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TOWN OF NEWBURGH
PLANNING BOARD
TECHNICAL REVIEW COMMENTS

PROJECT: GARDNER RIDGE
PROJECT NO.: 2002-29
PROJECT LOCATION: SECTION 75, BLOCK 1, LOT 4.12
REVIEW DATE: 1 MARCH 2016
MEETING DATE: 3 MARCH 2016
PROJECT REPRESENTATIVE: TOM OLLEY AND DARREN DOCE, P.E.

1. Status of City of Newburgh Flow Acceptance letter should be provided.

2. Mike Donnelly's comments regarding restrictions, covenants and deeds required to establish the Senior Housing should be received.

3. Language should be included in the site plan and leases requiring the availability of the garage spaces for parking of vehicles. Any other use of the garages should be restricted as required parking is included in the garaged parking spaces.

4. The Applicants representatives are requested to solicit comments from Central Hudson Gas and Electric regarding grading and construction activities within the gas line easement.

5. Gerry Canfield's comments regarding construction of the residential structures over significant amount of fill utilizing retaining walls should be received. Detailed engineering designs of the retaining walls, fill and foundations for the structures must be required.

6. The gates on the Emergency Access Road must be identified on the plans including details for same for review by Jurisdictional Fire Department.

7. NYSDOT for Access road should be received.

8. Orange County Planning referral for the project is required.

9. Building height is identified at 35 feet in the Bulk Table. Aerial access roadways in compliance with the Fire Code must be provided. It is requested that plans identify a dimension of the proposed roadways throughout for review.

10. The Thrust Block Chart and details on the plan should be removed. Town of Newburgh requires the use of restrain joint pipe.

11. Standard notes for Town of Newburgh Water and Sewer must be added to the plan sheets. Notes on the plan that would conflict with these must be removed.

12. A report depicting adequate flow and pressure at the project site should be provided.

13. The Applicants Representative are requested to evaluate pipe discharge velocities in the areas where very steep drainage pipes are proposed.

14. Site development details including roadway sections, guiderails, retaining walls and any other site appurentences proposed must be added to the plans.

15. Future submissions must address on site landscaping.

16. Road profiles for Emergency Access Roads should contain design information regarding vertical curve data. Stormwater Management for discharge down the Emergency Access Road must be addressed. Pipe size at Emergency Access Road connection with Town Roads should be depicted along with inverts.

17. The Applicants are requested to address hydraulic connectivity between the proposed wetland fill areas on the site.

18. The entrance road profile does not appear to depict the culvert located at approximately Station 1+ 90. This culvert should be shown in the section to determine if adequate space for all utilities is provided.

19. Information pertaining to the existing Sewer Main within North Plank Road/ NYS Route 32 Should be provided including rims and inverts of existing up gradient and down gradient Manholes from the proposed connection point.

20. A Stormwater Management Plan has been received on this date and is under review by this office.

21. Future plans should contain detailed information regarding the recreational building, pool and other amenities to be provided.

22. Plans should address access for maintenance of the Stormwater Management Facilities located at the lower portions of the site.

23. An offer of dedication appears proposed along Gardnertown Road. This dedication should be reviewed by Mike Donnelly/ Mark Taylor.

24. Details of the outlet control structure should be provided on the plans along with appropriate elevations.

Respectfully submitted,

McGoey, Hauser and Edsall
Consulting Engineers, D.P.C.

Patrick J. Hines
Principal

PRELIMINARY
Storm Water Management Report

Gardner Ridge

Town of Newburgh

Orange County, New York

February 2016

Prepared for:

Gardner Ridge Associates
134 Fairview Road
Rockaway, NJ 07866

STATE OF NEW YORK
THOMAS B. OLLEY
No. 064534
LICENSED PROFESSIONAL ENGINEER

Prepared by:

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152 Orange Avenue
Walden, NY 12586

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1.0 EXECUTIVE SUMMARY

This Storm Water Management Report has been prepared for the proposed Gardner Ridge Apartments (The "Project") in the Town of Newburgh, Orange County, NY. The site is a 23.4-acre parcel, in the Town of Newburgh located north of Gardnertown Road and west of the Gidneytown Creek. The site is accessed from NYS Route 32 at Chestnut Lane through an easement over lands of WPA Acquisition Corp.

The proposed project is an one hundred forty-four (144) unit apartment complex that will include 6 Buildings composed of 18 units per building and a separate 36 unit building dedicated to senior (age restricted) residences. The Project will also include a recreation facility consisting of a meeting/recreation building, pool and playground area.

The Project Storm Water Management System has been designed to comply with the current New York State Department of Environmental Conservation and Town of Newburgh regulations. The storm water management system pre-development model is based upon the 2016 pre-existing conditions. The site consists of wooded, moderately to steep sloped hillsides with a more gently sloped area at the top of the hillside.

The storm water management system has been designed to meet current standards and to operate effectively during the construction phase and upon completion of construction. This report details and describes the measures proposed to control and remove storm water from the site in a manner consistent with NYSDEC Storm Water Management regulations. A comparison of pre and post-development flows from the site for the 10- and 100-year storms was performed. The storm water management system has been designed such that the post-development peak flow rates will be less than the pre-development peak flow rates for the site for all storms analyzed. In addition, the project has been designed to implement "Green Infrastructure" for treatment of the initial storm water runoff and the 1-year storm as required under NYSDEC regulations. The storm water management system provides measures to minimize the impact to receiving water bodies' quality.

The analysis presented in this report demonstrates that there will be no increase in the rate of discharge from this site after completion of the project construction.

The stormwater management system was designed in accordance with current NYSDEC regulations. The project has incorporated several "Green Infrastructure Practices" into the design for the purpose of reducing stormwater runoff volumes and to increase the volume of infiltration into the site soils. The practices utilized include preservation of undisturbed areas, preservation of riparian buffers, reduction of pavement surfaces by utilizing narrow roads and emergency access drives, use of dry swales, storm water planters and bio-retention. While not used in the calculation of the water quality treatment, the plan also includes tree plantings along the roadways and parking as well as disconnection of portions of the roof drainage from other impervious surfaces where it is practical.

The project has been designed to meet both water quality and runoff reduction regulations as required by the New York State Department of Environmental Conservation.

2.0 STUDY DESCRIPTION

2.1 PROJECT SCOPE

This Stormwater Management Report provides an evaluation of the existing drainage conditions on site and an analysis of the changes in drainage patterns and runoff rates that will result from the proposed development. The pre-development and post-development flow rates are compared to show compliance with the requirements of the NYSDEC SPDES General Permit for Storm Water from Construction Activities. The pre-development and post-development peak discharge rates from the site were compared to identify potential impacts as a result of the proposed development.

This report describes water quality measures, designed to capture and provide treatment of the water quality runoff volume.

2.2 STUDY METHODOLOGY

This study considers existing and proposed drainage patterns, existing and proposed drainage structures, soil types, ground cover types, and off-site discharge points.

The pre-development and post-development storm water conditions were modeled using Hydroflow Hydrographs developed by Intellisolve. Hydroflow Hydrographs is a storm water hydrograph routing model that builds upon the techniques developed by the U.S. Soil Conservation Service published in SCS TR-20, TR-55, as well as the National Engineering Handbook Section 4.

3.0 SURFACE WATER HYDROLOGY

3.1 GENERAL

Drainage from the existing site vicinity is divided into three (3) watersheds for pre-development analysis. Storm water flow is generally from west to east to the Gidneytown Creek. The creek forms the easterly boundary of the site and flows in a southerly direction crossing Gardnertown Road along the southern boundary of the site. The Gidneytown Creek has approximately 10 square miles of tributary area at the project site. The area extends north into the Ulster County Town of Plattekill. Only the portion of the tributary area that flows through the project site was studied here.

WATERSHED AREA DESCRIPTIONS

The project area has been modeled using three (3) watersheds for the pre-development condition; and six (6) watersheds in the post-development model. The Post Development model includes one (1) storm water detention basin. The total study area encompasses approximately 23.4acres. The pre- and post-development watershed maps are included as Appendix A. The pre-development and post-development watersheds are described in more detail below.

3.1.1 Pre-Development Conditions

Watershed 101 is comprised of approximately 62.5-acres. It contains the westerly portion of the site and extends 1500 ft. to the west of the subject parcel. The watershed contains portions of Maurice Lane and Cronomer Heights Drive subdivisions, wooded undeveloped areas and the Town of Newburgh Highway Department yard and vehicle maintenance facilities. The run-off generally flows from west to east to the project site. The watershed contains large residential lots along Cronomer Heights Drive and small residential lots along Maurice Drive each with well-maintained yards as well as woods with light underbrush and very limited debris. This watershed also contains a large amount of impervious area located on the Town of Newburgh Highway Department Yard.

Watershed 102 is comprised of approximately 11.46-acres on site along Gidneytown Creek. The watershed contains woods with little to no underbrush.

Watershed 103 is comprised of approximately 8.32-acres along the north side of Gardnertown Road and includes the south portion of the site. The watershed contains woods and a small portion of Gardnertown Road and Maurice Lane subdivision. The run-off from this area originates near Maurice Lane and travels east through a roadside ditch that runs along Gardnertown Road.

Figure 1 shows the pre-development watersheds, the time of concentration (Tc) flow paths and the soil types for the watersheds.

3.1.2 Post-Development Conditions

Watershed 2011 is comprised of the off site portion of 101 and the portion of the site west of the buildings and Road A. It contains approximately 56.78-acres. The on site post development portion will contain a playground, lawn area and portion of a cul-de-sac. The runoff will flow in a similar manner similar to the pre-development condition. The flow path only has changed when it enters the site and will now flow through a proposed culvert pipe beneath Road A.

Watershed 2012 is comprised of approximately 2.0-acres located at the top of the on site hill. The watershed contains landscape areas, bio-retention area, roadways, driveways and parking for buildings 2-6.

The model does not contain a watershed 2013.

Watershed 2014 is comprised of approximately 3.24-acres and contains the northern portion of Road A, parking, roadways, senior apartments, clubhouse and buildings 1, 2 and 6.

Watershed 2015 is comprised of approximately 4.97-acres and contains buildings 2-5 and the storm water management basins.

Watershed 2021 is comprised of approximately 8.69-acres and it the undeveloped easterly portion of the site.

Watershed 2031 is comprised of approximately 6.74-acres south-west of the site and includes much of the emergency access road.

Figure 2 shows the post-development watersheds, the time of concentration (Tc) flow paths and the soil type boundaries for each watershed.

3.2 SOIL CONDITIONS

The site soil conditions were determined using the Soil Survey of Orange County, New York, prepared by the United States Department of Agriculture Soil Conservation Service (now Natural Resource Conservation Service).

According to the Soil Survey the area is underlain with Chenango gravelly silt loam, Erie, Pittsfield gravelly loam, Swartswood and Wayland soils.

The Hydrologic Soil Groups are defined as follows:

Hydrologic Group A Soils: These soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands and gravels and have a high rate of water transmission (greater than 0.30 in/hr).

Hydrologic Group B Soils: These soils have moderate infiltration rates when thoroughly wetted. They typically consist of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15 to 0.30 in/hr).

Hydrologic Group C Soils: These soils have low infiltration rates when thoroughly wetted. They typically consist of soils with a layer that impedes downward movement of water and soils with moderately fine texture. These soils have a low water transmission rate (0.05 to 0.15 in/hr).

Hydrologic Group D Soils: These soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0.0 to 0.05 in/hr).

4.0 HYDROLOGIC COMPUTER MODELING

Hydrologic computer modeling of the site was performed using Hydroflow Hydrographs software developed by Intellisolve. Hydroflow Hydrographs is a storm water hydrograph routing model that builds upon the techniques developed by the U.S. Soil Conservation Service published in SCS TR-20, TR-55, as well as the National Engineering Handbook Section 4. The computer modeling of the site was performed for the pre- and post-development conditions to fulfill the requirements of the NYSDEC SPDES General Permit For Stormwater Discharges from Construction Activity Permit No. GP-0-15-002. Pre- and post-development flows were modeled using a 24-hour storm event with 10- and 100- year return periods.

The runoff curve numbers and the time of concentrations are performed within the Hydroflow Hydrograph program and are presented in the output provided in the Appendices.

The outlet structure for the detention basin was modeled by outlet structures identical to those shown on the plans.

The 24-hour rainfall values presented in Table 1 were obtained from the "Technical Paper No. 40, Rainfall Frequency Atlas of the United States", United States Department of Commerce, January 1963, Charts 44, 46 and 49.

TABLE 1
24 HOUR RAINFALL AMOUNTS

Storm Event (years)	24 hour Rainfall (Inches)
1	2.60
10	4.68
100	8.30

The 90th percentile storm rainfall depth for the study area is 1.30 inches.

4.1 HYDROLOGIC SUMMARY

Table 2 summarizes the pre-development hydrologic model calculations for the 10-year and 100-year 24-hour storm events. The peak flow discharge rates for the pre-development model are highlighted on this table. Detailed computer model output is presented in Appendix B of this report.

TABLE 2
PRE-DEVELOPMENT DISCHARGE RATES

Storm Frequency (year)	Discharge Point	Watershed Area (ac.)	Peak Discharge (CFS)	Total Study Area (ac.)	Total Site Discharge (cfs)
10	101	62.56	121.02	82.3	148.66
	102	11.46	21.98		
	103	8.32	9.18		
100	101	62.56	283.40	82.3	361.87
	102	11.46	60.54		
	103	8.32	25.94		

Table 3 summarizes the post-development hydrologic model results for the 10-year and 100-year 24-hour storm events. The peak flow rates for the post-development model are highlighted on this table. Detailed computer model output is presented in Appendix B of this report.

TABLE 3

POST-DEVELOPMENT DISCHARGE RATES

Storm Frequency (year)	Discharge Point	Watershed Area (ac.)	Peak Discharge (CFS)	Total Study Area (ac.)	Total Site Discharge (cfs)
10	2011	113.90	262.21	82.4	147.19
	2012	6.74	13.99		
	2014	11.88	21.79		
	2015	8.56	21.15		
	2021	12.83	37.04		
	2031	8.20	22.13		
100	2011	56.78	262.21	82.4	358.07
	2012	2.00	13.99		
	2014	3.24	21.79		
	2015	4.97	21.15		
	2021	8.69	37.04		
	2031	6.74	22.13		

Table 4 provides a comparison of the pre-development and post-development hydrologic model calculations for the 10-year and 100-year 24-hour storm events. The peak flow rates at the off-site discharge point for the pre- and post-development models are highlighted on this table for comparison. As shown in the table, the post-development discharge rates are less than the pre-development discharge rates for all storms included in this study.

TABLE 4

COMPARISON OF PRE- AND POST-DEVELOPENT PEAK DISCHARGES

Storm Frequency (yrs)	Pre-Development Peak Discharge (cfs)	Post-Development Peak Discharge (cfs)
1	-	*
10	148.66	147.19
100	361.87	358.07

*The 1 year storm will be fully infiltrated though green infrastructure practices.

5.0 WATER QUALITY

The storm water management for this site has been designed to capture and detain the volume of water calculated as the "water quality volume" of runoff from contributing drainage areas that will be disturbed for the proposed development. This is required under the NYSDEC SPDES general permit for storm water discharges. Control of the water quality volume of storm water runoff is important since most runoff related water quality contaminants are transported from land, particularly the impervious surfaces, during the initial stages of storm events.

