



Carter H. Strickland, Jr.
Commissioner

Sean McAndrew, P.E.
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P.O. Box 260
Grahamsville, NY 12740

Tel. (845) 334-7195

February 7, 2014

FEB 10 2014

Mr. John P. Ewasutyn, Chairman
Town of Newburgh Planning Board
308 Gardner Town Road
Newburgh, New York 12550

Re: New York City Department of Environmental Protection
Delaware Aqueduct Rondout-West Branch Tunnel Repair Program
West Connection Site/Shaft 5B
Dewatering Force Main Extension Site Plan Approval Modification Request
Town Project Number 2013-5¹

Dear Mr. Ewasutyn:

Please see the enclosed project description and drawing package for the proposed 20-inch diameter dewatering force main extension for the Delaware Aqueduct Rondout-West Branch Tunnel Repair Program West Connection Site/Shaft 5B. The force main is needed to carry treated process water and infiltrated groundwater encountered during tunnel construction to the Hudson River given the limited capacity of the onsite stream to accommodate large flows. The force main will be abandoned in place at the end of the program.

This concept was first introduced to the Planning Board during the initial site plan approval process and development of the Environmental Impact Statement (EIS), and the first leg of the force main, which will extend along 9W from the 5B site to the intersection of 9W and Old Post Road, was included in the approved site plans. A detailed design for the remainder of the force main from 9W to the Hudson via Old Post Road and River Road was not initially available. The full length of the force main has now been designed, and DEP would like to request a modification of the existing site plan approval to include it.

This submission is intended to introduce DEP's near-final design for the force main extension and initiate work with the Planning Board and Town staff so that a complete application for site plan modification can be submitted in the summer of 2014.

Please see the enclosed materials, including a brief project description and design drawings, for more information. DEP looks forward to the February 20, 2014 Planning Board meeting and is prepared to present the design and discuss the site plan approval modification request.

Should you have any questions or require additional information in the meantime, please do not hesitate to contact me or my staff.

Sincerely,



Sean McAndrew

cc. Michael Donnelly, Town of Newburgh Planning Board Attorney (w/ attachments)
Patrick Hines, Town of Newburgh Planning Board Engineer (w/ attachments)
Gerald Canfield, Town of Newburgh Code Compliance Officer (w/ attachments)
Dan Michaud, DEP BWS (w/o attachments)
Ted Dowey, DEP BEDC (w/o attachments)
Phil Simmons, DEP BEDC (w/o attachments)
Chris Villari, DEP BEDC (w/o attachments)

¹ The pre-application project number was 2011-15. The post-approval project number is 2013-5.

Project Description

New York City Department of Environmental Protection
Delaware Aqueduct Rondout-West Branch Tunnel Repair Program
West Connection Site/Shaft 5B
Town Project Number 2013-5¹

Dewatering Force Main Extension Site Plan Approval Modification Request

February 6, 2014

Introduction

To support the construction of the Rondout-West Branch Tunnel (RWBT) bypass, DEP has proposed the installation of a 20-inch diameter dewatering force main to carry treated process water and infiltrated groundwater encountered during tunnel construction to the Hudson River. This concept was first introduced to the Planning Board during the initial site plan approval process and development of the Environmental Impact Statement (EIS). In fact, the first leg of the force main, which extends along 9W from the 5B site to the intersection of 9W and Old Post Road, is included in the approved site plans. A detailed design for the remainder of the force main from 9W to the Hudson, however, was not initially available. The full length of the force main has now been designed, and DEP would like to request a modification of the existing site plan approval to include this extension (See Figure 1).

The force main is intended for use during tunnel construction and will be abandoned in place, filled, and grouted upon project completion. The outfall and rip rap apron on the bank of the Hudson River inlet would also be removed, and the bank will be restored to its original condition.

Construction of the force main is expected to occur in the spring and summer of 2015 in preparation for the subsequent tunnel construction.

For a description of the larger Delaware Aqueduct Rondout-West Branch Tunnel Repair Program, see "Background" below.

Force Main Need

During construction of the shaft and bypass tunnel, groundwater is expected to infiltrate. At present, a treatment system has been installed to manage up to one million gallons per day (mgd) of water from the shaft construction. This minor volume of water is being discharged, post-treatment, to the onsite stream.

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During tunnel construction, the infiltrated groundwater is expected to be on the order of 10 mgd, and the onsite stream is unable to accommodate such a large volume. Therefore, the treatment systems will be upgraded accordingly, and a force main will be needed to carry the water to the Hudson River which can accommodate the flow.

Background²

The Delaware Aqueduct is critical to the nine million people who rely on the New York City water supply, including New York City and upstate residents. Repairing the Rondout-West Branch portion of the Delaware Aqueduct is required in order to maintain this critical piece of the City's water supply infrastructure. DEP is responsible for ensuring the safe and reliable transmission of drinking water from the watershed to consumers in sufficient quantity to meet all present and future water demands. The RWBT is a critical component of DEP's Delaware water supply system, which provides fifty percent of the City's supply, and is currently leaking, in total, between 10 and 35 million gallons per day in two critical areas in the vicinity of the Wawarsing and Roseton crossings.

Shutting down the Delaware Aqueduct during the bypass tunnel connection and repair of the leak in Wawarsing may require DEP to supplement its water sources, manage demand and make provisions for changes in the distribution system during the shutdown period.

Once ready with all of the necessary provisions for reliable drinking water during the shutdown, DEP will undertake the bypass tunnel connection to the existing Delaware Aqueduct. During the connection period, certain inspection and repairs from within the RWBT will be made to the remainder of the existing tunnel in areas outside the bypassed section, particularly those sections located in the Town of Wawarsing, which need repair.

Construction of the bypass tunnel and shaft sites began with construction of the shafts, which started in 2013 and will be complete in 2015. Construction of the bypass tunnel will begin in 2015 and be connected in 2020. It is anticipated that up to 15 months would be needed to complete the bypass connection and to undertake the inspection and repair of the RWBT, expected to occur sometime in 2021.

Force Main Route

As can be seen in the design drawings and Figure 1, the newly designed portion of force main extends along the southern edge of Old Post Road adjacent to Cedar Hill Cemetery from 9W to the intersection with River Road. It then extends down River Road to Tax Lot No 9-1-18.1, a

² Resolution of Approval: Site Plan for New York City Department of Environmental Protection [Delaware Aqueduct Rondout-West Branch Tunnel Repair Program] Project # 2011-15, certified July 9, 2012. (Note: The pre-application project number was 2011-15. The post-approval project number is 2013-5.)

narrow parcel owned by CCI Roseton LLC (formerly owned by Dynege) that stretches through the northeastern corner of the cemetery. From the cemetery, the force main would continue through the CCI Roseton property to the west of River Road (Tax Lot No. 9-1-25.1), crossing River Road onto the eastern portion of that same CCI Roseton parcel. The force main would then run to the east of and roughly parallel to River Road, crossing into an adjacent parcel to the south also owned by CCI Roseton (Tax Lot No. 9-1-29). The force main would eventually curve to the east and then south to the Hudson River inlet on the southern border of that property.³

Zoning

The force main route is located largely in the “AR, Agricultural” and “I, Industrial” zones which encompass Cedar Hill Cemetery and CCI Roseton. However, the initial portion along Old Post Road is located in a “B, Business” zone with a “LHI, Light and Heavy Equipment and Recreational Vehicle Sales, Service, and Repair” overlay.⁴

Forthcoming Information

DEP will work with the Planning Board to provide additional information required to modify the existing Shaft 5B site plan approval. For instance, erosion and sediment control plans, traffic control plans, and additional tree survey information, among other items as listed in the “Town of Newburgh Planning Board Application Package for Subdivisions, Site Plans, Lot Line Changes, and Special Exception Use Permits Procedures and Requirements” will be provided, as appropriate and required by the Planning Board.

³ Town of Newburgh Tax Year 2013, Tax Map 334600, Orange County Tax Map Department, New York

⁴ Town of Newburgh, Orange County, New York, Official Zoning Map, Orange County Planning Department, October 22, 2012.

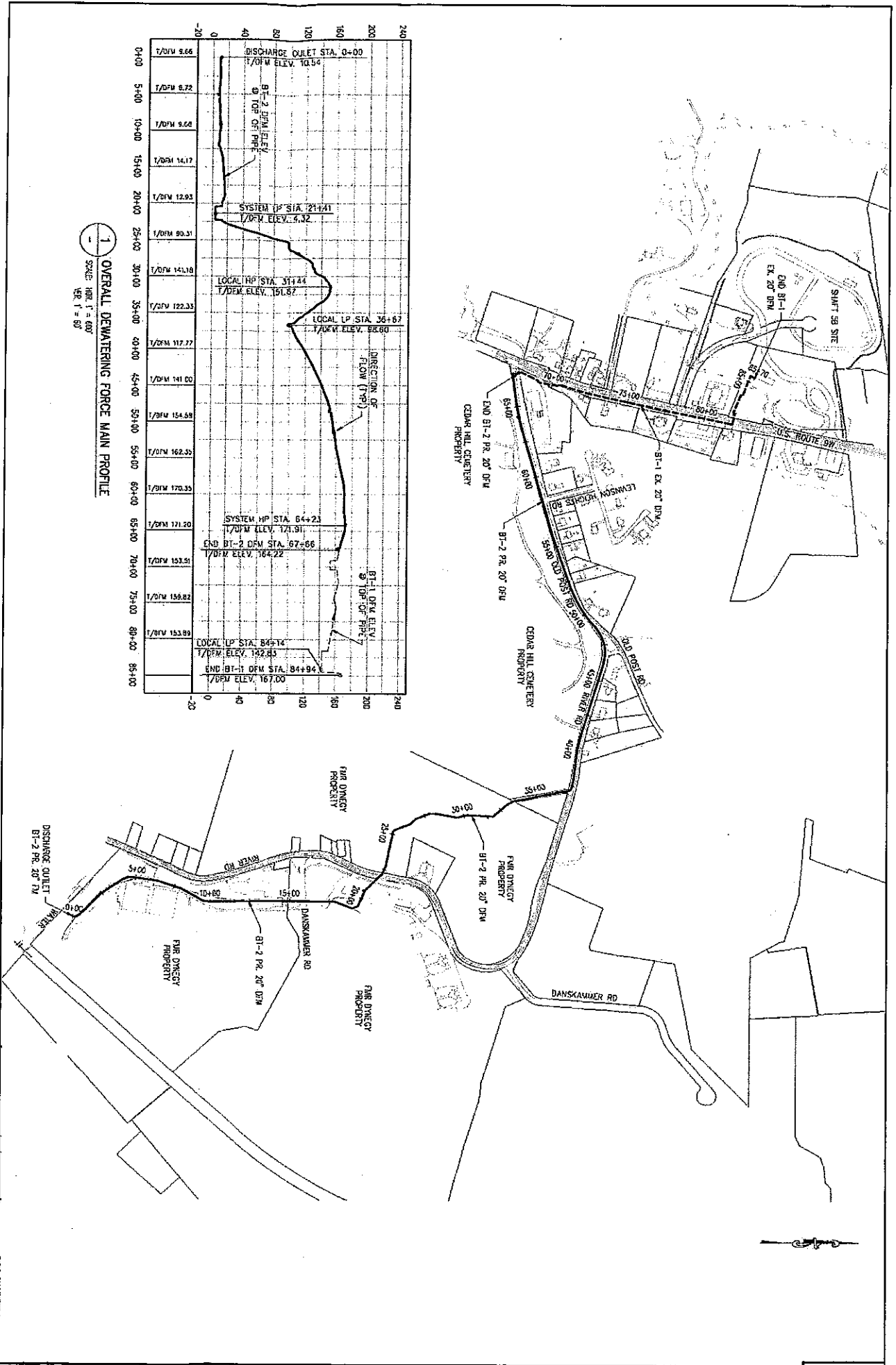


Figure 1: Proposed Force Main Route



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February 7, 2014

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Re: New York City Department of Environmental Protection
Delaware Aqueduct Rondout-West Branch Tunnel Repair Program
West Connection Site/Shaft 5B
Bell Property Preliminary Conceptual Design
Town Project Number 2013-5¹

Dear Mr. Ewasutyn:

Please see the enclosed drawing package that represents the preliminary design for the proposed expansion of DEP's Rondout West Branch Tunnel Repair Program Shaft 5B site onto the adjacent lot to the north, Tax Lot 8-1-22.2, the parcel currently owned by Mr. William E. Bell, Robert Bell, Jr., and Charles A. Perella (i.e., the Bell property). DEP has proposed the expansion into the Bell property for the purposes of placement of material from bypass tunnel excavation, process water treatment, and construction storage and laydown area. Beyond efficiency benefits for DEP, the use of the Bell property for these purposes would reduce the traffic associated with transporting excavated material from the bypass tunnel on Route 9W as the material would be handled solely on the internal, larger, combined site.

The intention of this submission is to introduce the Town of Newburgh Planning Board to DEP's conceptual design for the Bell property and solicit feedback from the Planning Board in order to address comments, concerns, and regulatory obligations as the design progresses. DEP would like to continue to work with the Planning Board and Town staff through the spring of this year, as appropriate, to advance the design in accordance with Planning Board and DEP needs so that a complete application for site plan modification can be made in the summer of 2014.

Please see the enclosed materials, including a brief project description and preliminary design drawings, for more information. DEP looks forward to the February 20, 2014 Planning Board meeting, and is prepared to present the preliminary design and discuss the site plan approval modification request.

Should you have any questions or require additional information in the meantime, please do not hesitate to contact me or my staff.

Sincerely,



Sean McAndrew

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Phil Simmons, DEP BEDC (w/o attachments)
Chris Villari, DEP BEDC (w/o attachments)

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FEB 10 2014

Project Description

New York City Department of Environmental Protection
Delaware Aqueduct Rondout-West Branch Tunnel Repair Program
West Connection Site/Shaft 5B
Town Project Number 2013-5¹

Bell Property Preliminary Conceptual Design February 6, 2014

Introduction

To better support the construction of the Rondout-West Branch Tunnel (RWBT) bypass, DEP has proposed expanding the existing Shaft 5B site by adding the 30.8-acre Bell property to the site plan. The additional space would be used for the following major purposes (see “Background” below for a description of the larger project).

- Placement of excavated material, on the order of 325,000 cubic yards, from the construction of the bypass tunnel;
- Location of settling ponds and treatment facilities to properly treat process water. This would include groundwater drained from the material from the deep rock excavation; and;
- Supplemental storage and laydown to facilitate the bypass tunnel construction, primarily for tunnel lining segments.

The use of the Bell property for these purposes would provide three major benefits to the project and, most importantly, reduce the traffic associated with the project, as follows.

- Streamline incoming construction material storage and handling;
- Provide for more effective process water treatment; and
- Reduce truck traffic by transporting excavated material within the site (i.e., from Shaft 5B to the Bell property) and removing these trucks from traffic on Route 9W.

After construction of the bypass tunnel and completion of the connection to the aqueduct, the Bell property would be returned to a state similar to its existing condition, albeit with a modified topography due to the placement of material. At present, the final landscaping plan has not been developed, but it is DEP’s intention to work with the Town of Newburgh to create a scheme that would mirror and complement the landscaping plan for the 5B site, incorporating the 60-foot

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buffer of existing vegetation that would be maintained along the perimeter of the site throughout construction.

Background²

The Delaware Aqueduct is critical to the nine million people who rely on the New York City water supply, including New York City and upstate residents. Repairing the Rondout-West Branch portion of the Delaware Aqueduct is required in order to maintain this critical piece of the City's water supply infrastructure. DEP is responsible for ensuring the safe and reliable transmission of drinking water from the watershed to consumers in sufficient quantity to meet all present and future water demands. The RWBT is a critical component of DEP's Delaware water supply system, which provides fifty percent of the City's supply, and is currently leaking, in total, between 10 and 35 million gallons per day in two critical areas in the vicinity of the Wawarsing and Roseton crossings.

Shutting down the Delaware Aqueduct during the bypass tunnel connection and repair of the leak in Wawarsing may require DEP to supplement its water sources, manage demand and make provisions for changes in the distribution system during the shutdown period.

Once ready with all of the necessary provisions for reliable drinking water during the shutdown, DEP will undertake the bypass tunnel connection to the existing Delaware Aqueduct. During the connection period, certain inspection and repairs from within the RWBT will be made to the remainder of the existing tunnel in areas outside the bypassed section, particularly those sections located in the Town of Wawarsing, which need repair.

Construction of the bypass tunnel and shaft sites began with construction of the shafts, which started in 2013 and will be complete in 2015. Construction of the bypass tunnel will begin in 2015 and be connected in 2020. It is anticipated that up to 15 months would be needed to complete the bypass connection and to undertake the inspection and repair of the RWBT, expected to occur sometime in 2021.

Location

The 30.8-acre Bell property (Tax Lot 8-1-22.2, currently owned by Mr. William E. Bell, Robert Bell, Jr., and Charles A. Perella) is located immediately north of and adjacent to Tax Lot 8-1-19.1, the lot comprising the majority of the existing Shaft 5B site. To the east, the Bell property is bordered by Tax Lots 8-1-21.12 and 8-21.22. A narrow portion of the lot also extends to Route 9W. To the north, the site is bounded by a Central Hudson Gas and Electric (CHGE) utility right

² Resolution of Approval: Site Plan for New York City Department of Environmental Protection [Delaware Aqueduct Rondout-West Branch Tunnel Repair Program] Project # 2011-15, certified July 9, 2012. (Note: The pre-application project number was 2011-15. The post-approval project number is 2013-5.)

of way (8-1-31.12). And to the west, the site is adjacent to five lots, including 8-1-85.2, 8-1-85.3, 8-1-85.4, 8-1-4.22, and 8-1-5.1.³

Zoning

The Bell property is zoned “AR, Agricultural” with a “Professional Office Overlay (O)” covering a small portion along the eastern boundary of the site.⁴ Note that it is DEP’s understanding that with the addition of the Bell property, the full, combined site would be considered a public utility, as the Shaft 5B site is currently categorized with regard to zoning and use variances.

Construction Use and Final Disposition

As indicated in the introduction, the Bell property would be used for additional storage and laydown, water treatment and, primarily, for placement of excavated material from the bypass tunnel construction. Activities associated with these purposes would occur largely within the interior of the site and within a 60-foot buffer of existing vegetation, except along the southern border with the existing Shaft 5B site. After construction is completed, the Bell property would be returned to a state similar to its existing condition, albeit with a modified topography due to the filling activity. At present, the final landscaping plan has not been developed, but it is DEP’s intention to work with the Town of Newburgh to develop a scheme that would mirror and complement the landscaping plan for the 5B site as well as integrating the 60-foot buffer.

Forthcoming Information

As the design progresses, DEP will work with the Planning Board to provide additional information required to modify the existing Shaft 5B site plan approval. For instance, a Stormwater Pollution Prevention Plan (SWPPP), a detailed construction description, an environmental assessment,⁵ and additional information as listed in the “Town of Newburgh Planning Board Application Package for Subdivisions, Site Plans, Lot Line Changes, and Special Exception Use Permits Procedures and Requirements” would be provided, as appropriate.

³ Town of Newburgh Tax Year 2013, Tax Map 334600, Orange County Tax Map Department, New York

⁴ Town of Newburgh, Orange County, New York, Official Zoning Map, Orange County Planning Department, October 22, 2012.

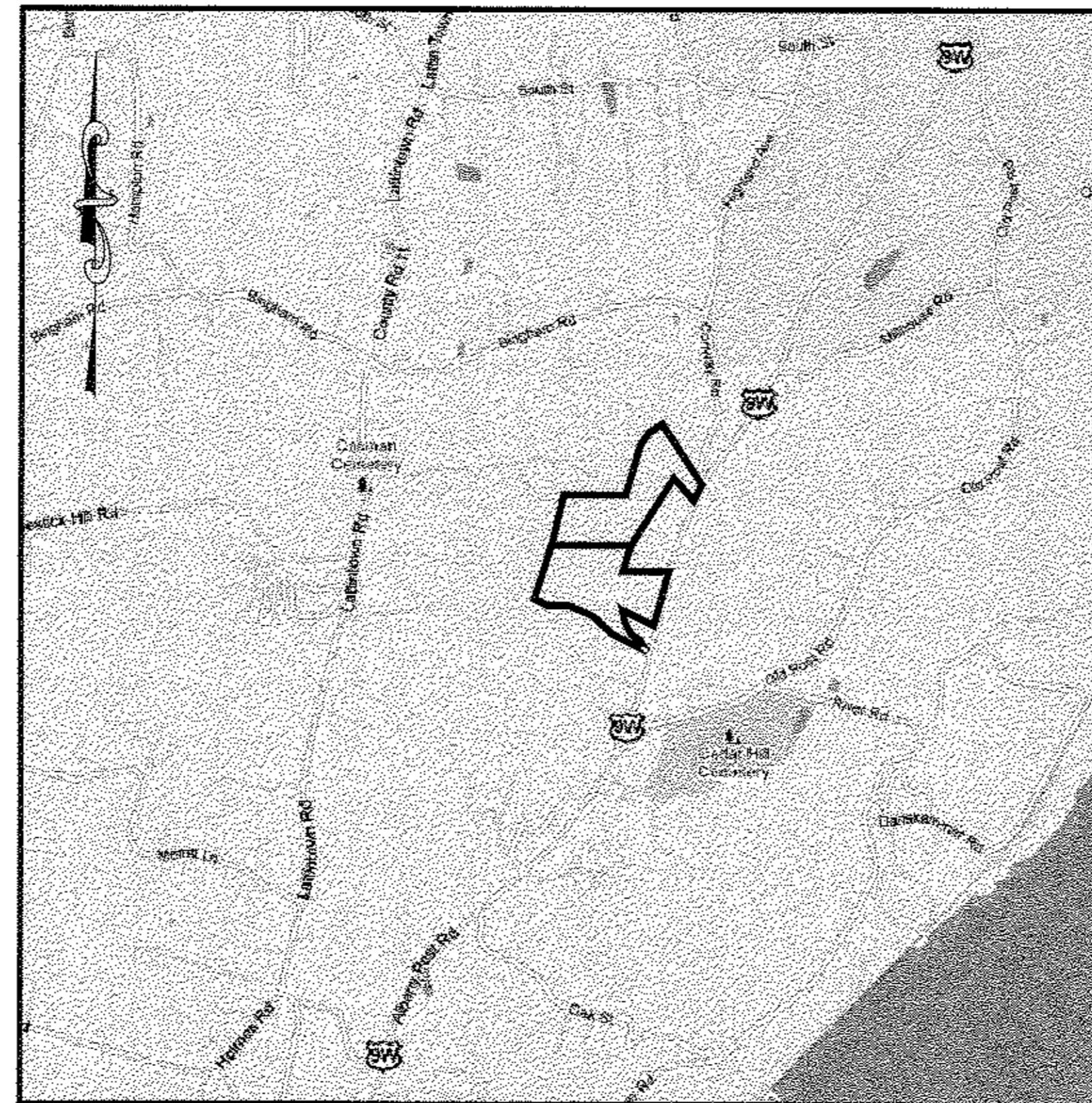
⁵ The environmental review will include cumulative transportation, air, noise, greenhouse gas, and historic resources assessments for use of both the current site and the proposed Bell property, among others.

