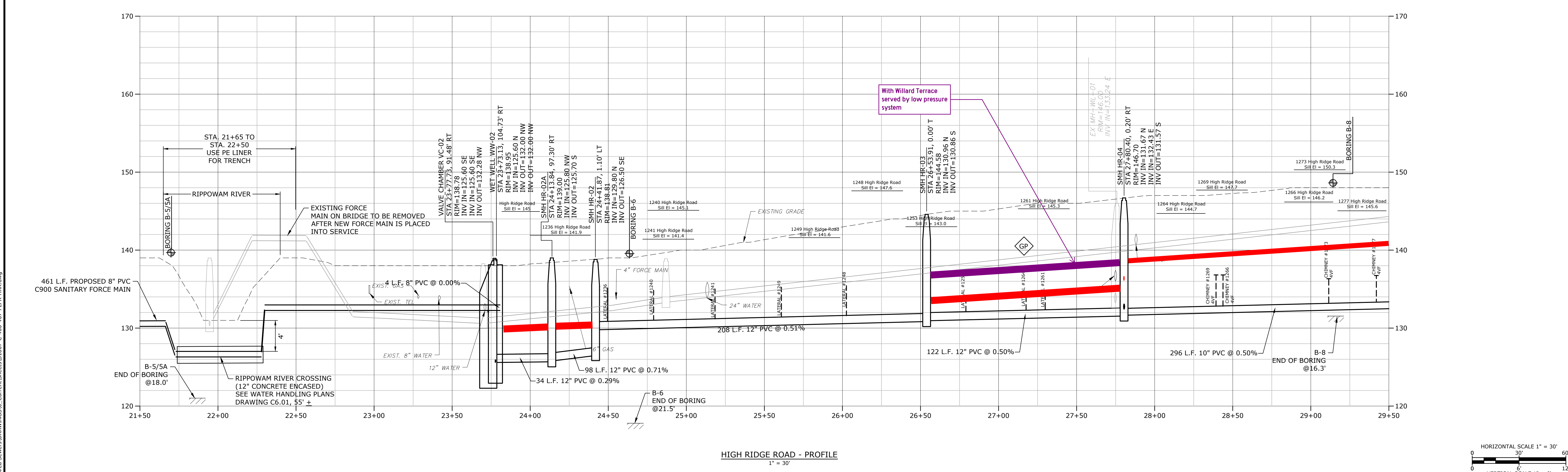
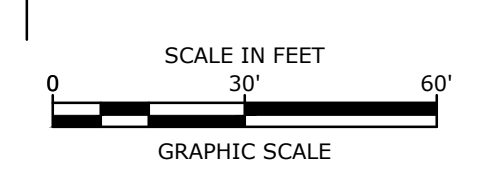
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APPENDIX B



NOTE:
 1. MAINTAIN ALL HIGHWAY SIGNS WITHIN PROJECT LIMITS. REPLACE SIGNS DAMAGED BY CONSTRUCTION ACTIVITIES IN KIND AT NO ADDITIONAL EXPENSE.
 2. ALL PAVEMENT MARKINGS DISTURBED SHALL BE REPLACED IN KIND.
 3. REPAIR SIDEWALKS AND RESTORE LANDSCAPED AREAS DISTURBED BY CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH CITY REQUIREMENTS.

FLOODPLAIN NOTES:
 1. DATUM: NAVD88.
 2. ELEVATIONS TAKEN FROM FEMA'S FAIRFIELD COUNTY FLOOD INSURANCE STUDY EFFECTIVE JULY 8, 2013
 3. PANEL REFERENCE 09001C0506F.



Tighe & Bond
 www.tighebond.com
 1000 Bridgeport Avenue
 Suite 320
 Shelton, CT 06484
 (203) 712-1100

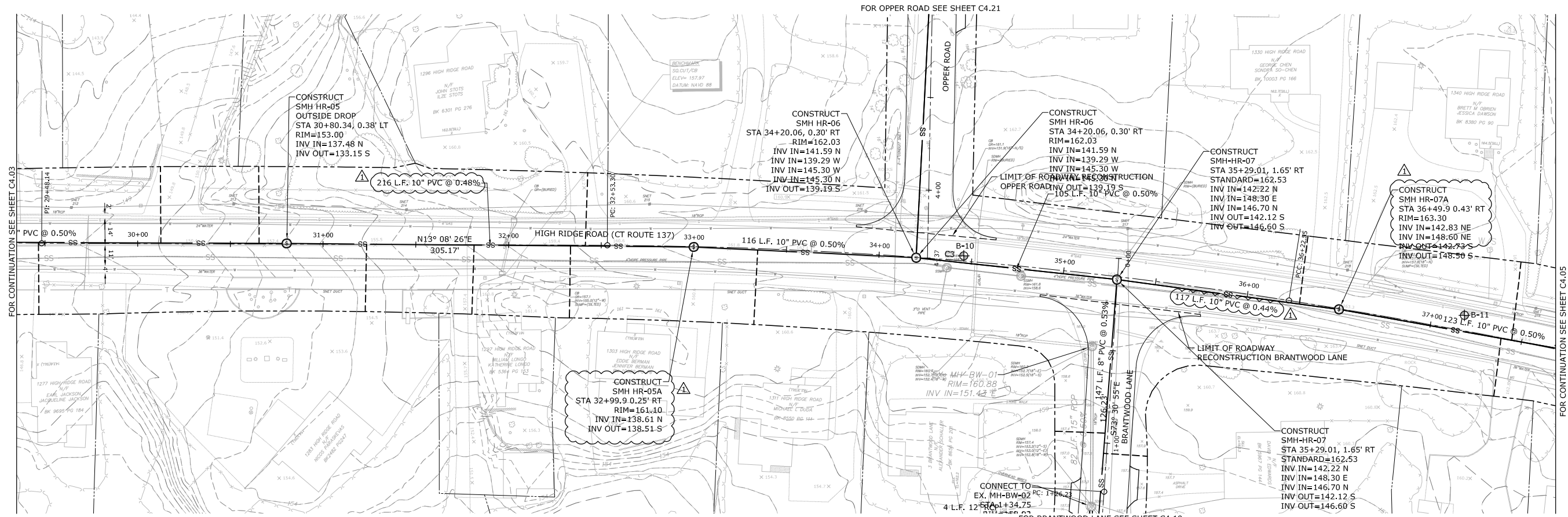
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FILE NO.			

CITY OF STAMFORD
 WATER POLLUTION CONTROL AUTHORITY

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DESIGNED BY	DATE	CHECKED BY JAC	DATE	DESCRIPTION PLAN AND PROFILE HIGH RIDGE ROAD STA 21+50 TO 29+50
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CITY ENGINEER				

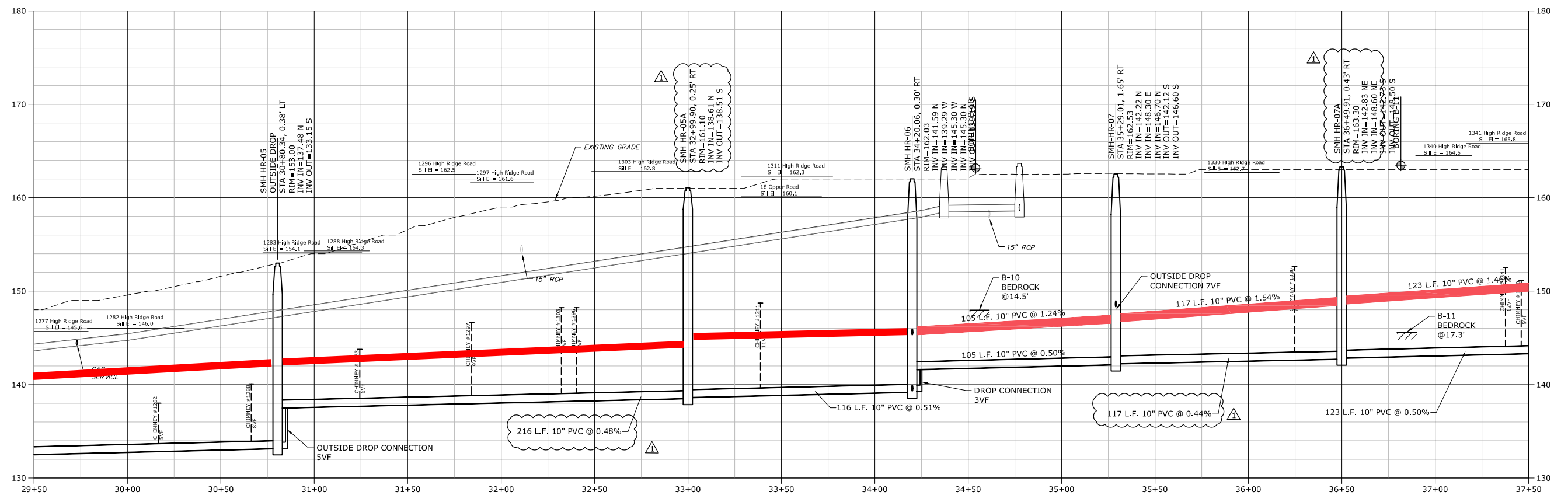
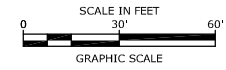
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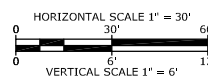


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HIGH RIDGE ROAD - PLAN
1" = 30'



HIGH RIDGE ROAD - PROFILE
1" = 30'



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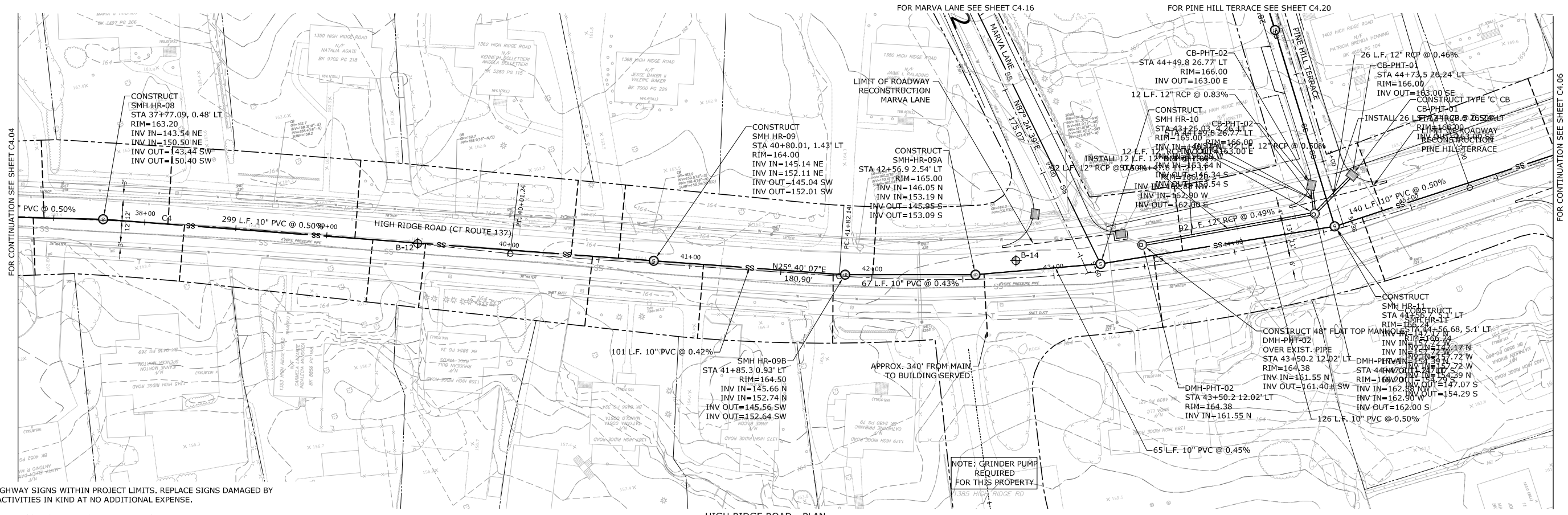
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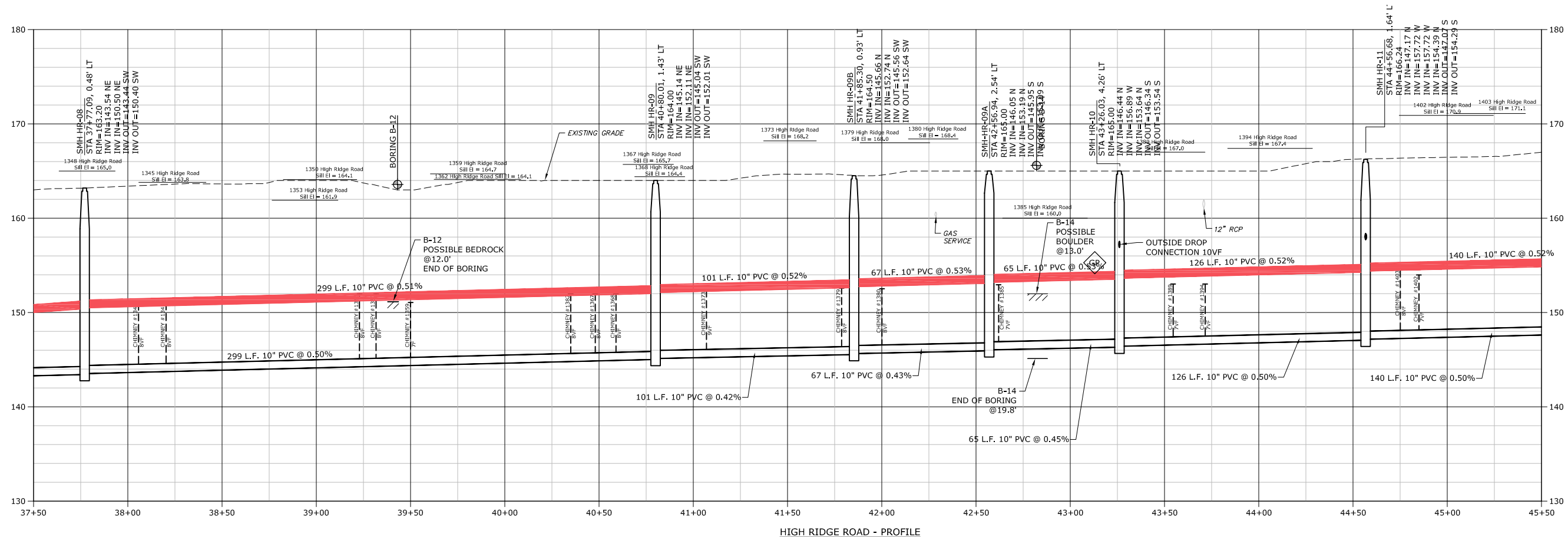
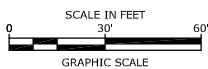
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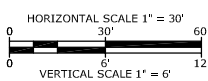


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HIGH RIDGE ROAD - PLAN
1" = 30'



HIGH RIDGE ROAD - PROFILE
1" = 30'