The Water Quality Volume (WQ_v) is determined using the methodology set forth in "New York State Stormwater Management Design Manual", January 2015, published by The New York State Department of Environmental Conservation.

The following formula was used to determine the required volume:

$$WQ_v = (P)(R_v)(A)/12$$

Where:

WQv = Water Quality Volume in acre-feet
P = 90% rainfall event from Figure 4.1 = 1.30 in.
R_v = 0.05 + 0.009(I), where I = % impervious cover (%)
A = site area in acres

6.0 RUNOFF REDUCTION

The current Stormwater SPDES Permit requires the implementation of "Green Infrastructure" (GI) for water quality treatment. The New York State Storm Water Management Design Manual, January 2015 requires the implementation of "Green Infrastructure Techniques" to reduce the volume of runoff from development sites. Water Quality Volume (WQ_v) is determined using the methodology set forth in "New York State Stormwater Management Design Manual", January 2015, published by The New York State Department of Environmental Conservation.

> *"Runoff reduction shall be achieved by infiltration, groundwater recharge, reuse, recycle, evaporation/evapotranspiration of 100 percent of the post-development water quality volumes to replicate pre-development hydrology by maintaining pre-construction infiltration, peak runoff flow, discharge volume, as well as minimizing concentrated flow by using runoff control techniques to provide treatment in a distributed manner before runoff reaches the collection system.. This requirement can be accomplished by application of on-site green infrastructure techniques, standard stormwater management practices with runoff reduction capacity, and good operation and maintenance."*

The regulations specify that a minimum level of volume reduction is required for all development sites. The minimum site reduction is dependent upon site soil conditions. The NYSDEC has established a *Specific Reduction Factors* based on Hydrologic Soil Groups. The specific reduction factors based the Hydrologic Soil Groups are:

- HSG A = 0.55
- HSG B = 0.40
- HSG C = 0.30
- HSG D = 0.20

The following formula was used to determine the minimum required runoff reduction volume:

$$RR_v = [(P)(R_v^*)(A_i)]/12$$

Where:

RR_v = Runoff Reduction Volume in acre-feet
A_i = Impervious area targeted for runoff reduction
= $S(A_{ic})$
A_{ic} = Total area of new impervious cover
R_v^* = $0.05 + 0.009(I)$
I = percent impervious cover = 100%
S = Hydrologic Soil Group (HSG) Specific Reduction Factor

$$RR_v = [(P)(R_v^*)(A_i)]/12$$
= 0.2 acre-feet (Minimum)

The Storm Water Design Manual (SWDM) provides for WQv reductions through implementation of various Site Planning efforts and Green Infrastructure Practices. The SWDM provides for the reduction of the Runoff Volume through the reduction of impervious area and tributary area. The impervious area reduction is achieved through the reduction in surface area and disconnection of impervious surfaces. Green Infrastructure Technology reductions are achieved through the use of dry swales, bioretention facilities, and infiltration.

The NYSDEC has created an Excel spreadsheet for the calculations associated with the implementation of GI. The implementation of GI requires attainment of a minimum level of Runoff Reduction (RRv) based upon the different Hydrologic Soil Groups (HSG). The goal of GI implementation is to achieve total infiltration of the 90th percentile storm volume. However, soil and site limitations may prevent this on any given project. Therefore, the NYSDEC has set a minimum level of Runoff Reduction (RRv) based upon the different Hydrologic Soil Groups (HSG). The Water Quality Volume that cannot be treated through implementation of the Green Infrastructure may be treated through the standard Stormwater Management Practices (SMP).

The design for the Gardner Ridge incorporates Green Infrastructure practices to achieve full treatment of the Water Quality volume in various methods including both area and volume reduction practices.

The summary calculation sheets from the NYSDEC Spreadsheet are attached as Appendix C.

7.0 STORMWATER DETENTION & FLOOD CONTROL

As shown in Tables 2, 3, and 4 the post-development runoff rates are less than the pre-development runoff rates at the Design Point. To achieve this, the stormwater management basin were designed to detain any rain falling within the associated watersheds for a short period of time. The water is then discharged through the outlet structure to the predevelopment discharge points.

The outlet structures for the SQMB are designed as multi-stage outlets. The structure contains an 18" orifice that regulates the 10 yr storm. The structure include Cipoletti weir to control high flow flood events. The Cipoletti weir are designed to provide reduction of the post development discharge rates to less than the pre-development rates for the 10 year storm event (to provide stream overbank protection) and for the 100 year storm event (to provide extreme flooding protection). Emergency Spillways are provide in each outlet structure through the drop inlets (riser inlet).

8.0 CONCLUSION

The stormwater management basins and other Stormwater Management Practices provided for herein are designed to meet the requirements of New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activities.

The project has been designed to include numerous Green Infrastructure Practices to reduce the volume of runoff and to increase the natural infiltration of groundwater into the soils. These practices include, but are not limited to, reduction of road widths, reduction of driveway lengths, use of semi-impervious surfaces for parking and emergency access areas, reduction of parking areas (reserve areas for parking expansion to meet Zoning requirements), disconnection of impervious surfaces (where practical).

The Stormwater Management Practices employed here, when properly constructed and maintained will meet the water quality and channel protection objectives set forth by the NYSDEC. In accordance with the requirements of the NYSDEC SPDES General Permit for Stormwater Discharges, the post-development peak flows will be less than the pre-development peak flows for the site.

Appendix A

Watershed Maps

Figure 1

Pre-Development Map

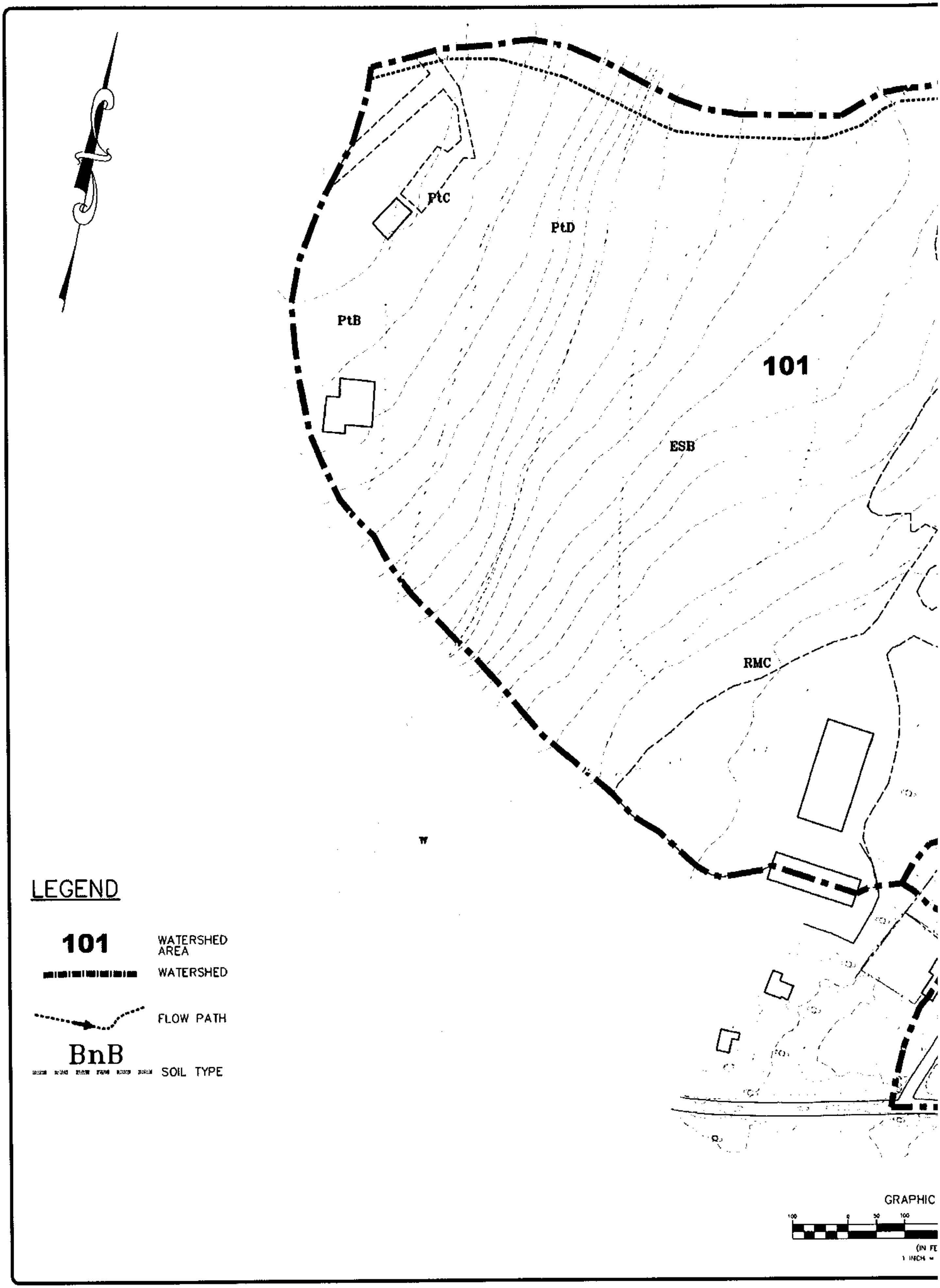
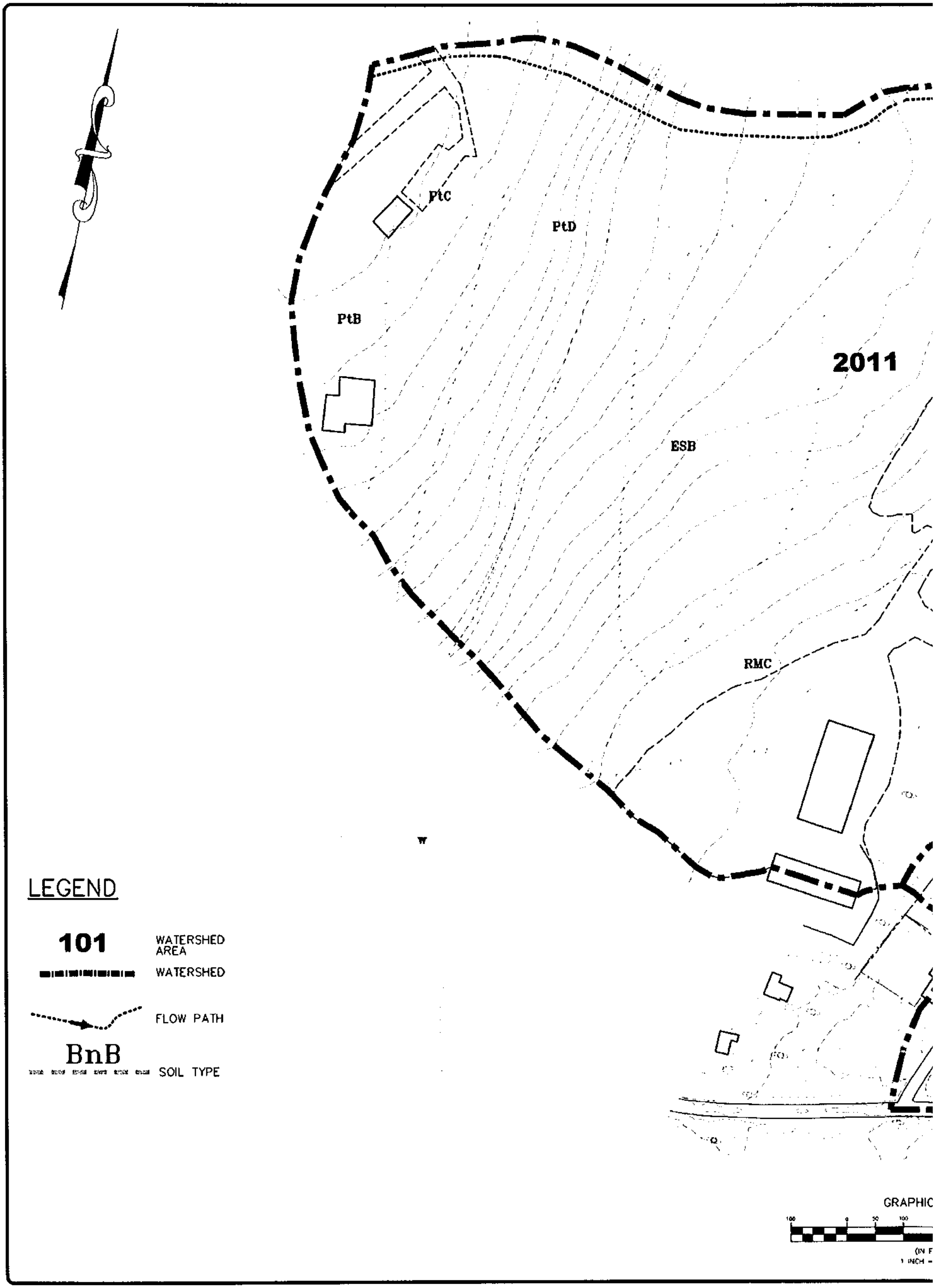

PtC
PtD
PtB
101
ESB
RMC
LEGEND
101 WATERSHED AREA
WATERSHED
FLOW PATH
BnB SOIL TYPE
GRAPHIC

Figure 2

Post-Development Watershed Map


PtC
PtD
PtB
2011
ESB
RMC
W
LEGEND
101
WATERSHED AREA
WATERSHED
FLOW PATH
BnB
SOIL TYPE
GRAPHIC

Appendix B

Hydrologic Computer Models

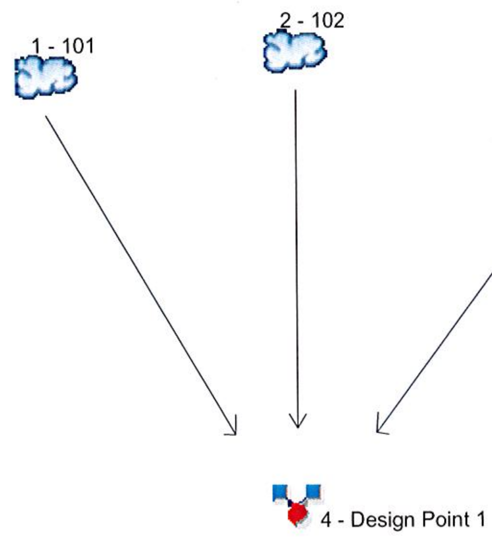
Appendix B-1

Pre-Development Drainage Model

Hydraflow Table of Contents

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10



Legend

Hyd.	Origin	Description
1	SCS Runoff	101
2	SCS Runoff	102
3	SCS Runoff	103
4	Combine	Design Point 1

Project: 160122 Pre Development.gpw

Friday, 02 / 26 / 2016

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	-------	-------	-------	121.02	-------	-------	283.40	101
2	SCS Runoff	------	-------	-------	-------	-------	21.98	-------	-------	60.54	102
3	SCS Runoff	------	-------	-------	-------	-------	9.181	-------	-------	25.94	103
4	Combine	1, 2, 3	-------	-------	-------	-------	148.66	-------	-------	361.87	Design Point 1