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**RONDOUT-WEST BRANCH BYPASS TUNNEL
SHAFT 5B THE TOWN OF NEWBURGH, NY**

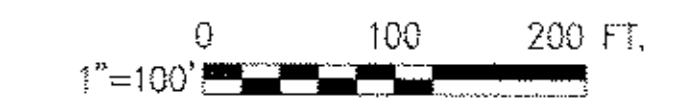
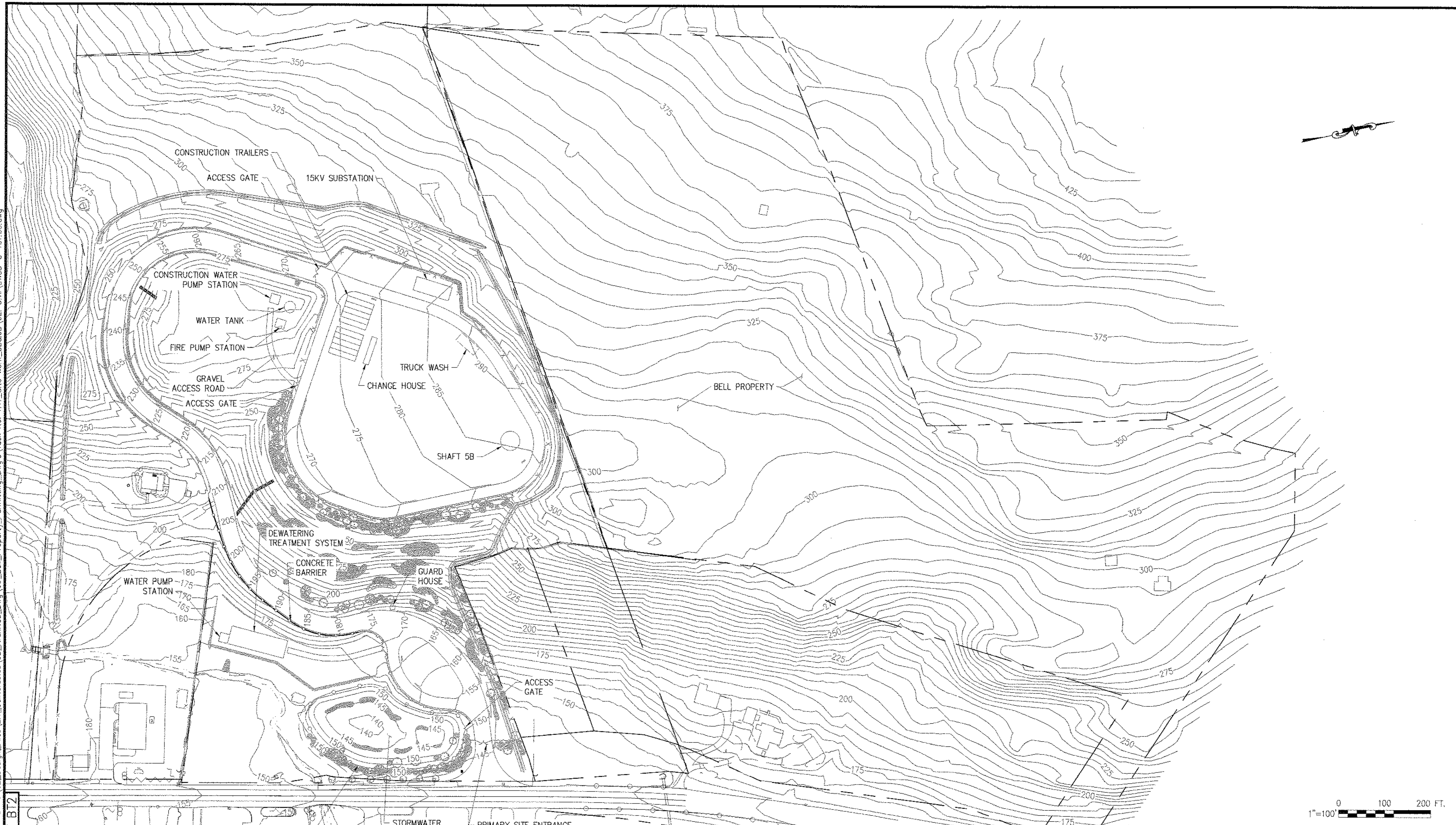
DATE: FEBRUARY 10, 2014
WEST CONNECTION SITE
SITE PLAN MODIFICATION:
BELL PROPERTY CONCEPTUAL DESIGN
TOWN PROJECT #2013-5



LOCATION PLAN — WEST CONNECTION SITE

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1"=2000'

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**FORCE MAIN SITE PLAN
MODIFICATION 2013-5**
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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SCALE ACCORDINGLY

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NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY:
GM
CHECKED BY:
FP
DESIGN LEAD:
GM
SECTION CHIEF:
FP

DRAWN BY:
GM
NYC Water & Future
Environmental Protection



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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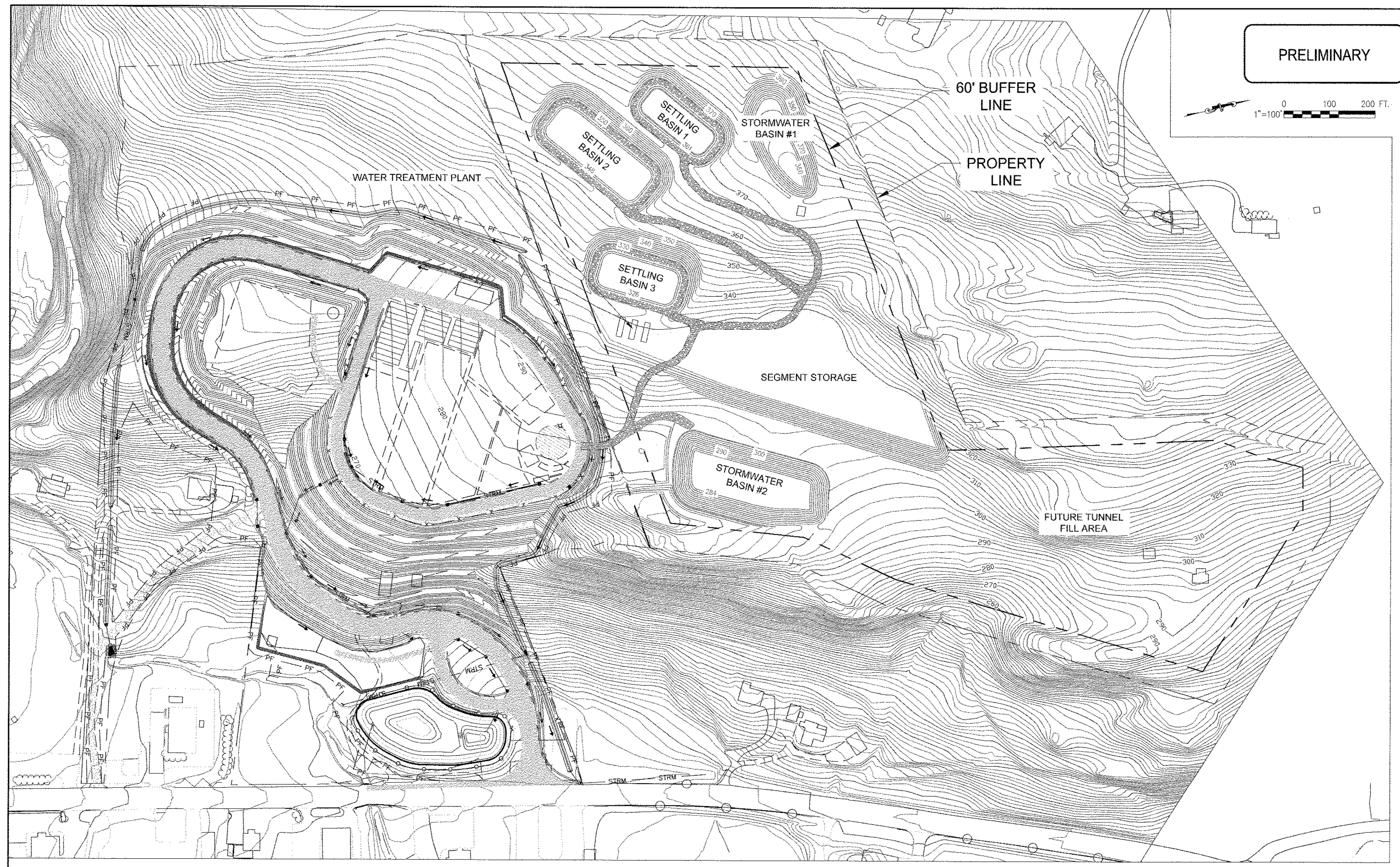
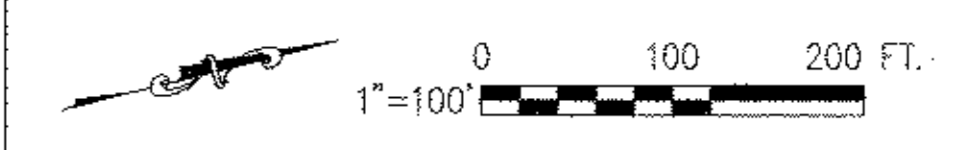
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**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT**

SHAFT 5B
OVERALL EXISTING SITE PLAN

DATE: 11/22/2013
SCALE: 1"=100'
SHEET NO:
1 OF 453
DRAWING NO.
SW5B-C-101.00

PRELIMINARY



JACOBS ASSOCIATES
Engineers/Consultants

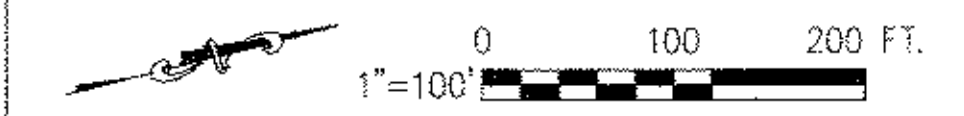
NYC
Environmental
Protection

**RONDOUT-WEST BRANCH BYPASS PROJECT
NEW YORK STATE
BELL PROPERTY SITE DESIGN
DEVELOPMENT OF SETTLING BASINS AND ROAD**

DATE
02/04/2014
FIGURE
2

N:\SS\2\1\CDP\BEP\Project\Map\CDP\BELL\0214\04_14\000 - Bell Property Site Design.dwg, 2/4/2014 4:52:38 PM

PRELIMINARY



60' BUFFER LINE

PROPERTY LINE



RONDOUT-WEST BRANCH BYPASS PROJECT
NEW YORK STATE
BELL PROPERTY SITE DESIGN
SITE RESTORATION PLAN

DATE

02/04/2014

FIGURE

3

JACOBS ASSOCIATES
Engineers/Consultants

NYC
Environmental
Protection

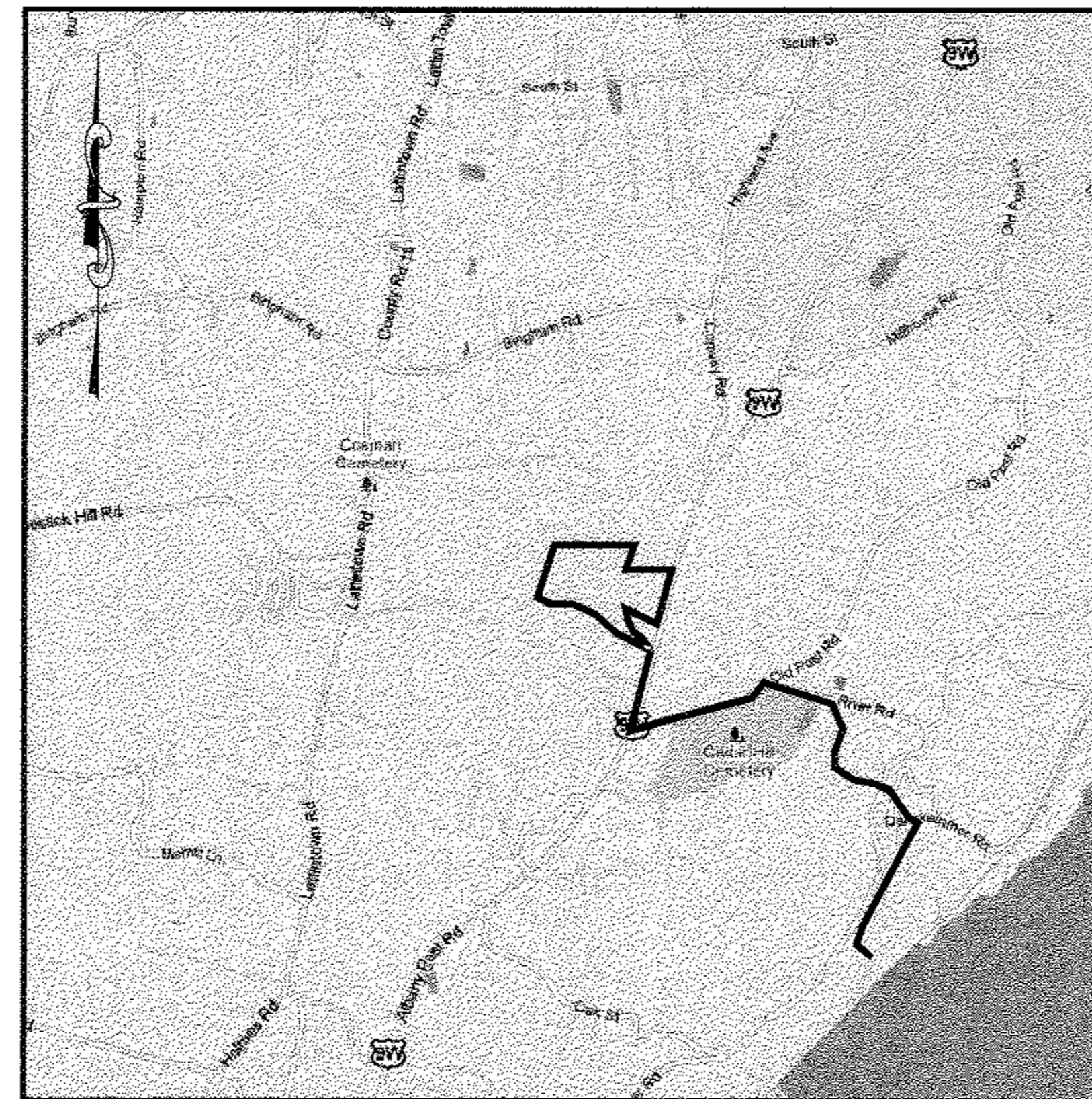
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**RONDOUT-WEST BRANCH BYPASS TUNNEL
SHAFT 5B THE TOWN OF NEWBURGH, NY**

DATE: FEBRUARY 10, 2014
WEST CONNECTION SITE
SITE PLAN MODIFICATION:
DEWATERING FORCE MAIN
TOWN PROJECT #2013-5

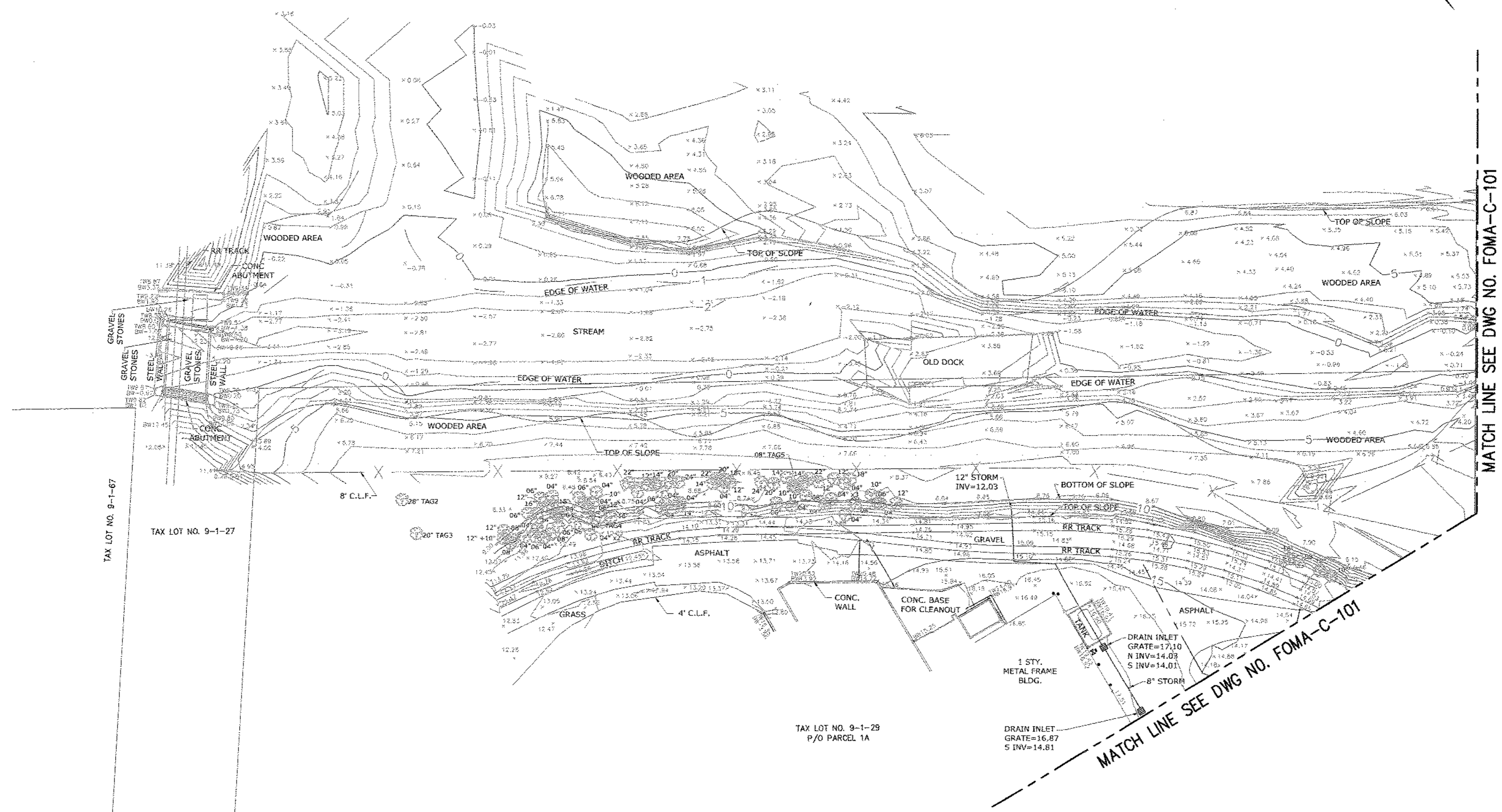


LOCATION PLAN – WEST CONNECTION SITE

SCALE: 1" = 2000' (APPROX)
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1"=2000'

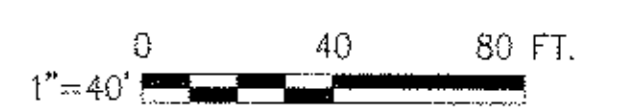
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MATCH LINE SEE DWG NO. FOMA-C-101

MATCH LINE SEE DWG NO. FOMA-C-101

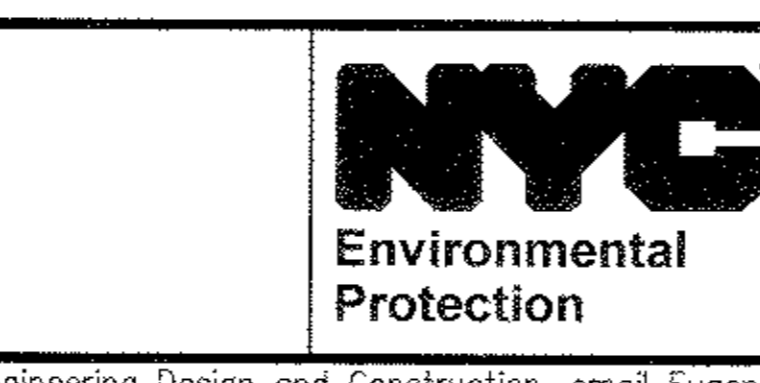


BELL PROPERTY
SITE DESIGN
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	
DESIGN LEAD: GM	
SECTION CHIEF: FP	



PROJECT MANAGER
TED DOWEY

CHIEF, TUNNEL DESIGN

BURJOR KHARIVALA

DIRECTOR, IN HOUSE DESIGN

PATRICK O'CONNOR

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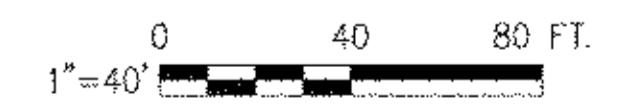
RONDOT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT
FORCE MAIN
EXISTING TOPOGRAPHIC SURVEY
SHEET 1 OF 8

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-100.00

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Task No. 1.13_Force_Main_5B_02_Civil_FOMA-C-101.00.dwg
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CONTRACT BT2



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SITE DESIGN**
DATE SUBMITTED: 02/10/2014

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NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	NYC Water Future Environmental Protection
DESIGN LEAD: GM	
SECTION CHIEF: FP	



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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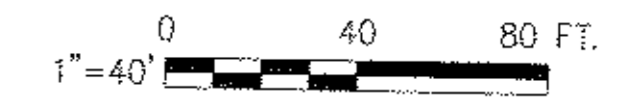
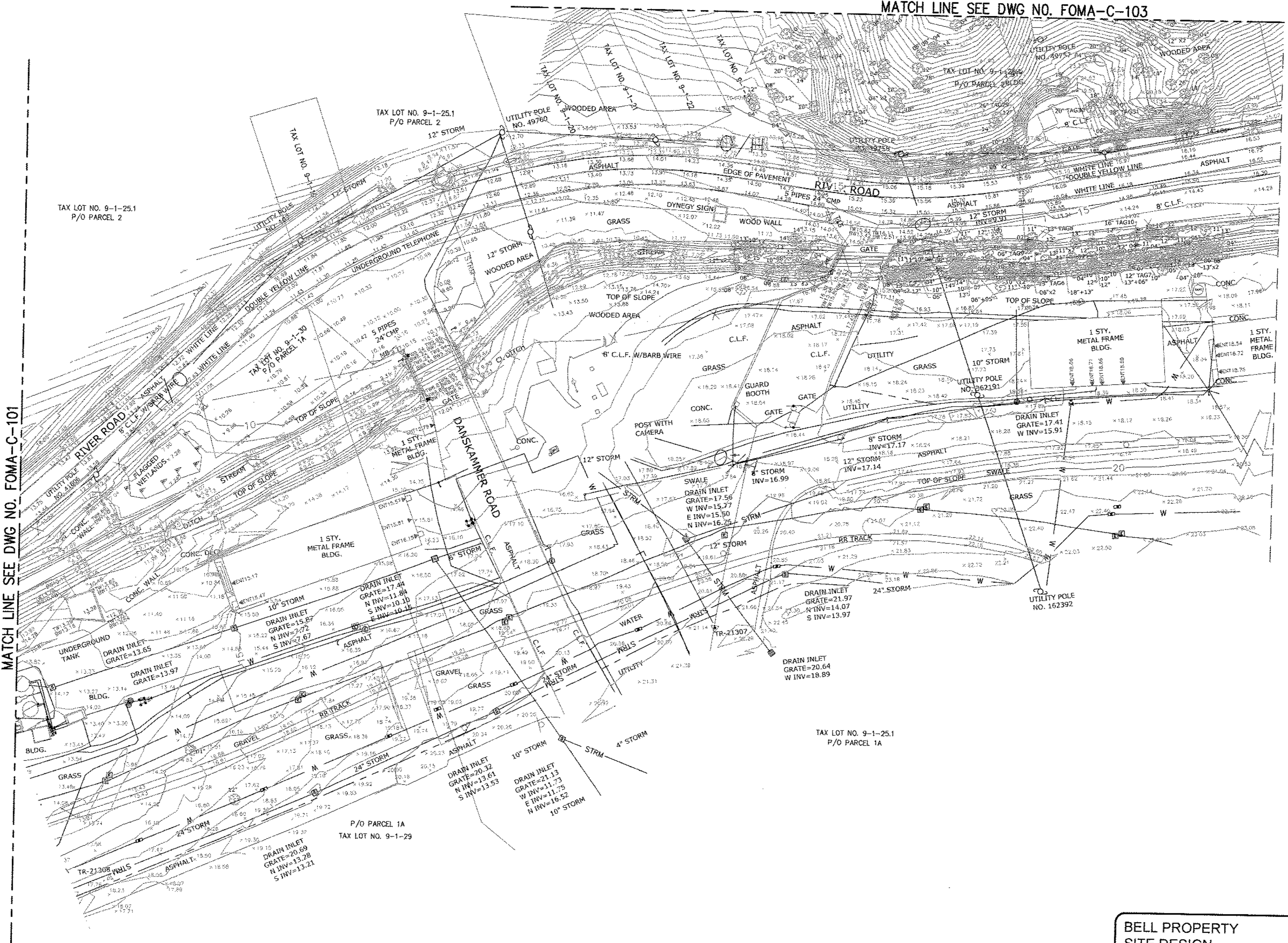
**NEW YORK CITY
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BUREAU OF ENGINEERING DESIGN & CONSTRUCTION**
96-05 HORACE HARDING EXPRESSWAY 5th FLOOR
CORONA, NEW YORK 11368
www.nyc.gov/dep

**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT
FORCE MAIN
EXISTING TOPOGRAPHIC SURVEY
SHEET 2 OF 8**

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-101.00

MATCH LINE SEE DWG NO. FOMA-C-103

MATCH LINE SEE DWG NO. FOMA-C-101



Lost Saved By & Date: Eugend, Tuesday, February 04, 2014 and Date Plotted: Tuesday, February 04, 2014
 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BDC_22x34_Full_Size.ctb
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 CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	NYC Water & Future Environmental Protection
DESIGN LEAD: GM	
SECTION CHIEF: FP	



PROJECT MANAGER
 TED DOWDY
 CHIEF, TUNNEL DESIGN
 BURJOR KHARIVALA
 DIRECTOR, IN HOUSE DESIGN
 PATRICK O'CONNOR

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BELL PROPERTY SITE DESIGN
 DATE SUBMITTED: 02/10/2014

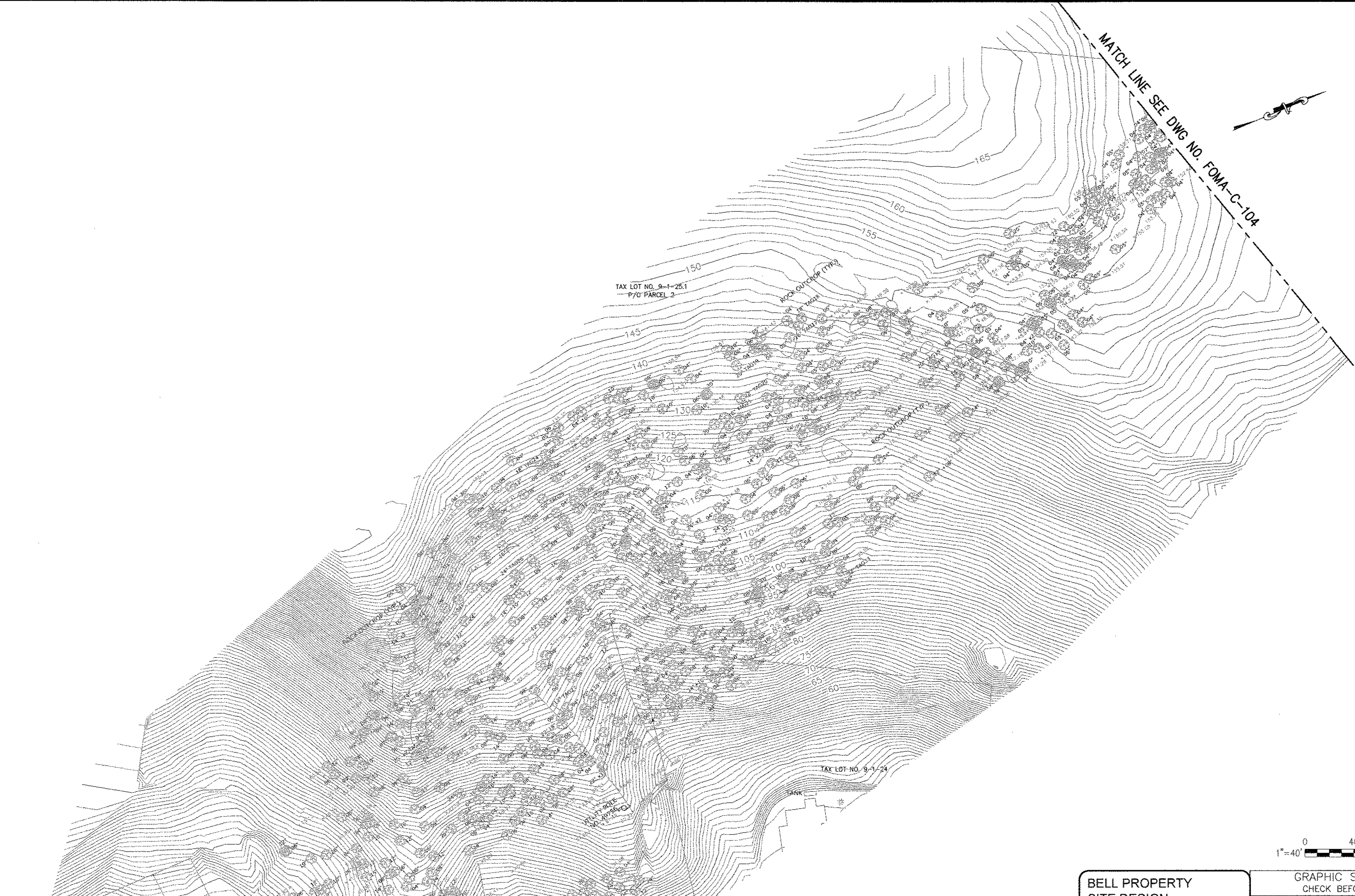
GRAPHIC SCALES
 CHECK BEFORE USE
 IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT. SCALE ACCORDINGLY

RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAARSING REPAIRS, DELAWARE AQUEDUCT
FORCE MAIN
 EXISTING TOPOGRAPHIC SURVEY
 SHEET 3 OF 8