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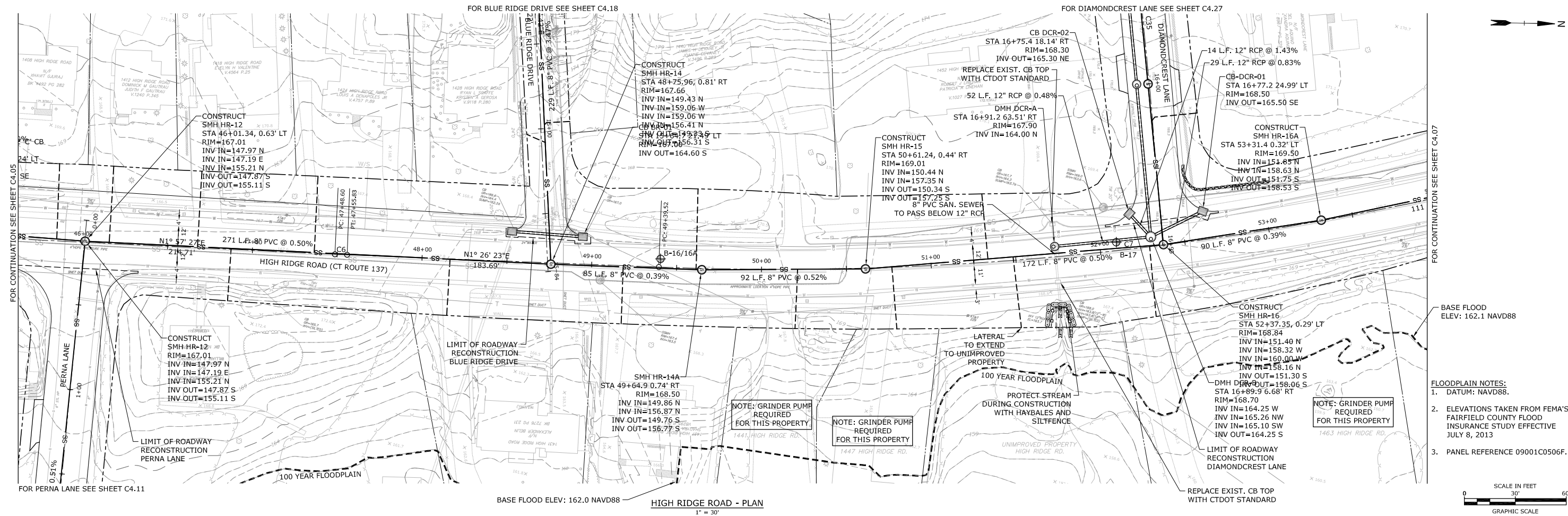
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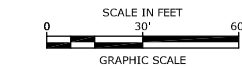
CITY OF STAMFORD
 WATER POLLUTION CONTROL AUTHORITY

SURVEYED BY	DATE	DRAWN BY	DATE	TITLE
RVD INC.	APR 12	MDS		PERNA LANE SEWERS
DESIGNED BY	DATE	CHECKED BY	DATE	
JAC		JWB		
DES. SUPV.	DATE	INSP. SUPV.	DATE	DESCRIPTION
				PLAN AND PROFILE HIGH RIDGE ROAD STA 37+50 TO 45+50
CITY ENGINEER				

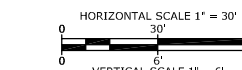
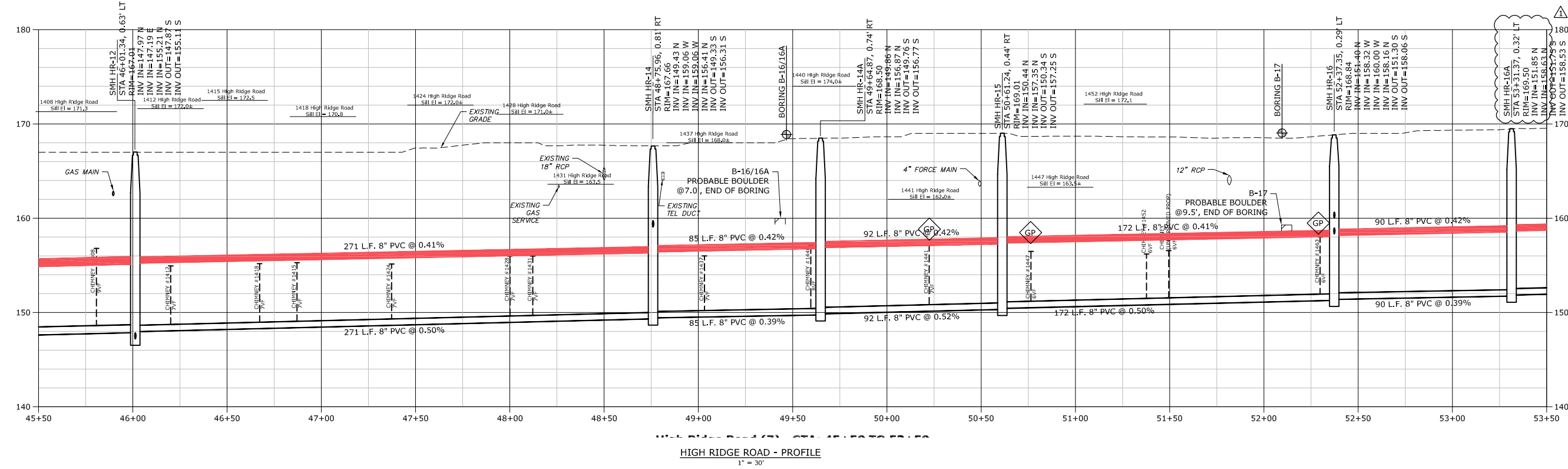
SCALE:	AS NOTED
PROJECT NO.	S1807
SHEET NO.	C4.05



- FLOODPLAIN NOTES:
- DATUM: NAVD88.
 - ELEVATIONS TAKEN FROM FEMA'S FAIRFIELD COUNTY FLOOD INSURANCE STUDY EFFECTIVE JULY 8, 2013
 - PANEL REFERENCE 09001C0506F.



- NOTE:
- MAINTAIN ALL HIGHWAY SIGNS WITHIN PROJECT LIMITS. REPLACE SIGNS DAMAGED BY CONSTRUCTION ACTIVITIES IN KIND AT NO ADDITIONAL EXPENSE.
 - ALL PAVEMENT MARKINGS DISTURBED SHALL BE REPLACED IN KIND.
 - REPAIR SIDEWALKS AND RESTORE LANDSCAPED AREAS DISTURBED BY CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH CITY REQUIREMENTS.



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		REVISIONS	
FILE NO.			

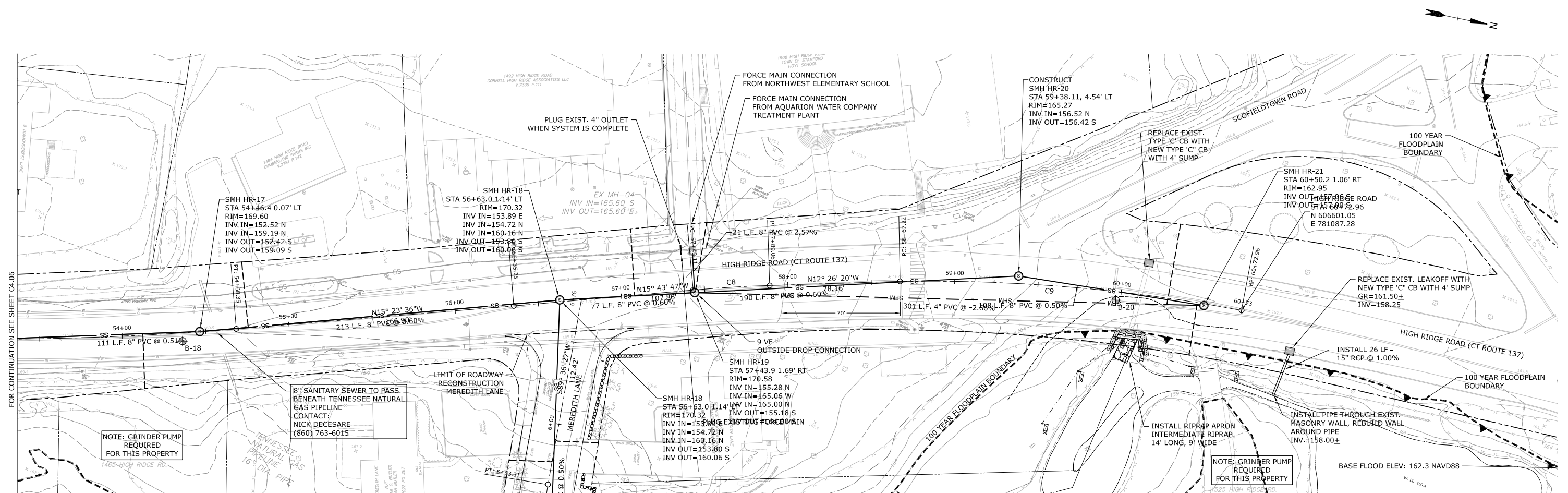
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CITY OF STAMFORD
 WATER POLLUTION CONTROL AUTHORITY

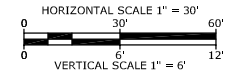
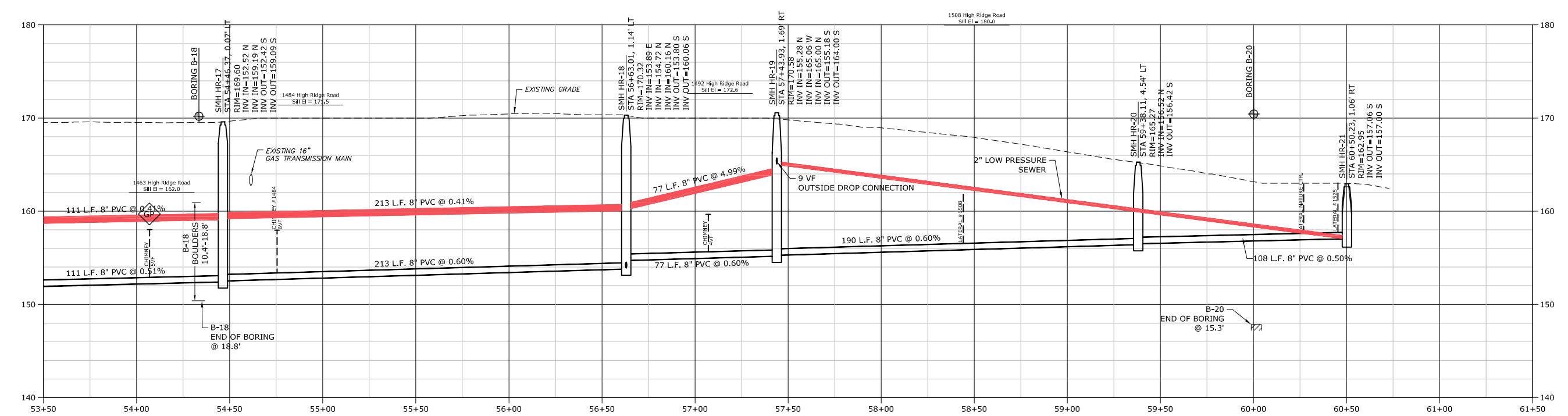
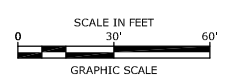
SURVEYED BY	DATE	DRAWN BY	DATE	TITLE
RVD INC.	APR 12	MDS		PERNA LANE SEWERS
DESIGNED BY	DATE	CHECKED BY	DATE	
JAC		JWB		
DES. SUPV.	DATE	INSP. SUPV.	DATE	DESCRIPTION
				PLAN AND PROFILE HIGH RIDGE ROAD STA 45+50 TO 53+50
CITY ENGINEER				

SCALE:	AS NOTED
PROJECT NO.	S1807
SHEET NO.	C4.06



- NOTE:
1. MAINTAIN ALL HIGHWAY SIGNS WITHIN PROJECT LIMITS. REPLACE SIGNS DAMAGED BY CONSTRUCTION ACTIVITIES IN KIND AT NO ADDITIONAL EXPENSE.
 2. ALL PAVEMENT MARKINGS DISTURBED SHALL BE REPLACED IN KIND.
 3. REPAIR SIDEWALKS AND RESTORE LANDSCAPED AREAS DISTURBED BY CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH CITY REQUIREMENTS.

- FLOODPLAIN NOTES:
1. DATUM: NAVD88.
 2. ELEVATIONS TAKEN FROM FEMA'S FAIRFIELD COUNTY FLOOD INSURANCE STUDY EFFECTIVE JULY 8, 2013
 3. PANEL REFERENCE 09001C0506F.