Proj. file: 160122 Pre Development.gpw

Friday, 02 / 26 / 2016

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	121.02	2	734	535,403	------	------	------	101
2	SCS Runoff	21.98	2	730	87,077	------	------	------	102
3	SCS Runoff	9.181	2	742	49,994	------	------	------	103
4	Combine	148.66	2	734	672,474	1, 2, 3	------	------	Design Point 1

Hydrograph Report

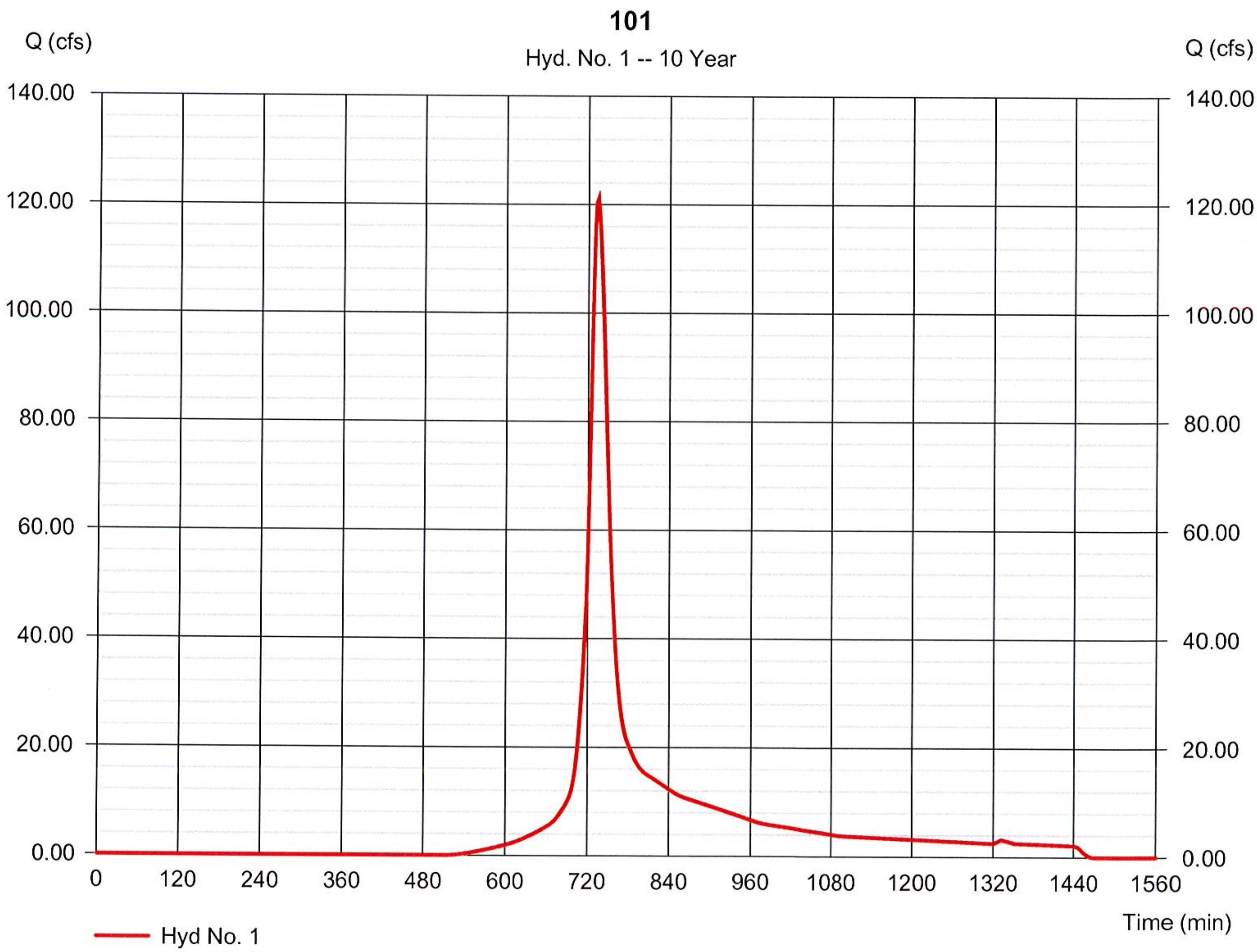
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Friday, 02 / 26 / 2016

Hyd. No. 1

101

Hydrograph type	= SCS Runoff	Peak discharge	= 121.02 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 535,403 cuft
Drainage area	= 62.560 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.20 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(12.170 x 98) + (8.490 x 65) + (27.090 x 76) + (6.700 x 61) + (8.110 x 74)] / 62.560



TR55 Tc Worksheet

Hyd. No. 1

101

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 10.68**	**+**	**0.00**	**+**	**0.00**	**=**	**10.68**
Shallow Concentrated Flow							
Flow length (ft)	= 311.00		1421.00		317.00		
Watercourse slope (%)	= 10.00		6.00		15.00		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=5.10		3.95		6.25		
Travel Time (min)	**= 1.02**	**+**	**5.99**	**+**	**0.85**	**=**	**7.85**
Channel Flow							
X sectional flow area (sqft)	= 104.50		0.00		0.00		
Wetted perimeter (ft)	= 100.00		0.00		0.00		
Channel slope (%)	= 4.50		0.00		0.00		
Manning's n-value	= 0.025		0.015		0.015		
Velocity (ft/s)	=13.02		0.00		0.00		
Flow length (ft)	({0})490.0		0.0		0.0		
Travel Time (min)	**= 0.63**	**+**	**0.00**	**+**	**0.00**	**=**	**0.63**

Total Travel Time, Tc .... 19.20 min

Hydrograph Report

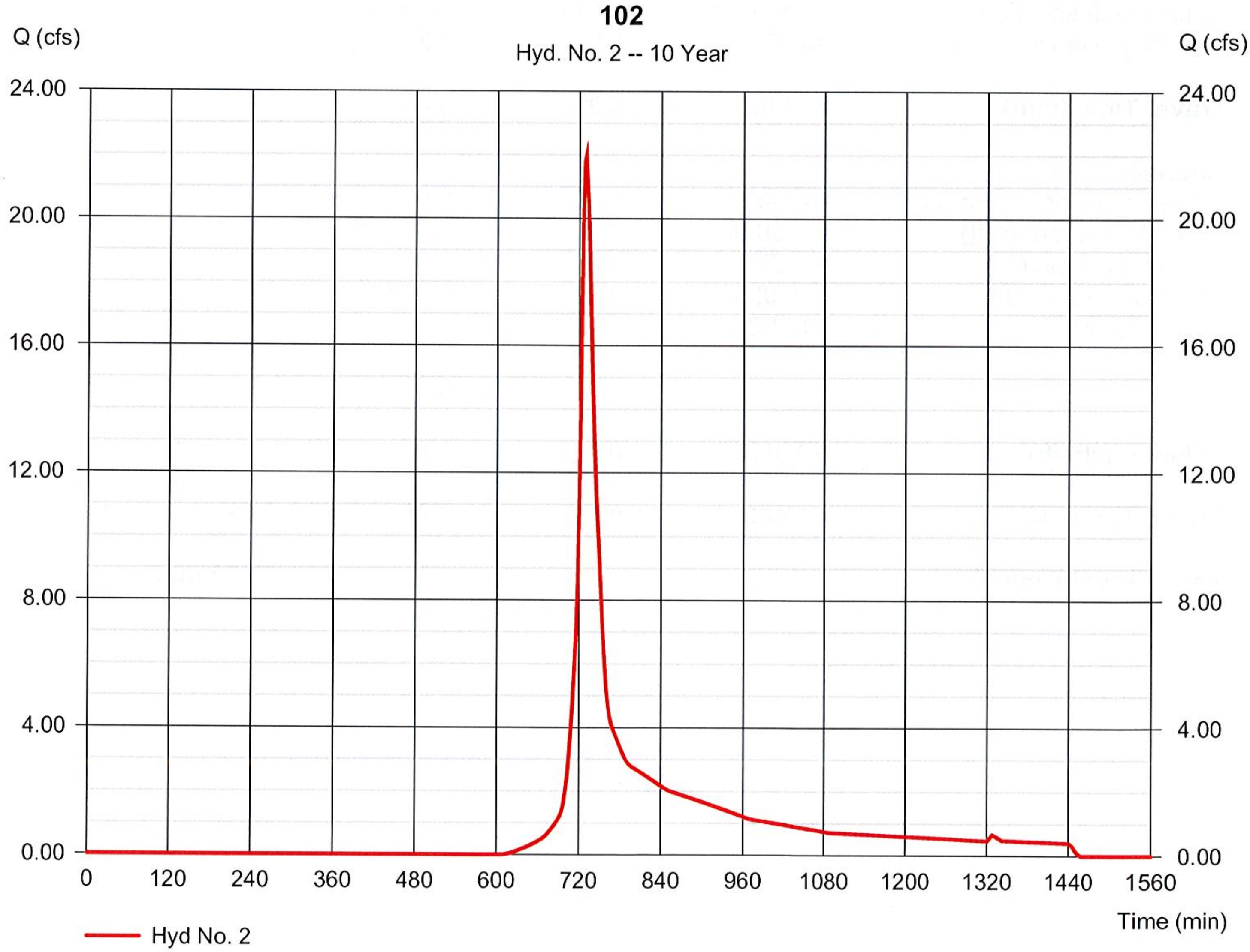
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Friday, 02 / 26 / 2016

Hyd. No. 2

102

Hydrograph type	= SCS Runoff	Peak discharge	= 21.98 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 87,077 cuft
Drainage area	= 13.460 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.20 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.080 x 98) + (3.040 x 43) + (2.900 x 65) + (2.640 x 76) + (3.810 x 82) + (0.990 x 89)] / 13.460



TR55 Tc Worksheet

Hyd. No. 2

102

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.28		0.00		0.00		
Land slope (%)	=	15.00		0.00		0.00		
Travel Time (min)	**=**	**9.47**	**+**	**0.00**	**+**	**0.00**	**=**	**9.47**
Shallow Concentrated Flow								
Flow length (ft)	=	270.00		0.00		0.00		
Watercourse slope (%)	=	20.00		0.00		0.00		
Surface description	=	Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=	7.22		0.00		0.00		
Travel Time (min)	**=**	**0.62**	**+**	**0.00**	**+**	**0.00**	**=**	**0.62**
Channel Flow								
X sectional flow area (sqft)	=	8.00		0.00		0.00		
Wetted perimeter (ft)	=	4.00		0.00		0.00		
Channel slope (%)	=	5.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	35.34		0.00		0.00		
Flow length (ft)		({0})276.0		0.0		0.0		
Travel Time (min)	**=**	**0.13**	**+**	**0.00**	**+**	**0.00**	**=**	**0.13**

Total Travel Time, Tc .... **10.20 min**

Hydrograph Report

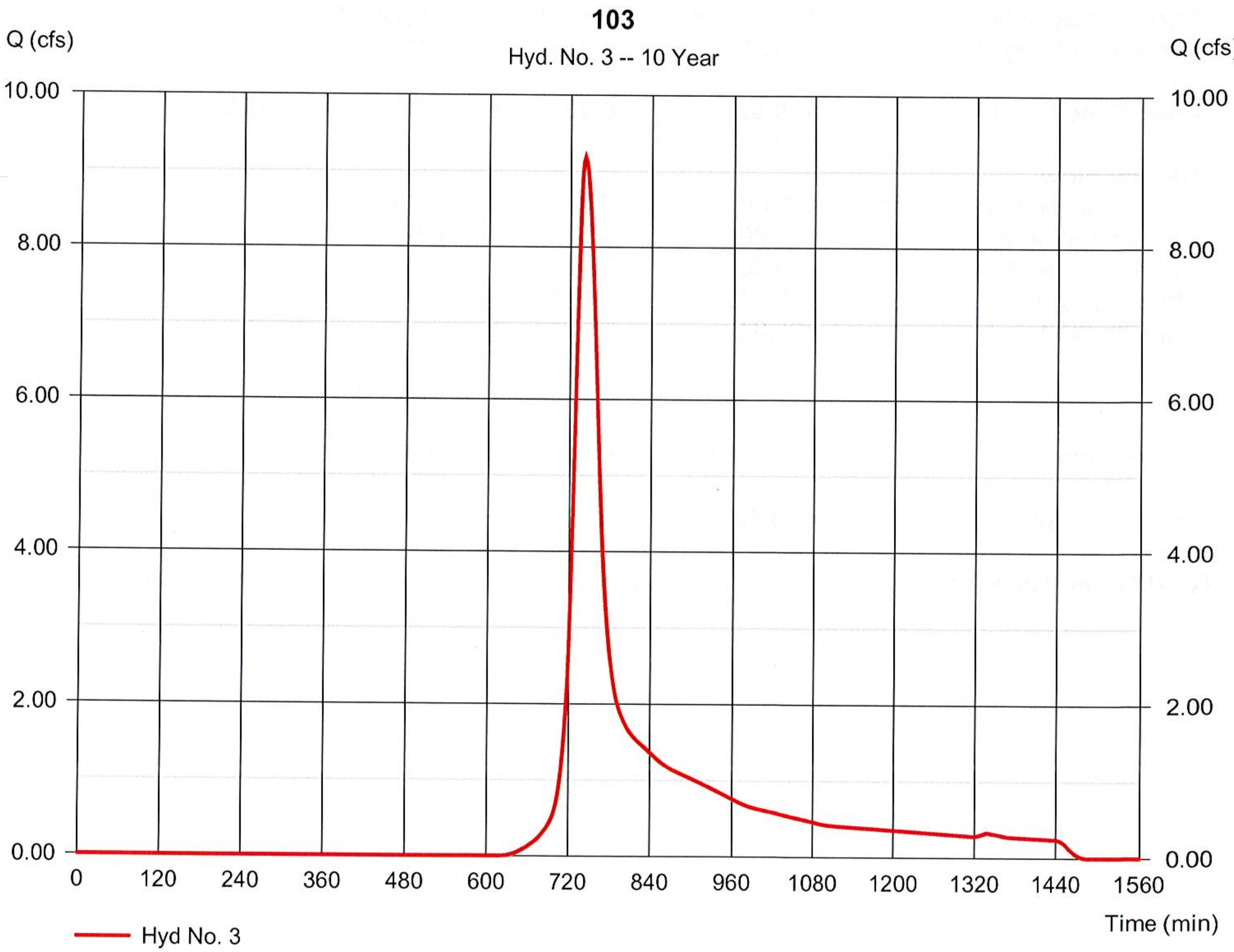
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Friday, 02 / 26 / 2016

Hyd. No. 3

103

Hydrograph type	= SCS Runoff	Peak discharge	= 9.181 cfs
Storm frequency	= 10 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 49,994 cuft
Drainage area	= 8.320 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.40 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.130 x 43) + (0.710 x 65) + (1.530 x 76) + (5.050 x 61)] / 8.320



TR55 Tc Worksheet

Hyd. No. 3

103

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 27.99**	**+**	**0.00**	**+**	**0.00**	**=**	**27.99**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 8.00		0.00		0.00		
Wetted perimeter (ft)	= 4.00		0.00		0.00		
Channel slope (%)	= 8.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=44.70		0.00		0.00		
Flow length (ft)	({0})1200.0		0.0		0.0		
Travel Time (min)	**= 0.45**	**+**	**0.00**	**+**	**0.00**	**=**	**0.45**