DATE: 11/22/2013
 SCALE: 1/8"=1'-0"
 SHEET NO:
 1 OF 453
 DRAWING NO.
FOMA-C-102.00

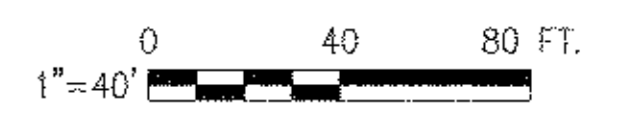
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CONTRACT BT2



MATCH LINE SEE DWG NO. FOMA-C-104

MATCH LINE SEE DWG NO. FOMA-C-102



**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

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CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY:
GM
CHECKED BY:
FP
DESIGN LEAD:
GM
SECTION CHIEF:
FP

DRAWN BY:
GM
NYC Water Future
Environmental Protection



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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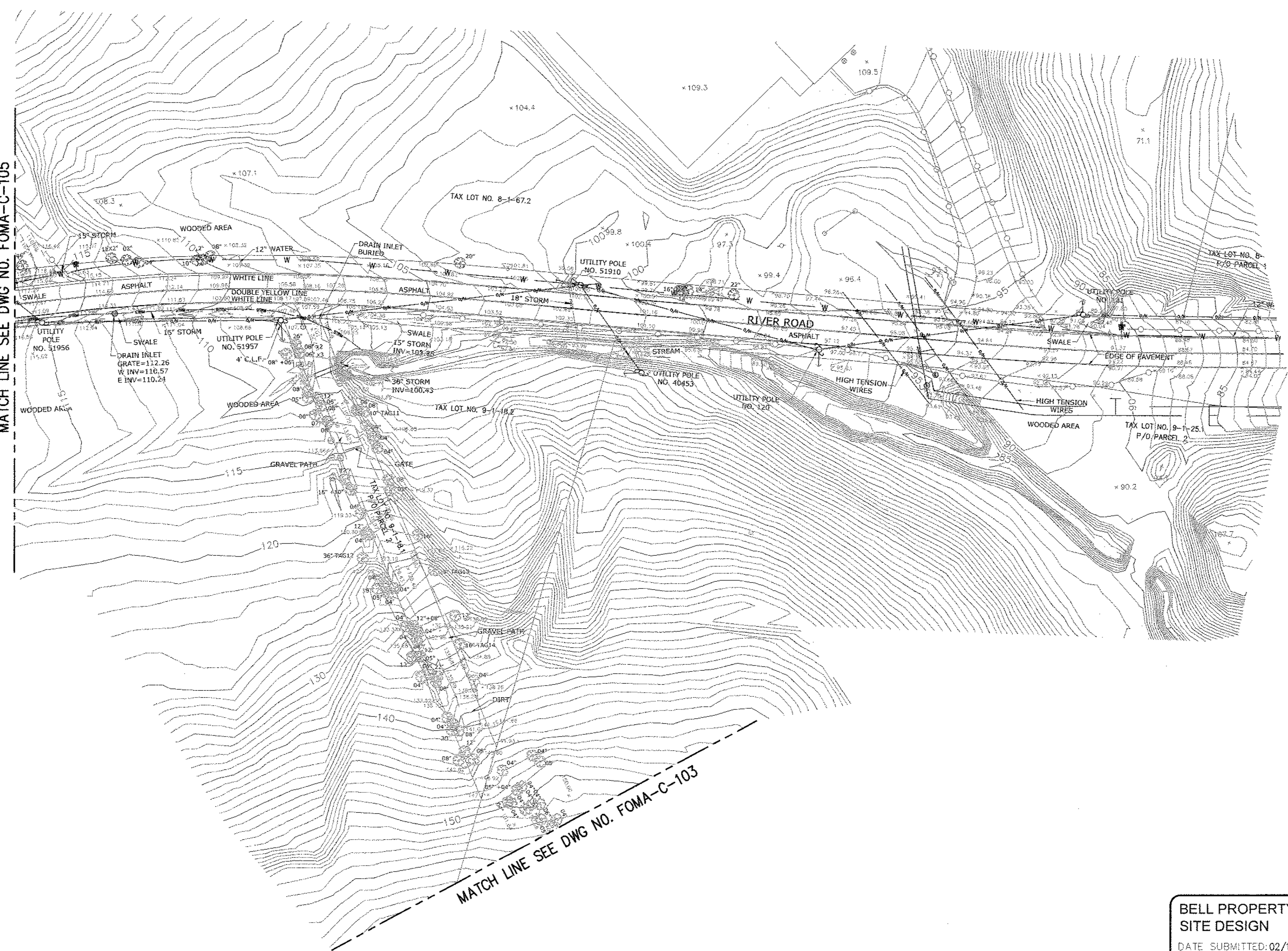
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**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT
FORCE MAIN
EXISTING TOPOGRAPHIC SURVEY
SHEET 4 OF 8**

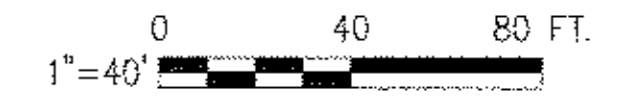
DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-103.00

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MATCH LINE SEE DWG NO. FOMA-C-105



MATCH LINE SEE DWG NO. FOMA-C-103



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SITE DESIGN**
DATE SUBMITTED: 02/10/2014

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 Paper Size: A3 (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BDDC_22x34_Full_Size.ctb
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CONTRACT B12

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY:
GM

CHECKED BY:
FP

DESIGN LEAD:
GM

SECTION CHIEF:
FP

DRAWN BY:
GM

NYC Water Future
Environmental Protection



PROJECT MANAGER
TED DOWEY

CHIEF, TUNNEL DESIGN

BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN

PATRICK O'CONNOR

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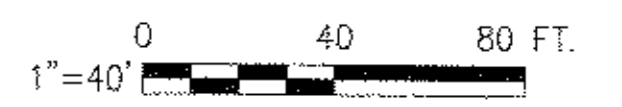
**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT**
FORCE MAIN
EXISTING TOPOGRAPHIC SURVEY
SHEET 5 OF 8

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-104.00



MATCH LINE SEE DWG NO. FOMA-C-104

MATCH LINE SEE DWG NO. FOMA-C-106



**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	NYC Water & Future Environmental Protection
DESIGN LEAD: GM	
SECTION CHIEF: FP	



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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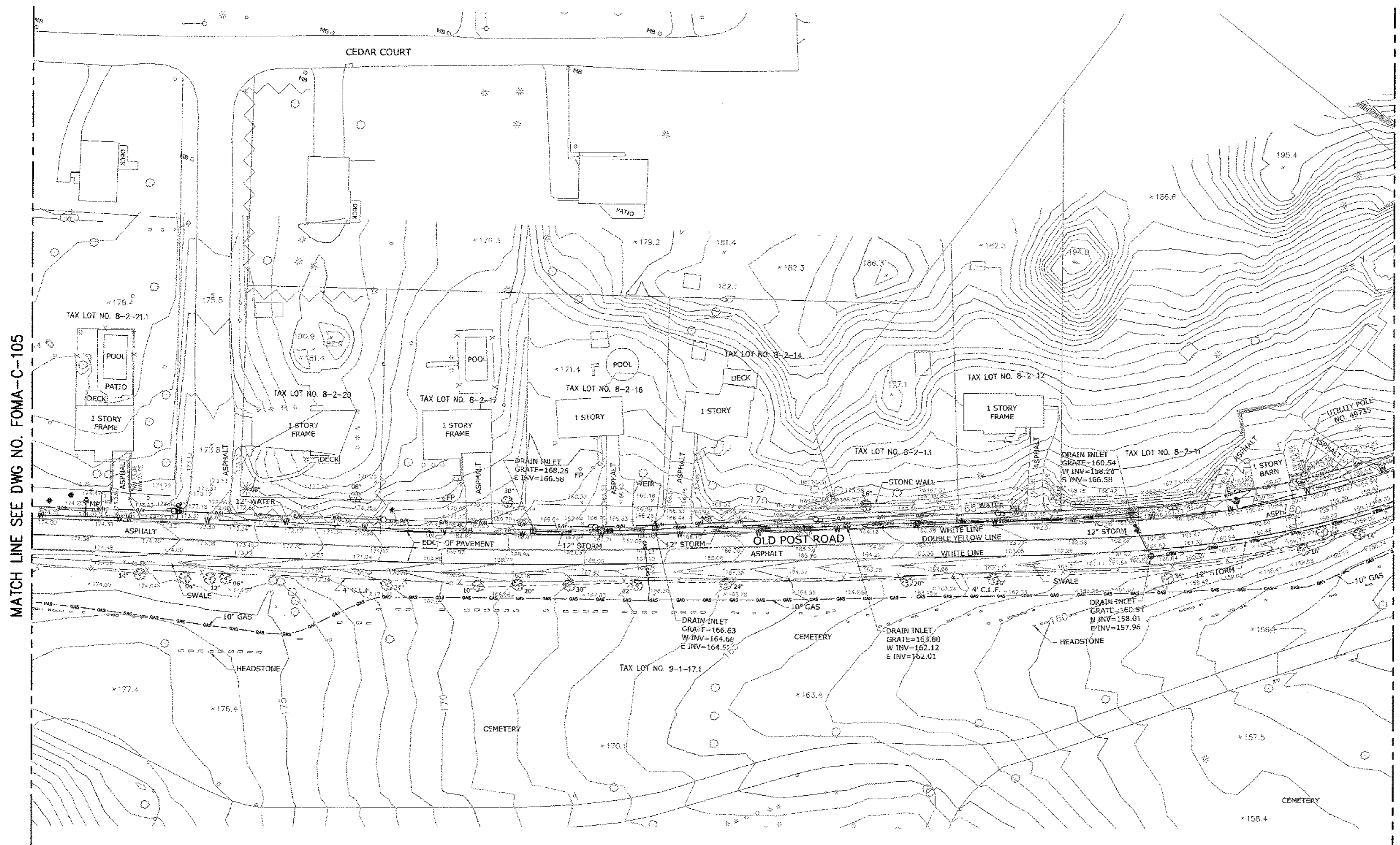
**NEW YORK CITY
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BUREAU OF ENGINEERING DESIGN & CONSTRUCTION
96-05 HORACE HARDING EXPRESSWAY 5th FLOOR
CORONA, NEW YORK 11368
www.nyc.gov/dep

**RONDOT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT
FORCE MAIN
EXISTING TOPOGRAPHIC SURVEY
SHEET 6 OF 8**

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-105.00

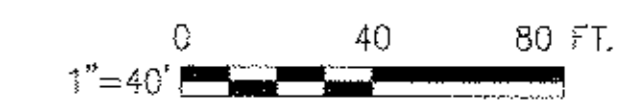
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CONTRACT B12



MATCH LINE SEE DWG NO. FOMA-C-105

MATCH LINE SEE DWG NO. FOMA-C-107



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SITE DESIGN**
DATE SUBMITTED: 02/10/2014

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**ROUNDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT**
FORCE MAIN
EXISTING TOPOGRAPHIC SURVEY
SHEET 7 OF 8

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-106.00

CONTRACT BT2

Lost Saved By & Date: Eugeni, Tuesday, February 04, 2014 and Date Plotted: Tuesday, February 04, 2014
Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BDDC_22x34_Full_Size.ctb
Drawing Name: & Location: B:\BWS_RWB1-2\02_Design_Files\2_L_Deliverables\02_Archived_Dwg\06_Bell_Property_Permitting_Dwg\Task No. 1.13_Force_Main_5B\02_Civil\FOMA-C-106.00.dwg

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	NYC Water Future Environmental Protection
DESIGN LEAD: GM	
SECTION CHIEF: FP	

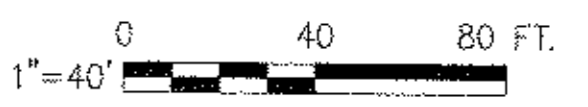


PROJECT MANAGER
TED DOWEY

CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA

DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

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**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT**
FORCE MAIN
EXISTING TOPOGRAPHIC SURVEY
SHEET 8 OF 8

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-107.00

Last Saved By: & Date: EugeneI, Tuesday, February 04, 2014 and Date Plotted: Tuesday, February 04, 2014
 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BDC_22x34_Full_Size.ctb
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CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY:
GM
CHECKED BY:
FP
DESIGN LEAD:
GM
SECTION CHIEF:
FP

DRAWN BY:
GM
**NYC Water & Future
Environmental Protection**

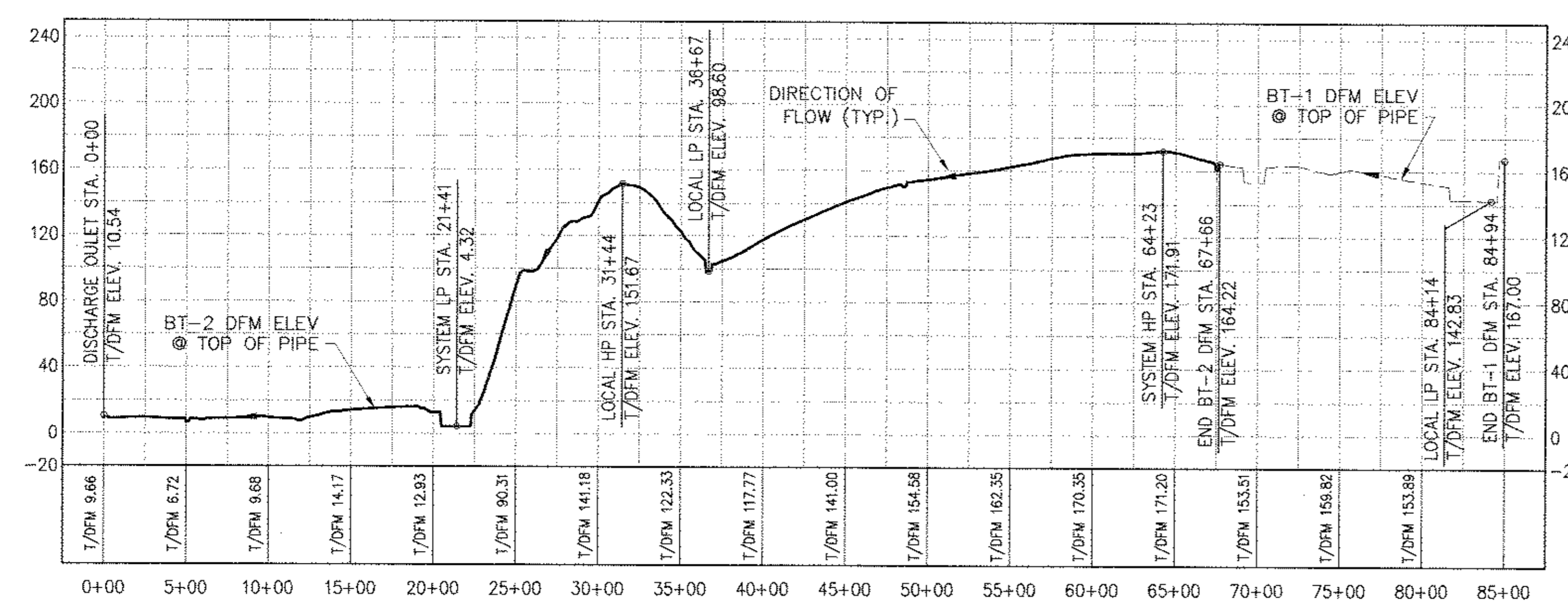
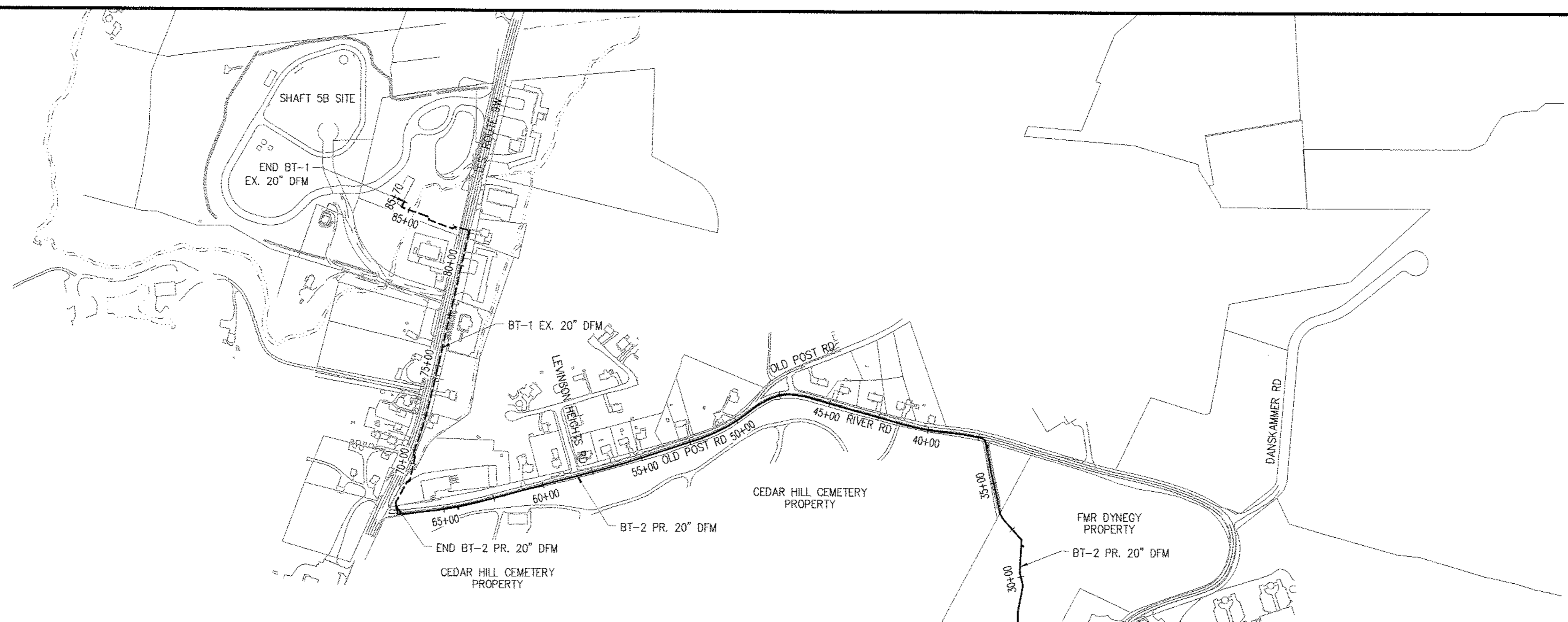


PROJECT MANAGER
TED DOWDY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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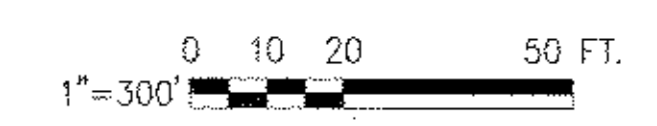
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1 OVERALL DEWATERING FORCE MAIN PROFILE
 SCALE: HOR. 1" = 60'
 VER. 1" = 60'

Last Saved By & Date: EugeneI, Tuesday, February 04, 2014 and Date Plotted: Tuesday, February 04, 2014
 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1" = 60'
 Drawing Name: & Location: B:\BWS_RWS-2\02_Design_Files\21_Deliverables\02_Archived_Dwg\06_Bell_Property_Permitting_Dwg's\Task No. 113_Force_Main_5B\02_Civil\FOMA-C-108.00.dwg

CONTRACT BT2

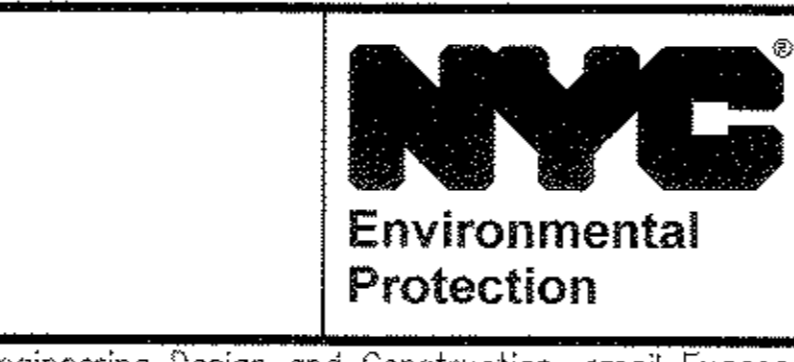


BELL PROPERTY SITE DESIGN
 DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM
 CHECKED BY: FP
 DESIGN LEAD: GM
 SECTION CHIEF: FP



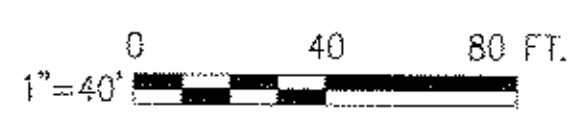
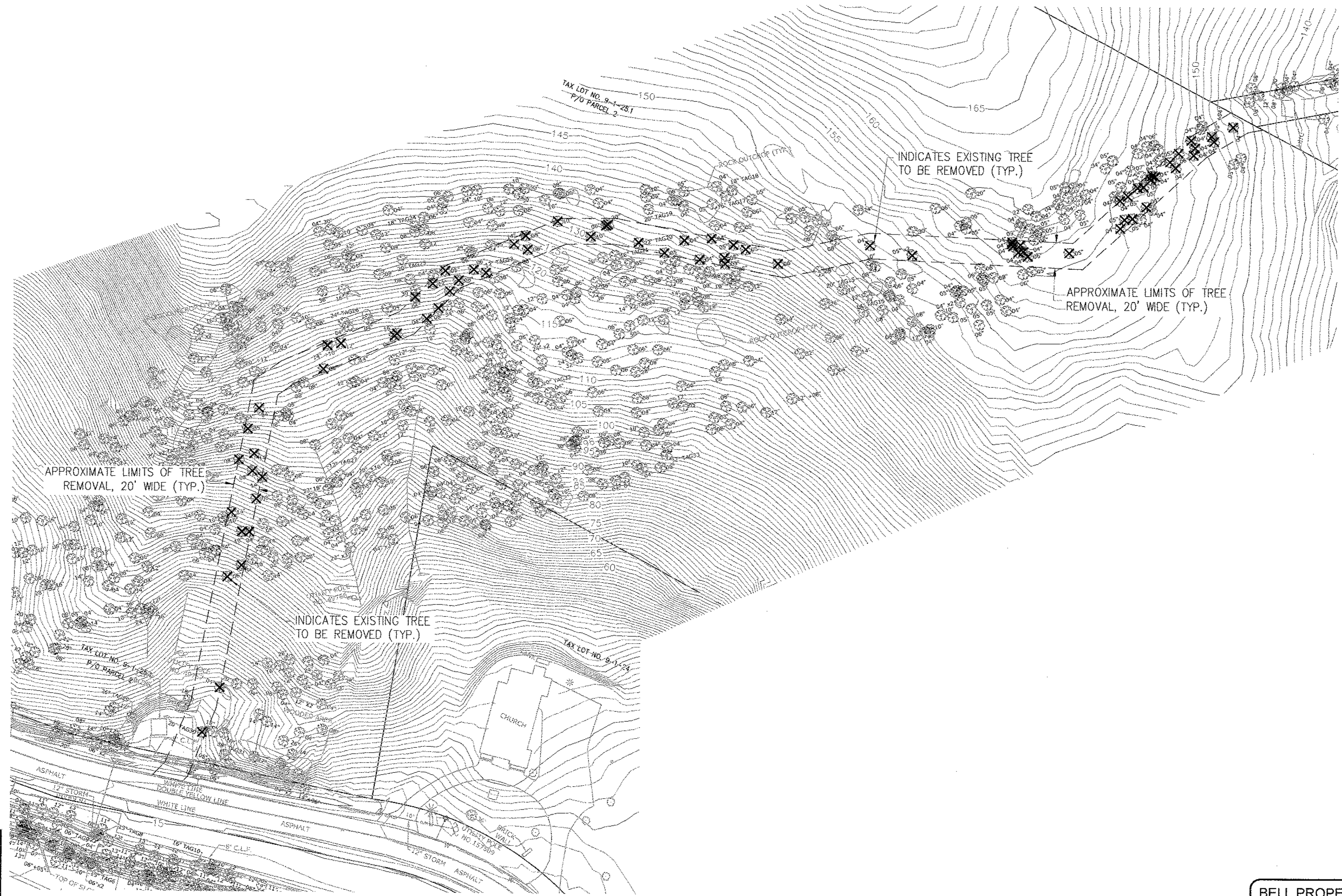
PROJECT MANAGER
 TED DOWEY
 CHIEF, TUNNEL DESIGN
 BURJOR KHARIVALA
 DIRECTOR, IN HOUSE DESIGN
 PATRICK O'CONNOR

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RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT
 FORCE MAIN - OVERALL PLAN

DATE: 11/22/2013
 SCALE: 1/8"=1'-0"
 SHEET NO: 1 OF 453
 DRAWING NO.
FOMA-C-108.00



**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
CHECK BEFORE USE
IF SHEET IS LESS THAN 22" X 34"
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SCALE ACCORDINGLY

**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAARSING REPAIRS,
DELAWARE AQUEDUCT**

FORCE MAIN
TREE REMOVAL PLAN

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-109.00

Last Saved By & Date: Eugene I., Tuesday, February 04, 2014 and Date Plotted: Tuesday, February 04, 2014
 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BDDC_22x34_Full_Size.ctb
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 CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY:
GM
CHECKED BY:
FP
DESIGN LEAD:
GM
SECTION CHIEF:
FP