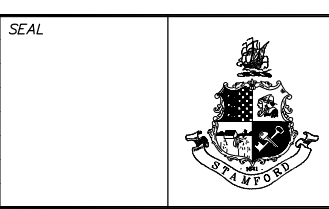


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FILE NO.		REVISIONS	



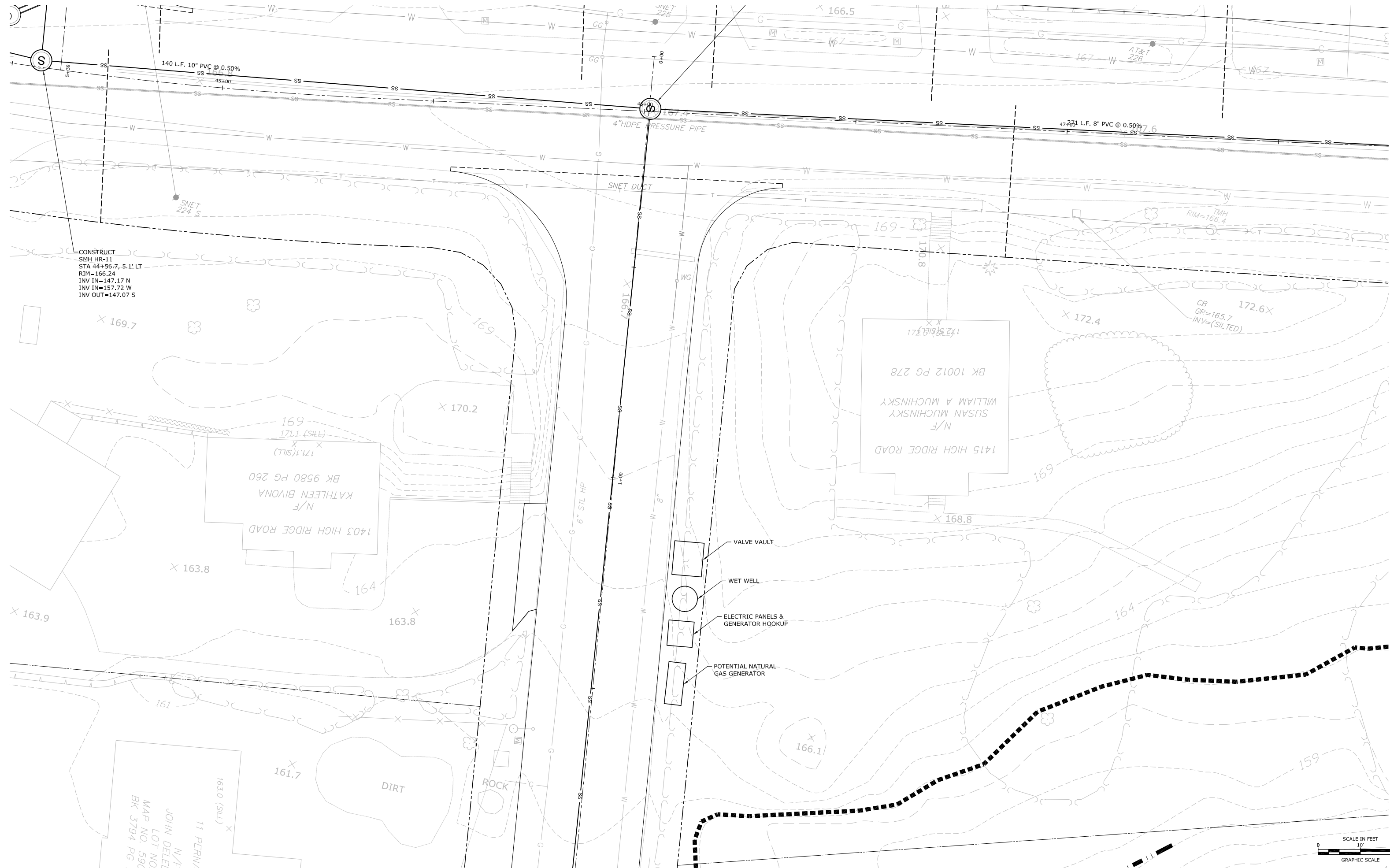
CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

SURVEYED BY	DATE	DRAWN BY	DATE
RVD INC.	APR 12	MDS	
DESIGNED BY	DATE	CHECKED BY	DATE
JAC		JAC	
DES. SUPV.	DATE	INSP. SUPV.	DATE
		JWB	

CITY ENGINEER

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE HIGH RIDGE ROAD STA 53+50 TO 61+50

SCALE:	AS NOTED
PROJECT NO.	S1807
SHEET NO.	C4.07



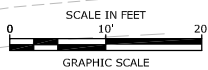
CONSTRUCT
SMH HR-11
STA 44+56.7, 5.1' LT
RIM=166.24
INV IN=147.17 N
INV IN=157.72 W
INV OUT=147.07 S

1403 HIGH RIDGE ROAD
N/F
KATHLEEN BIVONA
BK 9580 PG 260

1415 HIGH RIDGE ROAD
N/F
SUSAN MUCHINSKY
BK 10012 PG 278

11 PERM.
N/F
JOHN DELEI
LOT NO.
MAP NO. 59C
BK 3794 PG.

- VALVE VAULT
- WET WELL
- ELECTRIC PANELS & GENERATOR HOOKUP
- POTENTIAL NATURAL GAS GENERATOR



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REVISIONS			
FILE NO.			

SEAL

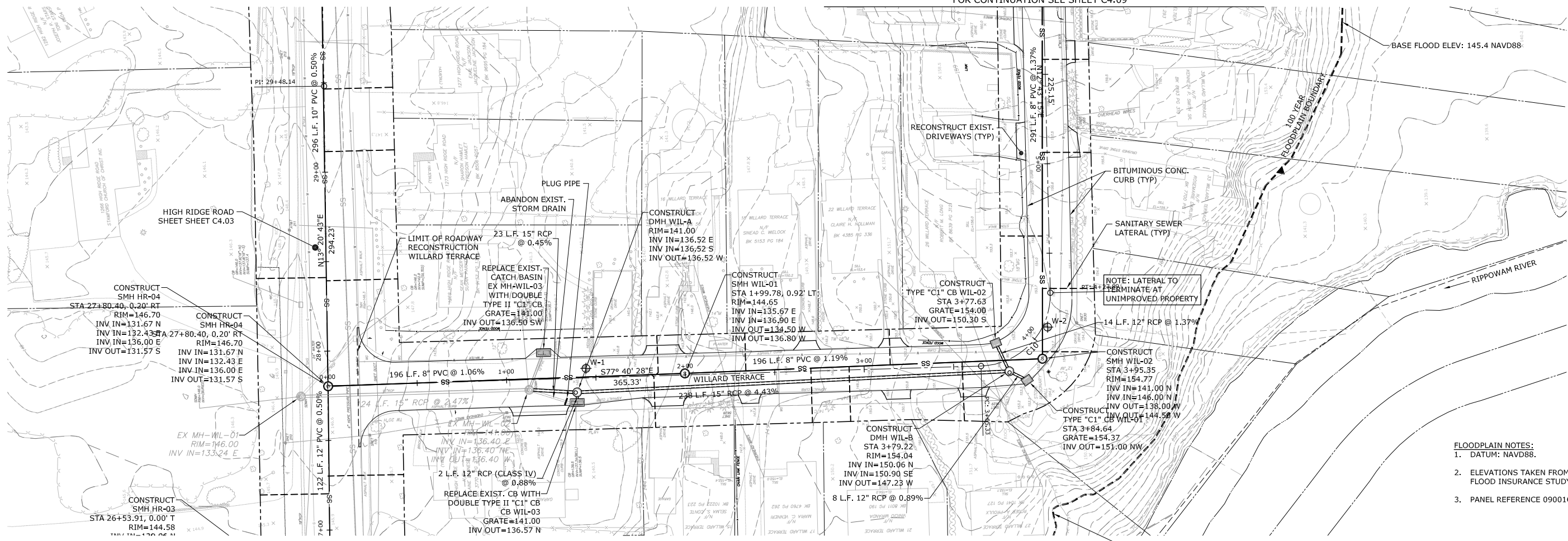


CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

SURVEYED BY DATE RVD INC. APR 12	DRAWN BY DATE MDS	TITLE
DESIGNED BY DATE	CHECKED BY DATE JAC	PERNA LANE SEWERS
DES. SUPV. DATE	INSP. SUPV. DATE JWB	
CITY ENGINEER		DESCRIPTION PLAN AND PROFILE HIGH RIDGE ROAD STA 45+50 TO 53+50

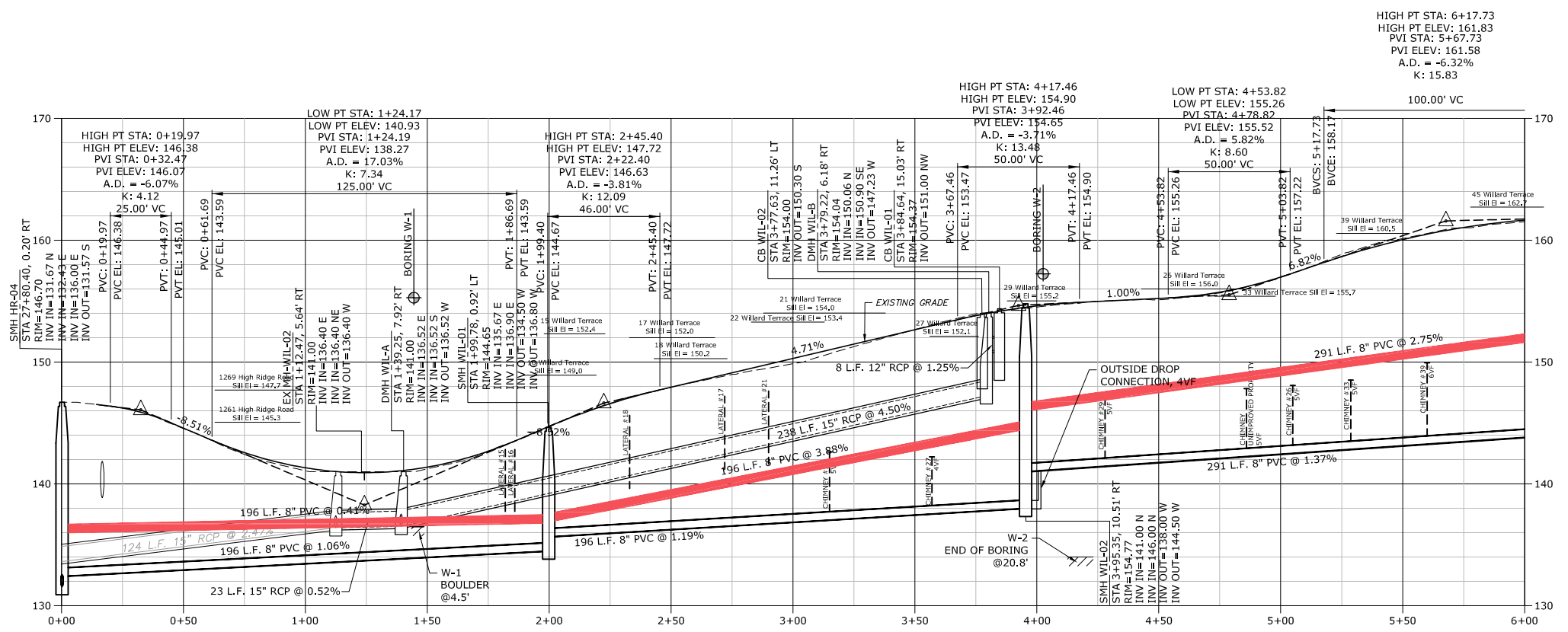
SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.06

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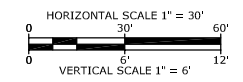


- FLOODPLAIN NOTES:**
- DATUM: NAVD88.
 - ELEVATIONS TAKEN FROM FEMA'S FAIRFIELD COUNTY FLOOD INSURANCE STUDY EFFECTIVE JULY 8, 2013
 - PANEL REFERENCE 09001C0506F.

WILLARD TERRACE - PLAN
1" = 30'



Willard Terrace (1) - STA: 0+00 TO 6+00 PROFILE
1" = 30'

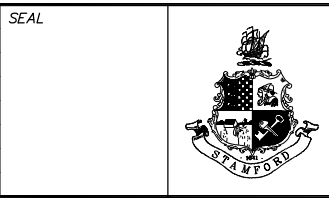


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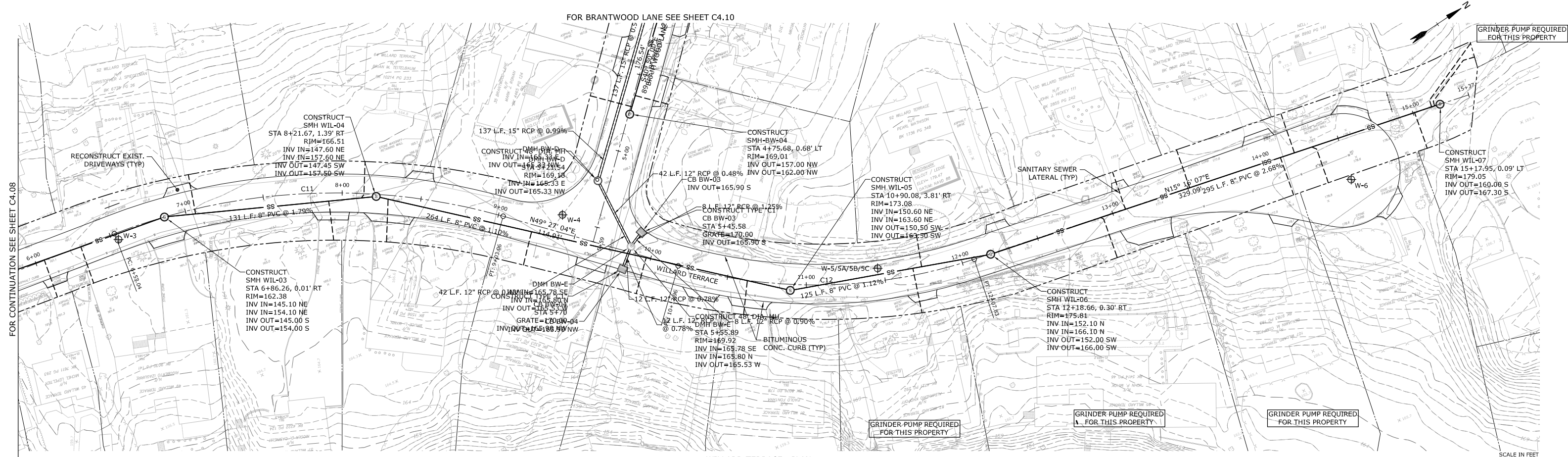
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		FILE NO.	



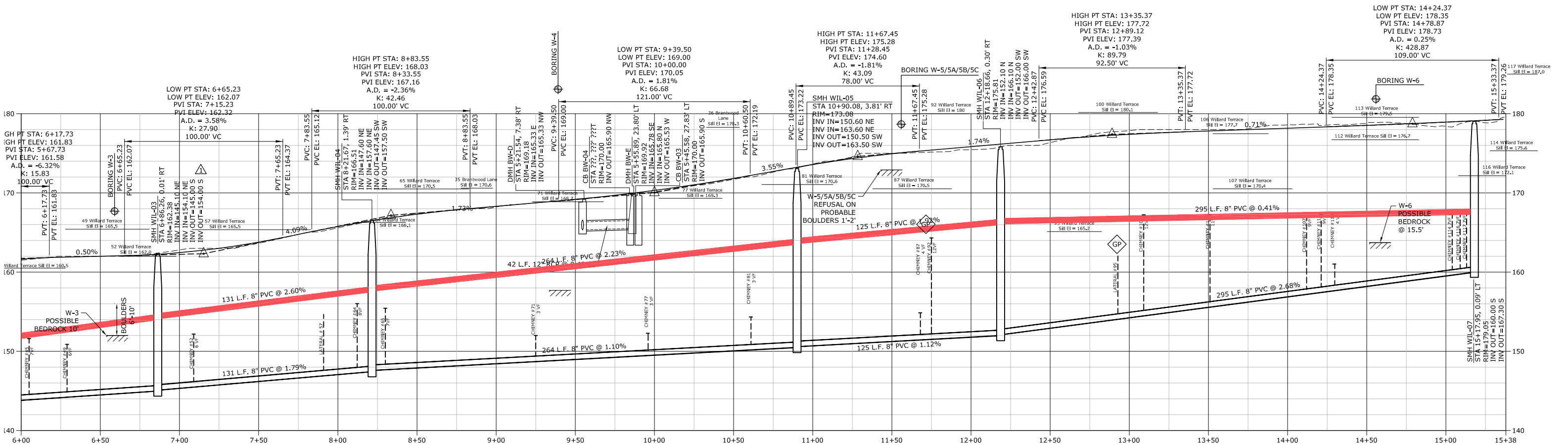
CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

SURVEYED BY	DATE	DRAWN BY	DATE	TITLE
RVD INC.	APR 12	MDS		PERNA LANE SEWERS
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JAC		JWB		
DES. SUPV.	DATE	INSP. SUPV.	DATE	DESCRIPTION
				PLAN AND PROFILE WILLARD TERRACE STA 0+00 TO 6+00

SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.08



WILLARD TERRACE - PLAN
1" = 30'



WILLARD TERRACE - PROFILE
1" = 30'

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REVISIONS			
FILE NO.			