Total Travel Time, Tc .... **28.40 min**

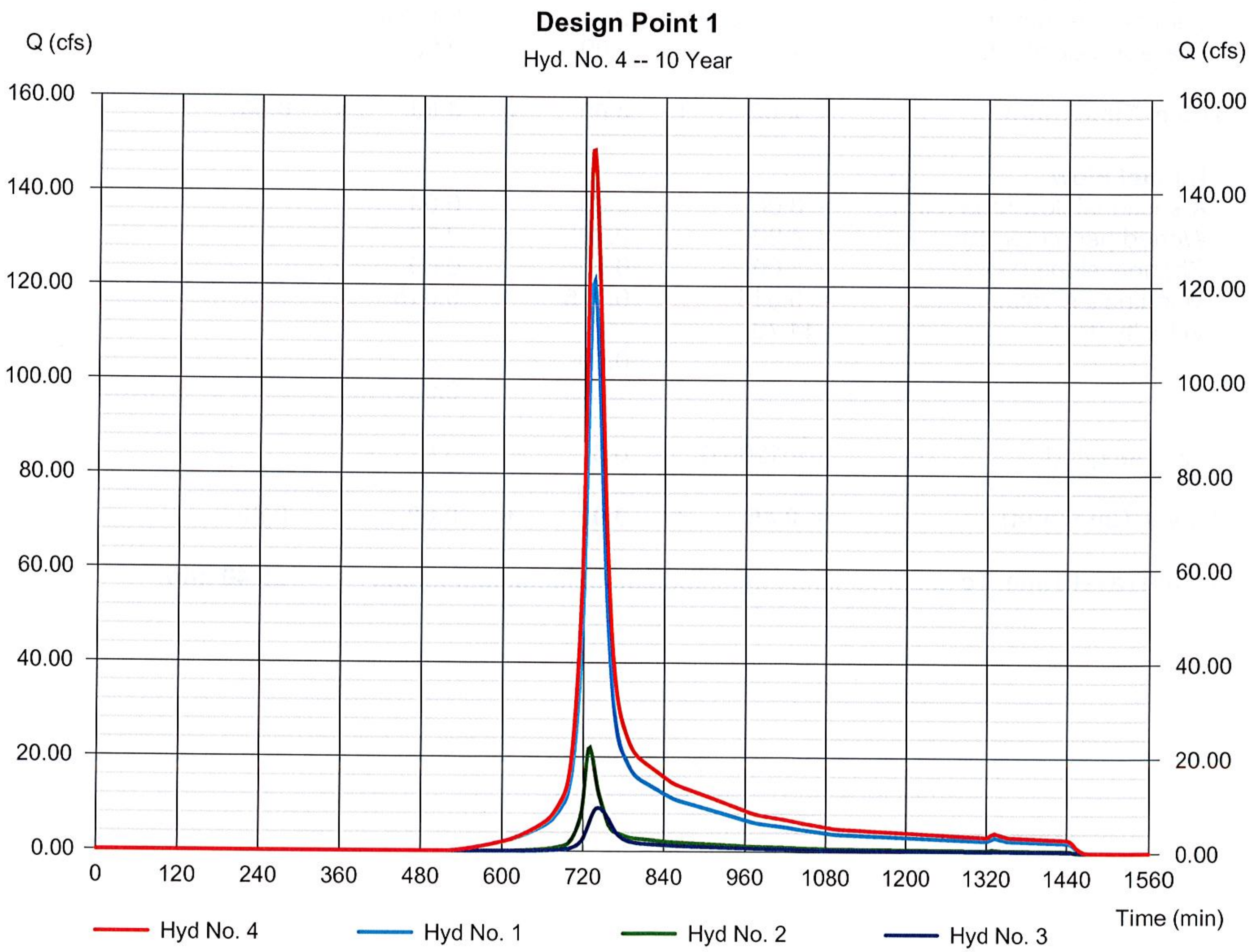
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Friday, 02 / 26 / 2016

Hyd. No. 4

Design Point 1

Hydrograph type	= Combine	Peak discharge	= 148.66 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 672,474 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 84.340 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	283.40	2	732	1,260,422	------	------	------	101
2	SCS Runoff	60.54	2	728	232,067	------	------	------	102
3	SCS Runoff	25.94	2	740	135,559	------	------	------	103
4	Combine	361.87	2	732	1,628,049	1, 2, 3	------	------	Design Point 1

Hydrograph Report

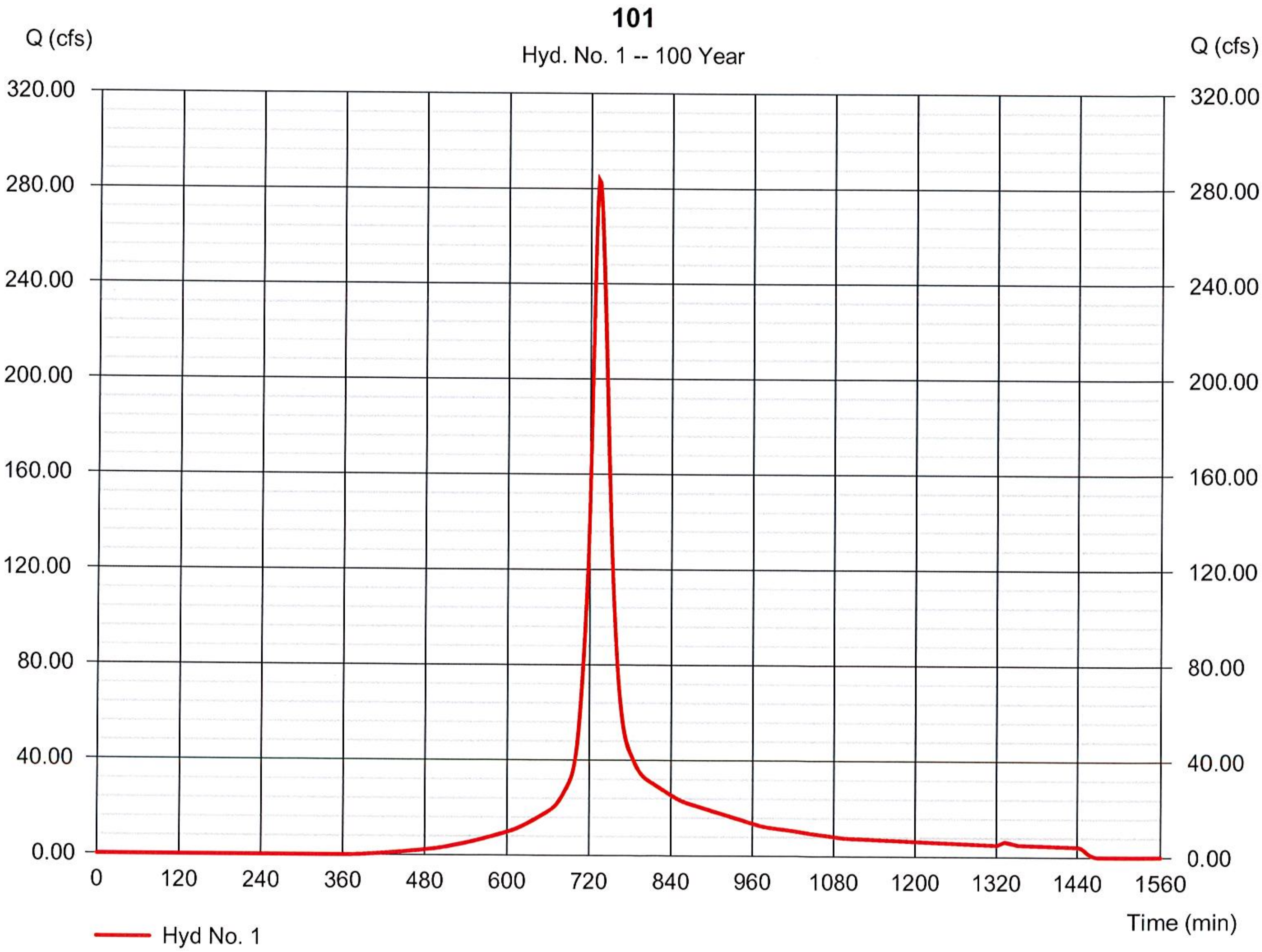
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Friday, 02 / 26 / 2016

Hyd. No. 1

101

Hydrograph type	= SCS Runoff	Peak discharge	= 283.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 1,260,422 cuft
Drainage area	= 62.560 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.20 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(12.170 x 98) + (8.490 x 65) + (27.090 x 76) + (6.700 x 61) + (8.110 x 74)] / 62.560



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

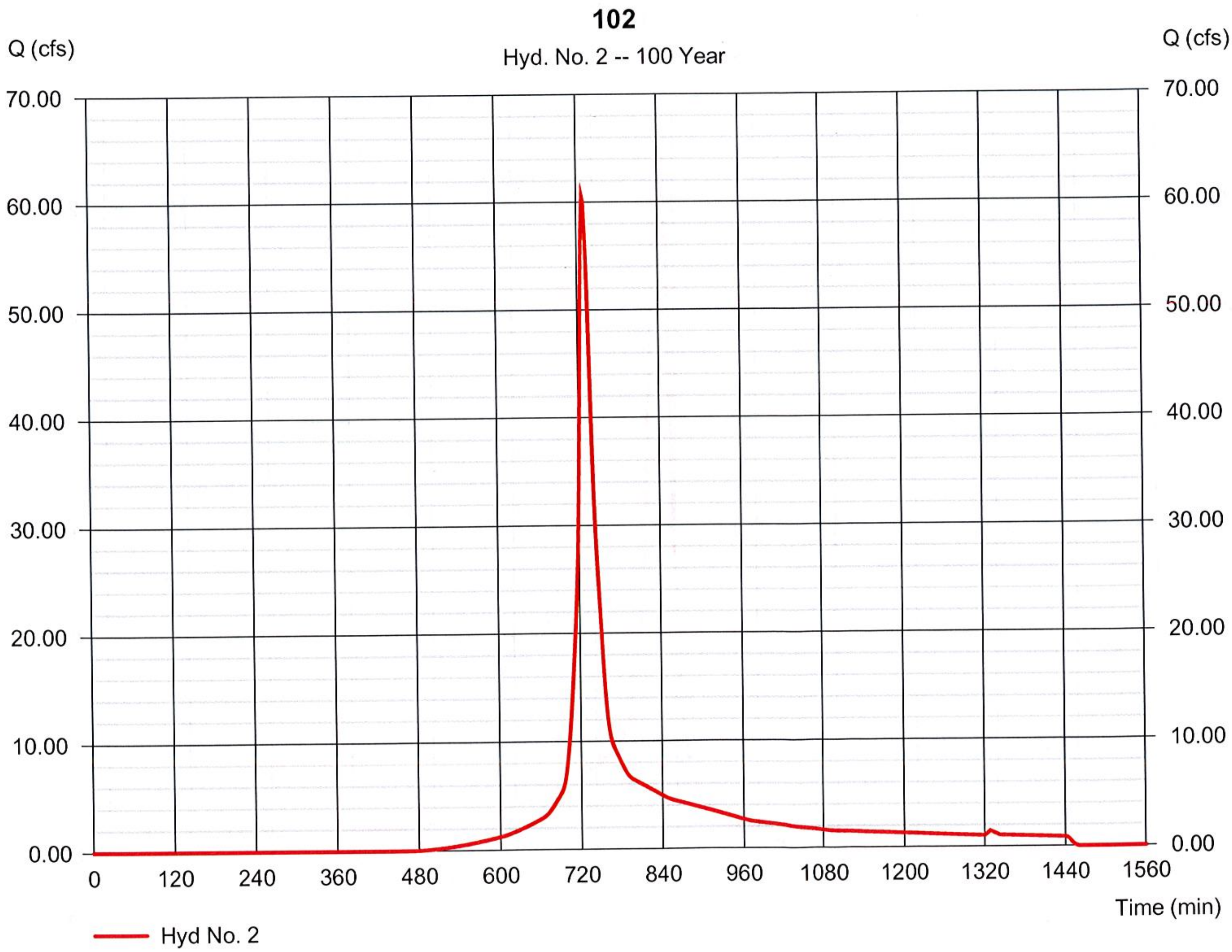
Friday, 02 / 26 / 2016

Hyd. No. 2

102

Hydrograph type	= SCS Runoff	Peak discharge	= 60.54 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 232,067 cuft
Drainage area	= 13.460 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.20 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.080 x 98) + (3.040 x 43) + (2.900 x 65) + (2.640 x 76) + (3.810 x 82) + (0.990 x 89)] / 13.460



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

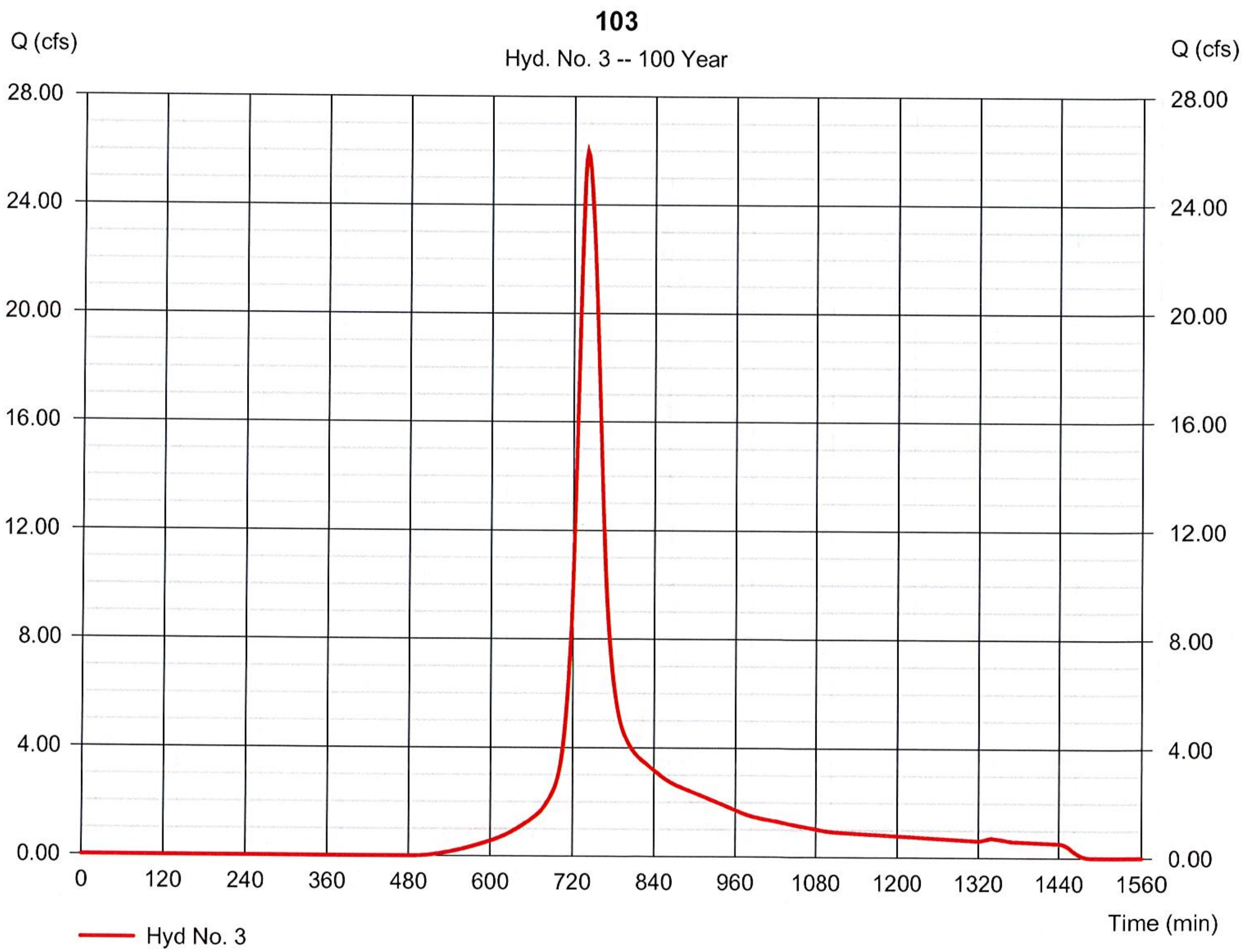
Friday, 02 / 26 / 2016

Hyd. No. 3

103

Hydrograph type	= SCS Runoff	Peak discharge	= 25.94 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 135,559 cuft
Drainage area	= 8.320 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.40 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (0.130 x 43) + (0.710 x 65) + (1.530 x 76) + (5.050 x 61)] / 8.320