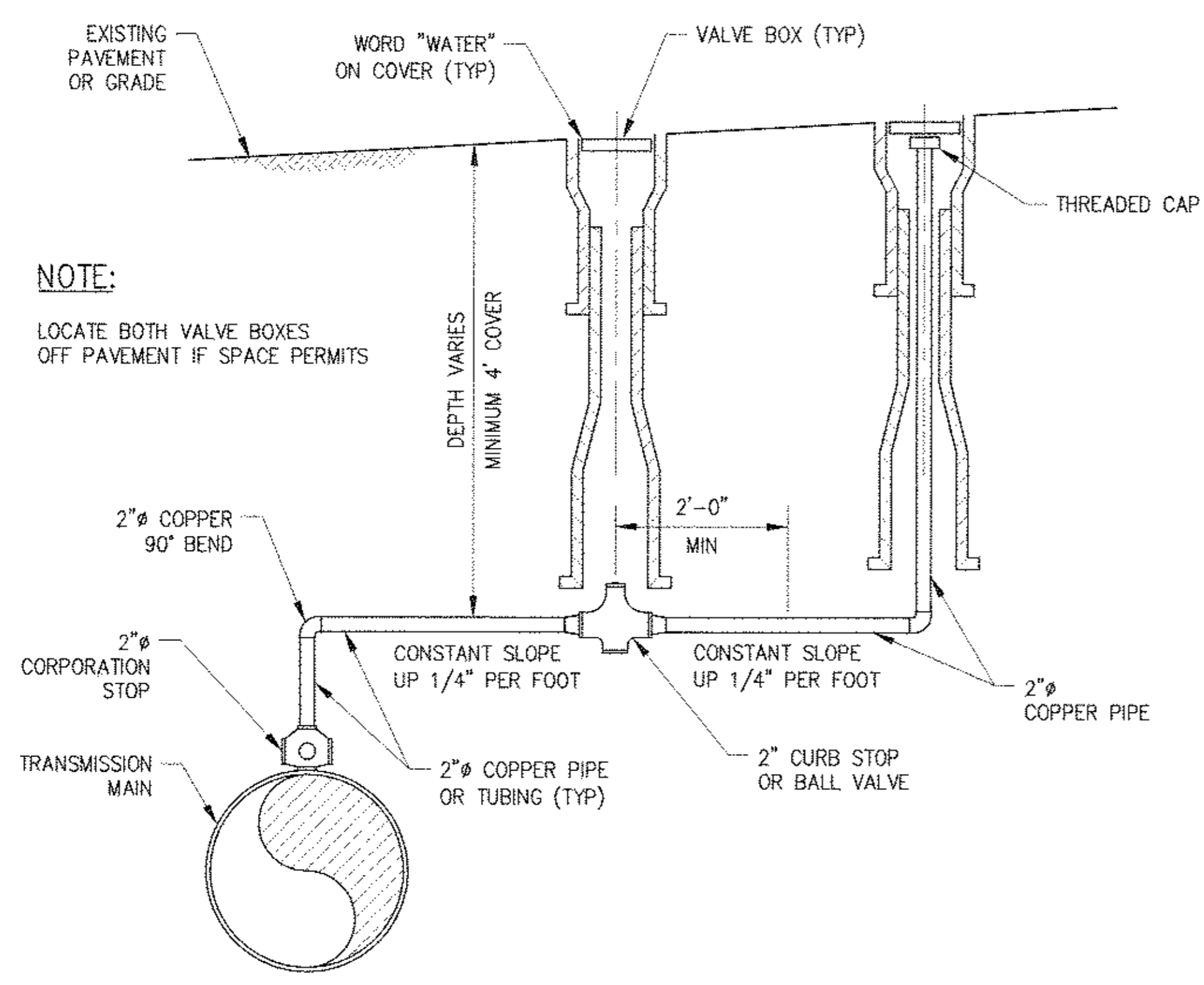
DRAWN BY:
GM
NYC Water Future
Environmental Protection



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

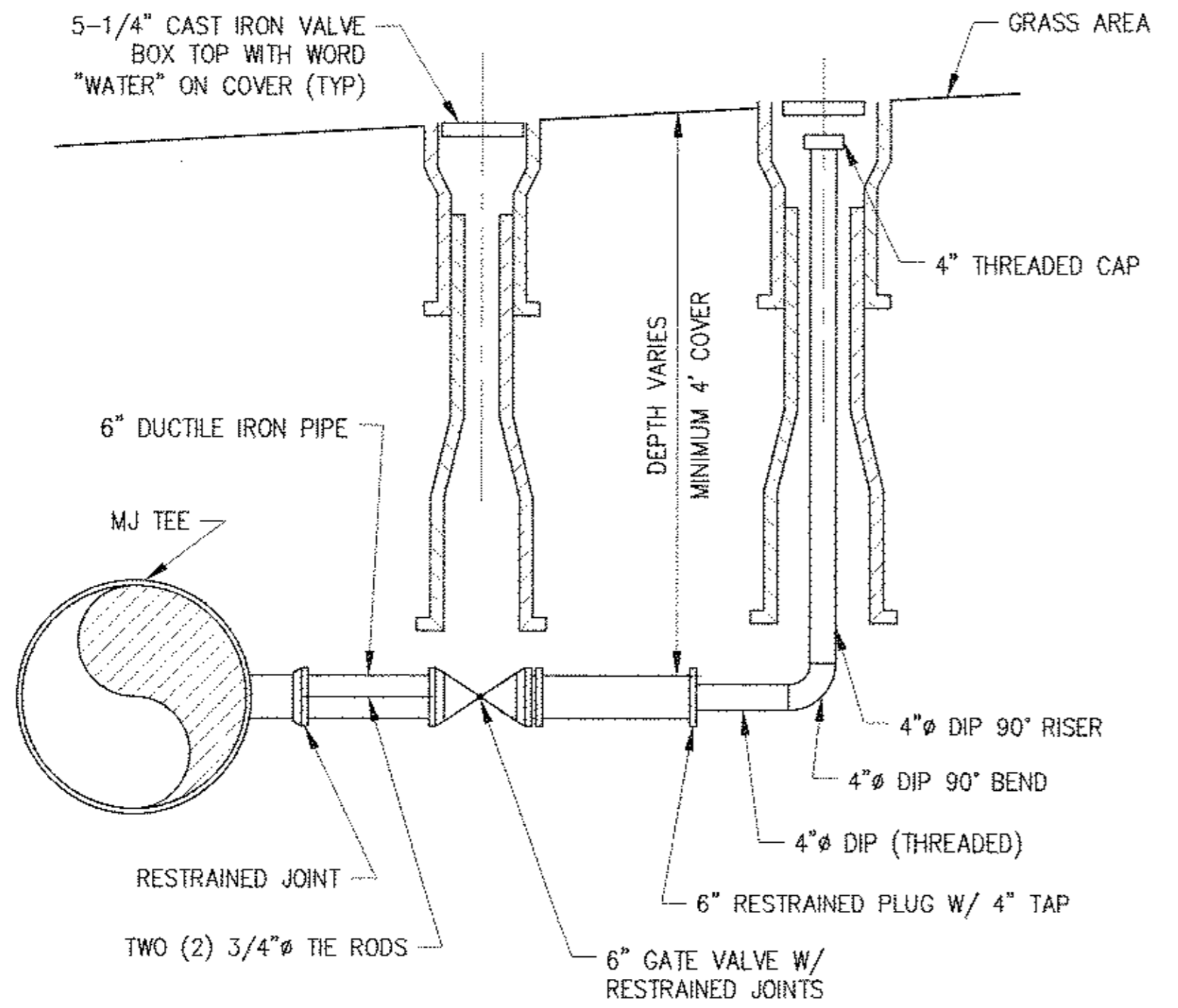
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BUREAU OF ENGINEERING DESIGN & CONSTRUCTION
96-05 HORACE HARDING EXPRESSWAY 5th FLOOR
CORONA, NEW YORK 11368
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NOTE:
LOCATE BOTH VALVE BOXES OFF PAVEMENT IF SPACE PERMITS

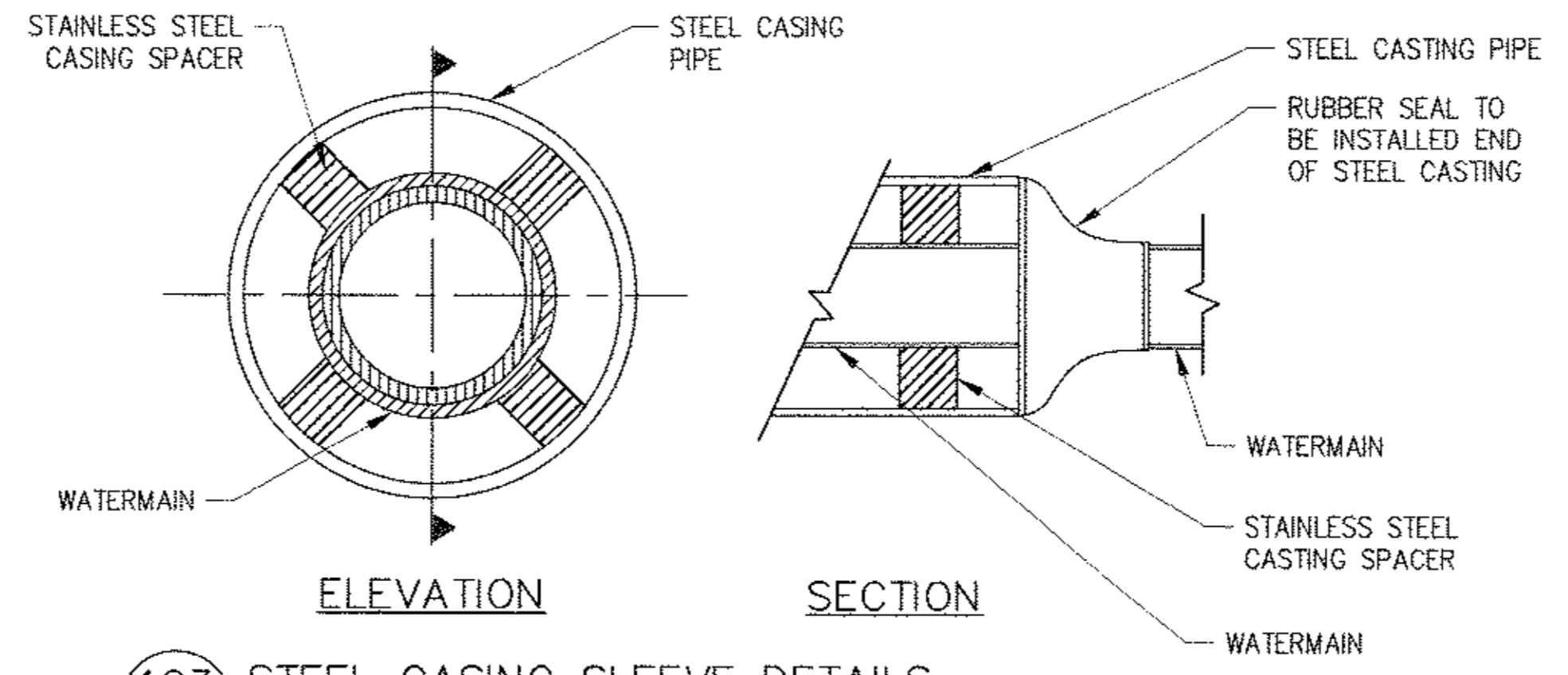
101 AIR RELEASE ASSEMBLY DETAIL
SCALE: NTS



102 BLOW-OFF ASSEMBLY DETAIL
SCALE: NTS

FORCE MAIN NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE GAS COMPANY PRIOR TO CROSSING THE GAS MAIN. A REPRESENTATIVE OF THE GAS COMPANY SHALL BE PRESENT TO WITNESS THE COMPLETE UTILITY CROSSING.
2. PIPING SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH THE SPECIFICATIONS PRIOR TO FINAL APPROVAL.
3. THRUST BLOCKS ARE NOT SHOWN ON PLAN AND PROFILE VIEWS FOR CLARITY PURPOSES. THRUST BLOCKS SHALL BE INSTALLED AS SPECIFIED AND IN ACCORDANCE WITH THE SCHEDULE PROVIDED ON GC-XXX.
4. RESTRAINING LENGTHS ARE NOT SHOWN ON THE PLAN AND PROFILE VIEWS FOR CLARITY PURPOSES. JOINT RESTRAINT SHALL BE PROVIDED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON THE SCHEDULE PROVIDED ON GC-XXX.
5. VERTICAL BENDS ARE NOT SHOWN ON THE PLAN VIEW FOR CLARITY PURPOSES. REFER TO PROFILE VIEW FOR LOCATION OF ALL VERTICAL BENDS TO BE INSTALLED.
6. THE CONTRACTOR SHALL REFER TO 5C-XXX FOR WORK ZONE TRAFFIC CONTROL REQUIREMENTS.
7. AS TRENCHES ARE BACKFILLED AND COMPACTED, THE CONTRACTOR IS TO STABILIZE THE SURFACE WITH PAVEMENT SUBBASE OR TOPSOIL AND SEED, AS REQUIRED.
8. PROVIDE MINIMUM VERTICAL DISTANCE OF 18-INCHES BETWEEN OUTSIDE OF DEWATERING FORCE MAIN AND OUTSIDE OF POTABLE WATER MAIN OR GAS MAIN. WHERE NOT POSSIBLE, PROVIDE CONCRETE ENCASEMENT IN ACCORDANCE WITH THE SPECIFICATIONS.
9. THE CONTRACTOR SHALL FURNISH AND INSTALL STEEL SHEETING AT THE PERIMETER OF THE JACKING AND RECEIVING PITS TO STABILIZE THE PIT WALLS. THE PITS LOCATED IN THE RIVER ROAD R.O.W. ARE TO BE PROTECTED IN ACCORDANCE WITH APPLICABLE RULES AND REGULATIONS. THE PITS LOCATED IN PRIVATE PROPERTY ARE TO BE PROTECTED WITH CONCRETE BARRIERS AT NO ADDITIONAL COST TO THE OWNER.
10. FOR THE WORK REQUIRING EASEMENTS FROM PROPERTY OWNERS, THE CONTRACTOR IS TO MAINTAIN VEHICULAR ACCESS TO ALL BUILDINGS ON THE PROPERTY OWNER'S SITE. THIS INCLUDES CLEAR AND ADEQUATE ACCESS FOR LARGER VEHICLES AND DELIVERY TRUCKS. THE CONTRACTOR WILL BE REQUIRED TO MOVE EQUIPMENT AT THE REQUEST OF THE PROPERTY OWNER TO ALLOW VEHICULAR TRAFFIC THROUGH THE PROPERTY OWNER'S SITE. ALL WORK BLOCKING DRIVEWAYS AND/OR SITE ENTRANCES SHALL BE STAGED TO MAINTAIN AT MINIMUM ONE-HALF OF THE SITE ENTRANCE OR AMPLE ROOM FOR LARGE VEHICLES TO ENTER THE SITE, WHICHEVER IS GREATER.
11. ANY EXCAVATION WITHIN THE RIGHT-OF-WAY WHICH EXCEEDS FIVE FEET IN DEPTH AND HAS LIVE TRAFFIC OR UTILITIES WITHIN A 1V:1H PROJECTION FROM THE BOTTOM OF THE EXCAVATION SHALL UTILIZE A SHEETING/SHORING SYSTEM WHICH PROVIDES DIRECT CONTACT AND SUPPORT OF THE EXCAVATION SIDES. REFER TO THE SPECIFICATIONS FOR EXCAVATION SUPPORT REQUIREMENTS.



103 STEEL CASING SLEEVE DETAILS
SCALE: NTS

Last Saved By & Date: Eugene, Tuesday, February 04, 2014 and Date Plotted: Tuesday, February 04, 2014
Paper Size: ANSI D (34.00 x 22.00 inches) Plot Style: Table: BDC, 22x34, Full Size.ctb
Drawing Name: & Location: B:\BWS_RWB1-2\02_Design_Files\2.1_Deliverables\02_Archived_Dwg\06_Bell_Property_Permitting_Dwg\Task No. 113_Force_Main_5B\02_Civil\FOMA-C-111.00.dwg

CONTRACT B12

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	NYC Water Future Environmental Protection
DESIGN LEAD: GM	
SECTION CHIEF: FP	



PROJECT MANAGER TED DOMEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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BELL PROPERTY SITE DESIGN
DATE SUBMITTED: 02/10/2014

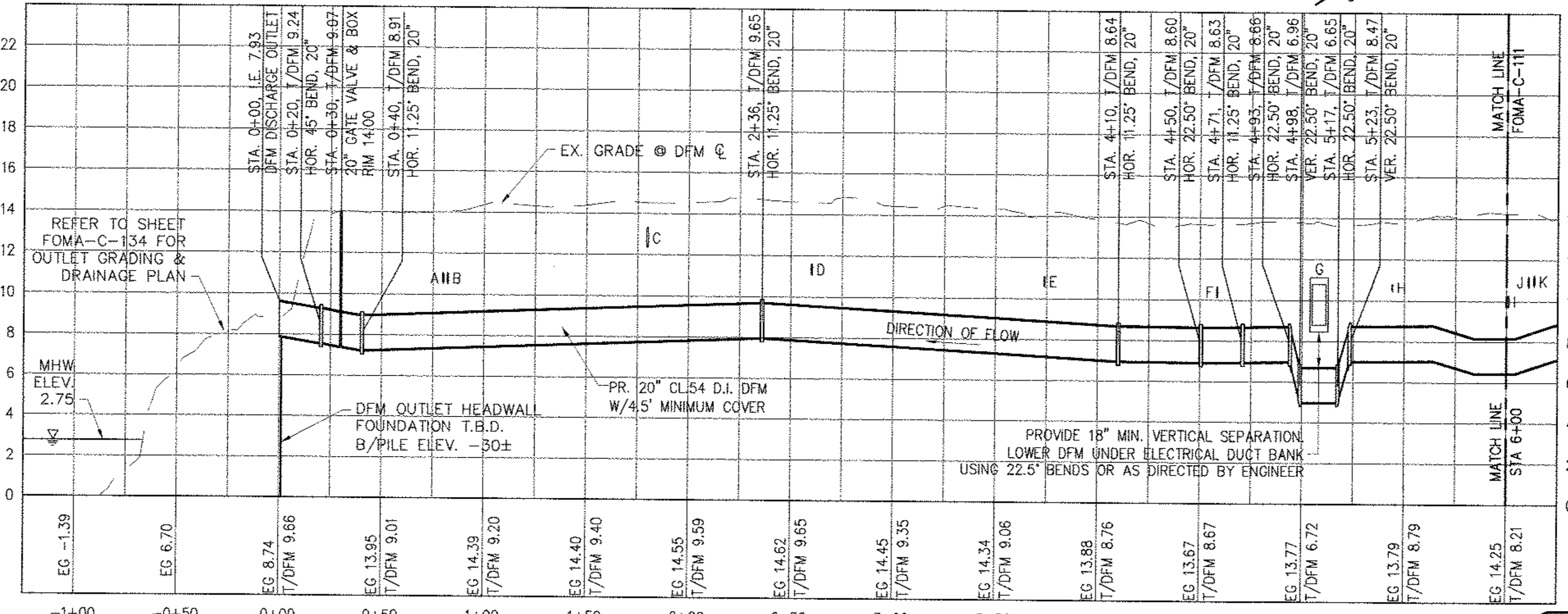
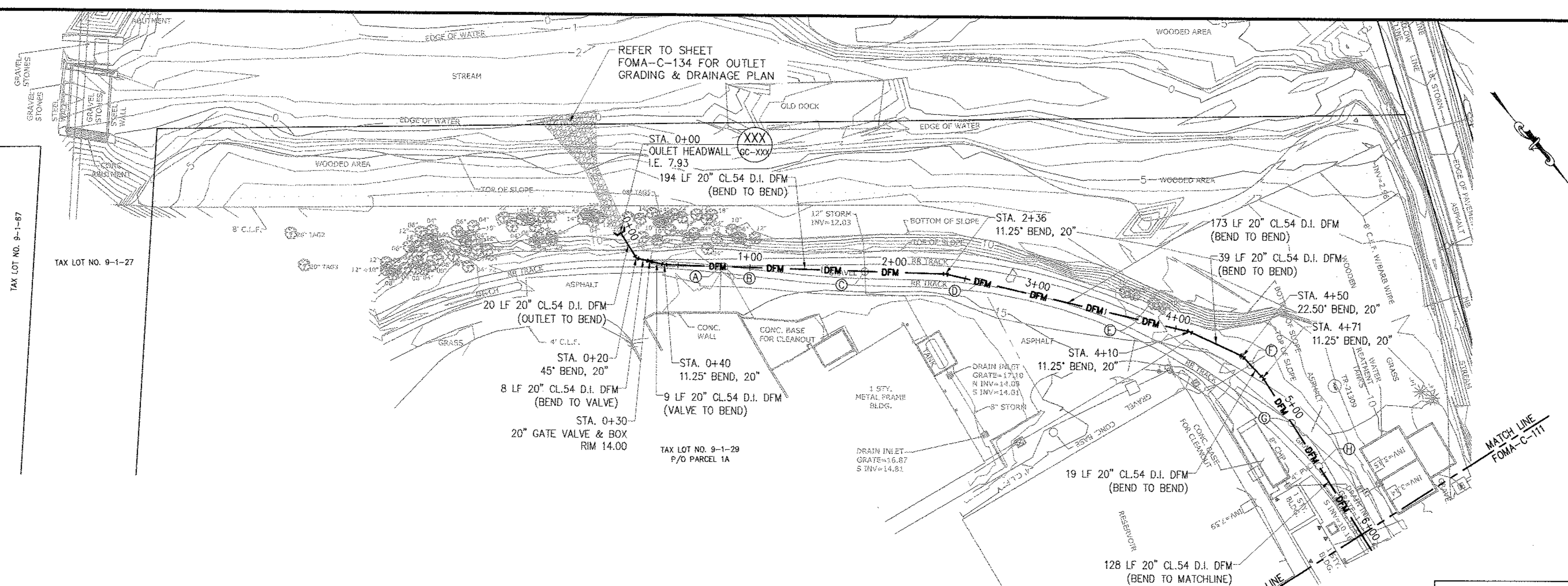
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RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT
FORCE MAIN - NOTES & DETAILS

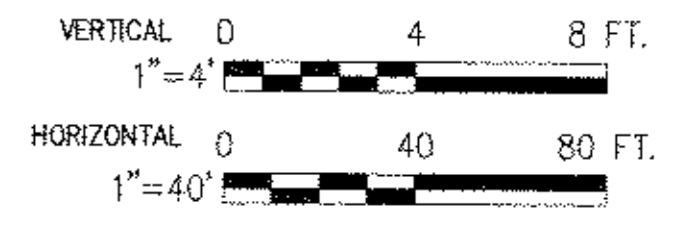
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SHEET NO: 1 OF 453
DRAWING NO. FOMA-C-111.00

CONTRACT BT2

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UTILITY CROSSING SCHEDULE				
NAME	STATION	DISCRIPTION	DFM ELEVATION	CROSSING ELEVATION
A	0+80	UNK UTILITY	T/P 9.13	VERIFY IN FIELD
B	0+82	UNK UTILITY	T/P 9.14	VERIFY IN FIELD
C	1+80	12" STORM DRAIN	T/P 9.51	B/P 12.34± (VF)
D	2+60	UNK UTILITY	T/P 9.59	VERIFY IN FIELD
E	3+74	UNK UTILITY	T/P 8.92	VERIFY IN FIELD
F	4+58	UNK UTILITY	T/P 8.68	VERIFY IN FIELD
G	5+08	UNK ELECTRICAL	T/P 6.72	VERIFY IN FIELD
H	5+44	4" STORM DRAIN	T/P 8.78	B/P 10.50± (VF)
I	6+01	UNK WATER MAIN	T/P 8.21	VERIFY IN FIELD
J	6+11	UNK UTILITY	T/P 8.43	VERIFY IN FIELD
K	6+13	UNK ELECTRICAL	T/P 8.52	VERIFY IN FIELD



BELL PROPERTY SITE DESIGN
DATE SUBMITTED: 02/10/2014

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REVISIONS			

DESIGNED BY: GM
CHECKED BY: FP
DESIGN LEAD: GM
SECTION CHIEF: FP

DRAWN BY: GM
NYC Water Future
Environmental Protection



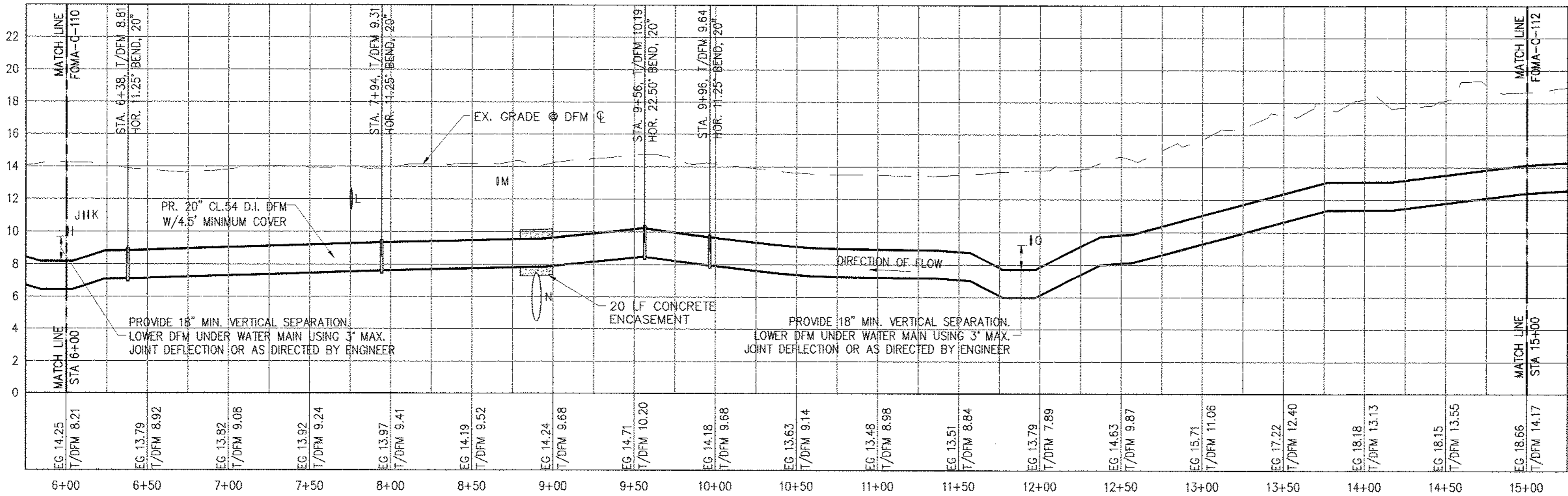
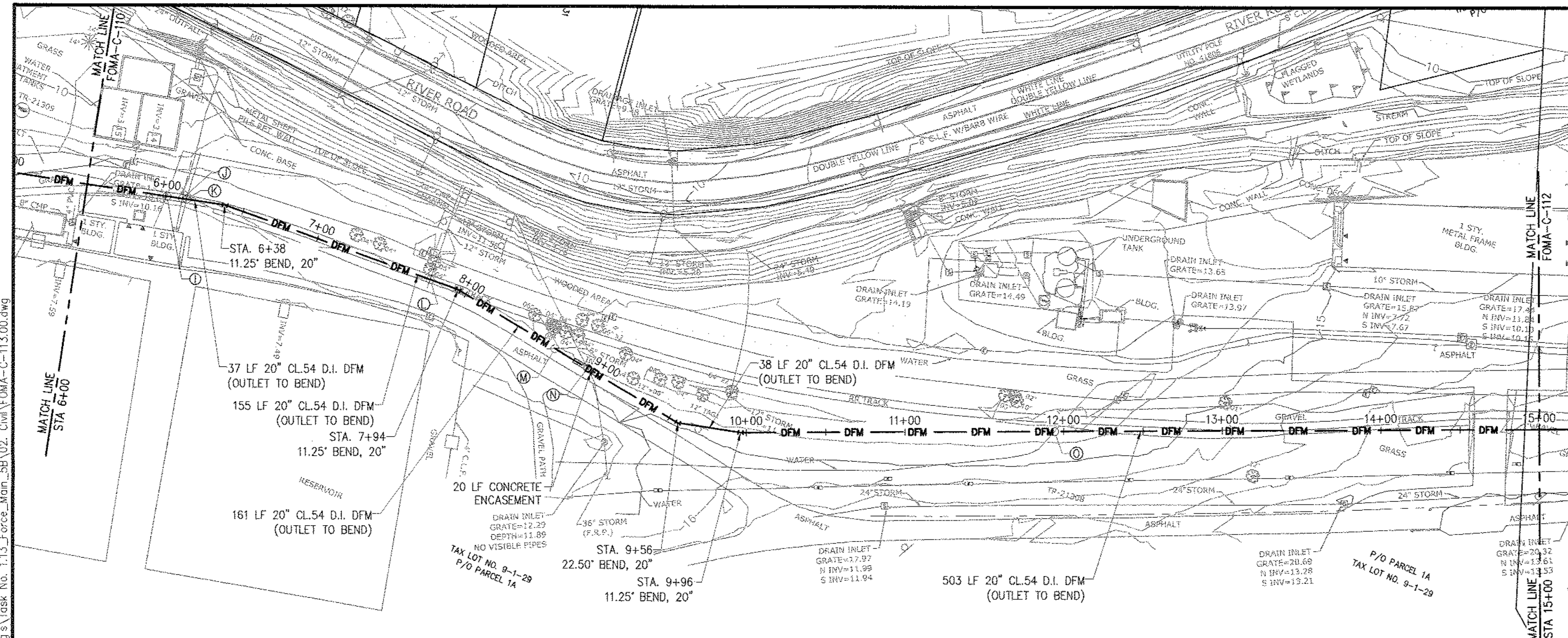
PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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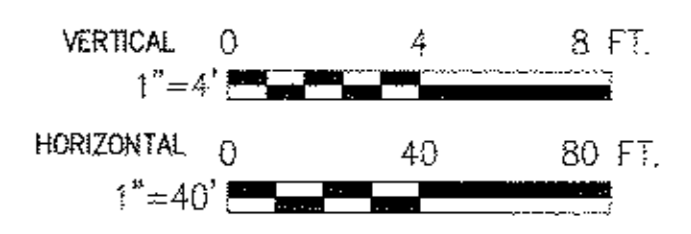
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RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT
FORCE MAIN
PIPING PLAN & PROFILE
P.O.B TO STA 6+00