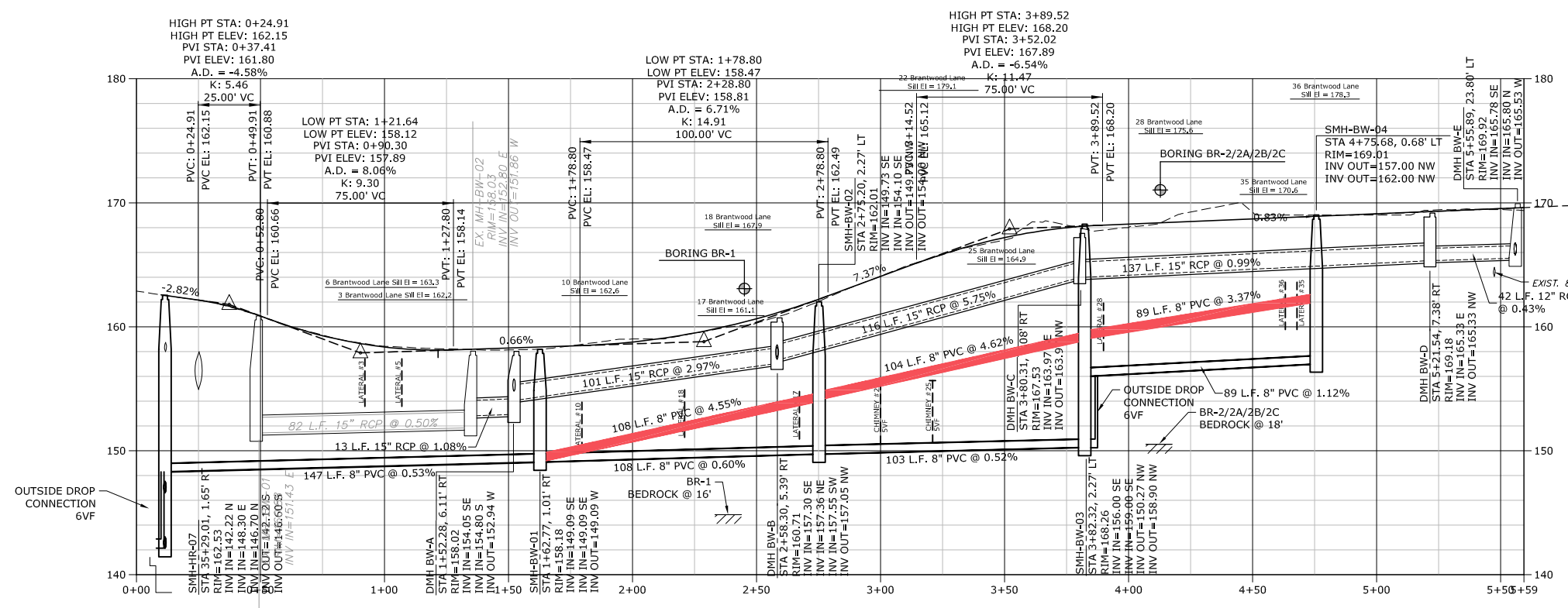
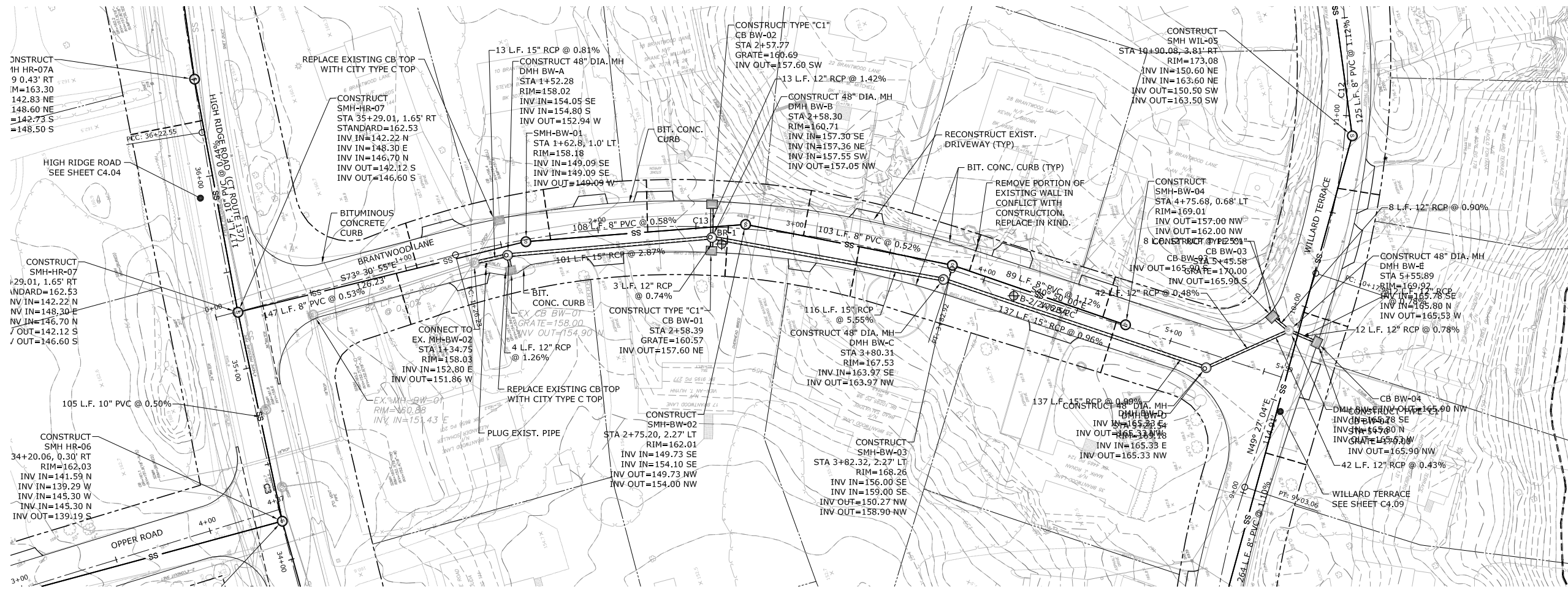
SEAL

CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

SURVEYED BY DATE	APR 12	DRAWN BY DATE	MDS	TITLE
DESIGNED BY DATE		CHECKED BY DATE	JAC	PERNA LANE SEWERS
DES. SUPV. DATE		INSP. SUPV. DATE	JWB	PLAN AND PROFILE WILLARD TERRACE STA 6+00 TO 15+38
CITY ENGINEER				

SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.09

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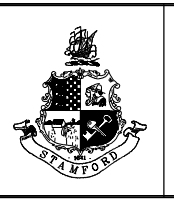
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NO.	DATE	DESCRIPTION	CK.
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NO.	DATE	REVISIONS	CK.

NO.	DATE	REVISIONS	CK.



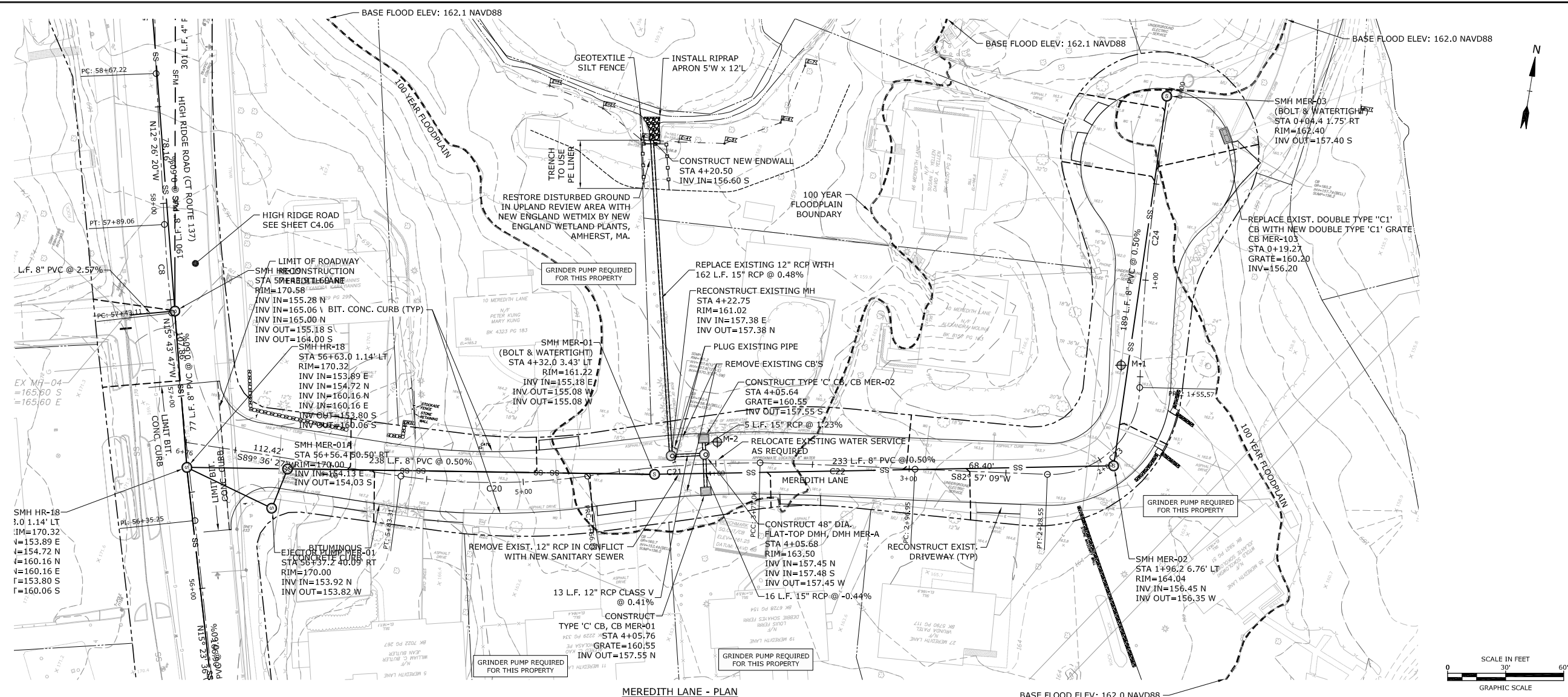
CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

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DESIGNED BY DATE		CHECKED BY DATE	JAC
DES. SUPV. DATE		INSP. SUPV. DATE	JWB
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE BRANTWOOD LANE STA 0+00 TO 5+50

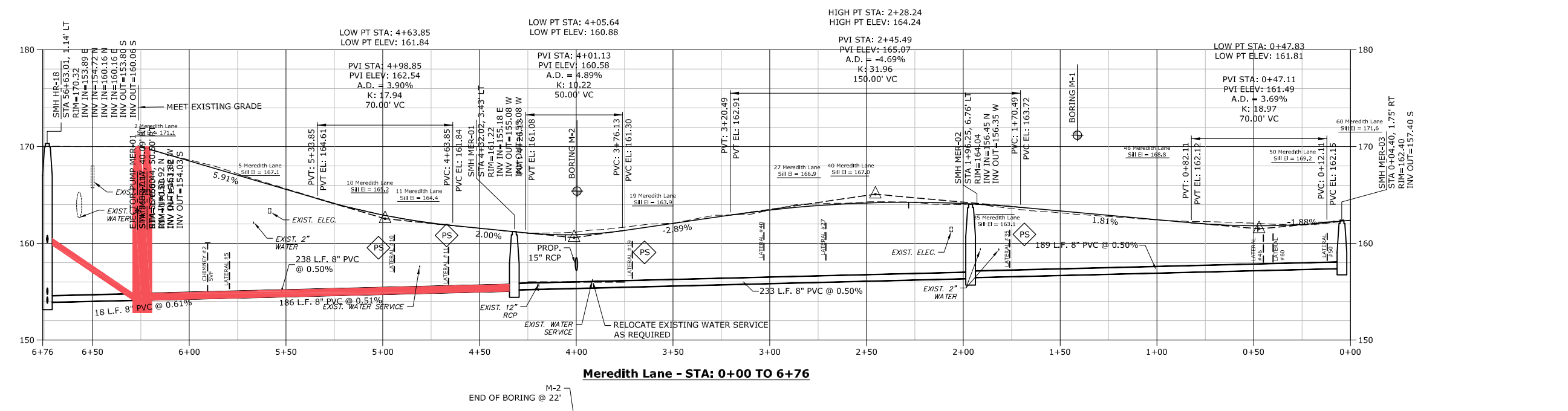
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SHEET NO.	C4.10

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- SEGREGATION OF MATERIALS IN WETLAND AREAS**
1. PRIOR TO COMMENCING WORK IN A WETLAND, BUT AFTER INSTALLATION OF SEDIMENTATION AND EROSION CONTROLS, EXCAVATE A TEST PIT TO EXPOSE SOIL PROFILE.
 2. NOTE SOIL PROFILE AND PHOTOGRAPH.
 3. DURING CONSTRUCTION SEGREGATE DIFFERENT EXCAVATED MATERIALS BASED ON OBSERVED SOIL PROFILE.
 4. WHEN BACKFILLING, REPLACE MATERIALS TO MATCH EXISTING SOIL PROFILE.
- FLOODPLAIN NOTES:**
1. DATUM: NAVD88.
 2. ELEVATIONS TAKEN FROM FEMA'S FAIRFIELD COUNTY FLOOD INSURANCE STUDY EFFECTIVE JULY 8, 2013
 3. PANEL REFERENCE 09001C0506F.