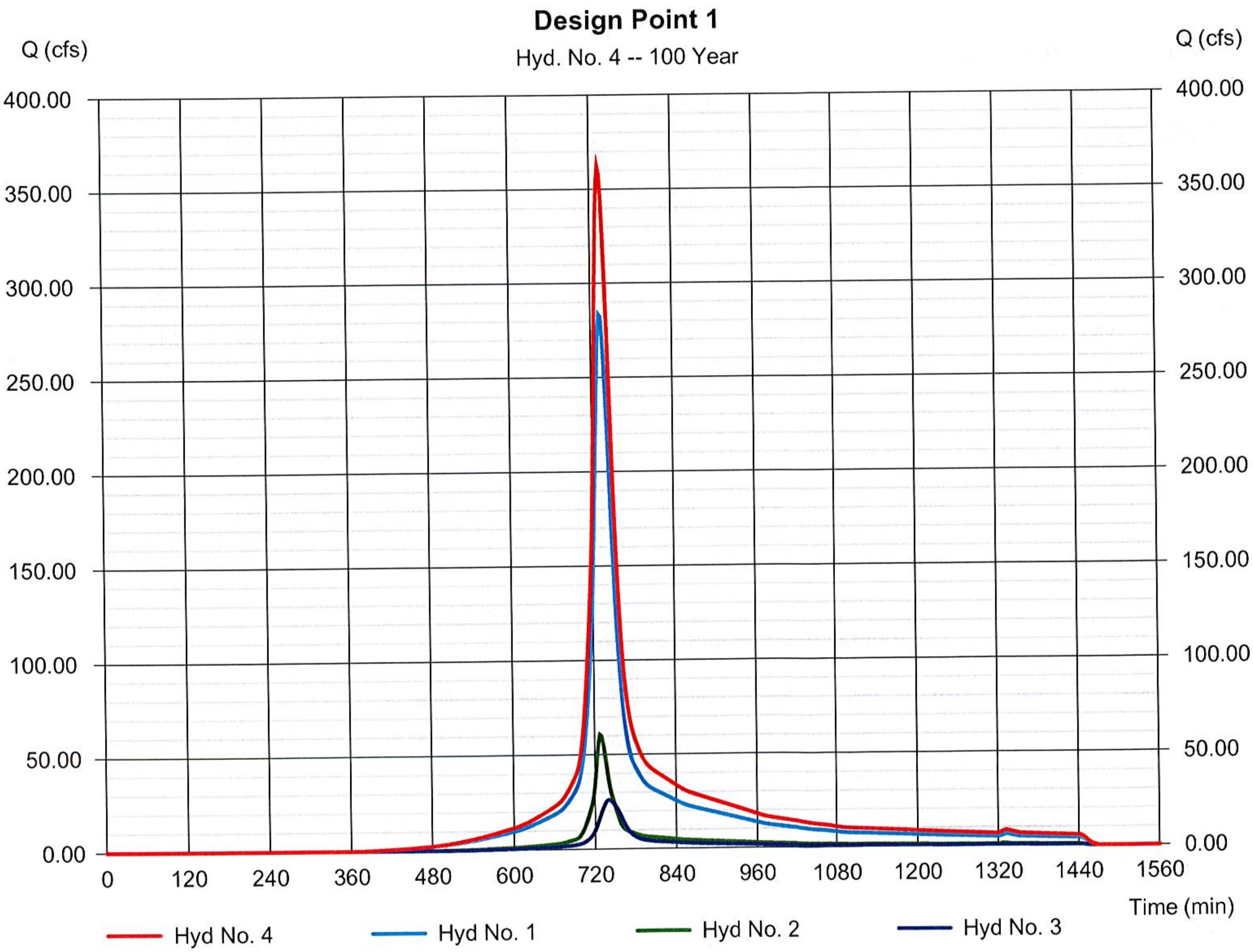
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Friday, 02 / 26 / 2016

Hyd. No. 4

Design Point 1

Hydrograph type	= Combine	Peak discharge	= 361.87 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 1,628,049 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 84.340 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Friday, 02 / 26 / 2016

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Orange County.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.60	3.28	0.00	0.00	4.68	6.88	0.00	8.30
SCS 6-Hr	1.76	0.00	0.00	0.00	3.21	0.00	0.00	5.76
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

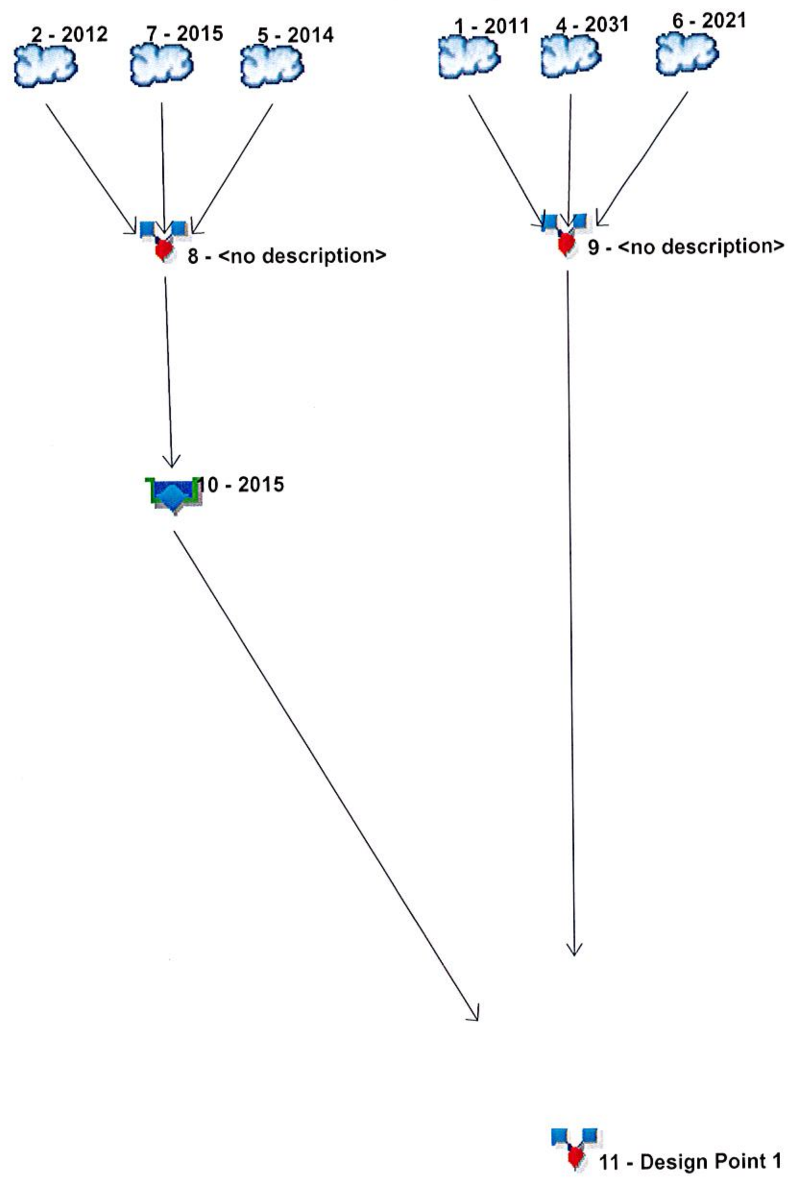
Appendix B-2

Post-Development Drainage Model

Hydraflow Table of Contents

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10



Legend

Hyd.	Origin	Description
1	SCS Runoff	2011
2	SCS Runoff	2012
4	SCS Runoff	2031
5	SCS Runoff	2014
6	SCS Runoff	2021
7	SCS Runoff	2015
8	Combine	<no description>
9	Combine	<no description>
10	Reservoir	2015
11	Combine	Design Point 1

Project: 160127 Post Development.gpw

Friday, 02 / 26 / 2016

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	-------	-------	-------	113.90	-------	-------	262.21	2011
2	SCS Runoff	------	-------	-------	-------	-------	6.738	-------	-------	13.99	2012
4	SCS Runoff	------	-------	-------	-------	-------	8.200	-------	-------	22.13	2031
5	SCS Runoff	------	-------	-------	-------	-------	11.88	-------	-------	21.79	2014
6	SCS Runoff	------	-------	-------	-------	-------	12.83	-------	-------	37.04	2021
7	SCS Runoff	------	-------	-------	-------	-------	8.557	-------	-------	21.15	2015
8	Combine	2, 5, 7	-------	-------	-------	-------	24.09	-------	-------	50.57	<no description>
9	Combine	1, 4, 6,	-------	-------	-------	-------	132.65	-------	-------	315.70	<no description>
10	Reservoir	8	-------	-------	-------	-------	16.02	-------	-------	44.31	2015
11	Combine	9, 10	-------	-------	-------	-------	147.19	-------	-------	358.07	Design Point 1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	113.90	2	734	503,380	------	------	------	2011
2	SCS Runoff	6.738	2	724	20,277	------	------	------	2012
4	SCS Runoff	8.200	2	742	44,096	------	------	------	2031
5	SCS Runoff	11.88	2	728	48,424	------	------	------	2014
6	SCS Runoff	12.83	2	730	51,520	------	------	------	2021
7	SCS Runoff	8.557	2	734	38,099	------	------	------	2015
8	Combine	24.09	2	728	106,800	2, 5, 7	------	------	<no description>
9	Combine	132.65	2	734	598,996	1, 4, 6,	------	------	<no description>
10	Reservoir	16.02	2	740	106,746	8	257.39	21,691	2015
11	Combine	147.19	2	734	705,742	9, 10	------	------	Design Point 1

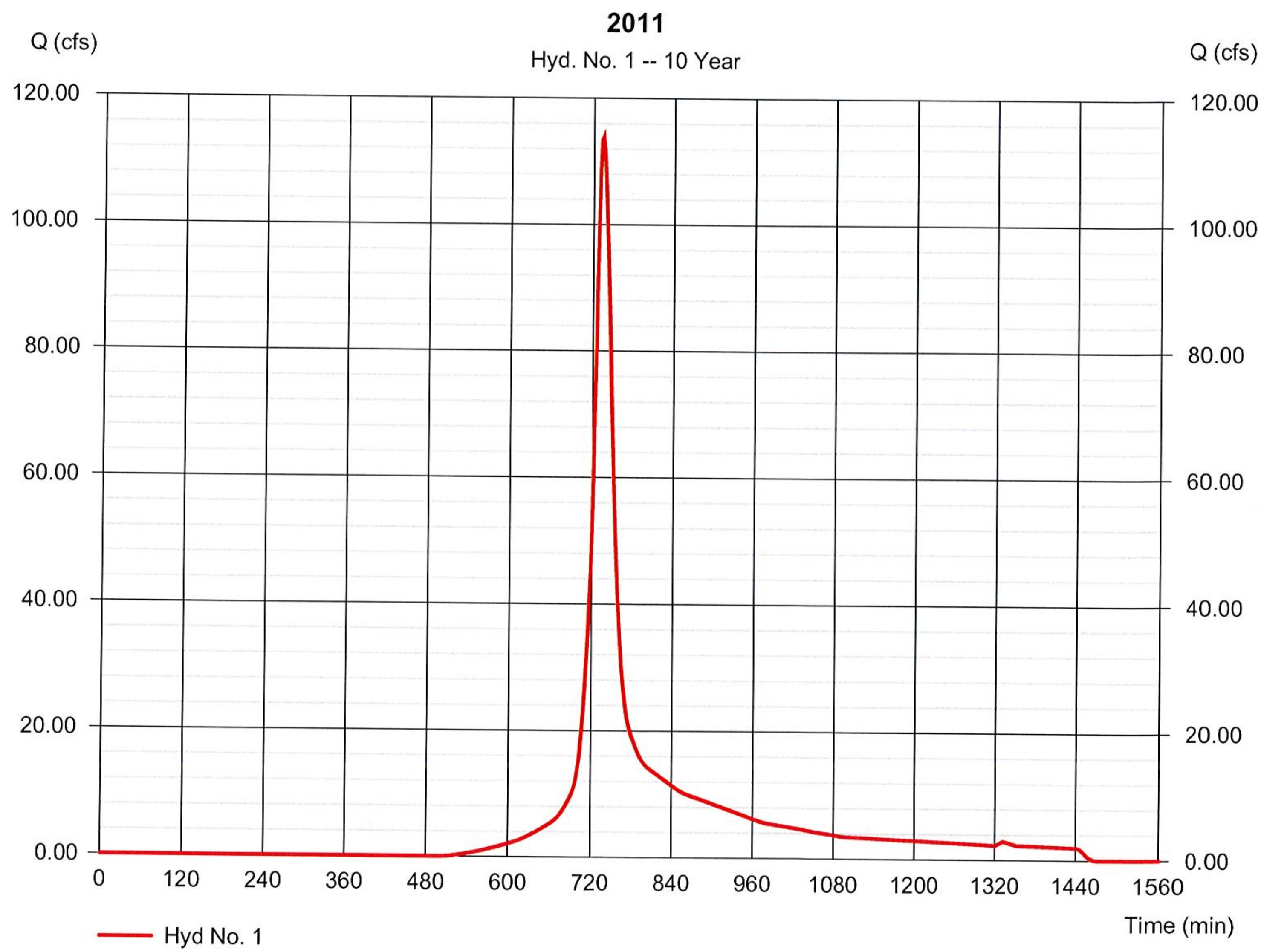
Hydrograph Report

Hyd. No. 1

2011

Hydrograph type	= SCS Runoff	Peak discharge	= 113.90 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 503,380 cuft
Drainage area	= 56.780 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.20 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(12.690 x 98) + (5.450 x 65) + (22.850 x 76) + (6.780 x 61) + (2.940 x 79) + (6.070 x 74)] / 56.780