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO: 1 OF 453
DRAWING NO: FOMA-C-112.00



UTILITY CROSSING SCHEDULE				
NAME	STATION	DISCRIPTION	DFM ELEVATION	CROSSING ELEVATION
I	6+01	UNK WATER MAIN	T/P 8.21	VERIFY IN FIELD
J	6+11	UNK UTILITY	T/P 8.43	VERIFY IN FIELD
K	6+13	UNK ELECTRICAL	T/P 8.52	VERIFY IN FIELD
L	7+75	12" STORM DRAIN	T/P 9.52	B/P 11.50± (VF)
M	8+66	6" STORM DRAIN	T/P 9.56	B/P 12.84± (VF)
N	8+90	36" STORM DRAIN	B/P 7.82	T/P 7.48± (VF)
O	11+94	UNK WATER MAIN	T/P 7.74	VERIFY IN FIELD



**BELL PROPERTY
SITE DESIGN**
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 Drawing Name: & Location: B:\BMS_R\B12-2\02_Design_Files\21_Deliverables\02_Archived_Dwg_06_Bell_Property_Permitting_Dwg's\Task No. 1.13_Force_Main_5B\02_Civil\FOMA-C-113.00.dwg

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM
 CHECKED BY: FP
 DESIGN LEAD: GM
 SECTION CHIEF: FP

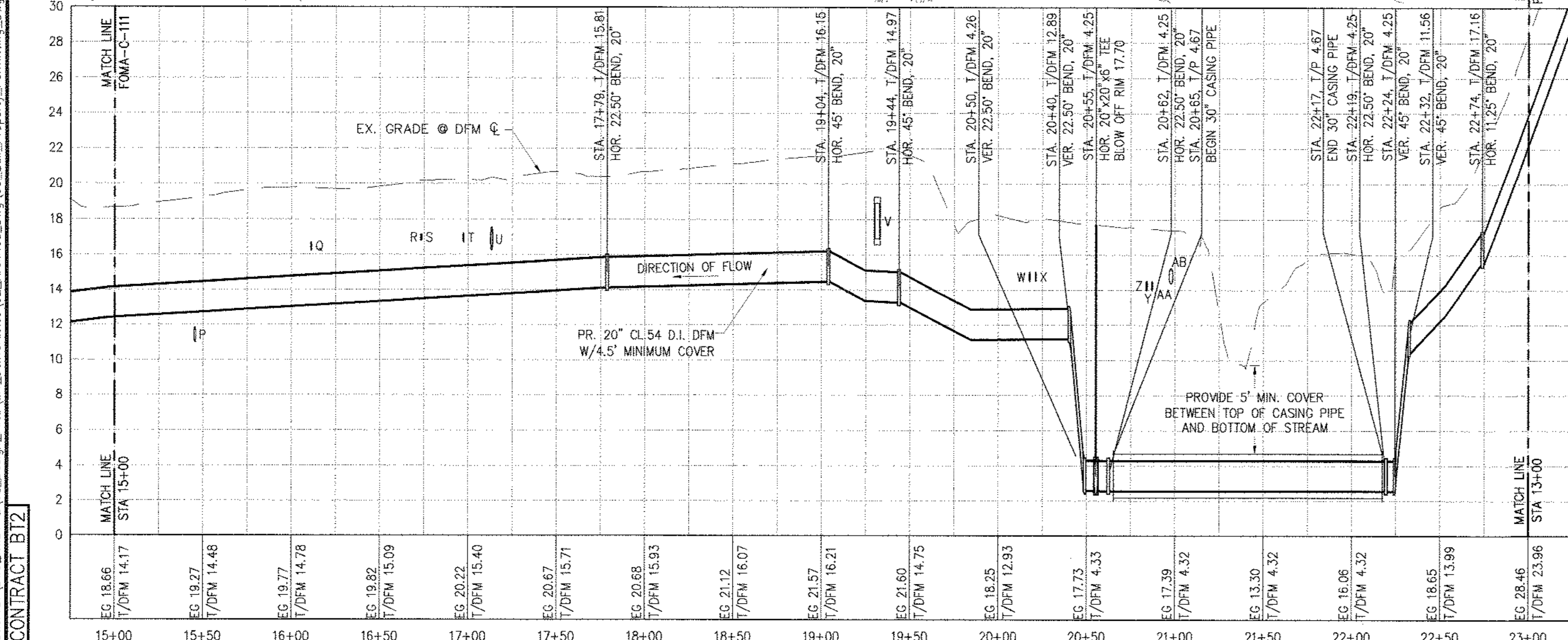
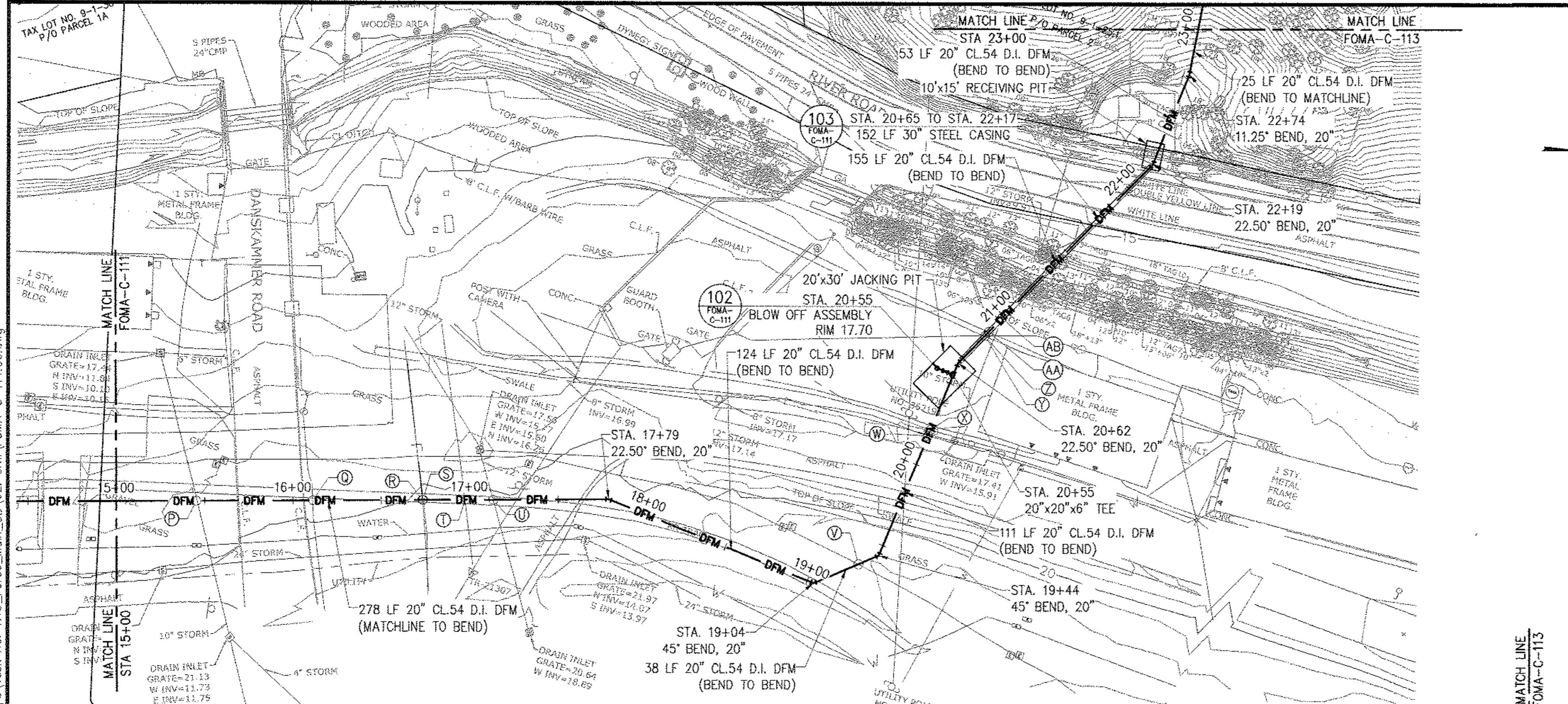
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NYC Water @ Future
 Environmental Protection

PROJECT MANAGER
 TED DOWEY
 CHIEF, TUNNEL DESIGN
 BURJOR KHARIVALA
 DIRECTOR, IN HOUSE DESIGN
 PATRICK O'CONNOR

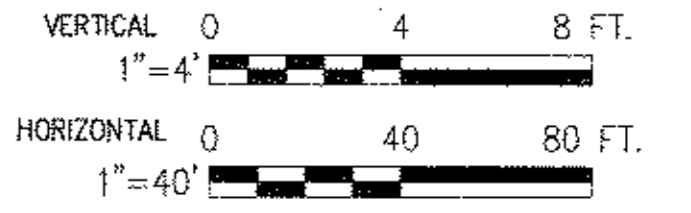
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**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT**
 FORCE MAIN
 PIPING PLAN & PROFILE
 STA 6+00 TO STA 15+00

DATE: 11/22/2013
 SCALE: 1/8" = 1'-0"
 SHEET NO:
 1 OF 453
 DRAWING NO.
FOMA-C-113.00



UTILITY CROSSING SCHEDULE				
NAME	STATION	DISCRPTION	DFM ELEVATION	CROSSING ELEVATION
P	15+45	10" STORM DRAIN	B/P 12.65	T/P 11.81± (VF)
Q	16+11	UNK ELECTRICAL	T/P 14.85	VERIFY IN FIELD
R	16+73	UNK ELECTRICAL	T/P 15.23	VERIFY IN FIELD
S	16+74	UNK FIBER OPTIC	T/P 15.24	VERIFY IN FIELD
T	16+97	UNK ELECTRICAL	T/P 15.38	VERIFY IN FIELD
U	17+13	12" STORM DRAIN	T/P 15.48	B/P 16.40± (VF)
V	19+31	UNK ELECTRICAL	T/P 15.10	VERIFY IN FIELD
W	20+18	UNK ELECTRICAL	T/P 12.94	VERIFY IN FIELD
X	20+21	UNK ELECTRICAL	T/P 12.95	VERIFY IN FIELD
Z	20+84	UNK ELECTRICAL	T/P 4.25	VERIFY IN FIELD
Y	20+84	UNK ELECTRICAL	T/P 4.25	VERIFY IN FIELD
AA	20+87	UNK ELECTRICAL	T/P 4.25	VERIFY IN FIELD
AB	20+98	10" STORM DRAIN	T/P 4.25	B/P 14.38± (VF)



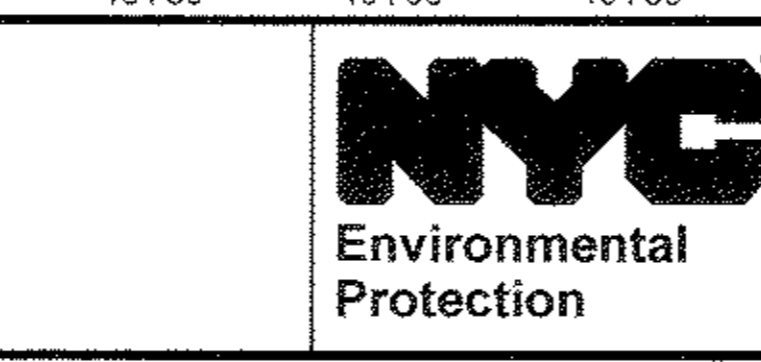
BELL PROPERTY SITE DESIGN
DATE SUBMITTED: 02/10/2014

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NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM
CHECKED BY: FP
DESIGN LEAD: GM
SECTION CHIEF: FP

DRAWN BY: GM
NYC Water Future
Environmental Protection



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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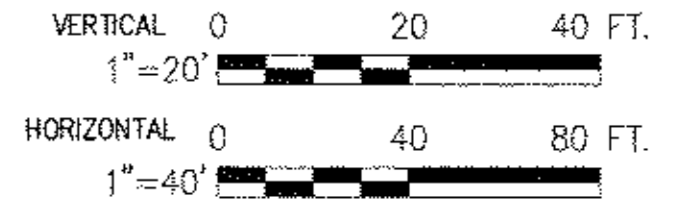
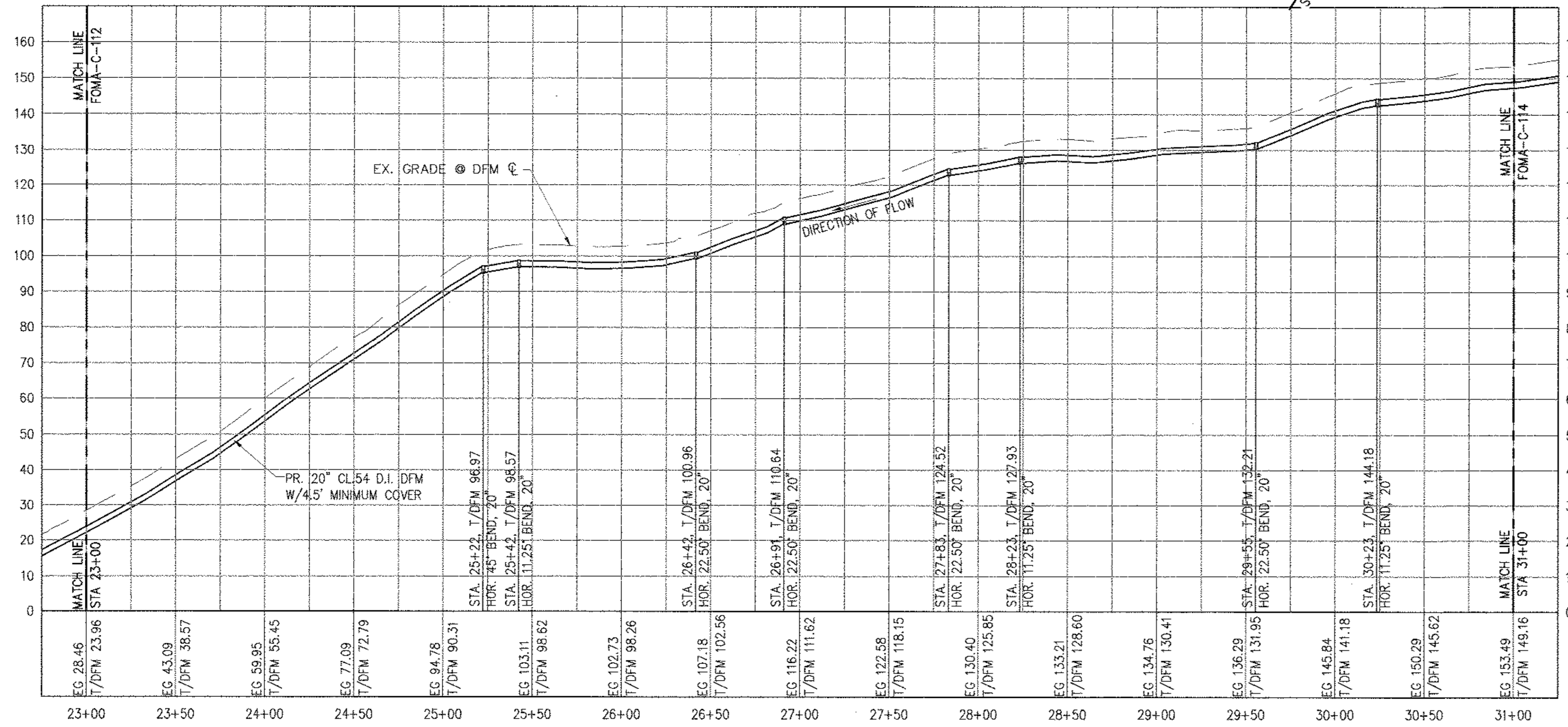
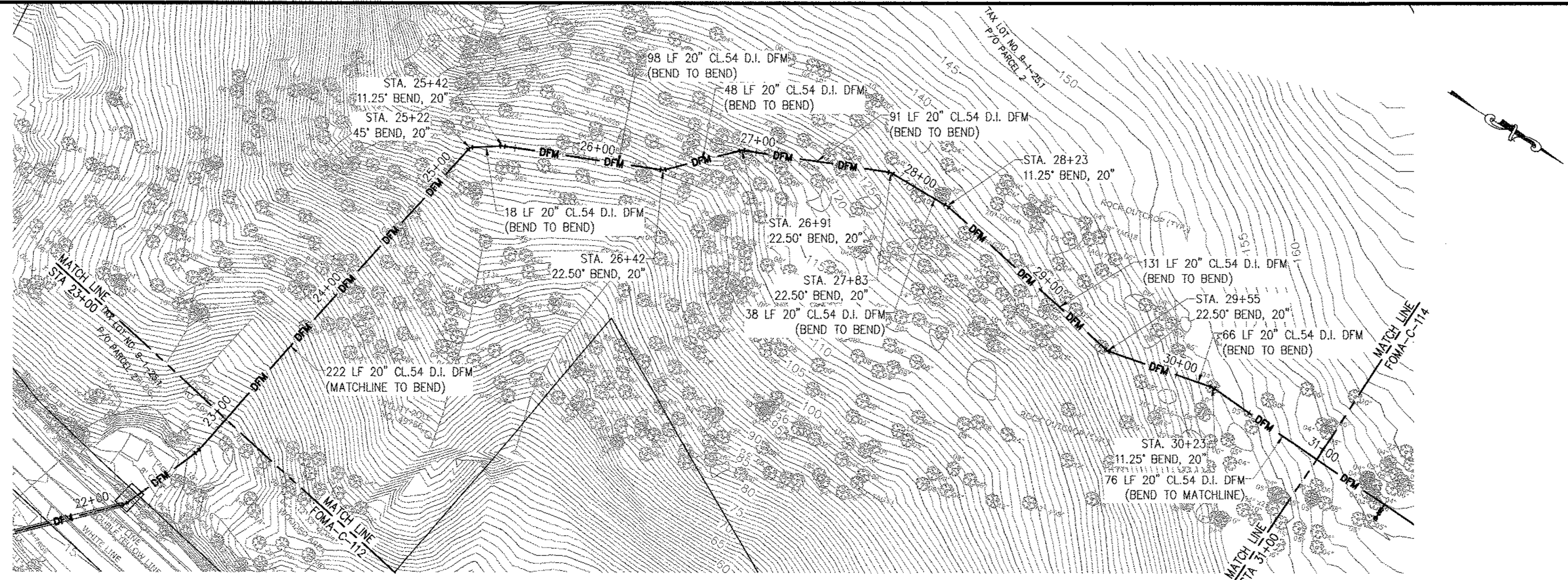
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RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT
FORCE MAIN
PIPING PLAN & PROFILE
STA 15+00 TO STA 24+00

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO: 1 OF 453
DRAWING NO. FOMA-C-114.00

Last Saved By & Date: EugeneI, Tuesday, February 04, 2014 and Date Plotted: Thursday, February 06, 2014
Paper Size: ANSI D (34.00 x 22.00 Inches) Plot Scale: 1:1 Plot Style Table: BDDC_22x34_Full_Size.ctb
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CONTRACT B12



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SITE DESIGN
DATE SUBMITTED: 02/10/2014

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CONTRACT B12

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM
CHECKED BY: FP
DESIGN LEAD: GM
SECTION CHIEF: FP

DRAWN BY: GM
NYC Water Future
Environmental Protection



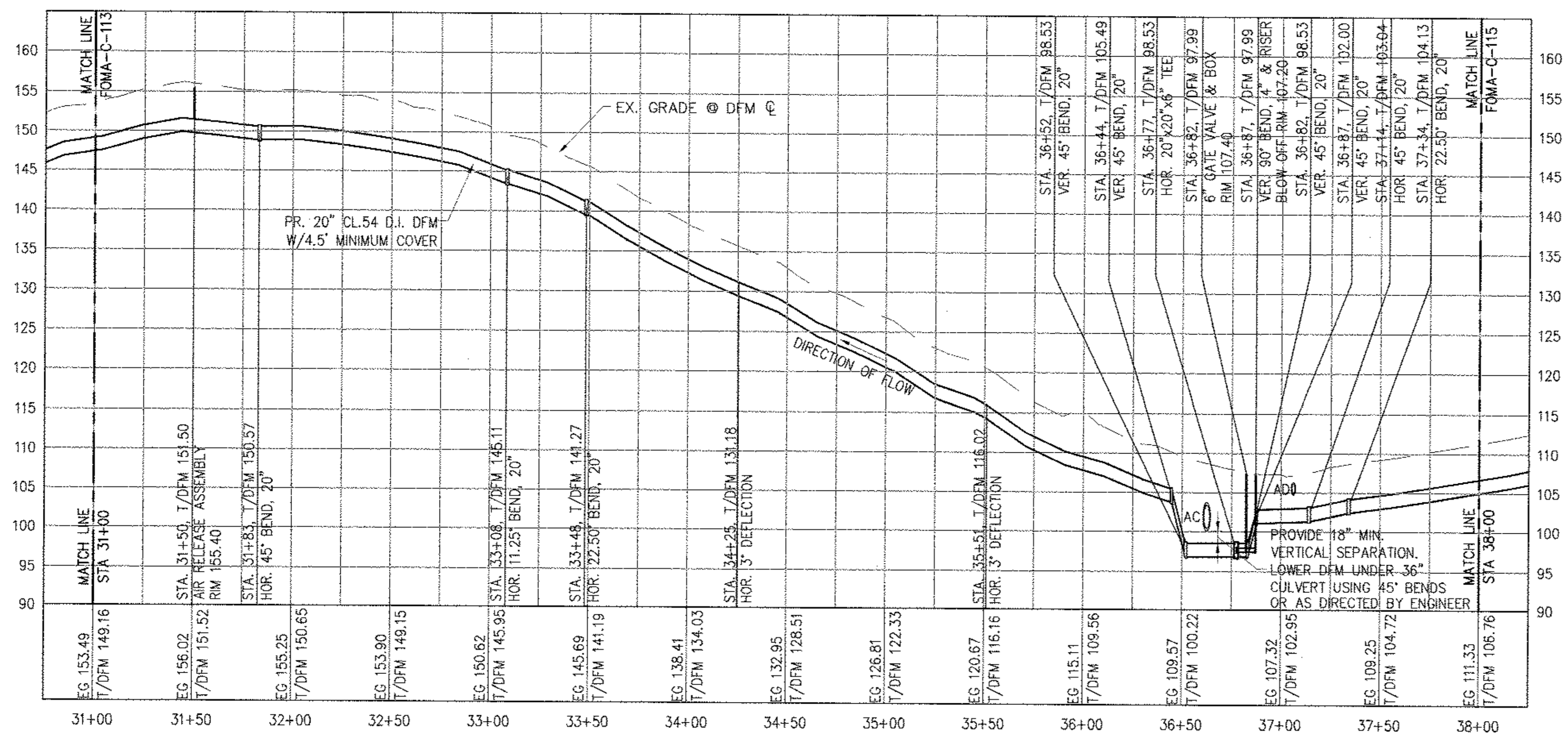
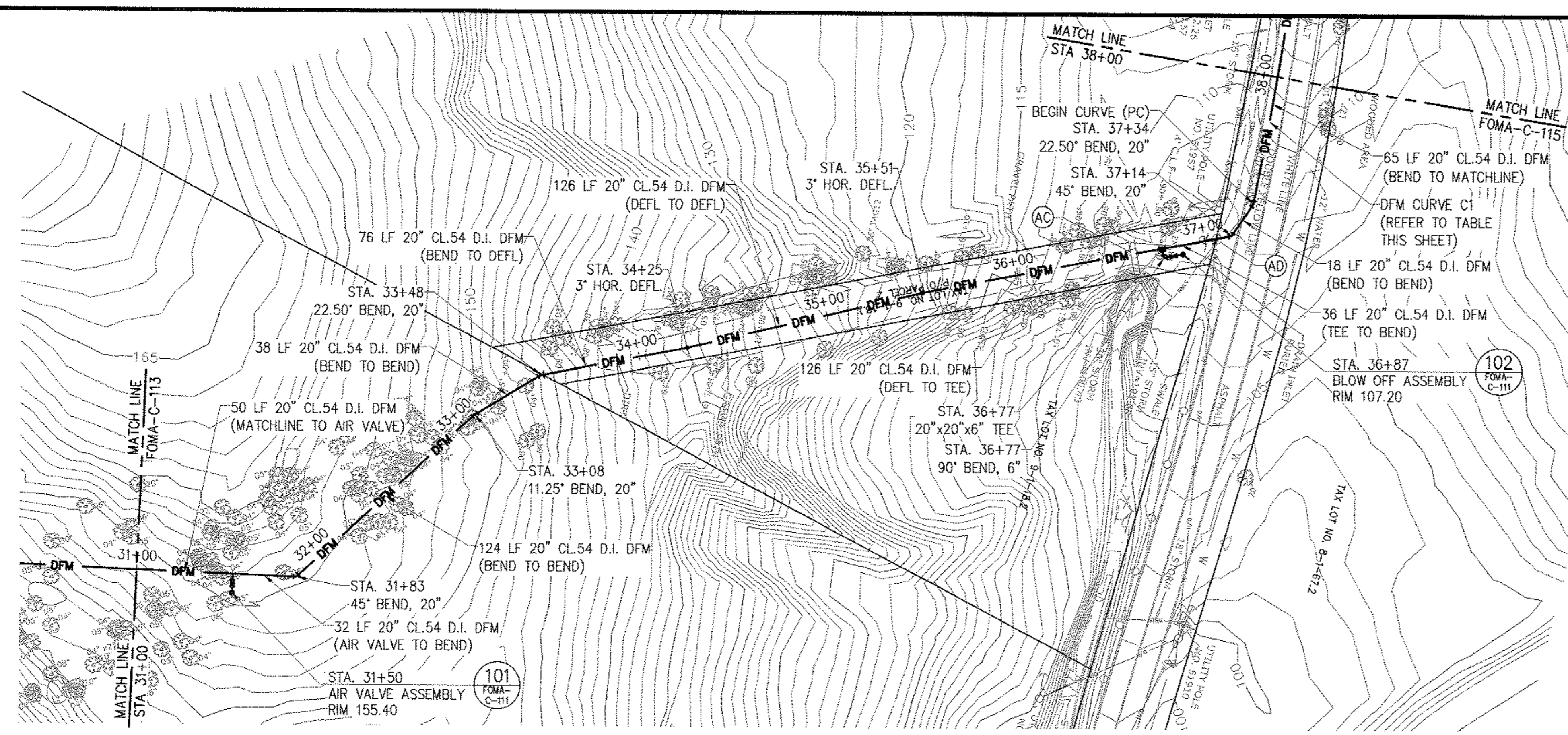
PROJECT MANAGER
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CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
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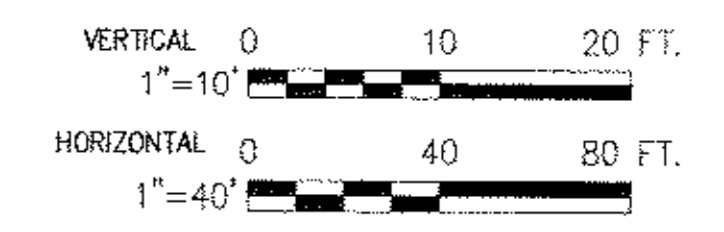
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FORCE MAIN
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STA 24+00 TO STA 32+00