MEREDITH LANE - PLAN
1" = 30'



Meredith Lane - STA: 0+00 TO 6+76

MEREDITH LANE - PROFILE
HORIZONTAL SCALE 1" = 30'
VERTICAL SCALE 1" = 6'

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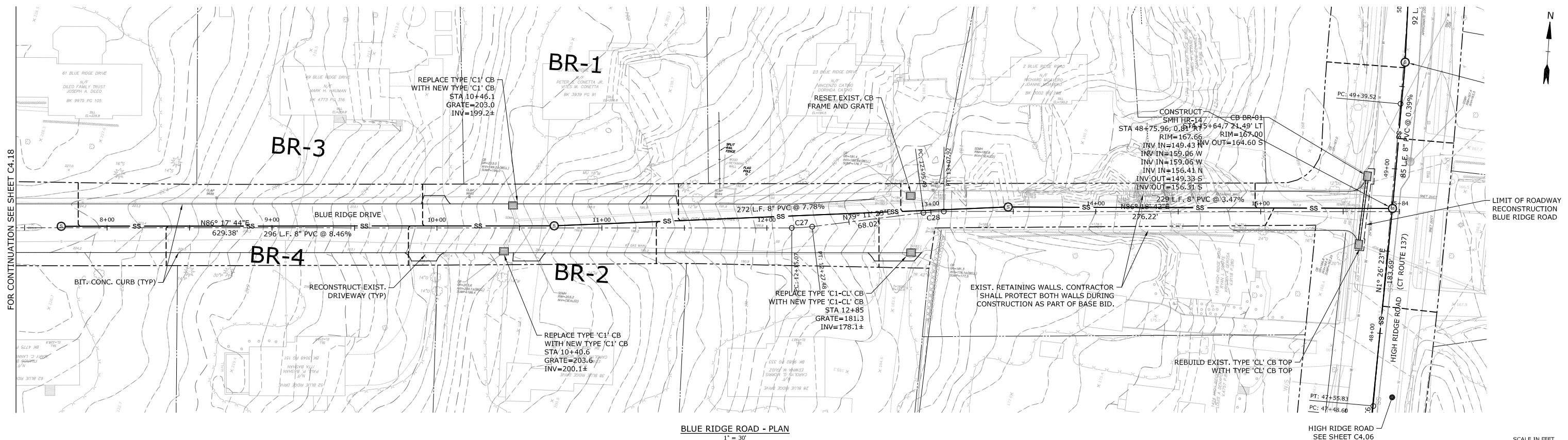


CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

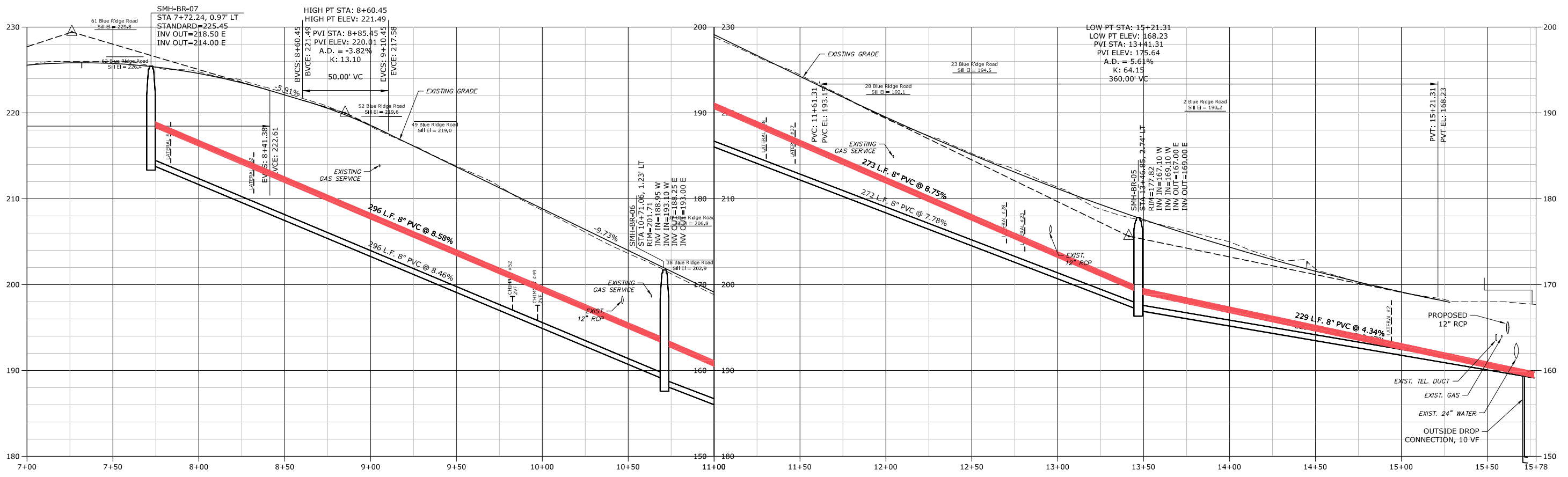
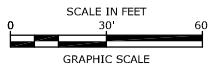
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DESIGNED BY DATE		CHECKED BY DATE	JAC	PERNA LANE SEWERS
DES. SUPV. DATE		INSP. SUPV. DATE	JWB	PLAN AND PROFILE MEREDITH LANE STA 0+00 TO 6+76
CITY ENGINEER				

SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.15

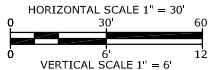
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BLUE RIDGE ROAD - PLAN
1" = 30'



BLUE RIDGE ROAD - PROFILE
HORZ: 1" = 30' VERT: 1" = 6'



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FILE NO.		REVISIONS	

SEAL

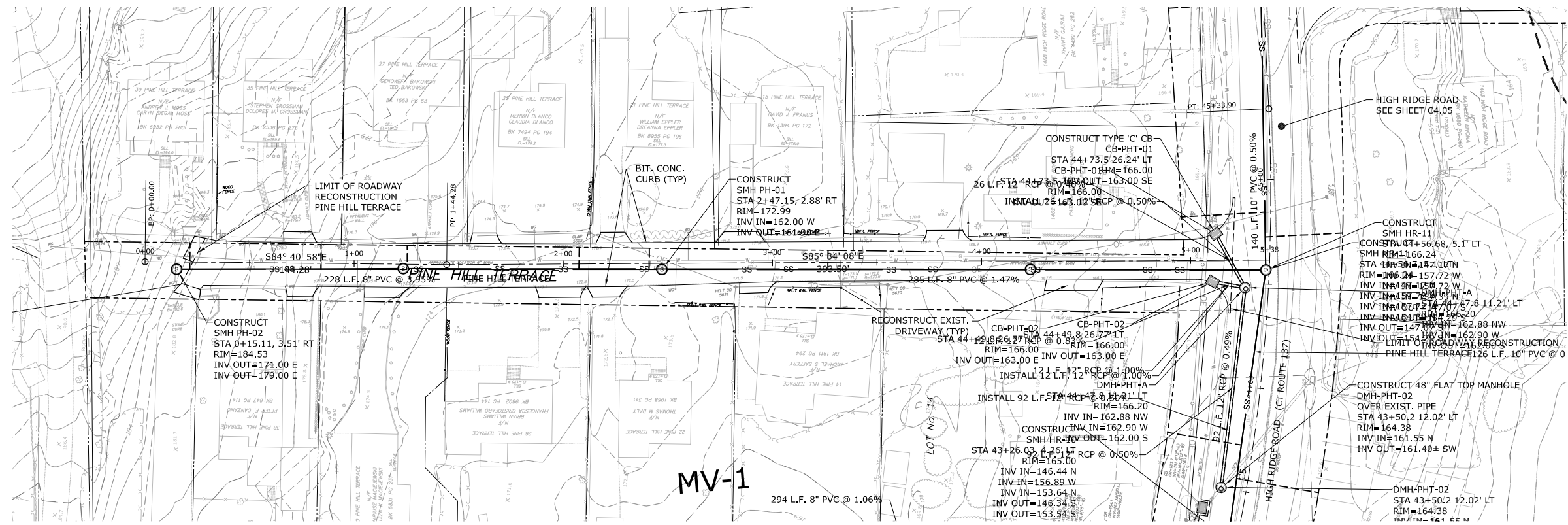


CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

SURVEYED BY RVD INC.	DATE APR 12	DRAWN BY MDS	DATE
DESIGNED BY	DATE	CHECKED BY JAC	DATE
DES. SUPV.	DATE	INSP. SUPV. JWB	DATE
CITY ENGINEER			

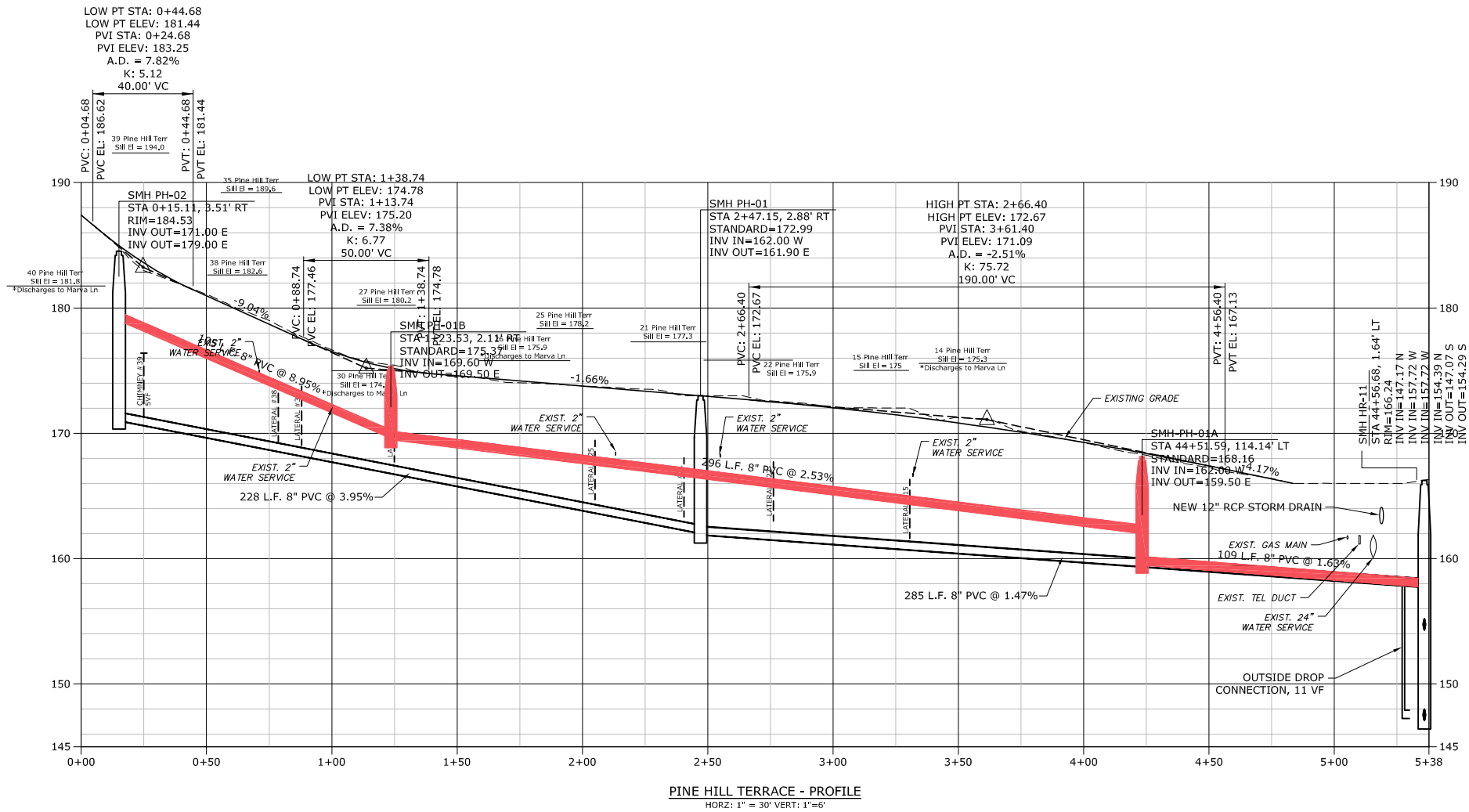
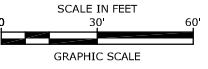
TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE BLUE RIDGE DRIVE STA 7+00 TO 15+78

SCALE:	
PROJECT NO.	S1807
SHEET NO.	C4.19

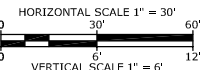


MV-1

PINE HILL TERRACE - PLAN
1" = 30'



PINE HILL TERRACE - PROFILE
HORZ: 1" = 30' VERT: 1" = 6'



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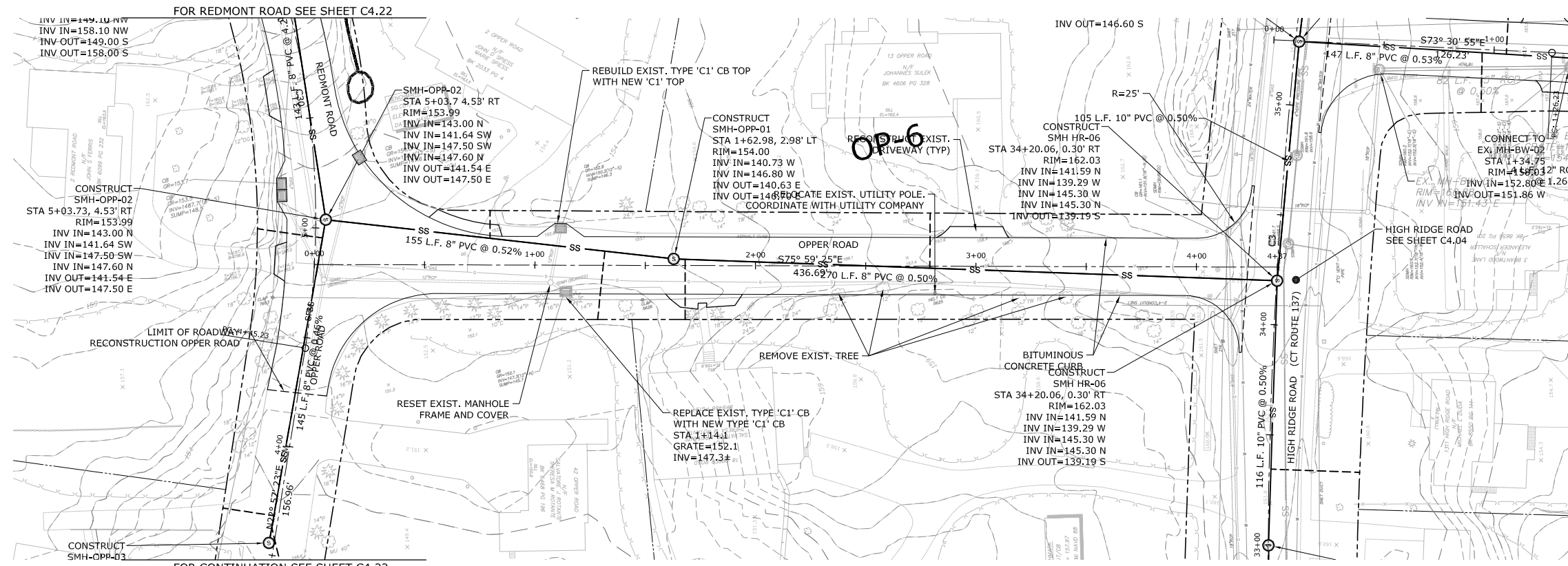