TR55 Tc Worksheet

Hyd. No. 1

2011

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 10.68**	**+**	**0.00**	**+**	**0.00**	**=**	**10.68**
Shallow Concentrated Flow							
Flow length (ft)	= 311.00		1429.00		317.00		
Watercourse slope (%)	= 10.00		6.00		15.00		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=5.10		3.95		6.25		
Travel Time (min)	**= 1.02**	**+**	**6.03**	**+**	**0.85**	**=**	**7.89**
Channel Flow							
X sectional flow area (sqft)	= 104.50		0.00		0.00		
Wetted perimeter (ft)	= 100.00		0.00		0.00		
Channel slope (%)	= 4.50		0.00		0.00		
Manning's n-value	= 0.025		0.015		0.015		
Velocity (ft/s)	=13.02						
			0.00				
					0.00		
Flow length (ft)	({0})490.0		0.0		0.0		
Travel Time (min)	**= 0.63**	**+**	**0.00**	**+**	**0.00**	**=**	**0.63**

Total Travel Time, Tc .... **19.20 min**

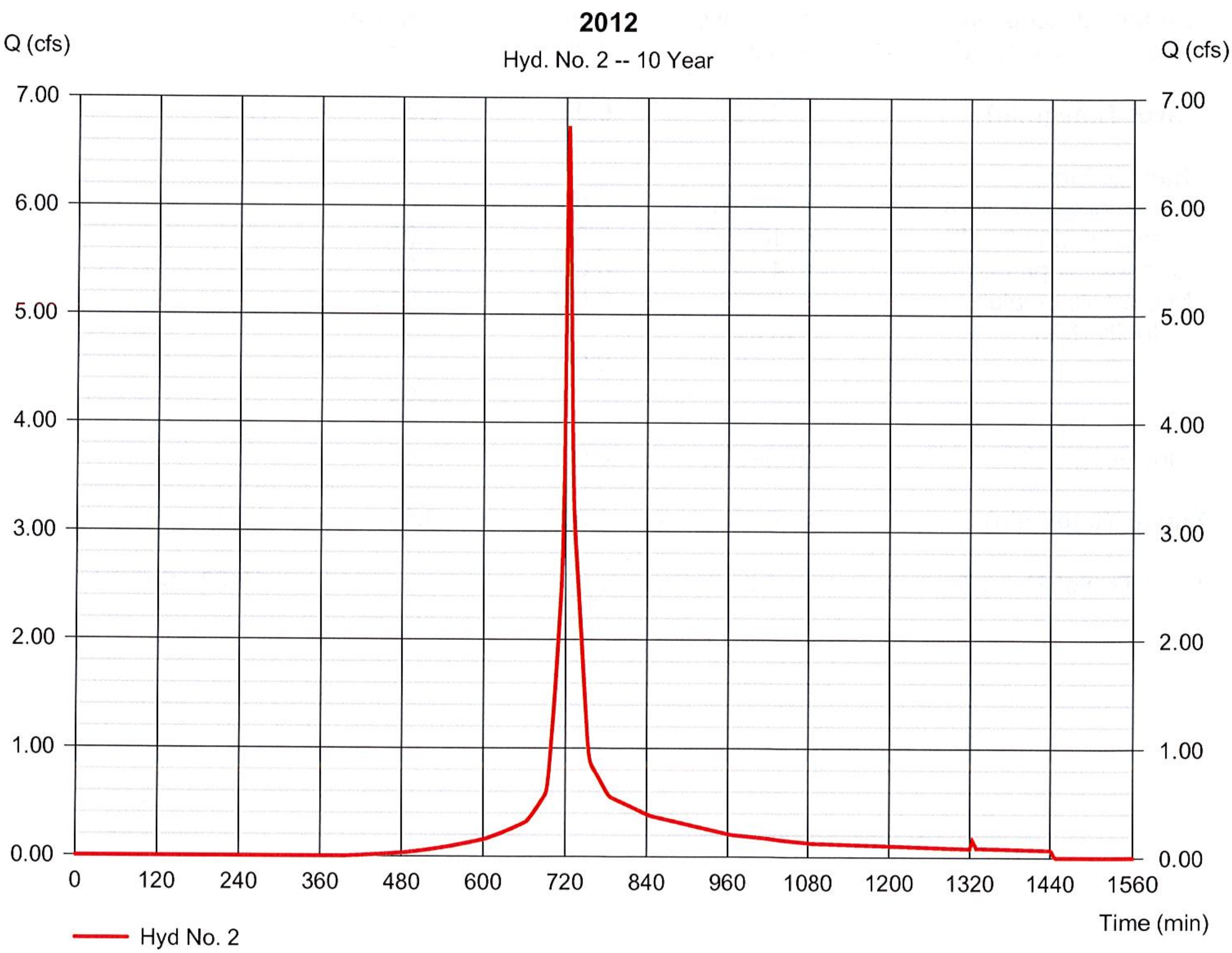
Hydrograph Report

Hyd. No. 2

2012

Hydrograph type	= SCS Runoff	Peak discharge	= 6.738 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 20,277 cuft
Drainage area	= 2.000 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.10 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.170 x 98) + (0.680 x 61) + (0.150 x 74)] / 2.000



TR55 Tc Worksheet

Hyd. No. 2

2012

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 20.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 0.44**	**+**	**0.00**	**+**	**0.00**	**=**	**0.44**
Shallow Concentrated Flow							
Flow length (ft)	= 450.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.61		0.00		0.00		
Travel Time (min)	**= 4.65**	**+**	**0.00**	**+**	**0.00**	**=**	**4.65**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc							**5.10 min**

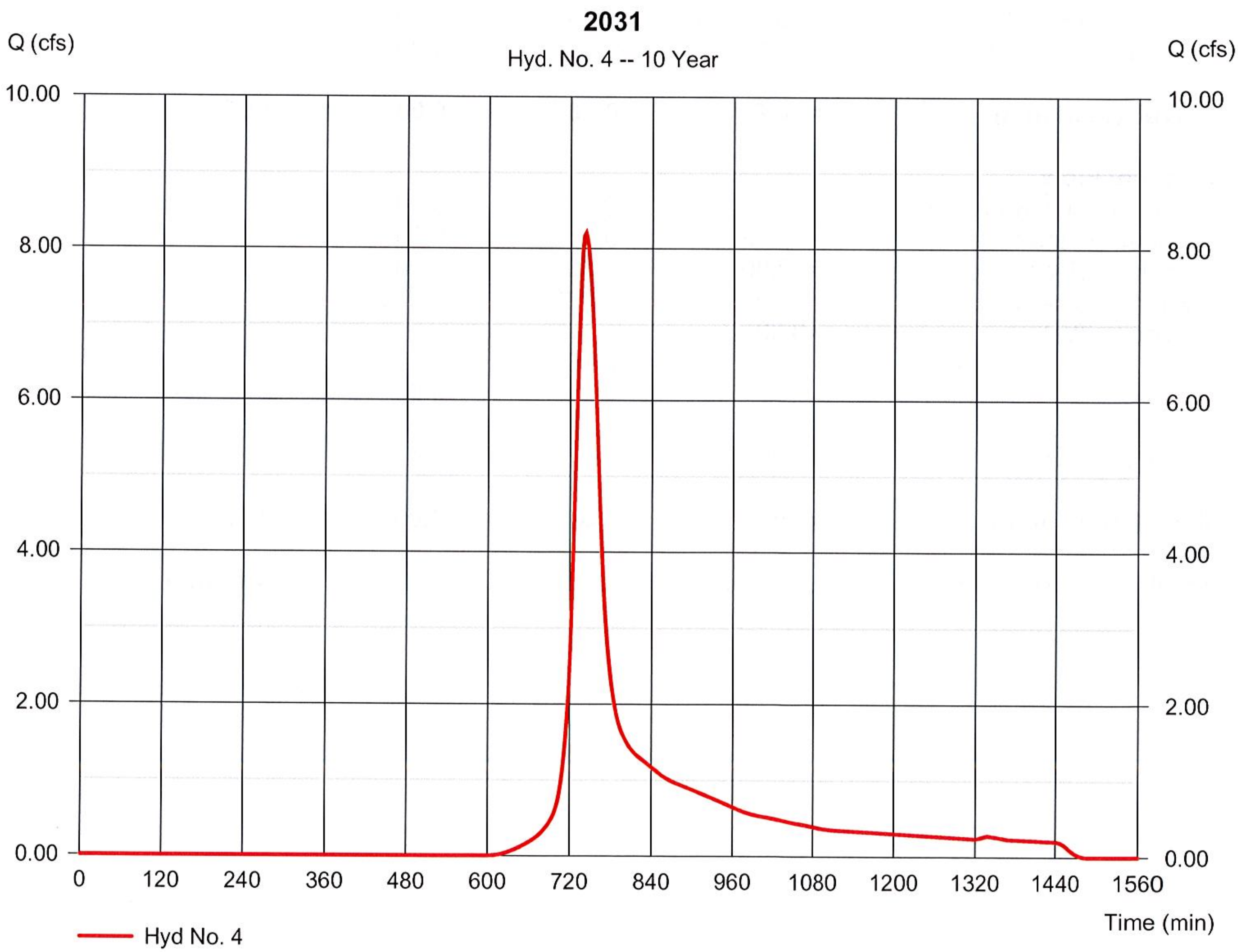
Hydrograph Report

Hyd. No. 4

2031

Hydrograph type	= SCS Runoff	Peak discharge	= 8.200 cfs
Storm frequency	= 10 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 44,096 cuft
Drainage area	= 6.740 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.30 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.050 x 98) + (0.250 x 74) + (4.300 x 61) + (1.140 x 76)] / 6.740



TR55 Tc Worksheet

Hyd. No. 4

2031

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 27.99**	**+**	**0.00**	**+**	**0.00**	**=**	**27.99**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 8.00		0.00		0.00		
Wetted perimeter (ft)	= 4.00		0.00		0.00		
Channel slope (%)	= 8.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=44.70		0.00		0.00		
Flow length (ft)	({0})756.0		0.0		0.0		
Travel Time (min)	**= 0.28**	**+**	**0.00**	**+**	**0.00**	**=**	**0.28**

Total Travel Time, Tc .... **28.30 min**

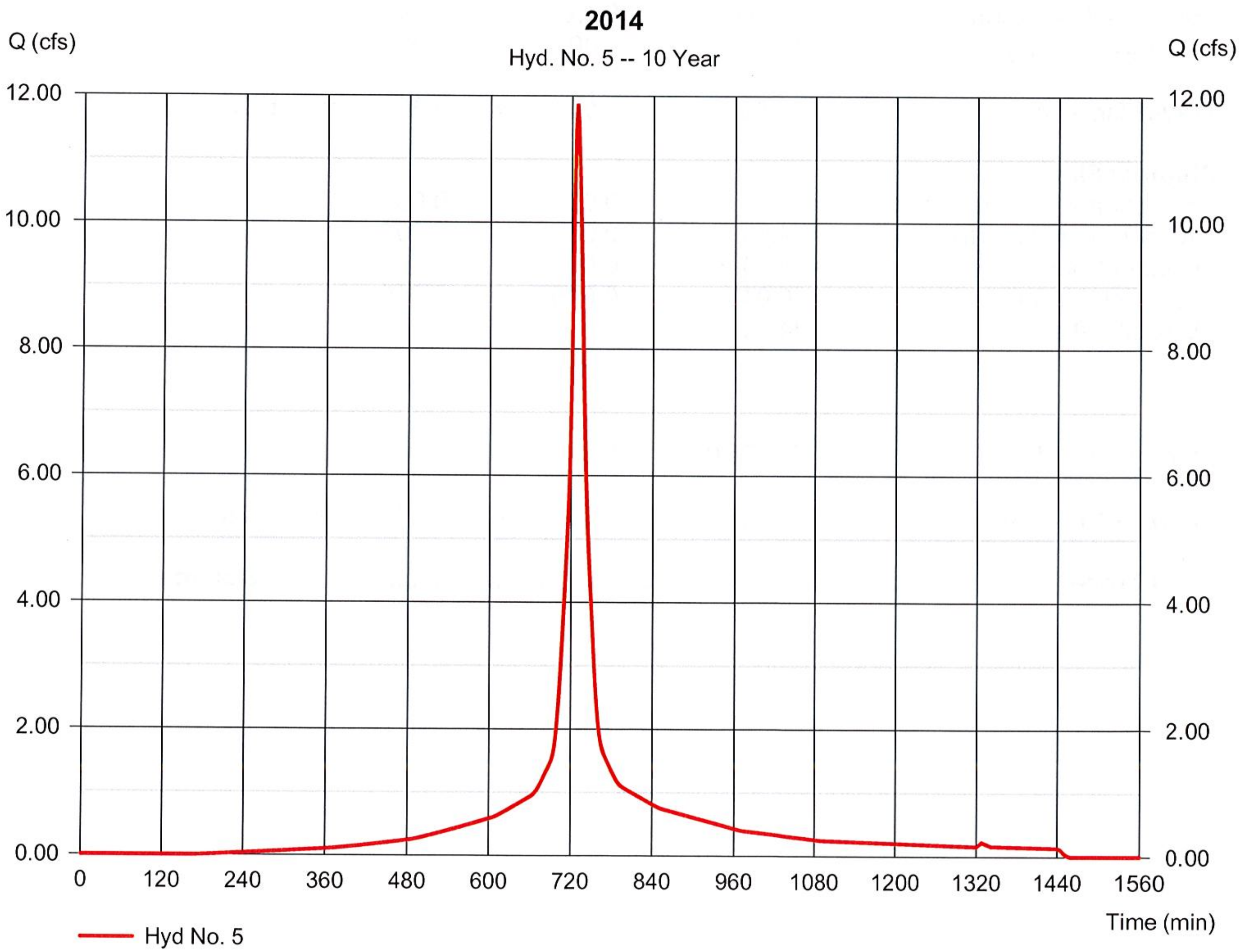
Hydrograph Report

Hyd. No. 5

2014

Hydrograph type	= SCS Runoff	Peak discharge	= 11.88 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 48,424 cuft
Drainage area	= 3.240 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.890 x 98) + (0.090 x 39) + (0.260 x 74)] / 3.240



TR55 Tc Worksheet

Hyd. No. 5

2014

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 10.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 0.10		0.00		0.00		
Travel Time (min)	**= 11.14**	**+**	**0.00**	**+**	**0.00**	**=**	**11.14**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 3.14		0.00		0.00		
Wetted perimeter (ft)	= 1.50		0.00		0.00		
Channel slope (%)	= 3.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=28.22		0.00		0.00		
Flow length (ft)	({0})600.0		0.0		0.0		
Travel Time (min)	**= 0.35**	**+**	**0.00**	**+**	**0.00**	**=**	**0.35**