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO: 1 OF 453
DRAWING NO.
FOMA-C-115.00



NAME	STATION	DISCRIPTION	DFM ELEVATION	CROSSING ELEVATION
AC	36+62	36" STORM DRAIN	T/P 98.60	B/P 100.10± (VIF)
AD	37+06	15" STORM DRAIN	T/P 103.30	B/P 104.95± (VIF)

CURVE #	START STATION	END STATION	RADIUS	CURVE LENGTH	TOTAL ANGLE, Δ	LAYING LENGTH	JOINT DEFLECTION ANGLE, φ	JOINT DEFLECTION OFFSET
C1	37+34	39+06	1408.00'	171.82'	6°59'30"	20'	0°48'50"	0.28'



**BELL PROPERTY
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NO.	DATE	DESCRIPTION	APPR'D.
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 SECTION CHIEF: FP



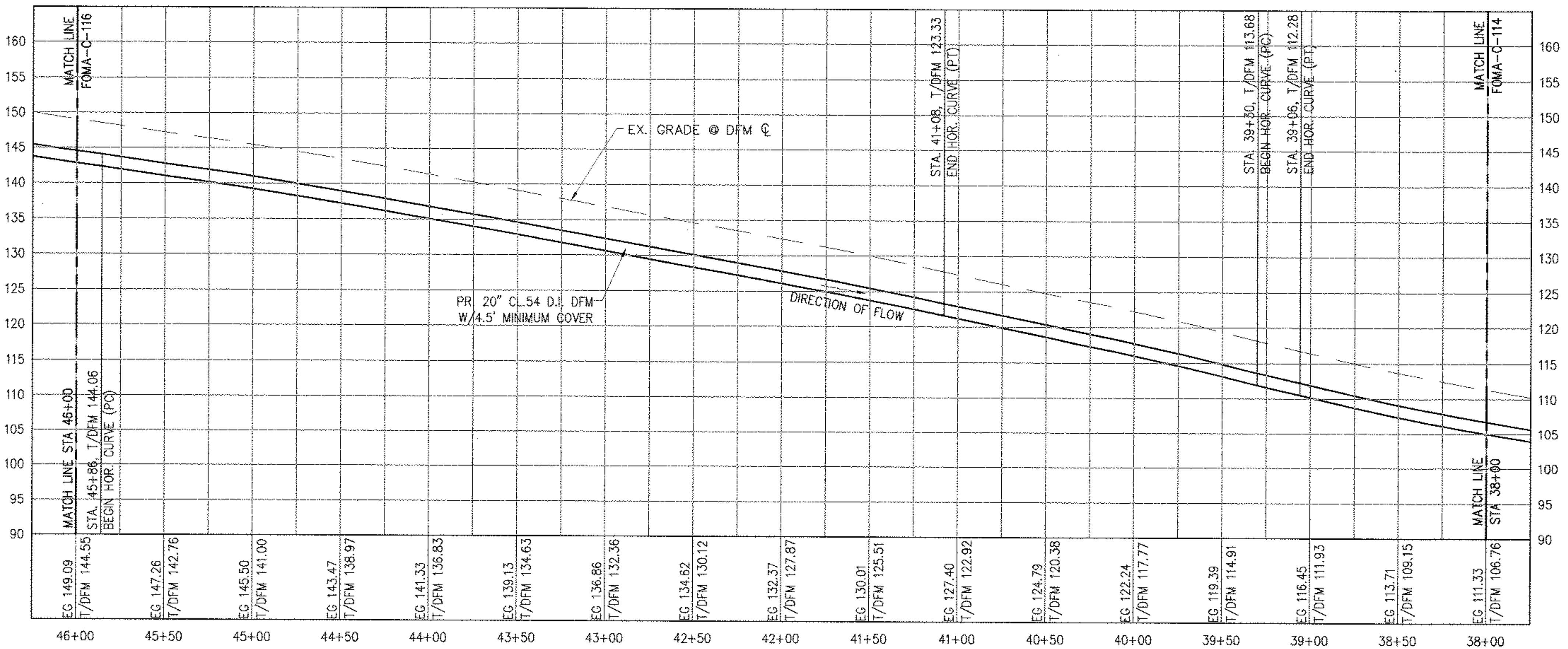
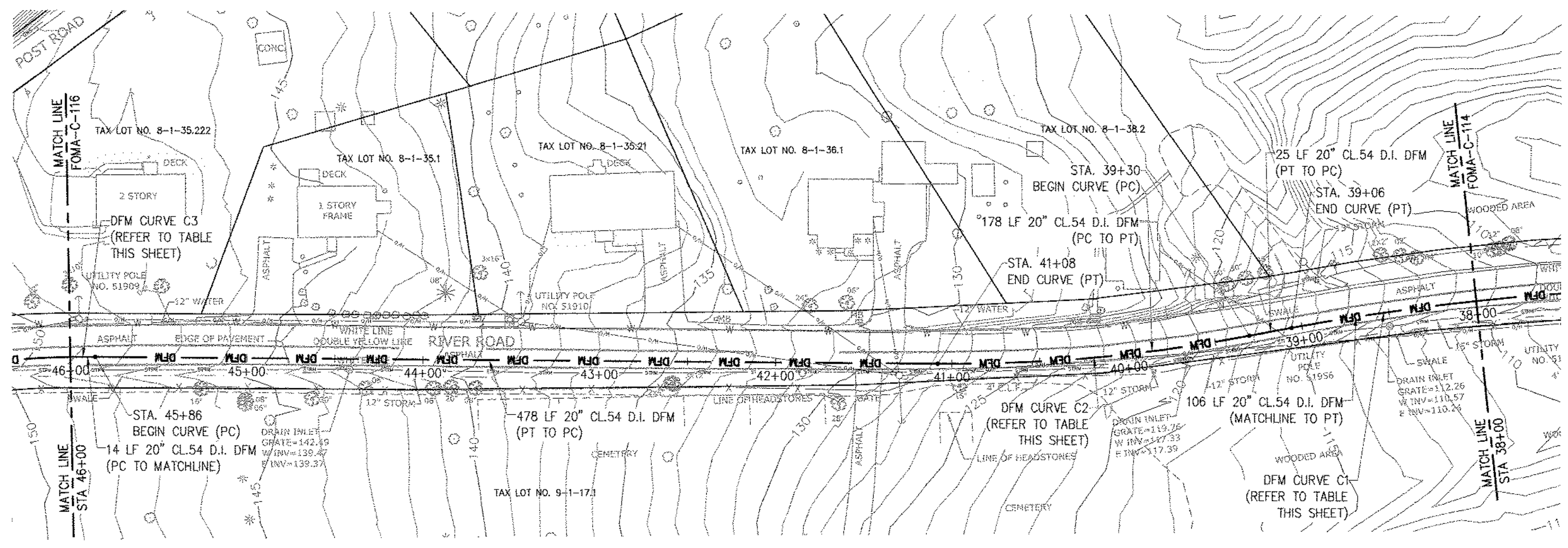
PROJECT MANAGER
 TED DOWEY
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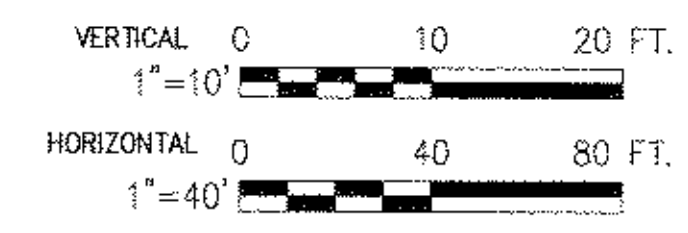
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CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT
FORCE MAIN
PIPING PLAN & PROFILE
STA 32+00 TO STA 39+00**

DATE: 11/22/2013
 SCALE: 1/8"=1'-0"
 SHEET NO: 1 OF 453
 DRAWING NO.
FOMA-C-116.00



CURVE #	START STATION	END STATION	RADIUS	CURVE LENGTH	TOTAL ANGLE, Δ	LAYING LENGTH	JOINT DEFLECTION ANGLE, φ	JOINT DEFLECTION OFFSET
C1	37+34	39+06	1408.00'	171.82'	6°59'30"	20'	0°48'50"	0.28'
C2	39+30	41+08	942.00'	177.71'	10°48'33"	20'	1°12'59"	0.42'
C3	45+86	46+72	538.00'	86.35'	9°11'45"	20'	2°07'47"	0.74'



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CONTRACT B12

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

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 DESIGN LEAD: GM
 SECTION CHIEF: FP

DRAWN BY: GM

NYC Environmental Protection

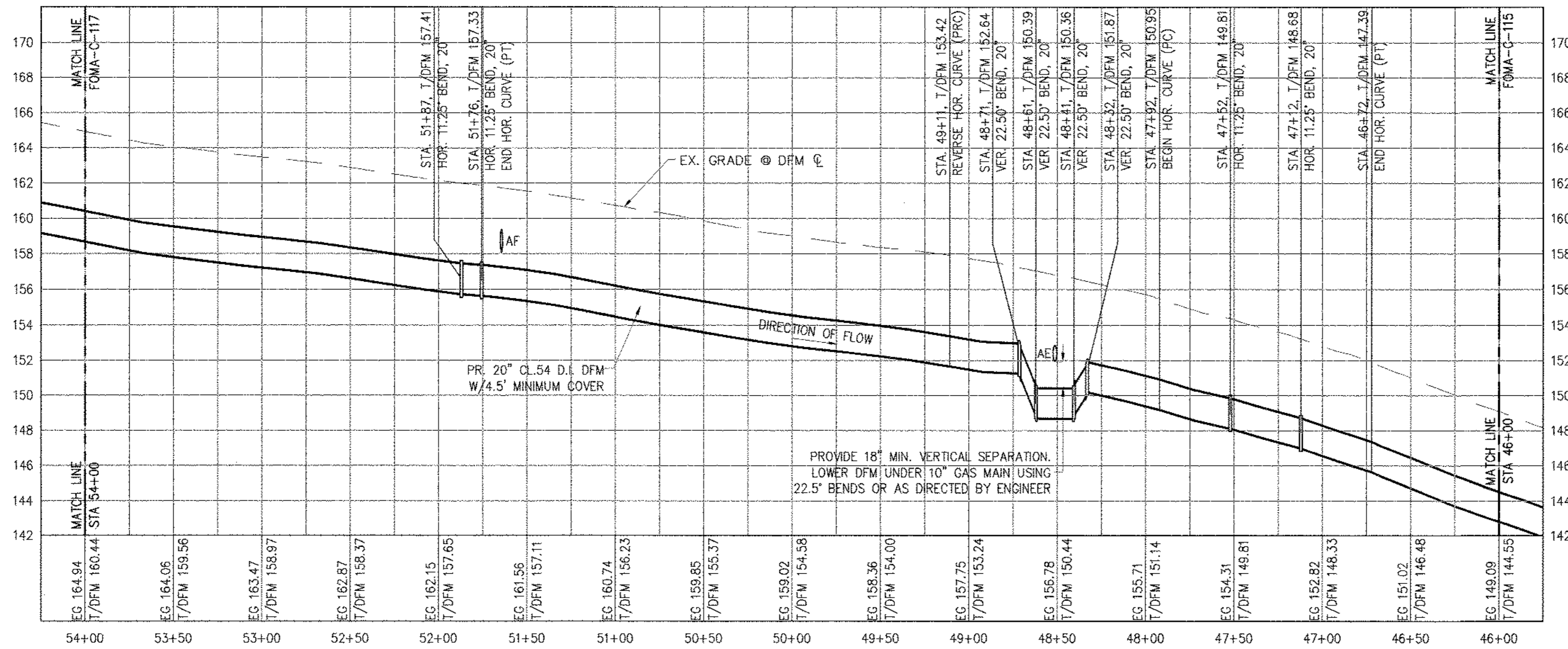
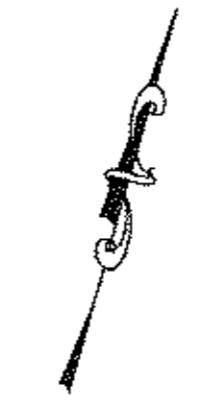
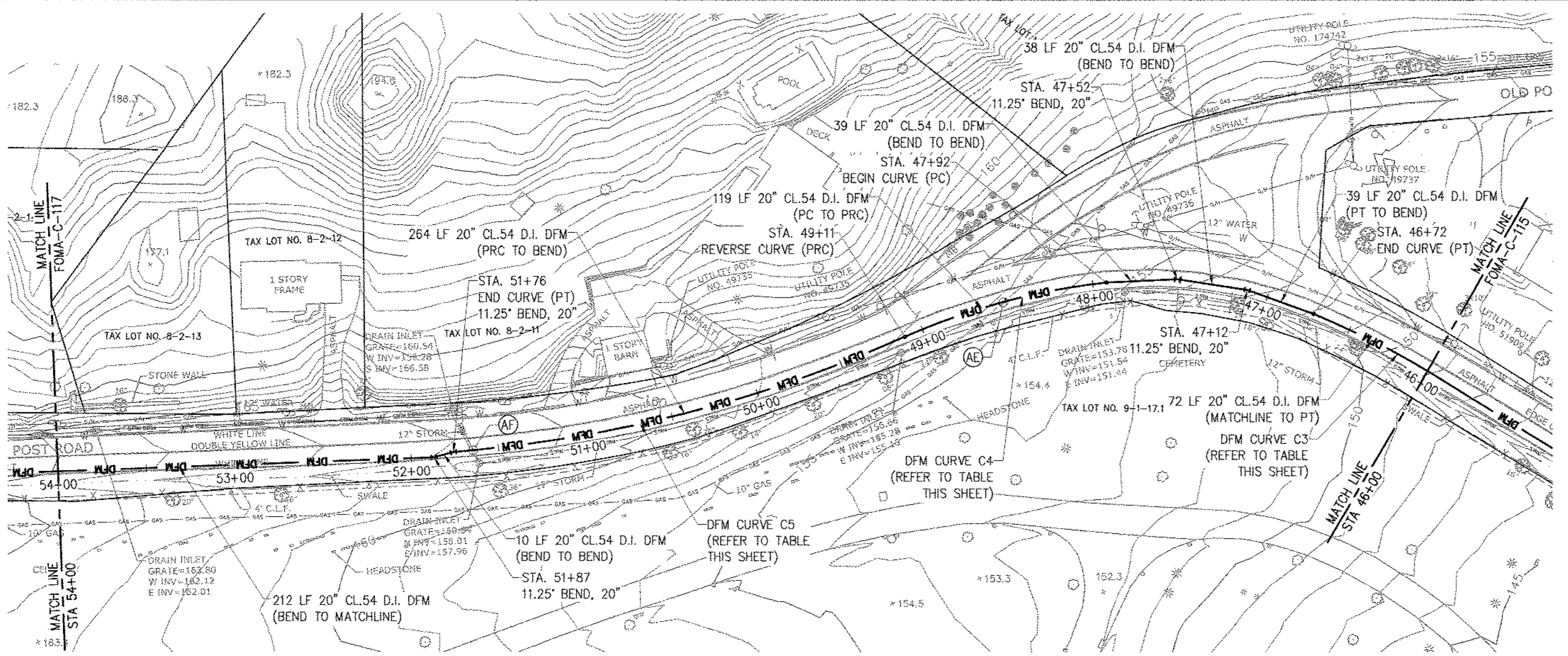
PROJECT MANAGER: TED DOWEY
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 BURJOR KHARIVALA
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 PATRICK O'CONNOR

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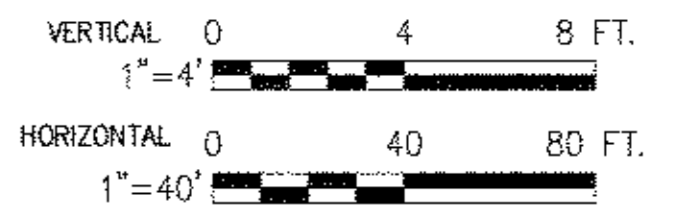
RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT FORCE MAIN PIPING PLAN & PROFILE
 STA 39+00 TO STA 47+00

DATE: 11/22/2013
 SCALE: AS NOTED
 SHEET NO: 1 OF 453
 DRAWING NO: FOMA-C-117.00



UTILITY CROSSING SCHEDULE				
NAME	STATION	DISCRIPTION	DFM ELEVATION	CROSSING ELEVATION
AE	48+51	10" HP GAS MAIN	T/P 150.45	B/P 152.00± (VIF)
AF	51+64	12" STORM DRAIN	T/P 157.28	B/P 158.22± (VIF)

DFM CURVE SCHEDULE								
CURVE #	START STATION	END STATION	RADIUS	CURVE LENGTH	TOTAL ANGLE, Δ	LAYING LENGTH	JOINT DEFLECTION ANGLE, Θ	JOINT DEFLECTION OFFSET
C3	45+86	46+72	538.00'	86.35'	9°11'45"	20'	2°07'47"	0.74'
C4	47+92	49+11	383.00'	118.69'	17°45'18"	20'	2°59'29"	1.04'
C5	49+11	51+76	787.00'	264.81'	19°16'45"	20'	1°27'22"	0.51'



BELL PROPERTY SITE DESIGN
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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 Paper Size: ANSI D (34.00 x 22.00 Inches) Plot Scale: 1:1 Plot Style Table: BEDC_22x34_Full_Size.ctb
 Drawing Name: & Location: B:\BWS\WB1-2\02_Design_Files\2_1_Deliverables\02_Archived_Dwg_Bell_Property_Permitting_Dwg\Task No. 1.13_Force_Main_5B_02_Civil\FOMA-C-118.00.dwg

CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: NYC Water Future Environmental Protection
CHECKED BY: FP	
DESIGN LEAD: GM	
SECTION CHIEF: FP	



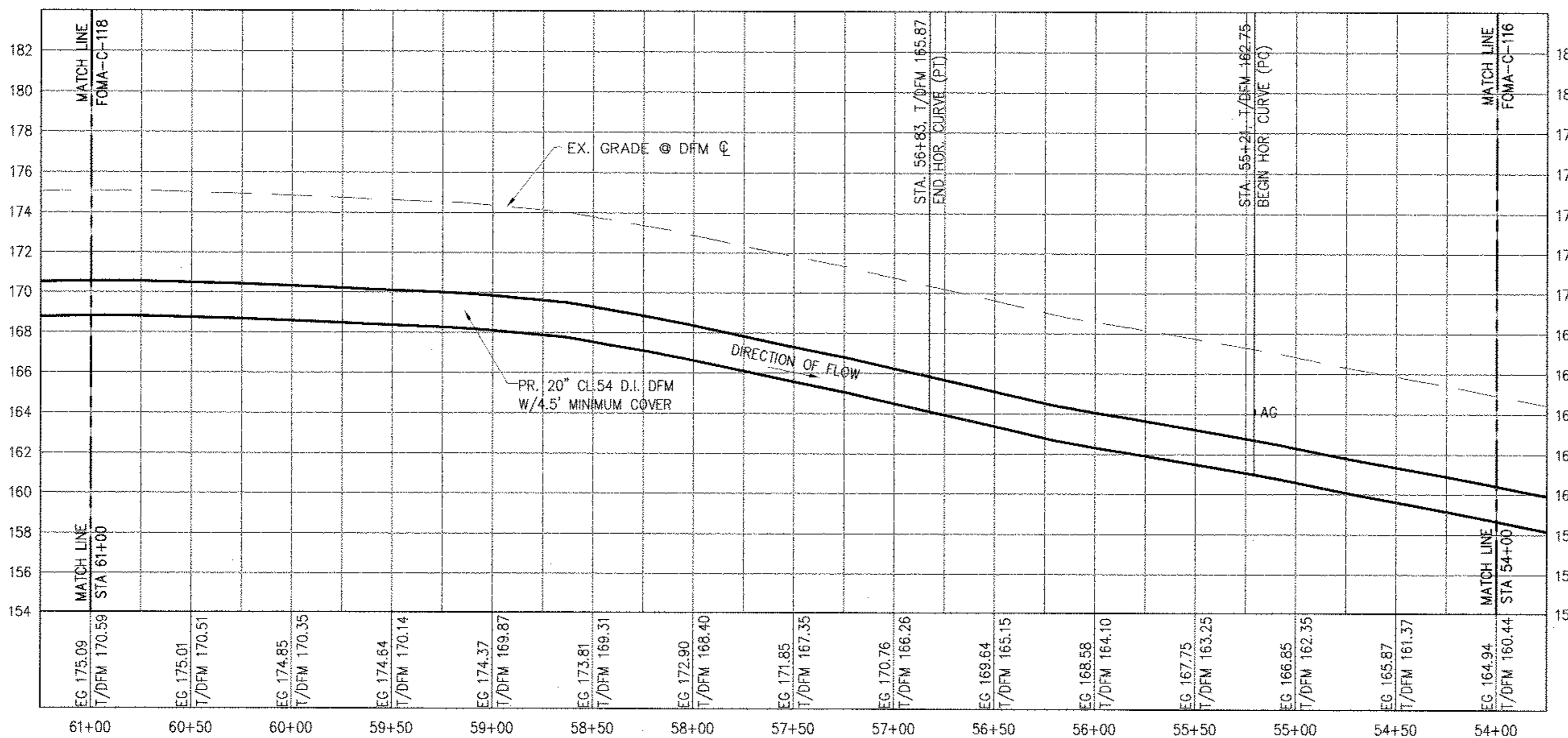
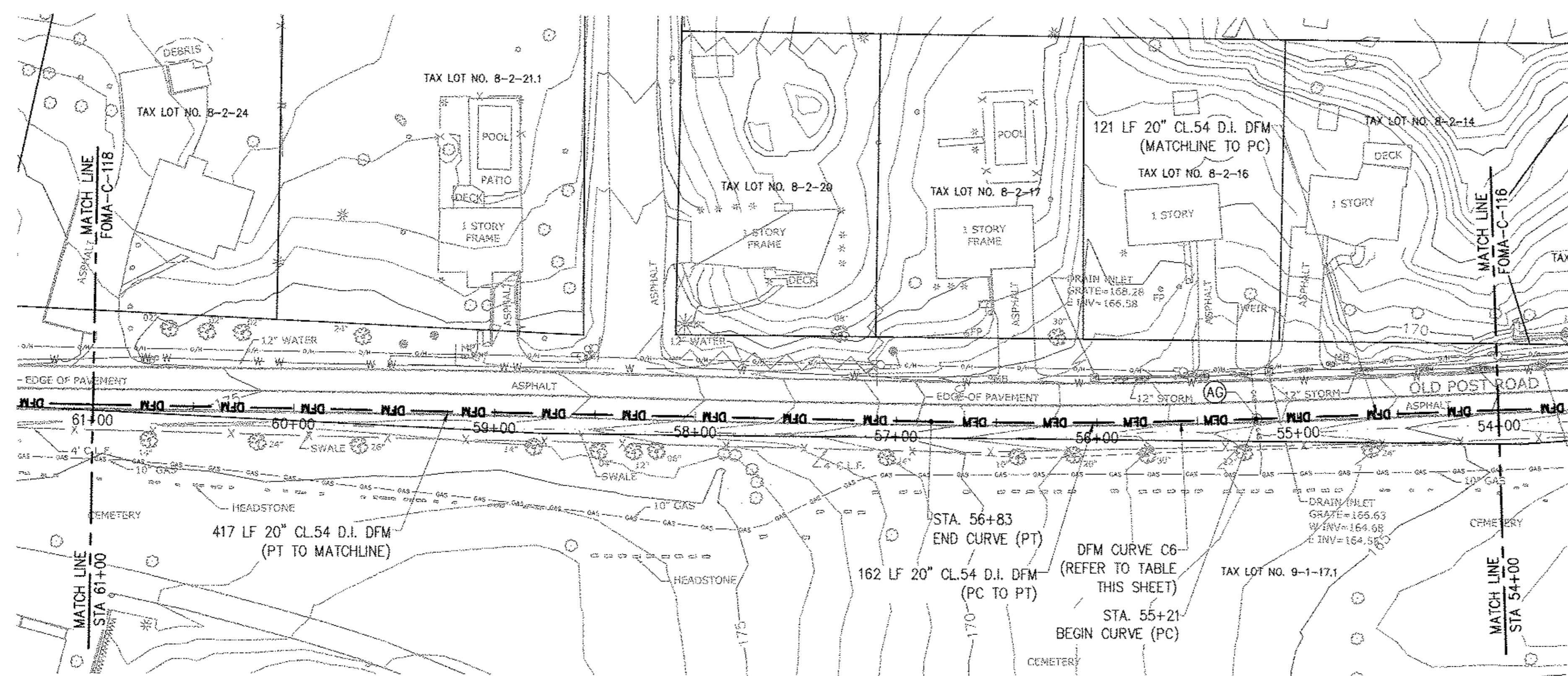
PROJECT MANAGER TED DOWEY
CHIEF, TUNNEL DESIGN BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN PATRICK O'CONNOR