CITY OF STAMFORD
 WATER POLLUTION CONTROL AUTHORITY

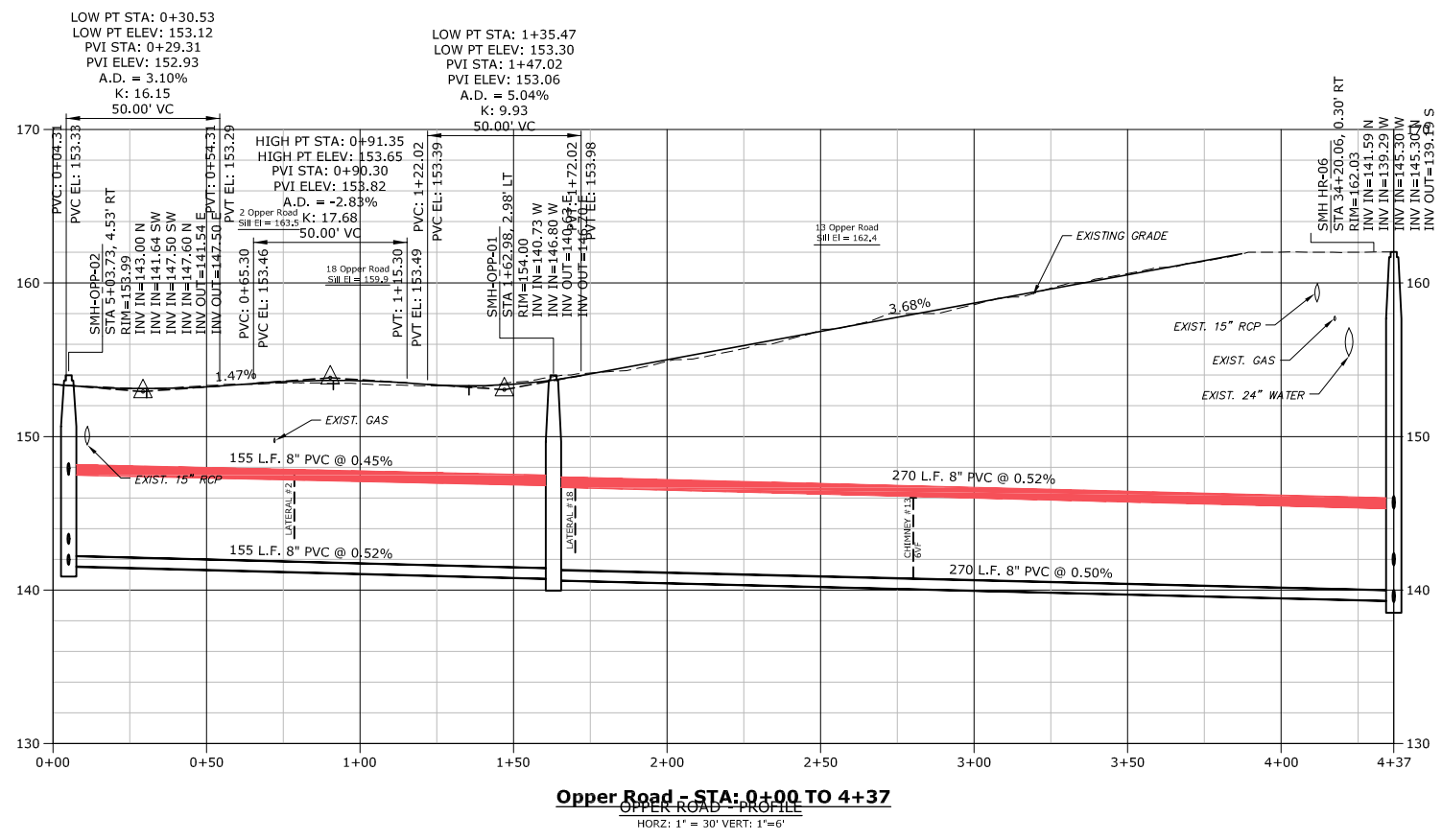
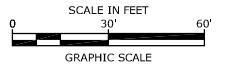
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RVD INC.	APR 12	MDS	
DESIGNED BY	DATE	CHECKED BY	DATE
JAC		JAC	
DES. SUPV.	DATE	INSP. SUPV.	DATE
		JWB	
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE PINE HILL TERRACE STA 0+00 TO 5+58

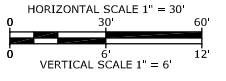
SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.20



OPPER ROAD - PLAN
1" = 30'



Opper Road - STA: 0+00 TO 4+37
OPPER ROAD - PROFILE
HORIZ: 1" = 30' VERT: 1" = 6'



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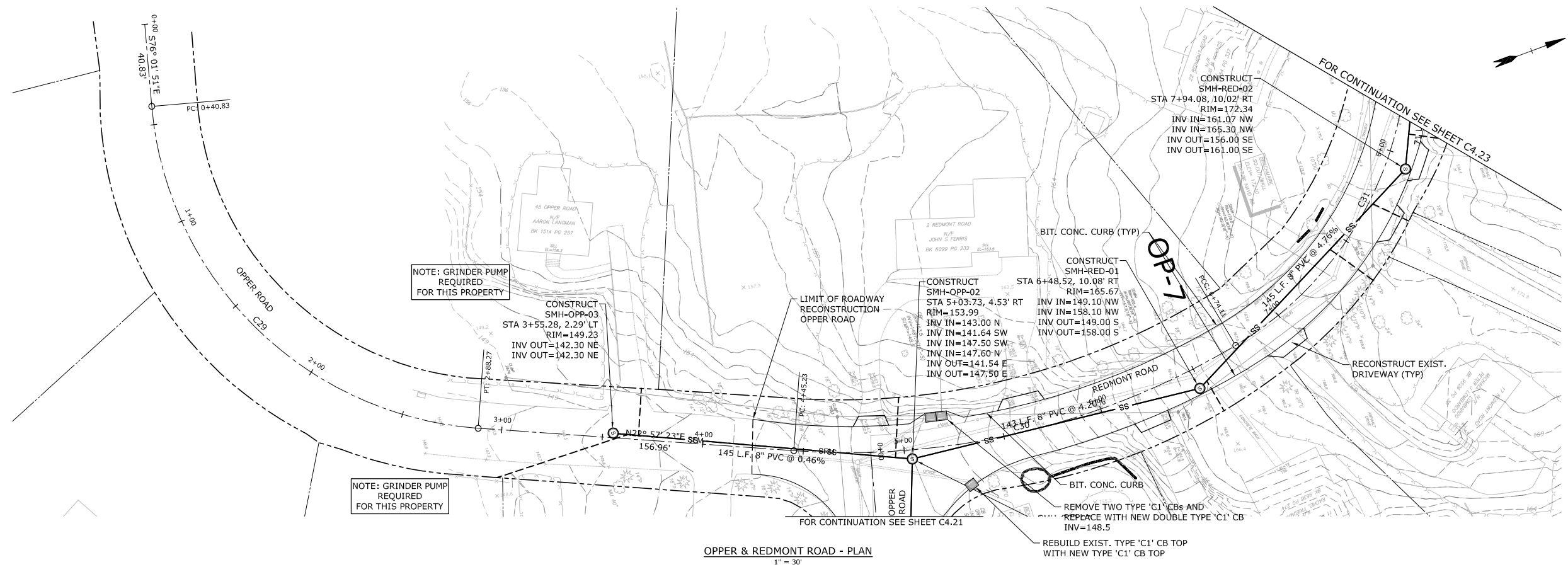


CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

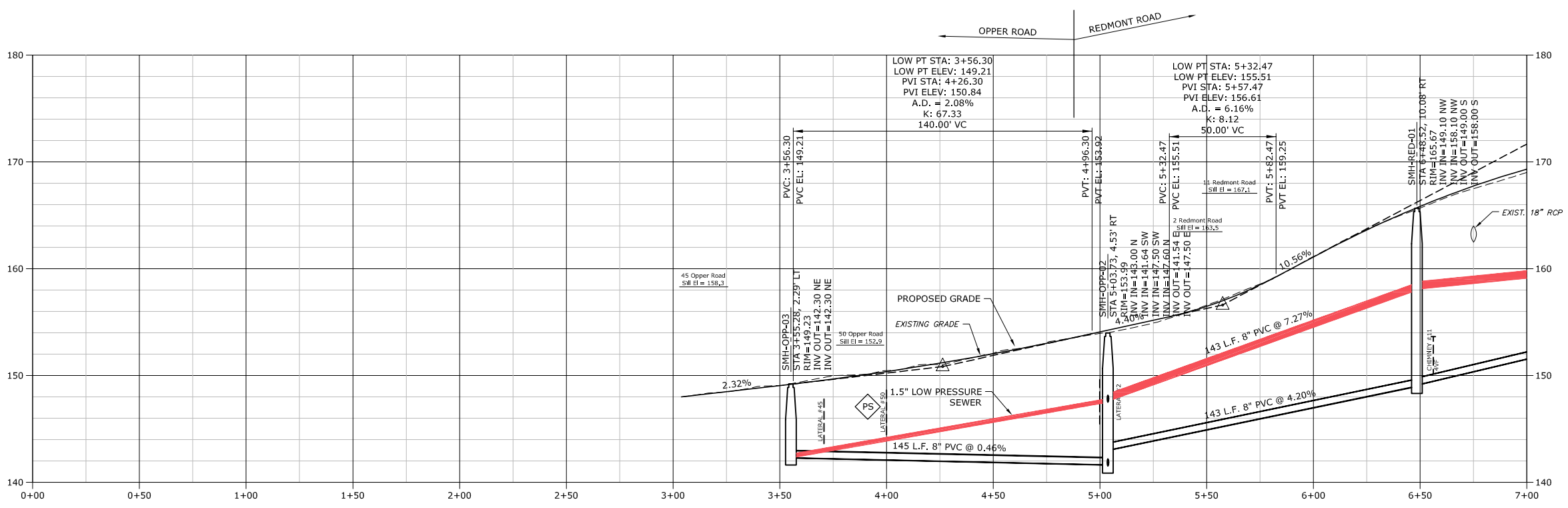
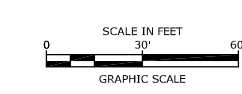
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DESIGNED BY DATE		CHECKED BY DATE	JAC
DES. SUPV. DATE		INSP. SUPV. DATE	JWB
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE OPPER ROAD STA 0+00 TO 4+37

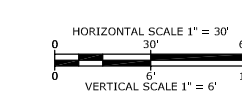
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PROJECT NO. S1807
SHEET NO. C4.21



OPPER & REDMONT ROAD - PLAN
1" = 30'



OPPER & REDMONT ROAD - PROFILE
HORZ. 1" = 30' VERT. 1" = 6'



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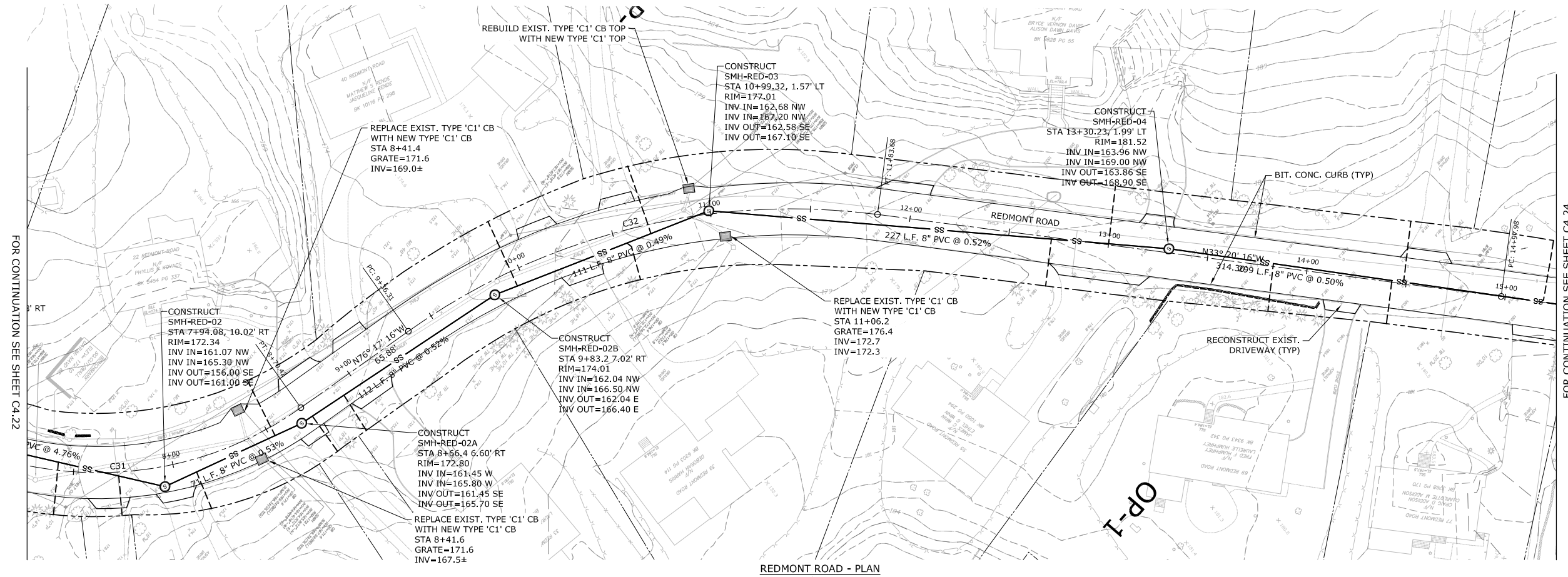


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WATER POLLUTION CONTROL AUTHORITY

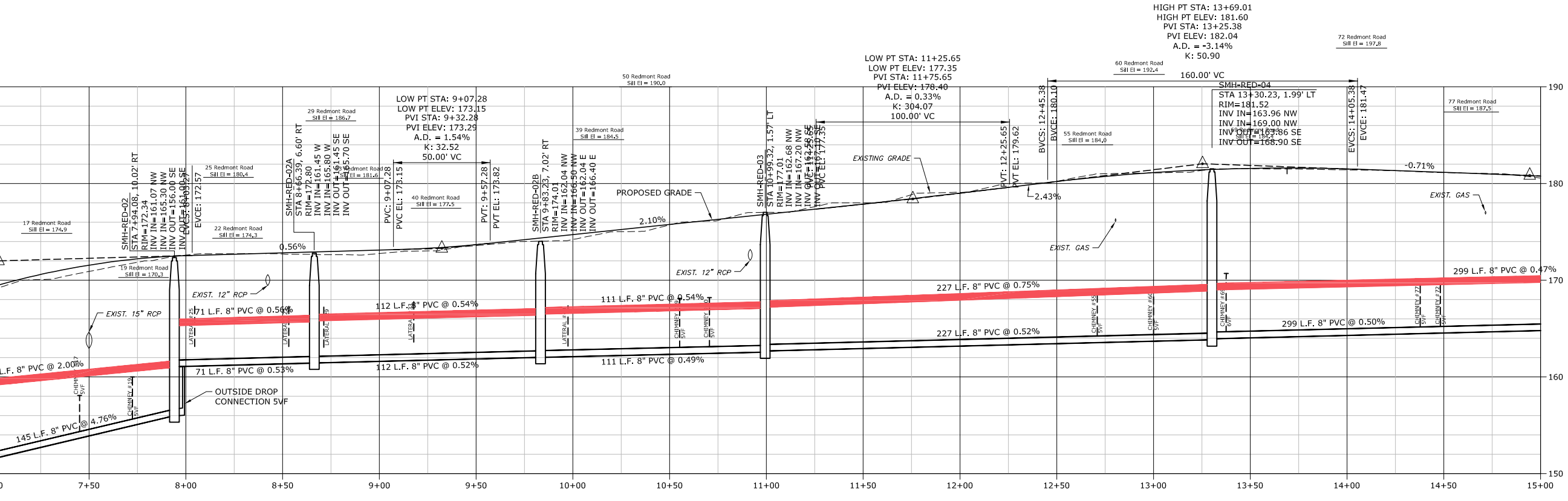
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RVD INC.	APR 12	MDS	
DESIGNED BY	DATE	CHECKED BY	DATE
		JAC	
DES. SUPV.	DATE	INSP. SUPV.	DATE
		JWB	
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE REDMONT ROAD STA 0+00 TO 7+00

SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.22

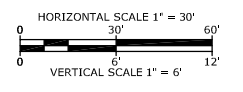


REDMONT ROAD - PLAN
1" = 30'



Redmont Road (2) - STA: 7+00 TO 15+00

REDMONT ROAD - PROFILE
HORZ: 1" = 30' VERT: 1" = 6'



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FILE NO.			