Total Travel Time, Tc .... **11.50 min**

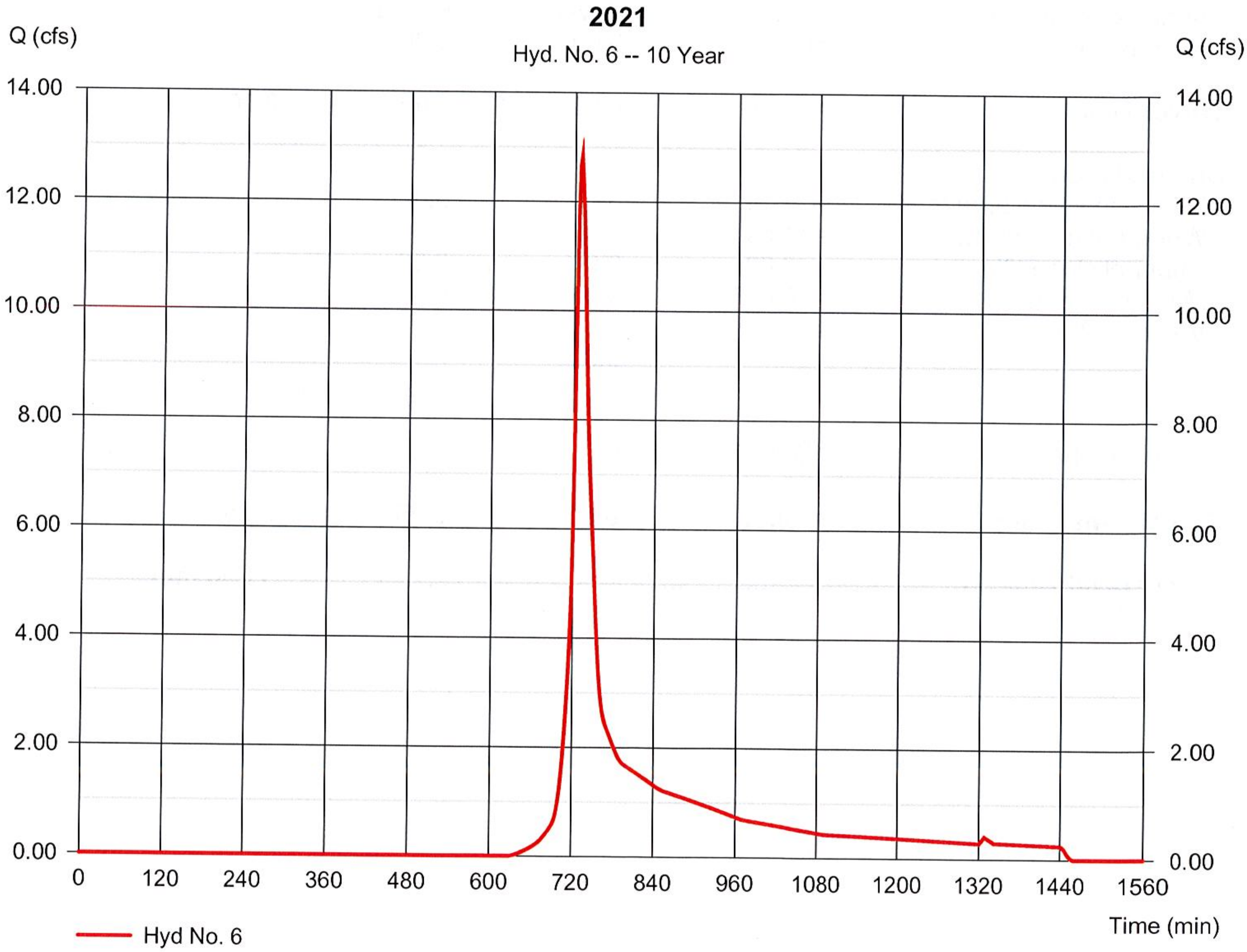
Hydrograph Report

Hyd. No. 6

2021

Hydrograph type	= SCS Runoff	Peak discharge	= 12.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 51,520 cuft
Drainage area	= 8.690 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 98) + (2.080 x 36) + (1.790 x 73) + (1.760 x 79) + (2.680 x 74)] / 8.690



TR55 Tc Worksheet

Hyd. No. 6

2021

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 15.00		0.00		0.00		
Travel Time (min)	**= 9.47**	**+**	**0.00**	**+**	**0.00**	**=**	**9.47**
Shallow Concentrated Flow							
Flow length (ft)	= 83.00		0.00		0.00		
Watercourse slope (%)	= 20.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=7.22		0.00		0.00		
Travel Time (min)	**= 0.19**	**+**	**0.00**	**+**	**0.00**	**=**	**0.19**
Channel Flow							
X sectional flow area (sqft)	= 8.00		0.00		0.00		
Wetted perimeter (ft)	= 4.00		0.00		0.00		
Channel slope (%)	= 5.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=35.34		0.00		0.00		
Flow length (ft)	({0})470.0		0.0		0.0		
Travel Time (min)	**= 0.22**	**+**	**0.00**	**+**	**0.00**	**=**	**0.22**

Total Travel Time, Tc .... **9.90 min**

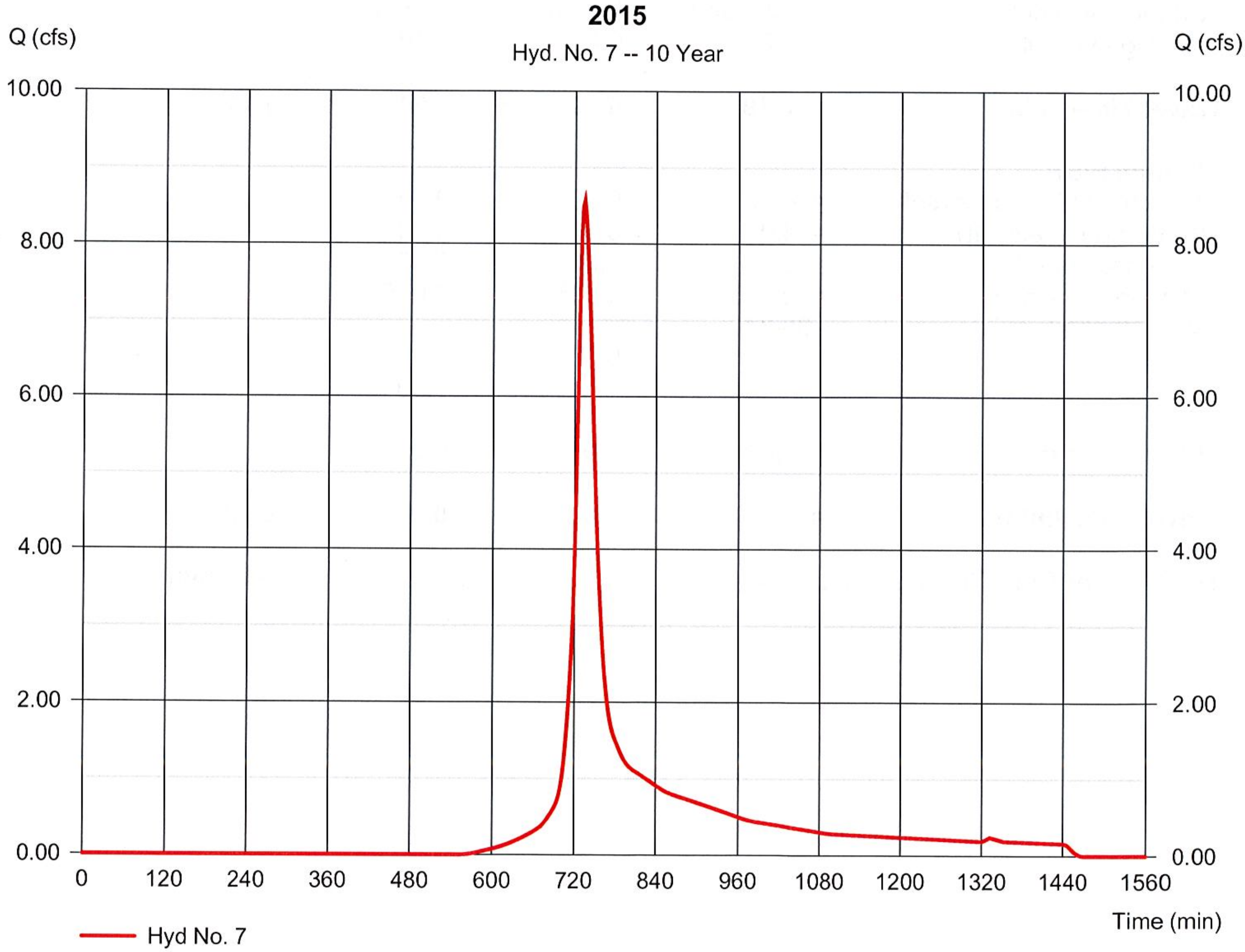
Hydrograph Report

Hyd. No. 7

2015

Hydrograph type	= SCS Runoff	Peak discharge	= 8.557 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 38,099 cuft
Drainage area	= 4.970 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.00 min
Total precip.	= 4.68 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.370 x 73) + (0.490 x 36) + (2.260 x 80) + (0.530 x 74) + (0.430 x 39) + (0.890 x 98)] / 4.970



TR55 Tc Worksheet

Hyd. No. 7

2015

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.28		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	**= 18.60**	**+**	**0.00**	**+**	**0.00**	**=**	**18.60**
Shallow Concentrated Flow							
Flow length (ft)	= 164.00		0.00		0.00		
Watercourse slope (%)	= 20.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=7.22		0.00		0.00		
Travel Time (min)	**= 0.38**	**+**	**0.00**	**+**	**0.00**	**=**	**0.38**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 19.00 min

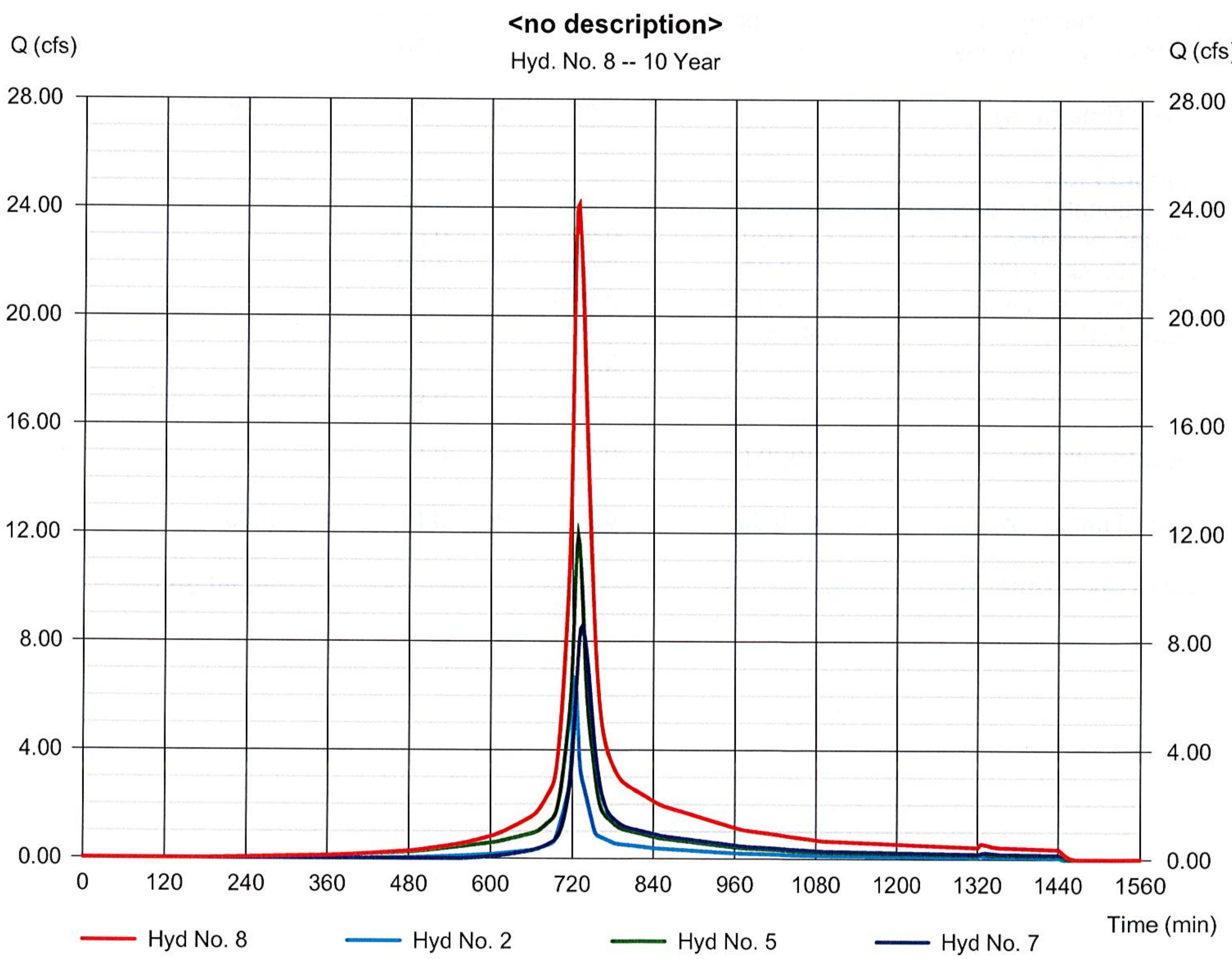
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Friday, 02 / 26 / 2016

Hyd. No. 8

<no description>

Hydrograph type	= Combine	Peak discharge	= 24.09 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 106,800 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 10.210 ac