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96-05 HORACE HARDING EXPRESSWAY 5th FLOOR
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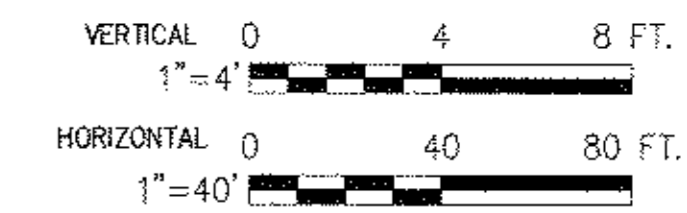
RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARESING REPAIRS, DELAWARE AQUEDUCT FORCE MAIN
PIPING PLAN & PROFILE
STA 47+00 TO STA 55+00

DATE: 11/22/2013
SCALE: AS NOTED
SHEET NO: 1 OF 453
DRAWING NO. FOMA-C-118.00



NAME	STATION	DISCRIPTION	DFM ELEVATION	CROSSING ELEVATION
AG	55+20	UNK GAS MAIN	T/P 162.74	VERIFY IN FIELD

CURVE #	START STATION	END STATION	RADIUS	CURVE LENGTH	TOTAL ANGLE, Δ	LAYING LENGTH	JOINT DEFLECTION ANGLE, Θ	JOINT DEFLECTION OFFSET
C6	55+21	56+83	2909.00'	161.70'	3°11'06"	20'	0°23'38"	0.14'



BELL PROPERTY SITE DESIGN
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
CHECK BEFORE USE
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 Drawing Name: B:\BWS_RWB1-2\02 Design_Files\2.1 Deliverables\02_Archived_Dwg\06 Bell_Property_Permitting_Dwg\1.13_Force_Main_5B\02_Civil\FOMA-C-119.00.dwg

CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	
DESIGN LEAD: GM	
SECTION CHIEF: FP	

NYC Environmental Protection

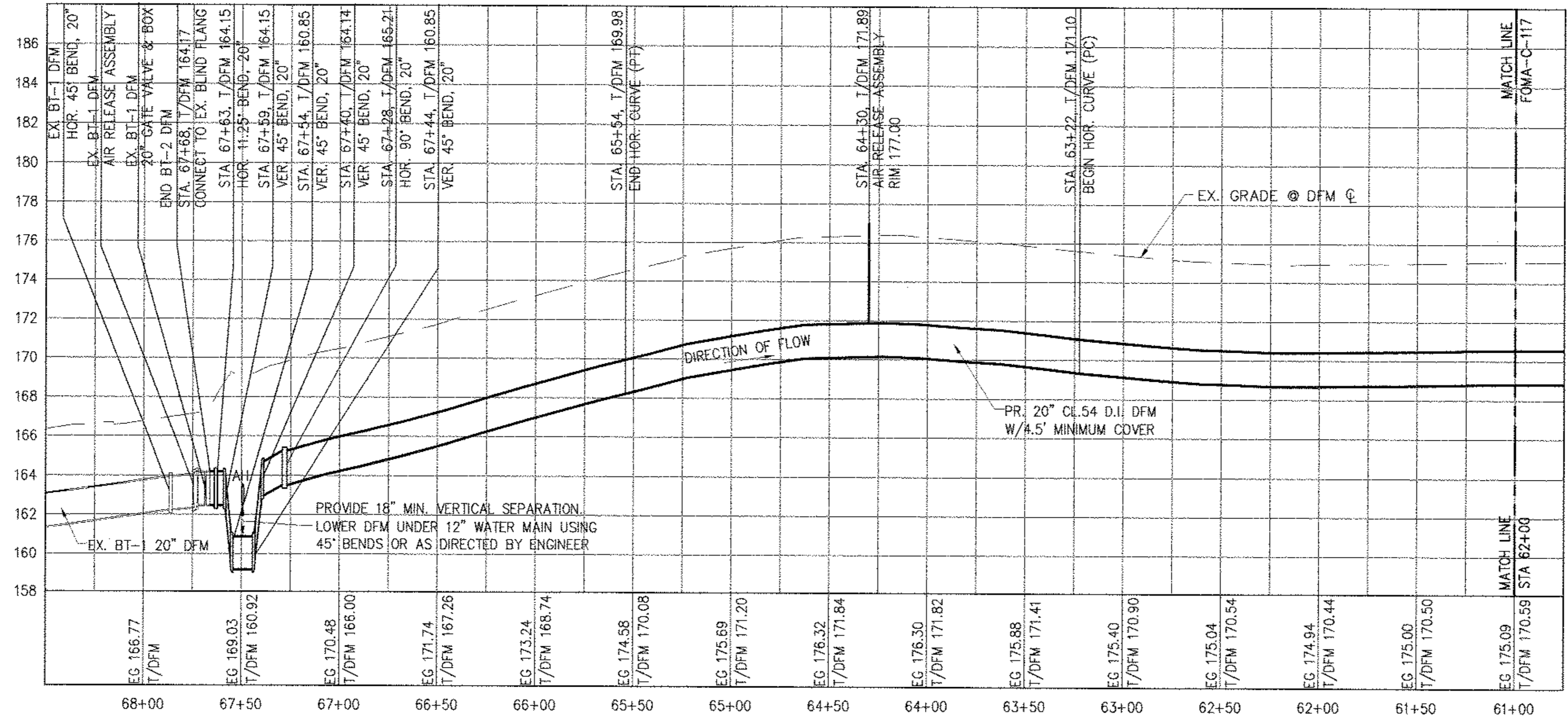
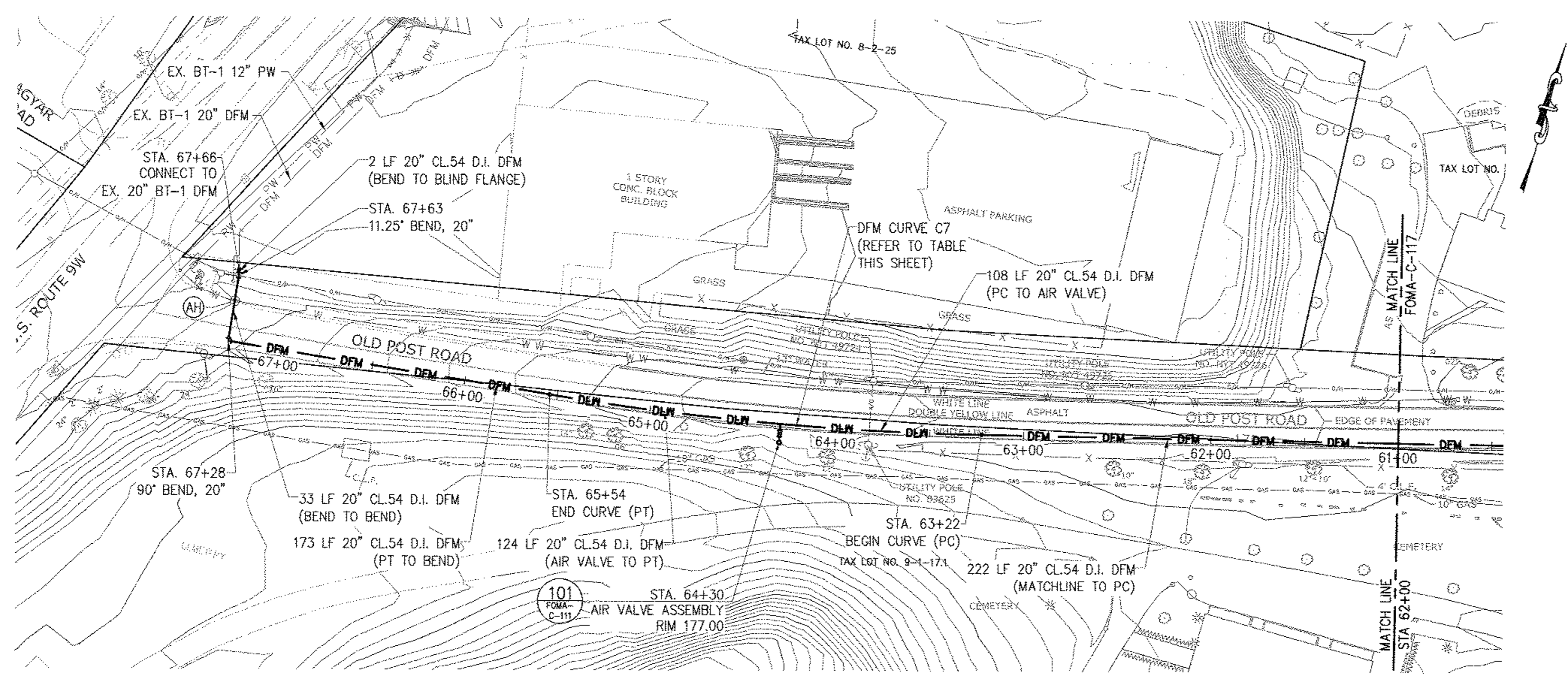
PROJECT MANAGER: TED DOWEY
CHIEF, TUNNEL DESIGN: BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN: PATRICK O'CONNOR

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ROUNDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT FORCE MAIN
PIPING PLAN & PROFILE
STA 55+00 TO STA 62+00

DATE: 11/22/2013
SCALE: AS NOTED
SHEET NO: 1 OF 453
DRAWING NO. FOMA-C-119.00



NAME	STATION	DISCRPTION	DFM ELEVATION	CROSSING ELEVATION
AH	67+49	12" WATER MAIN	T/P 160.92	B/P 162.42± (VIF)

CURVE #	START STATION	END STATION	RADIUS	CURVE LENGTH	TOTAL ANGLE, Δ	LAYING LENGTH	JOINT DEFLECTION ANGLE, φ	JOINT DEFLECTION OFFSET
C7	63+22	65+54	1629.00'	231.67'	8°08'54"	20'	0°42'12"	0.25'



BELL PROPERTY SITE DESIGN
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
CHECK BEFORE USE
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 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BEDC_2x34_Full_Size.ctb
 Drawing Name: & Location: B:\BWS_RWB1-2\02_Design_Files\2.1_Deliverables\02_Archived_Dwg\06_Bell_Property_Permitting_Dwg\Task No. 1.13_Force_Main_5B\02_Civil\FOMA-C-120.00.dwg

CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM
CHECKED BY: FP
DESIGN LEAD: GM
SECTION CHIEF: FP

DRAWN BY: GM
NYC Water Future
Environmental Protection



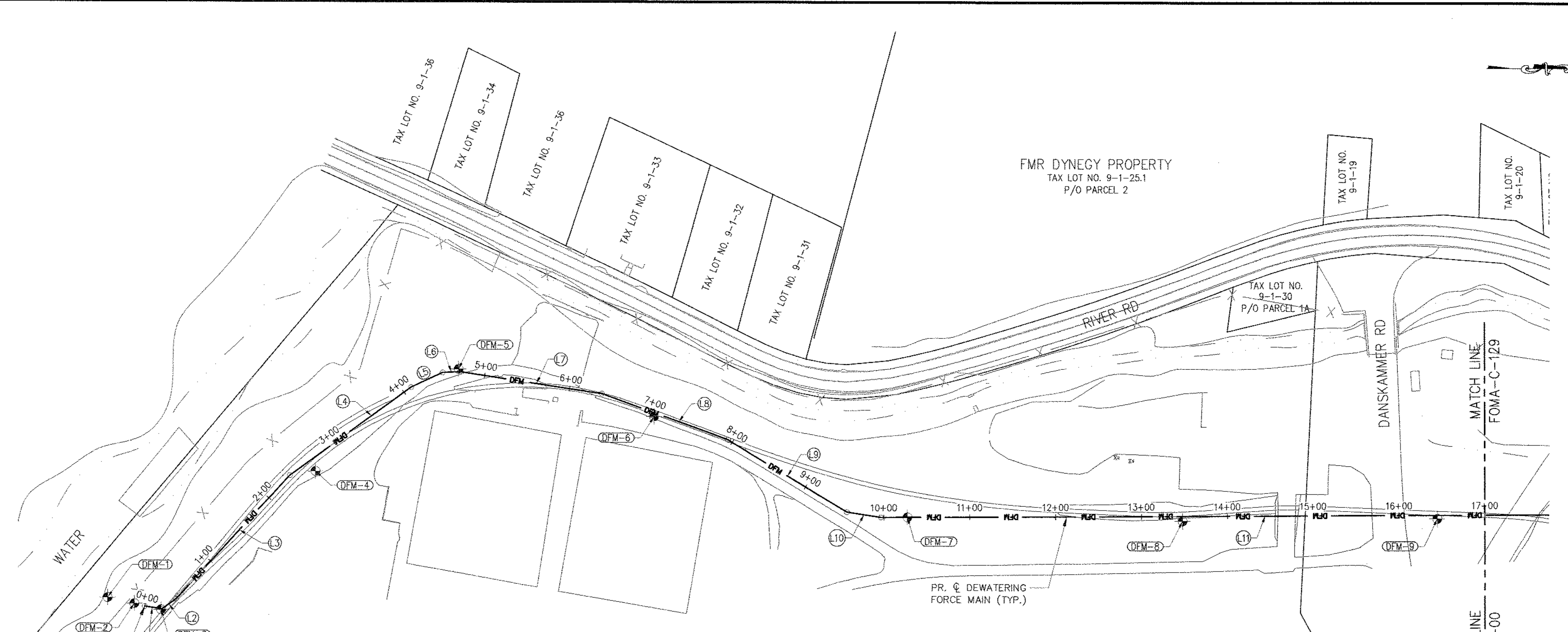
PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT FORCE MAIN PIPING PLAN & PROFILE
STA 62+00 TO P.O.E

DATE: 11/22/2013
SCALE: AS NOTED
SHEET NO: 1 OF 453
DRAWING NO. FOMA-C-120.00



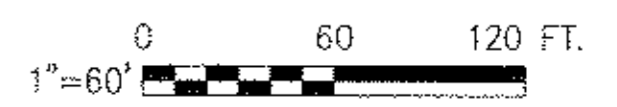
SOIL BORING TABLE: DFM

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
DFM-1	995550.6862	635293.6980	6.98	SOIL BORING - 40' DEEP
DFM-2	995581.8821	635300.6689	8.03	SOIL BORING - 40' DEEP
DFM-3	995613.0780	635307.6399	12.90	SOIL BORING - 40' DEEP
DFM-4	995792.3761	635146.2452	13.92	SOIL BORING - 12' DEEP
DFM-5	995958.4961	635027.5271	12.71	SOIL BORING - 12' DEEP
DFM-6	996186.3375	635081.9245	13.11	SOIL BORING - 12' DEEP
DFM-7	996481.7674	635198.0870	12.98	SOIL BORING - 12' DEEP
DFM-8	996802.2859	635201.9895	16.27	SOIL BORING - 12' DEEP
DFM-9	997098.9993	635198.8075	19.03	SOIL BORING - 12' DEEP

LINE TABLE: DFM

LINE #	LENGTH	DIRECTION	START POINT	END POINT
L1	20.43	N8°50'46"E	N: 995593.9058, E: 635304.0254	N: 995614.0942, E: 635307.1674
L2	20.00	N36°09'14"W	N: 995614.0942, E: 635307.1674	N: 995630.2429, E: 635295.3683
L3	195.54	N47°24'14"W	N: 995630.2429, E: 635295.3683	N: 995762.5869, E: 635151.4261
L4	174.10	N36°09'14"W	N: 995762.5869, E: 635151.4261	N: 995903.1623, E: 635048.7144
L5	40.40	N24°54'14"W	N: 995903.1623, E: 635048.7144	N: 995939.8057, E: 635031.7021
L6	20.42	N2°44'48"W	N: 995939.8057, E: 635031.7021	N: 995960.2042, E: 635030.7235
L7	167.07	N8°30'12"E	N: 995960.2042, E: 635030.7235	N: 996125.4394, E: 635055.4276
L8	156.36	N19°45'12"E	N: 996125.4394, E: 635055.4276	N: 996272.5940, E: 635108.2709
L9	162.10	N31°11'21"E	N: 996272.5940, E: 635108.2709	N: 996411.2636, E: 635192.2166
L10	40.00	N8°41'21"E	N: 996411.2636, E: 635192.2166	N: 996450.8045, E: 635198.2596
L11	782.19	N0°19'10"W	N: 996450.8045, E: 635198.2596	N: 997232.9842, E: 635193.9003

- BASIS OF BEARING:**
- HORIZONTAL DATUM IS NAD-83-96, NEW YORK STATE PLANE COORDINATE SYSTEM, ZONE 3101 (NEW YORK EAST).
 - ALL BEARINGS ARE IN THE DIRECTION OF STATIONING.



**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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 Drawing Name: & Location: B:\BMS_RWB1-2\02_Design_Files\2_1_Deliverables\02_Archived_Dwg_06_Bel_Property_Permitting_Dwg_02_Civil\FOMA-C-125.dwg

CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY:
GM
CHECKED BY:
FP
DESIGN LEAD:
GM
SECTION CHIEF:
FP

DRAWN BY:
GM
NYC Water Future
Environmental Protection



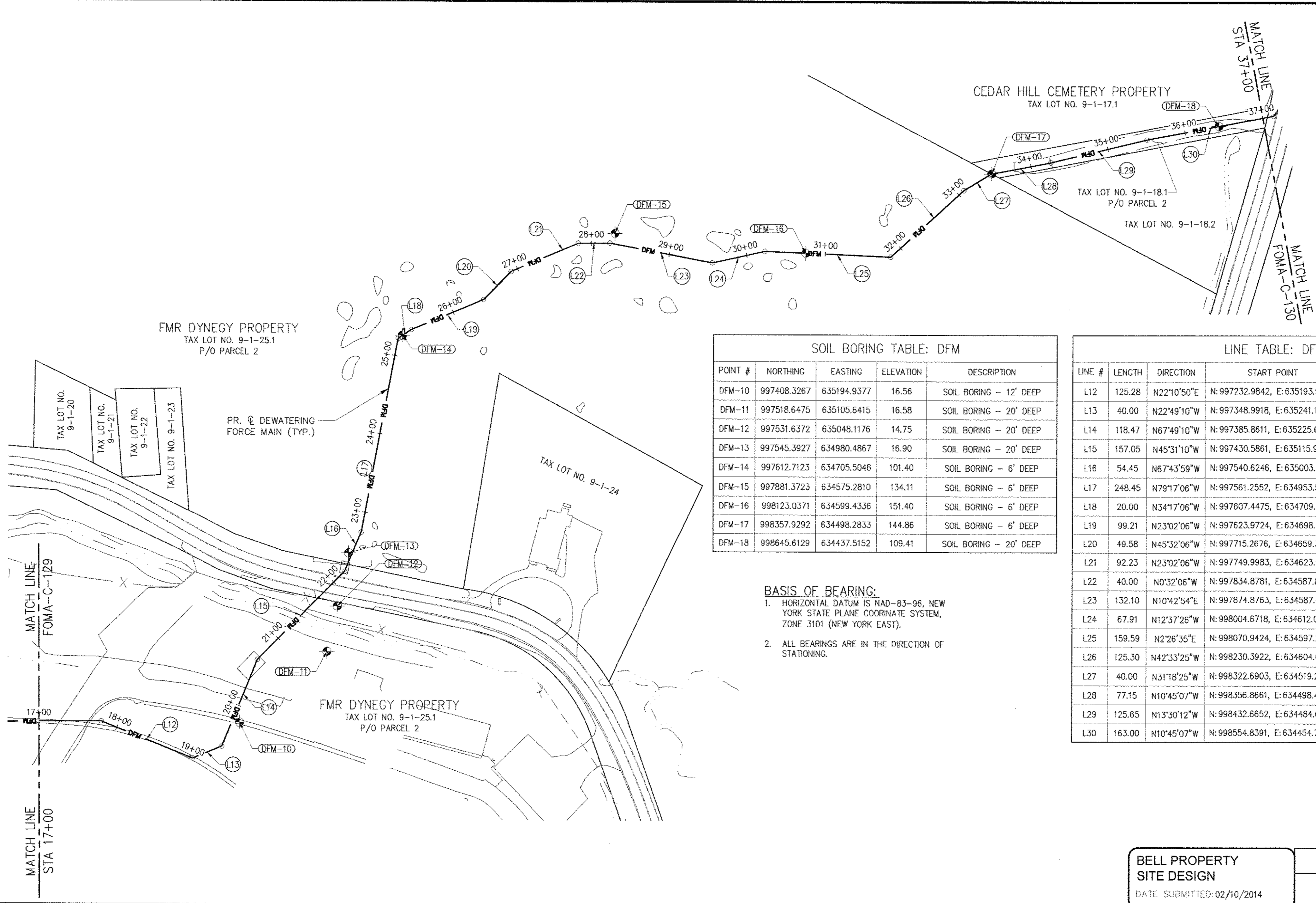
PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJDR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT**
FORCE MAIN
HORIZONTAL CONTROL & BORING PLAN
P.O.B. TO STA 17+00

DATE: 11/22/2013
SCALE: 1"=60'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-125.00



SOIL BORING TABLE: DFM

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
DFM-10	997408.3267	635194.9377	16.56	SOIL BORING - 12' DEEP
DFM-11	997518.6475	635105.6415	16.58	SOIL BORING - 20' DEEP
DFM-12	997531.6372	635048.1176	14.75	SOIL BORING - 20' DEEP
DFM-13	997545.3927	634980.4867	16.90	SOIL BORING - 20' DEEP
DFM-14	997612.7123	634705.5046	101.40	SOIL BORING - 6' DEEP
DFM-15	997881.3723	634575.2810	134.11	SOIL BORING - 6' DEEP
DFM-16	998123.0371	634599.4336	151.40	SOIL BORING - 6' DEEP
DFM-17	998357.9292	634498.2833	144.86	SOIL BORING - 6' DEEP
DFM-18	998645.6129	634437.5152	109.41	SOIL BORING - 20' DEEP

LINE TABLE: DFM

LINE #	LENGTH	DIRECTION	START POINT	END POINT
L12	125.28	N22°10'50"E	N: 997232.9842, E: 635193.9003	N: 997348.9918, E: 635241.1965
L13	40.00	N22°49'10"W	N: 997348.9918, E: 635241.1965	N: 997385.8611, E: 635225.6834
L14	118.47	N67°49'10"W	N: 997385.8611, E: 635225.6834	N: 997430.5861, E: 635115.9825
L15	157.05	N45°31'10"W	N: 997430.5861, E: 635115.9825	N: 997540.6246, E: 635003.9300
L16	54.45	N67°43'59"W	N: 997540.6246, E: 635003.9300	N: 997561.2552, E: 634953.5447
L17	248.45	N79°17'06"W	N: 997561.2552, E: 634953.5447	N: 997607.4475, E: 634709.4273
L18	20.00	N34°17'06"W	N: 997607.4475, E: 634709.4273	N: 997623.9724, E: 634698.1611
L19	99.21	N23°02'06"W	N: 997623.9724, E: 634698.1611	N: 997715.2676, E: 634659.3426
L20	49.58	N45°32'06"W	N: 997715.2676, E: 634659.3426	N: 997749.9983, E: 634623.9571
L21	92.23	N23°02'06"W	N: 997749.9983, E: 634623.9571	N: 997834.8781, E: 634587.8665
L22	40.00	N0°32'06"W	N: 997834.8781, E: 634587.8665	N: 997874.8763, E: 634587.4929
L23	132.10	N10°42'54"E	N: 997874.8763, E: 634587.4929	N: 998004.6718, E: 634612.0531
L24	67.91	N12°37'26"W	N: 998004.6718, E: 634612.0531	N: 998070.9424, E: 634597.2109
L25	159.59	N2°26'35"E	N: 998070.9424, E: 634597.2109	N: 998230.3922, E: 634604.0142
L26	125.30	N42°33'25"W	N: 998230.3922, E: 634604.0142	N: 998322.6903, E: 634519.2700
L27	40.00	N31°18'25"W	N: 998322.6903, E: 634519.2700	N: 998356.8661, E: 634498.4851
L28	77.15	N10°45'07"W	N: 998356.8661, E: 634498.4851	N: 998432.6652, E: 634484.0915
L29	125.65	N13°30'12"W	N: 998432.6652, E: 634484.0915	N: 998554.8391, E: 634454.7525
L30	163.00	N10°45'07"W	N: 998554.8391, E: 634454.7525	N: 998714.9744, E: 634424.3440

BASIS OF BEARING:

- HORIZONTAL DATUM IS NAD-83-96, NEW YORK STATE PLANE COORDINATE SYSTEM, ZONE 3101 (NEW YORK EAST).
- ALL BEARINGS ARE IN THE DIRECTION OF STATIONING.