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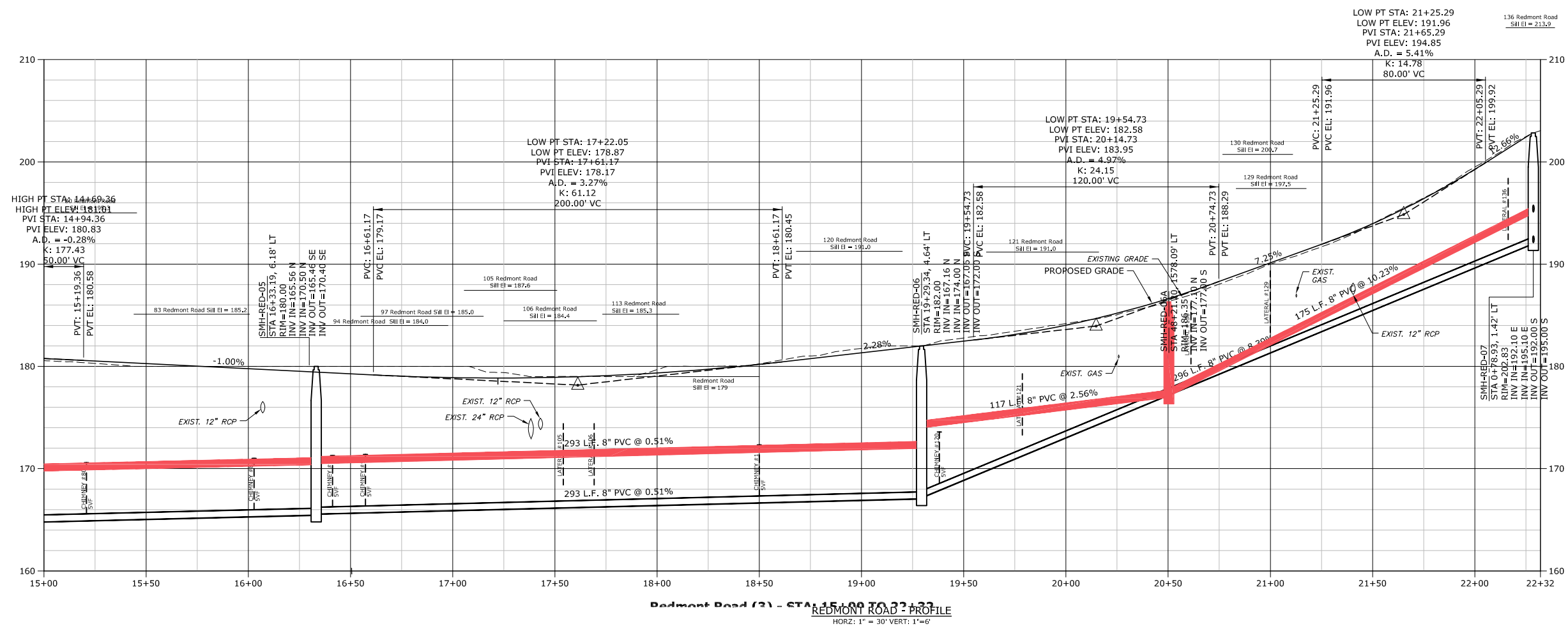
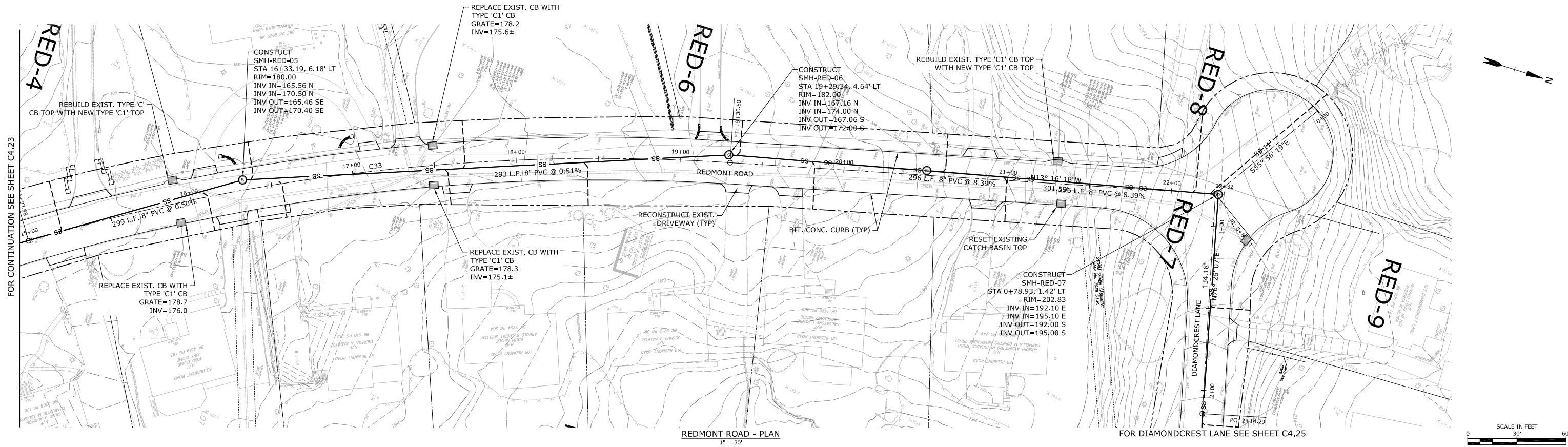


CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

SURVEYED BY DATE	RVD INC. APR 12	DRAWN BY DATE	MDS
DESIGNED BY DATE		CHECKED BY DATE	JAC
DES. SUPV. DATE		INSP. SUPV. DATE	JWB
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE REDMONT ROAD STA 7+00 TO 15+00

SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.23



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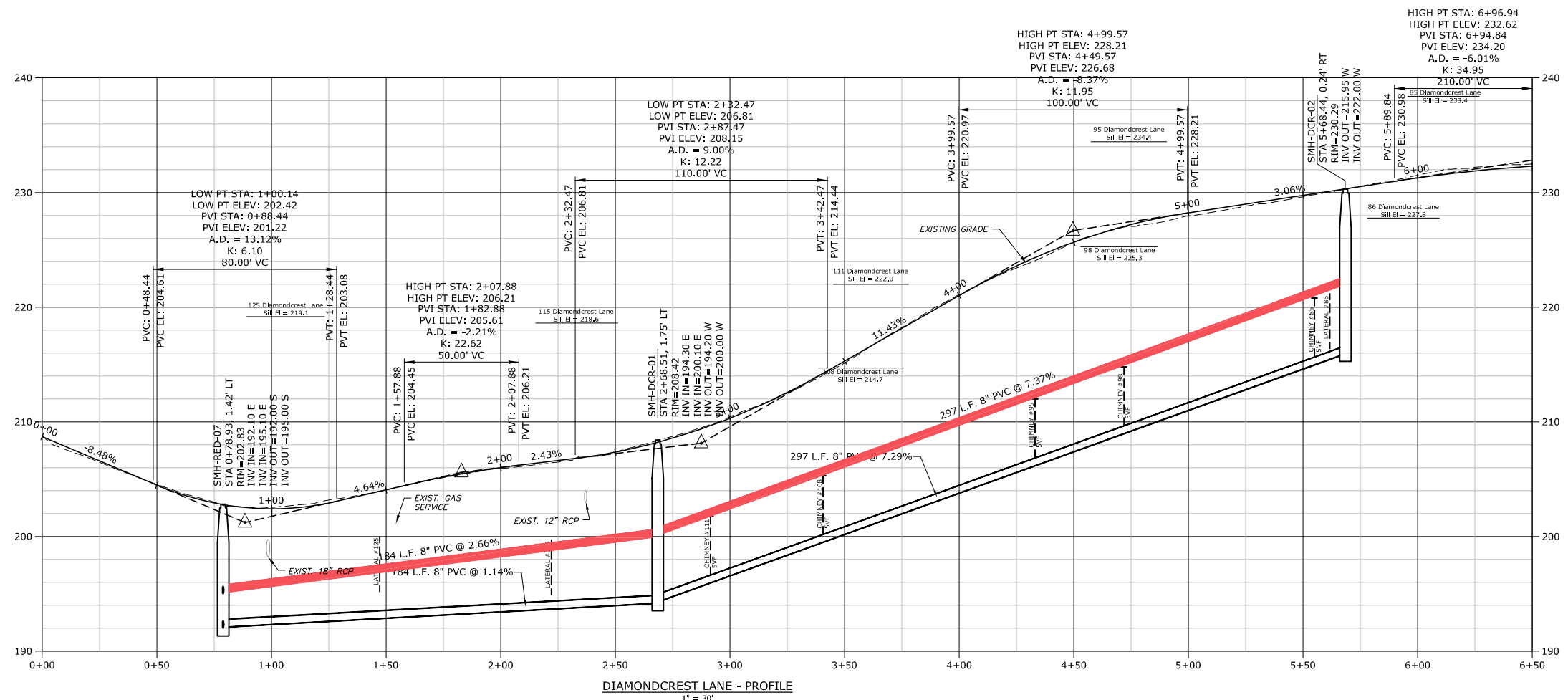
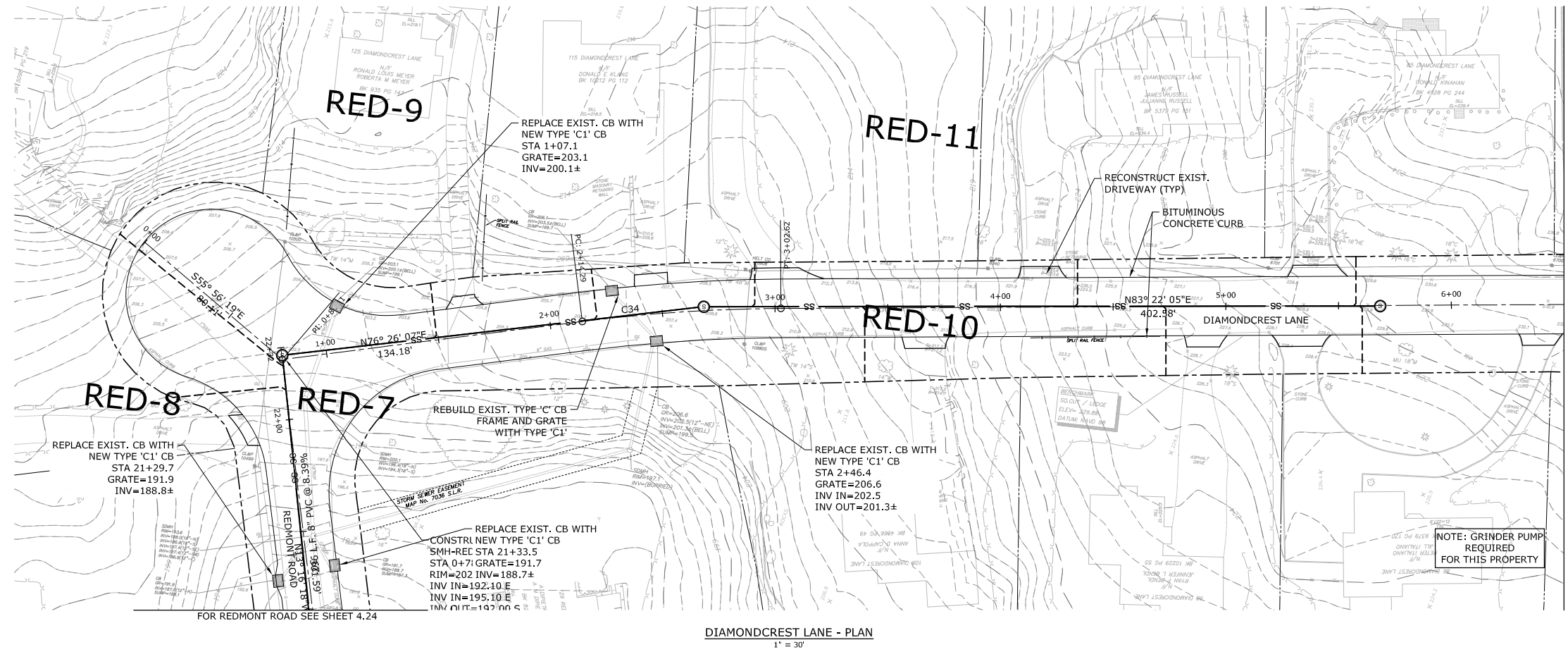
CITY OF STAMFORD
WATER POLLUTION CONTROL AUTHORITY

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DES. SUPV. DATE		INSP. SUPV. DATE	JWB
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE REDMONT ROAD STA 15+00 TO 27+27

SCALE: AS NOTED
PROJECT NO. S1807
SHEET NO. C4.24

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REVISIONS			
FILE NO.			