**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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 Drawing Name: & Location: B:\BWS_RWB1-2\02_Design_Files\21_Deliverables\02_Archived_Dwg\06_Bell_Property_Permitting_Dwg's\Task No. 1.13_Force_Main_SB\02_Civil\FOMA-C-126.00.dwg

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM	DRAWN BY: GM
CHECKED BY: FP	NYC Water & Future Environmental Protection
DESIGN LEAD: GM	
SECTION CHIEF: FP	

PROJECT MANAGER
TED DOWEY

CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA

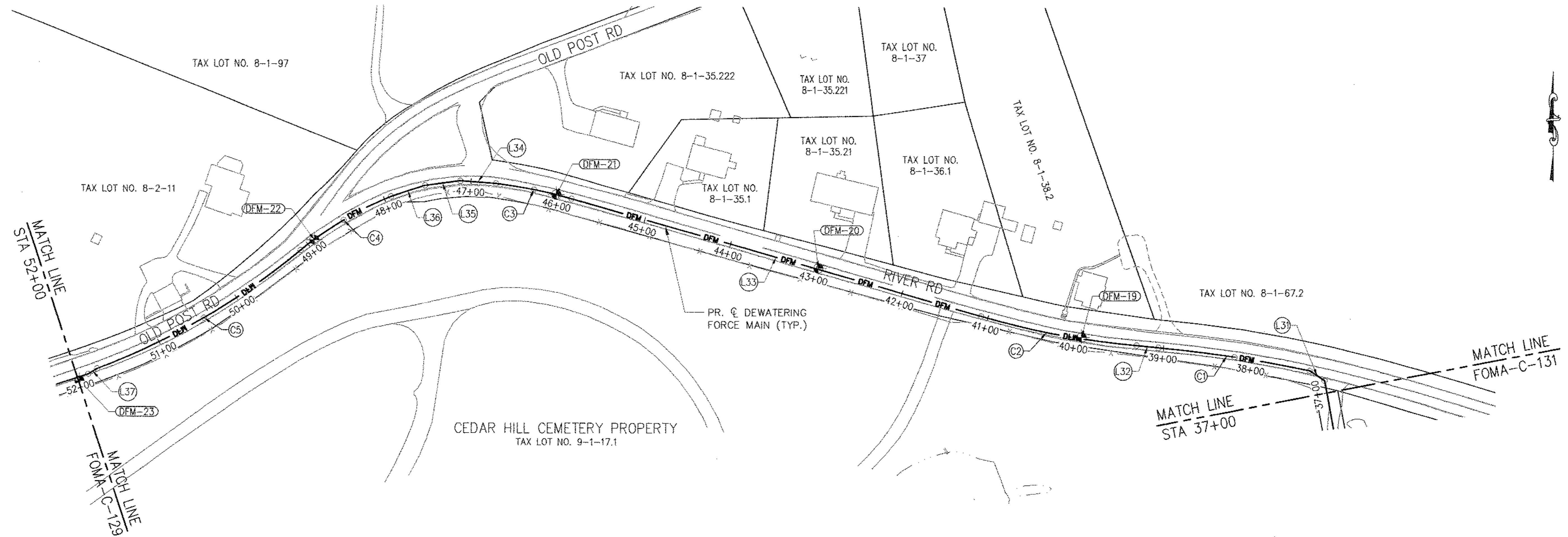
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT
FORCE MAIN
HORIZONTAL CONTROL & BORING PLAN
STA. 17+00 TO STA. 37+00**

DATE: 1/22/2013
SCALE: 1"=60'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-126.00



SOIL BORING TABLE: DFM

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
DFM-19	998763.1133	634151.8769	121.82	SOIL BORING - 12' DEEP
DFM-20	998839.4997	633856.6139	136.72	SOIL BORING - 12' DEEP
DFM-21	998921.9471	633562.9707	149.11	SOIL BORING - 12' DEEP
DFM-22	998870.0595	633292.0275	157.58	SOIL BORING - 20' DEEP
DFM-23	998711.4768	633029.0849	161.46	SOIL BORING - 12' DEEP

LINE TABLE: DFM

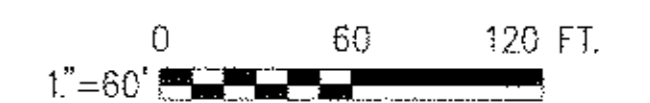
LINE #	LENGTH	DIRECTION	START POINT	END POINT
L31	20.00	N56°06'56"W	N: 998714.9744, E: 634424.3440	N: 998726.1248, E: 634407.7408
L32	24.51	N84°53'10"W	N: 998751.8304, E: 634237.9653	N: 998754.0147, E: 634213.5574
L33	477.68	N74°04'37"W	N: 998786.4083, E: 634039.0901	N: 998917.4578, E: 633579.7362
L34	40.00	N86°06'21"W	N: 998934.3960, E: 633495.1616	N: 998937.1125, E: 633455.2540
L35	40.00	S82°38'39"W	N: 998937.1125, E: 633455.2540	N: 998931.9912, E: 633415.5832
L36	40.00	S71°23'39"W	N: 998931.9912, E: 633415.5832	N: 998919.2292, E: 633377.6743
L37	11.55	S58°05'11"W	N: 998725.2419, E: 633048.8615	N: 998719.1380, E: 633039.0604

CURVE TABLE: DFM

CURVE #	RADIUS	LENGTH	CHORD DIRECTION	CHORD LENGTH	START POINT	END POINT
C1	1408.00	171.82	N81°23'25"W	171.71	N: 998726.1248, E: 634407.7408	N: 998751.8304, E: 634237.9653
C2	942.00	177.71	N79°28'54"W	177.45	N: 998754.0147, E: 634213.5574	N: 998786.4083, E: 634039.0901
C3	538.00	86.35	N78°40'30"W	86.25	N: 998917.4578, E: 633579.7362	N: 998934.3960, E: 633495.1616
C4	383.00	118.69	S58°56'05"W	118.21	N: 998919.2292, E: 633377.6743	N: 998858.2309, E: 633276.4173

BASIS OF BEARING:

- HORIZONTAL DATUM IS NAD-83-96, NEW YORK STATE PLANE COORDINATE SYSTEM, ZONE 3101 (NEW YORK EAST).
- ALL BEARINGS ARE IN THE DIRECTION OF STATIONING.



**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

GRAPHIC SCALES
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SCALE ACCORDINGLY

**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT**
FORCE MAIN
HORIZONTAL CONTROL & BORING PLAN
STA. 37+00 TO STA. 52+00

DATE: 11/22/2013
SCALE: 1/8"=1'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-127.00

Last Saved By & Date: Eugeni, Tuesday, February 04, 2014 and Date Plotted: Thursday, February 06, 2014
 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BDC_2x34_Full_Size.ctb
 Drawing Name: & Location: B:\BWS_RWB1-2\02_Design_Files\2_L_Deliverables\02_Archived_Dwg_06_Bell_Property_Permitting_Dwg.s\Task No. 113_Force_Main_5B\02_Civil\FOMA-C-127.00.dwg

CONTRACT B12

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY:
GM
CHECKED BY:
FP
DESIGN LEAD:
GM
SECTION CHIEF:
FP

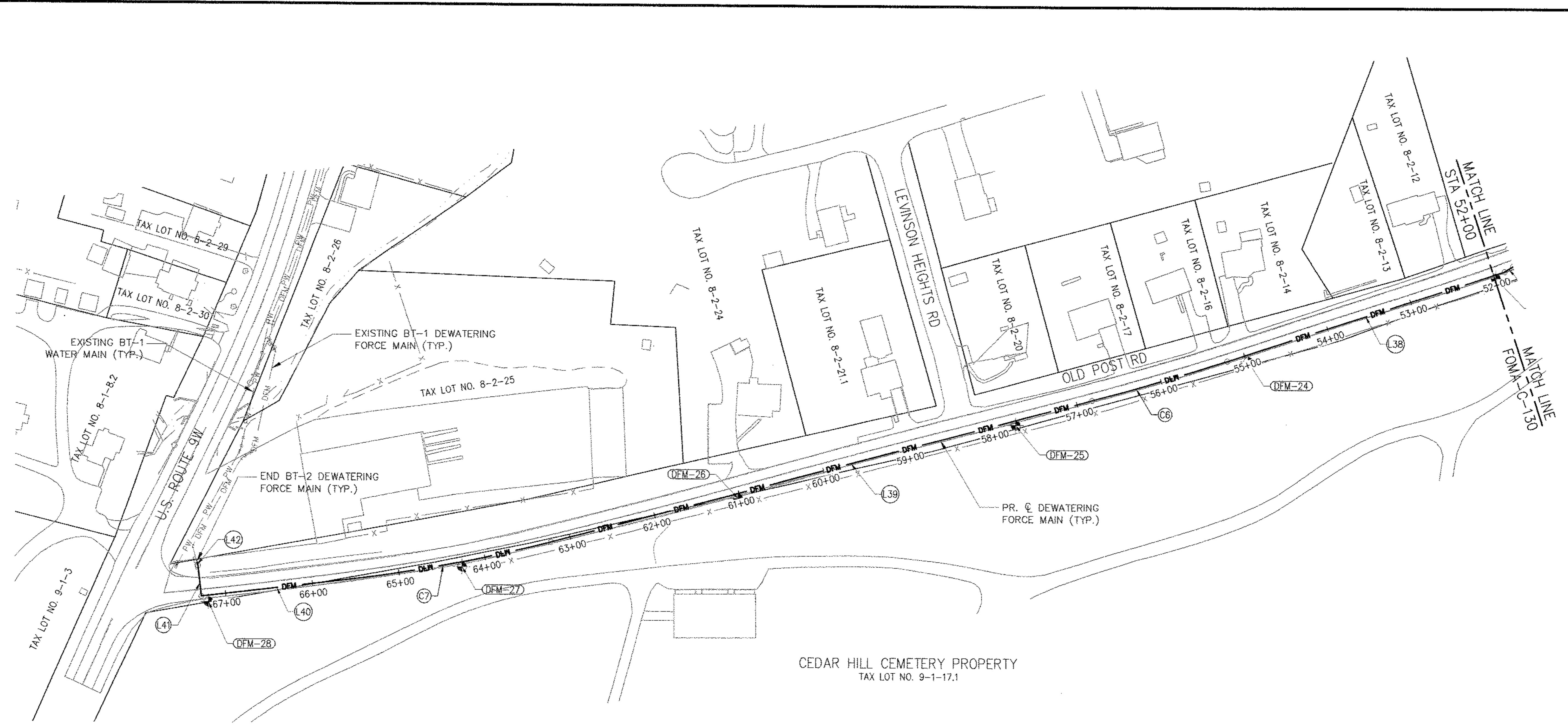
DRAWN BY:
GM
NYC Water & Future
Environmental Protection



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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CORONA, NEW YORK 11368
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SOIL BORING TABLE: DFM

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
DFM-24	998614.6572	632746.0672	165.95	SOIL BORING - 12' DEEP
DFM-25	998540.2608	632479.9683	171.74	SOIL BORING - 12' DEEP
DFM-26	998455.0006	632162.9758	174.80	SOIL BORING - 12' DEEP
DFM-27	998374.1432	631847.1703	176.59	SOIL BORING - 12' DEEP
DFM-28	998332.4764	631557.1363	169.98	SOIL BORING - 20' DEEP

LINE TABLE: DFM

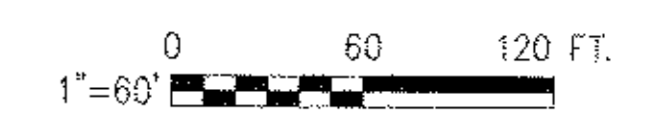
LINE #	LENGTH	DIRECTION	START POINT	END POINT
L38	333.67	S71°49'30"W	N: 998719.1380, E: 633039.0604	N: 998615.0590, E: 632722.0348
L39	639.96	S75°00'36"W	N: 998568.9155, E: 632567.0763	N: 998403.3900, E: 631948.8959
L40	173.89	S83°09'30"W	N: 998359.5563, E: 631721.6085	N: 998338.8416, E: 631548.9560
L41	35.10	N6°50'30"W	N: 998338.8416, E: 631548.9560	N: 998373.6966, E: 631544.7742
L42	23.09	N15°41'14"W	N: 998373.6966, E: 631544.7742	N: 998395.9226, E: 631538.5320

CURVE TABLE: DFM

CURVE #	RADIUS	LENGTH	CHORD DIRECTION	CHORD LENGTH	START POINT	END POINT
C5	787.00	264.81	S59°41'49"W	263.57	N: 998858.2309, E: 633276.4173	N: 998725.2419, E: 633048.8615
C6	2909.00	161.70	S73°25'03"W	161.68	N: 998615.0590, E: 632722.0348	N: 998568.9155, E: 632567.0763

BASIS OF BEARING:

- HORIZONTAL DATUM IS NAD-83-96, NEW YORK STATE PLANE COORDINATE SYSTEM, ZONE 3101 (NEW YORK EAST).
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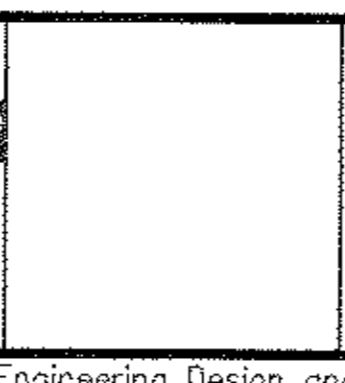


**BELL PROPERTY
SITE DESIGN**
DATE SUBMITTED: 02/10/2014

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SCALE ACCORDINGLY

NO.	DATE	DESCRIPTION	APPR'D.
REVISIONS			

DESIGNED BY: GM
CHECKED BY: FP
DESIGN LEAD: GM
SECTION CHIEF: FP



PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'DONNOR

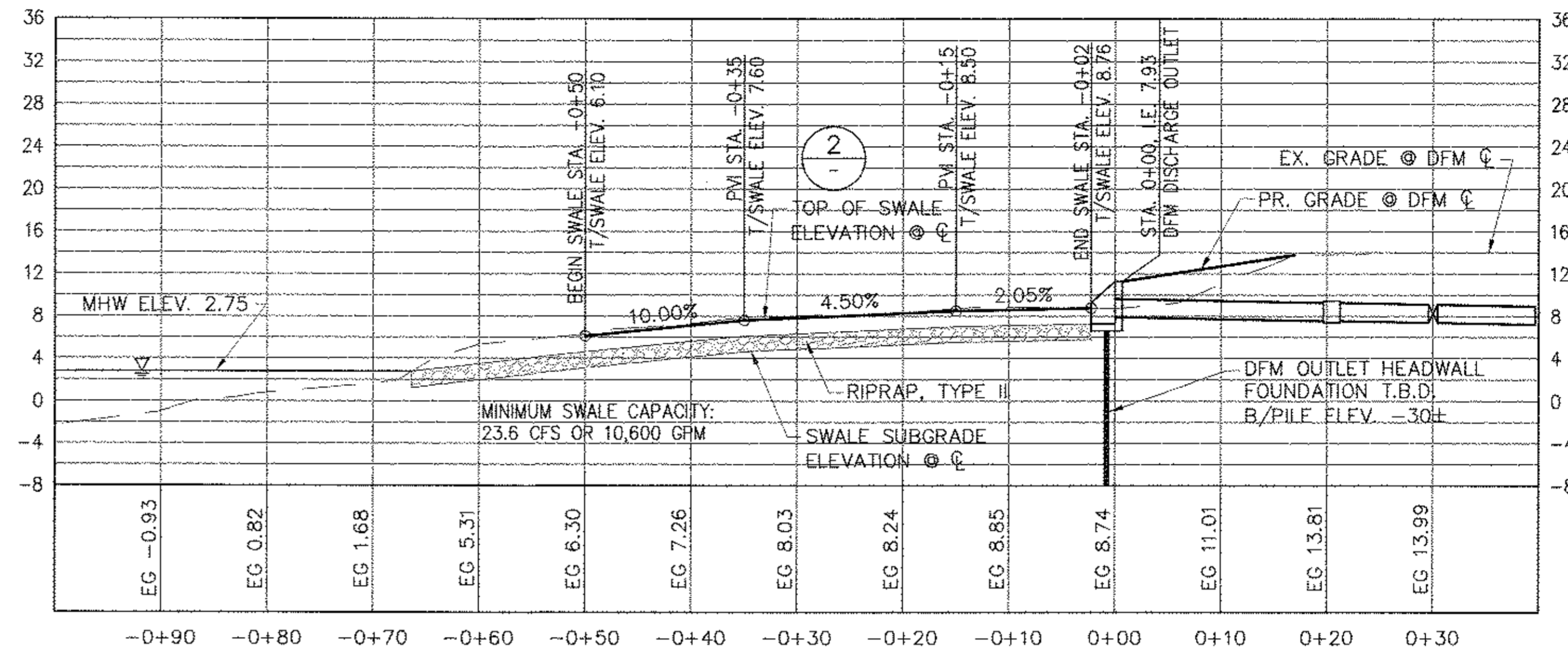
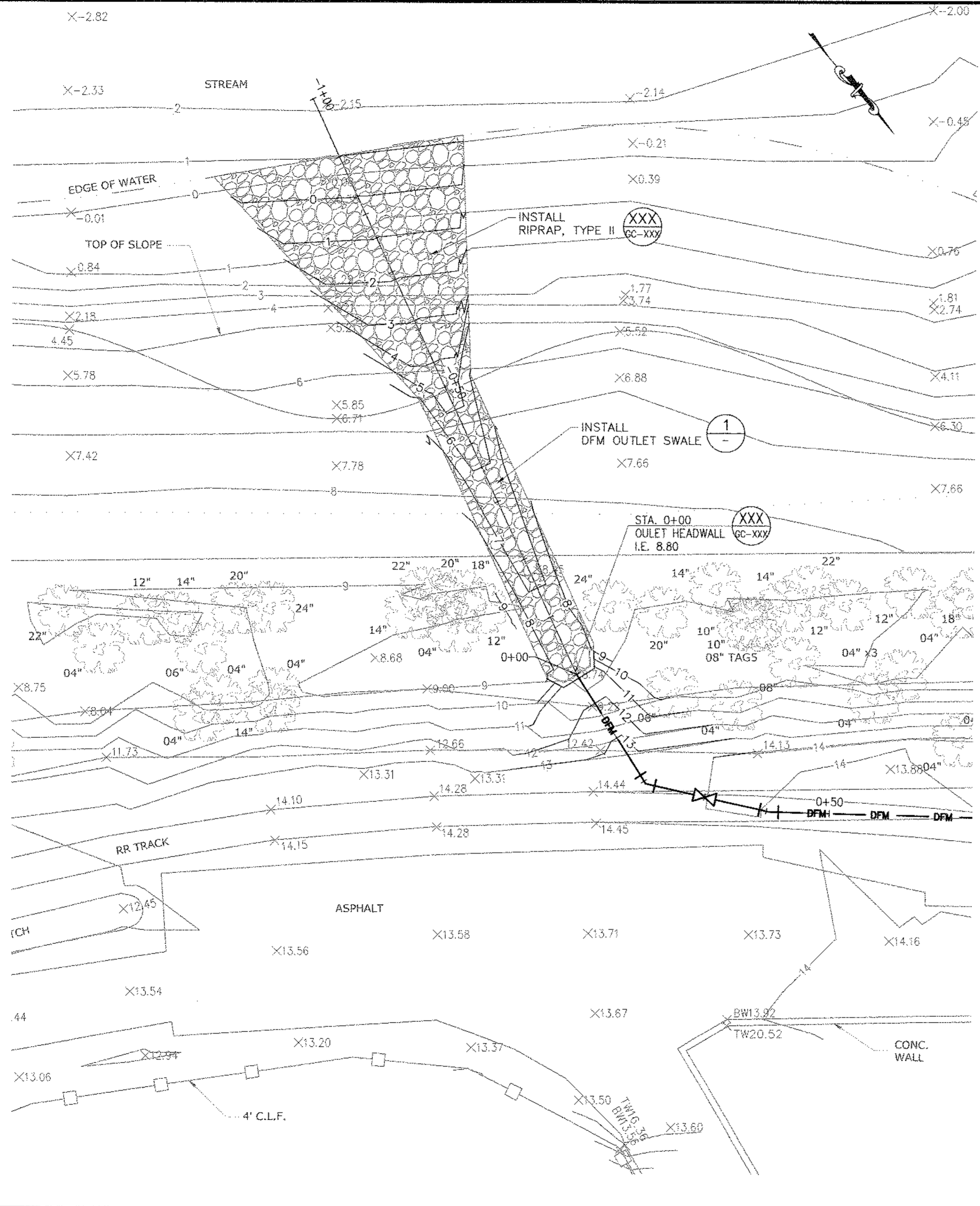
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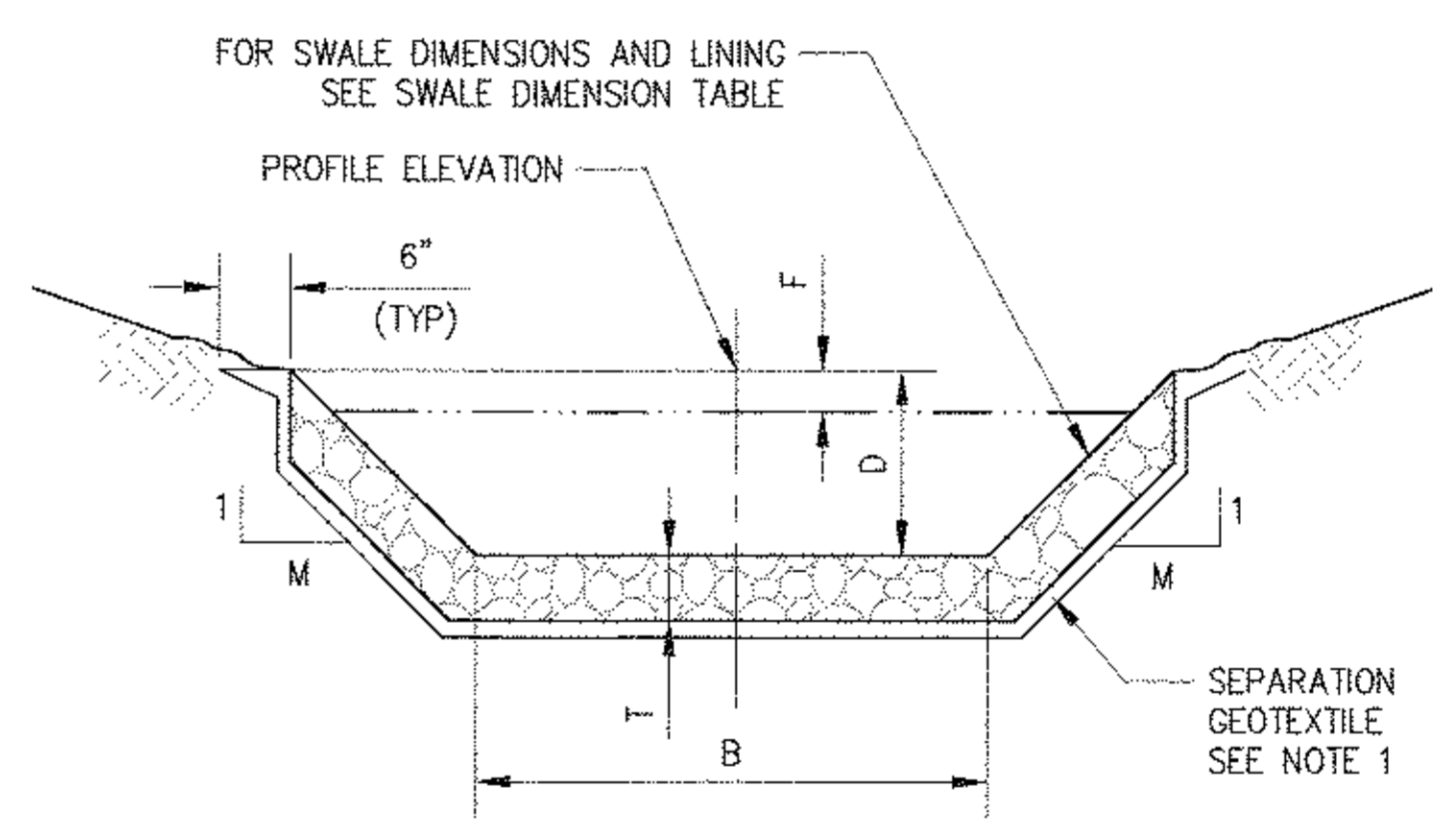
**RONDOUT WEST BRANCH BYPASS TUNNEL
CONSTRUCTION AND WAWARSING REPAIRS,
DELAWARE AQUEDUCT
FORCE MAIN
HORIZONTAL CONTROL & BORING PLAN
STA. 52+00 TO P.O.E**

DATE: 11/22/2013
SCALE: 1"=60'-0"
SHEET NO:
1 OF 453
DRAWING NO.
FOMA-C-128.00

Last Saved By & Date: Eugene, Tuesday, February 04, 2014 and Date Plotted: Thursday, February 06, 2014
 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style: Table: BEDC_22x34_Full_Size.ctb
 Drawing Name: & Location: B:\BWS_RWB\2\02_Design_Files\2_1_Deliverables\02_Archived_Dwg\06_Bell_Property_Permitting_Dwg's\Task No. 1.13_Force_Main_5B\02_Civil\FOMA-C-128.00.dwg



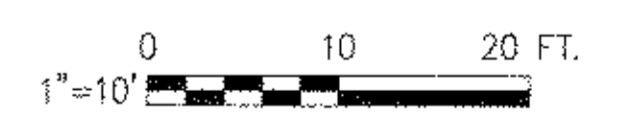
1 DFM OUTLET SWALE PROFILE
SCALE: 1" = 10'



2 SWALE LINING
SCALE: NTS

- SWALE LINING NOTES:**
- SEPARATION GEOTEXTILE SHALL BE LISTED AS STABILIZATION TYPE GEOTEXTILE ON THE NYS DOT "TECHNICAL SERVICES - MATERIALS - APPROVED LIST FOR GEOSYNTHETICS FOR HIGHWAY CONSTRUCTION."
 - THICKNESS OF STONE FILLING (T) SHALL BE 1.5 TIMES THE MEDIAN STONE SIZE (d50).
 - GRADATION REQUIREMENTS FOR STONE FILLING AND RIP-RAP PER SPECIFICATIONS.

SWALE NO.	STA. START	STA. END	SIDE SLOPES (M:1)	BOTTOM (B) (FT)	DEPTH (D) (FT)	FREEBOARD (F) (FT)	LENGTH (FT)	MAXIMUM SLOPE (FT/FT)	SWALE LINING	SEPARATION GEOTEXTILE
DFM OUTLET	-0+50	-0+02	2:1	3	1.5	0.33	48	0.10	TYPE II RIP-RAP	SEE NOTE 1



BELL PROPERTY
SITE DESIGN
DATE SUBMITTED: 02/10/2014

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 Paper Size: ANSI D (34.00 x 22.00 inches) Plot Scale: 1:1 Plot Style Table: BDDC_22x34.ctb Full Size.ctb
 Drawing Name: & Location: B:\BWS_RWB1-2\02 Design_Files\2.1_Deliverables\02_Archived_Dwg\06_Bell_Property_Permitting_Dwg\Task No. 1.13_Force_Main_5B\02_Civil\FOMA-C-134.00.dwg

CONTRACT BT2

NO.	DATE	DESCRIPTION	APPR'D
REVISIONS			

DESIGNED BY: GM
CHECKED BY: FP
DESIGN LEAD: GM
SECTION CHIEF: FP

DRAWN BY: GM
NYC Water & Future
Environmental Protection

NYC Environmental Protection

PROJECT MANAGER
TED DOWEY
CHIEF, TUNNEL DESIGN
BURJOR KHARIVALA
DIRECTOR, IN HOUSE DESIGN
PATRICK O'CONNOR

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RONDOUT WEST BRANCH BYPASS TUNNEL CONSTRUCTION AND WAWARSING REPAIRS, DELAWARE AQUEDUCT
FORCE MAIN
OUTLET GRADING & DRAINAGE PLAN

DATE: 11/22/2013
SCALE: 1"=10'-0"
SHEET NO: 1 OF 453
DRAWING NO. FOMA-C-134.00