SEAL	
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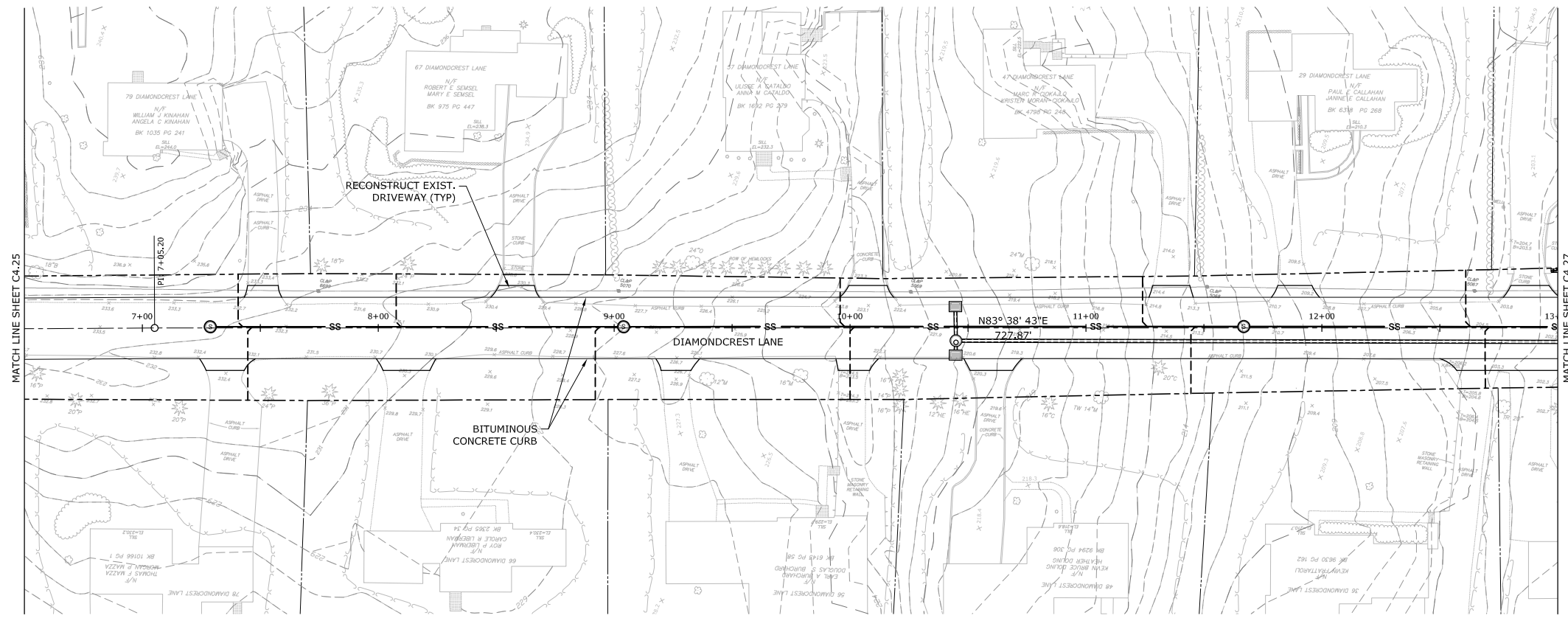


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 WATER POLLUTION CONTROL AUTHORITY

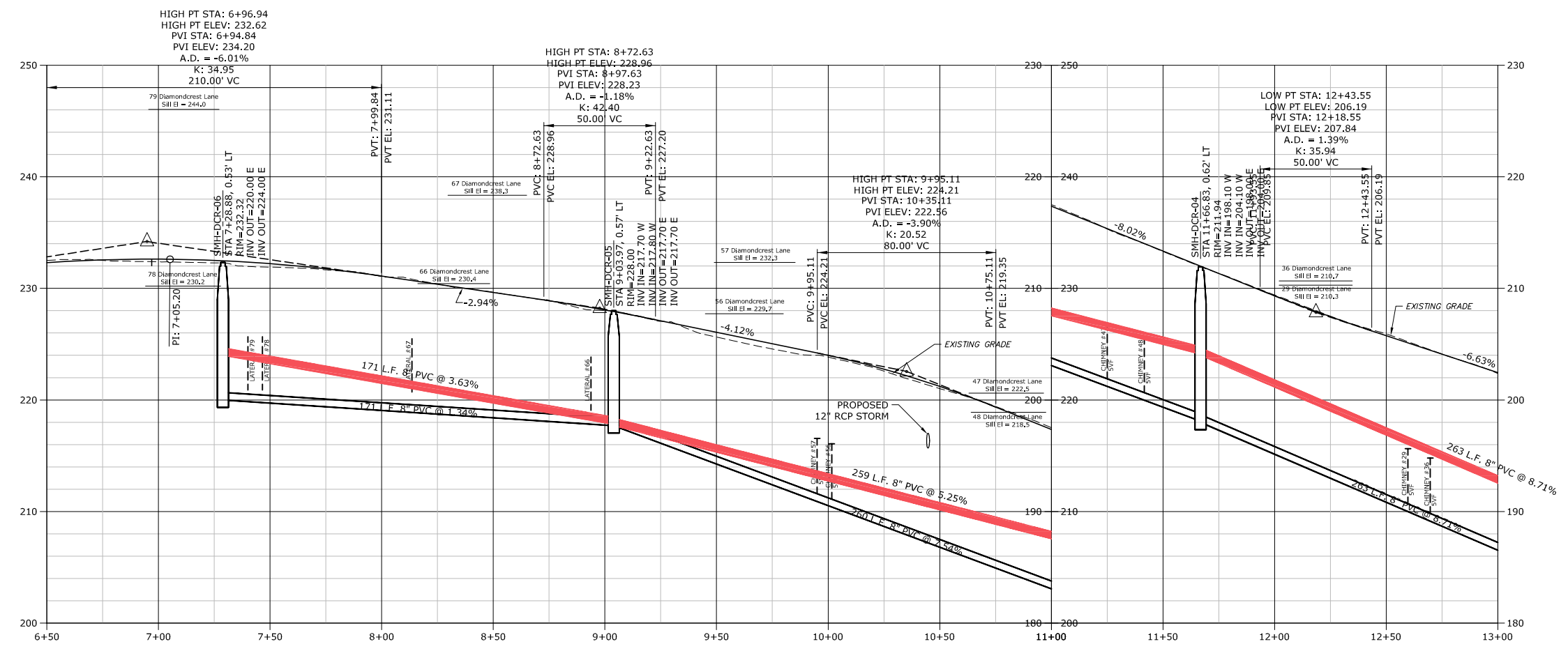
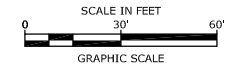
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DESCRIPTION	PLAN AND PROFILE DIAMONDCREST LANE STA 0+00 TO 6+50

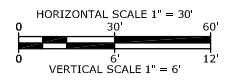
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PROJECT NO. S1807
SHEET NO. C4.25



DIAMONDCREST LANE - PLAN
1" = 30'



DIAMONDCREST LANE - PROFILE
1" = 30'



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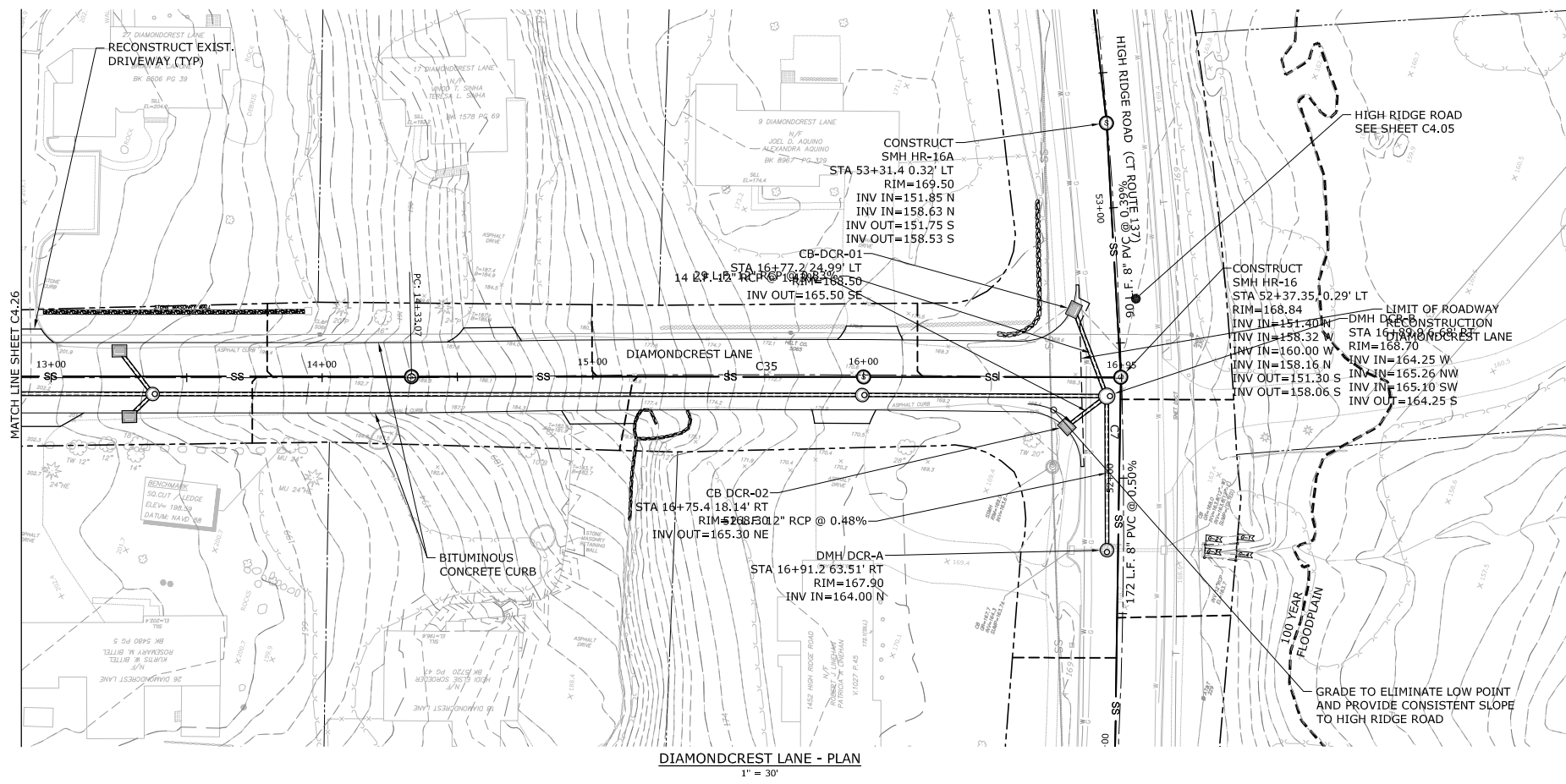


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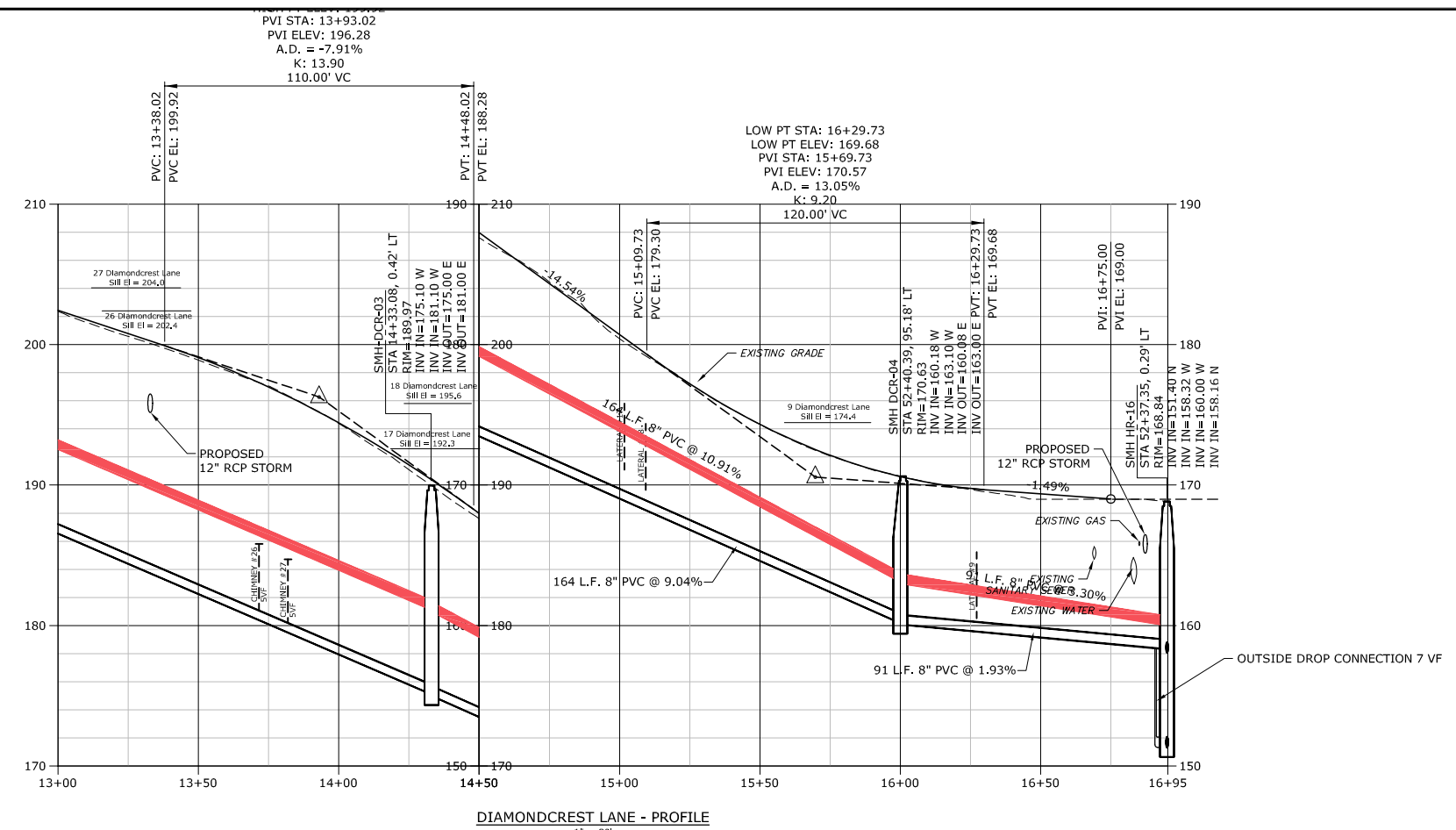
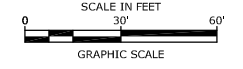
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RVD INC.	APR 12	MDS	
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		JAC	
DES. SUPV.	DATE	INSP. SUPV.	DATE
		JWB	
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE DIAMONDCREST LANE STA 6+50 TO 13+00

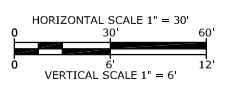
SCALE:	AS NOTED
PROJECT NO.	S1807
SHEET NO.	C4.26



DIAMONDCREST LANE - PLAN
1" = 30'



DIAMONDCREST LANE - PROFILE
1" = 30'



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RVD INC.	APR 12	MDS	
DESIGNED BY	DATE	CHECKED BY	DATE
		JAC	
DES. SUPV.	DATE	INSP. SUPV.	DATE
		JWB	
CITY ENGINEER			

TITLE	PERNA LANE SEWERS
DESCRIPTION	PLAN AND PROFILE DIAMONDCREST LANE STA 13+00 TO 16+95

SCALE:	AS NOTED
PROJECT NO.	S1807
SHEET NO.	C4.27