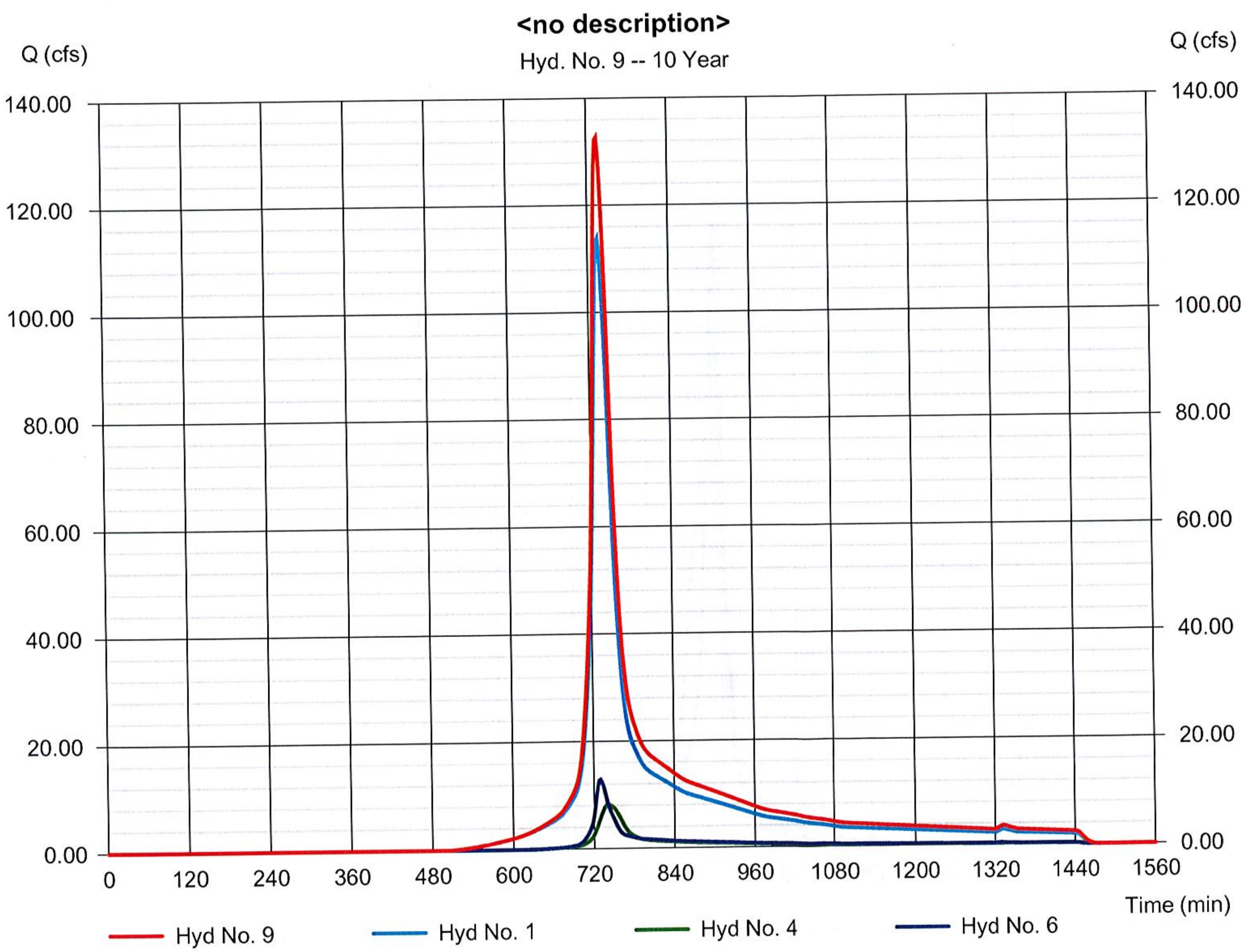


Hydrograph Report

Hyd. No. 9

<no description>

Hydrograph type	= Combine	Peak discharge	= 132.65 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 598,996 cuft
Inflow hyds.	= 1, 4, 6	Contrib. drain. area	= 72.210 ac



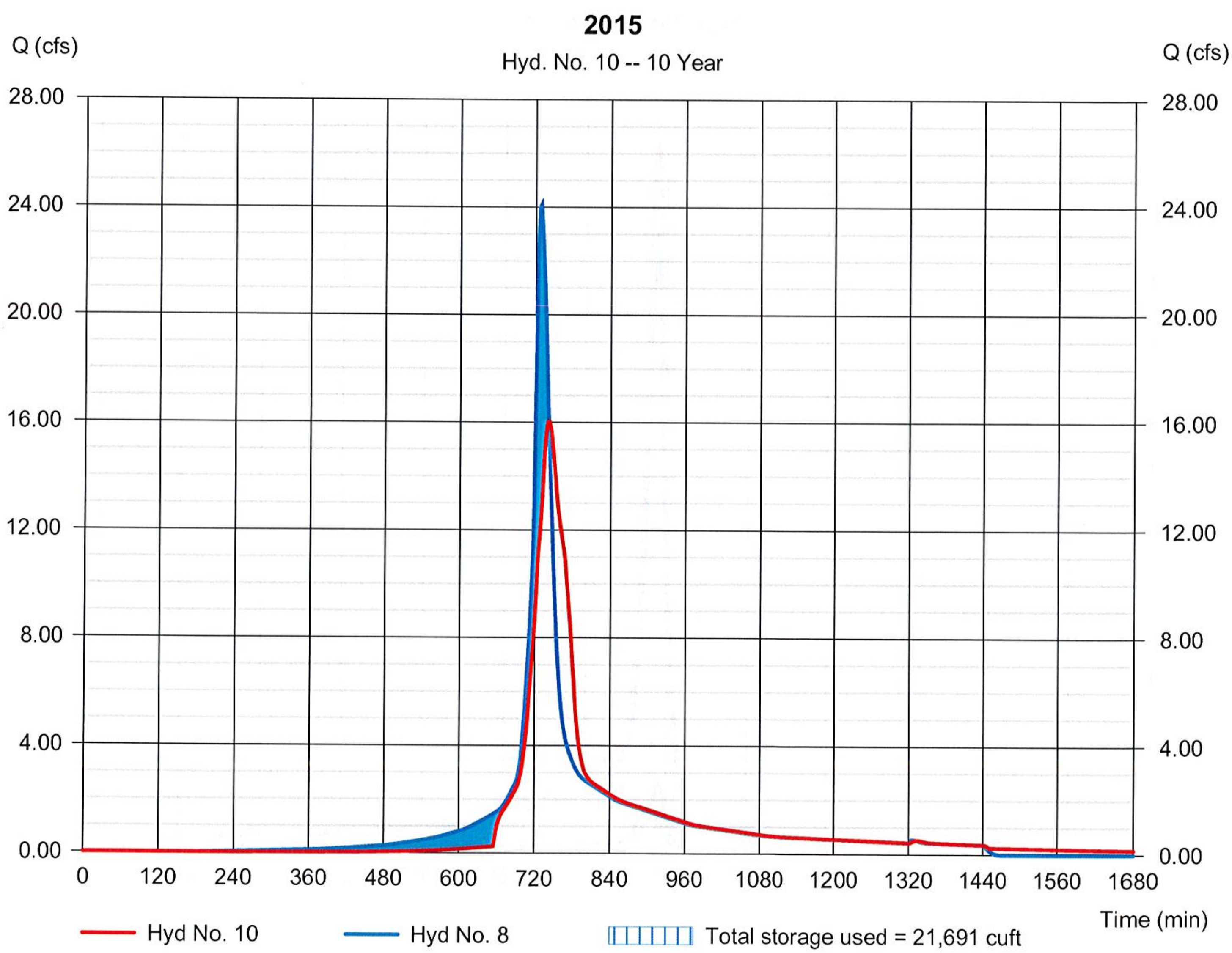
Hydrograph Report

Hyd. No. 10

2015

Hydrograph type	= Reservoir	Peak discharge	= 16.02 cfs
Storm frequency	= 10 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 106,746 cuft
Inflow hyd. No.	= 8 - <no description>	Max. Elevation	= 257.39 ft
Reservoir name	= 2015	Max. Storage	= 21,691 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - 2015

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 254.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	254.00	4,377	0	0
2.00	256.00	6,593	10,894	10,894
4.00	258.00	9,042	15,569	26,463
6.00	260.00	11,724	20,706	47,169

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	18.00	Inactive	Inactive
Span (in)	= 24.00	18.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 254.00	254.00	0.00	0.00
Length (ft)	= 25.00	0.50	0.00	0.00
Slope (%)	= 1.00	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	2.00	Inactive	Inactive
Crest El. (ft)	= 258.50	256.91	257.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Ciplti	Rect	---
Multi-Stage	= Yes	No	Yes	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

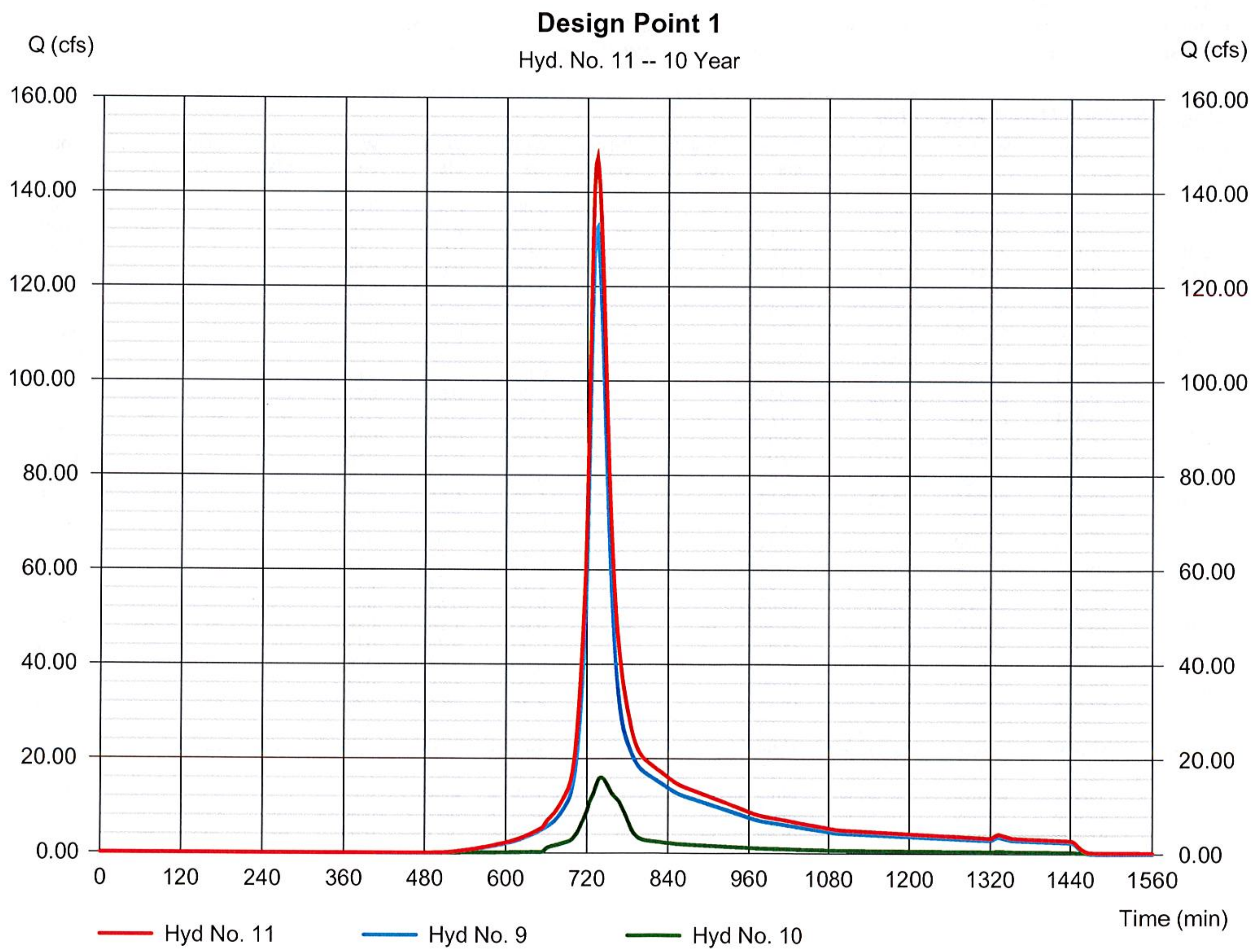
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	254.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.20	1,089	254.20	0.00	0.02 oc	---	---	0.00	0.00	0.00	---	---	---	0.020
0.40	2,179	254.40	0.00	0.06 oc	---	---	0.00	0.00	0.00	---	---	---	0.055
0.60	3,268	254.60	0.00	0.10 oc	---	---	0.00	0.00	0.00	---	---	---	0.097
0.80	4,357	254.80	0.00	0.14 oc	---	---	0.00	0.00	0.00	---	---	---	0.141
1.00	5,447	255.00	0.00	0.18 oc	---	---	0.00	0.00	0.00	---	---	---	0.184
1.20	6,536	255.20	0.00	0.22 oc	---	---	0.00	0.00	0.00	---	---	---	0.222
1.40	7,625	255.40	0.00	0.25 oc	---	---	0.00	0.00	0.00	---	---	---	0.252
1.60	8,715	255.60	0.00	3.66 oc	---	---	0.00	0.00	0.00	---	---	---	3.659
1.80	9,804	255.80	0.00	6.33 oc	---	---	0.00	0.00	0.00	---	---	---	6.328
2.00	10,894	256.00	0.00	8.17 oc	---	---	0.00	0.00	0.00	---	---	---	8.166
2.20	12,450	256.20	0.00	9.66 oc	---	---	0.00	0.00	0.00	---	---	---	9.661
2.40	14,007	256.40	0.00	10.93 ic	---	---	0.00	0.00	0.00	---	---	---	10.93
2.60	15,564	256.60	0.00	11.57 ic	---	---	0.00	0.00	0.00	---	---	---	11.57
2.80	17,121	256.80	0.00	12.18 ic	---	---	0.00	0.00	0.00	---	---	---	12.18
3.00	18,678	257.00	0.00	12.76 ic	---	---	0.00	0.18	0.00	---	---	---	12.94
3.20	20,235	257.20	0.00	13.32 ic	---	---	0.00	1.04	0.00	---	---	---	14.36
3.40	21,792	257.40	0.00	13.85 ic	---	---	0.00	2.28	0.00	---	---	---	16.13
3.60	23,349	257.60	0.00	14.36 ic	---	---	0.00	3.82	0.00	---	---	---	18.18
3.80	24,906	257.80	0.00	14.86 ic	---	---	0.00	5.59	0.00	---	---	---	20.45
4.00	26,463	258.00	0.00	15.34 ic	---	---	0.00	7.58	0.00	---	---	---	22.92
4.20	28,533	258.20	0.00	15.80 ic	---	---	0.00	9.76	0.00	---	---	---	25.56
4.40	30,604	258.40	0.00	16.25 ic	---	---	0.00	12.11	0.00	---	---	---	28.37
4.60	32,674	258.60	1.73 ic	16.69 ic	---	---	1.69	14.63	0.00	---	---	---	33.01
4.80	34,745	258.80	8.78 oc	17.12 ic	---	---	8.75	17.30	0.00	---	---	---	43.18
5.00	36,816	259.00	18.84 oc	17.54 ic	---	---	18.84	20.12	0.00	---	---	---	56.51
5.20	38,886	259.20	29.13 ic	17.95 ic	---	---	29.13 s	23.08	0.00	---	---	---	70.16
5.40	40,957	259.40	30.87 ic	18.35 ic	---	---	30.86 s	26.17	0.00	---	---	---	75.38
5.60	43,027	259.60	31.95 ic	18.74 ic	---	---	31.94 s	29.38	0.00	---	---	---	80.07
5.80	45,098	259.80	32.82 ic	19.12 ic	---	---	32.81 s	32.72	0.00	---	---	---	84.65
6.00	47,169	260.00	33.61 ic	19.49 ic	---	---	33.60 s	36.18	0.00	---	---	---	89.27

Hydrograph Report

Hyd. No. 11

Design Point 1

Hydrograph type	= Combine	Peak discharge	= 147.19 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 705,742 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	262.21	2	732	1,168,442	------	------	------	2011
2	SCS Runoff	13.99	2	724	43,448	------	------	------	2012
4	SCS Runoff	22.13	2	740	115,558	------	------	------	2031
5	SCS Runoff	21.79	2	728	91,939	------	------	------	2014
6	SCS Runoff	37.04	2	728	142,206	------	------	------	2021
7	SCS Runoff	21.15	2	732	93,721	------	------	------	2015
8	Combine	50.57	2	728	229,108	2, 5, 7	------	------	<no description>
9	Combine	315.70	2	732	1,426,205	1, 4, 6,	------	------	<no description>
10	Reservoir	44.31	2	734	229,055	8	258.82	34,920	2015
11	Combine	358.07	2	732	1,655,258	9, 10	------	------	Design Point 1

160127 Post Development.gpw	Return Period: 100 Year	Friday, 02 / 26 / 2016

Hydrograph Report

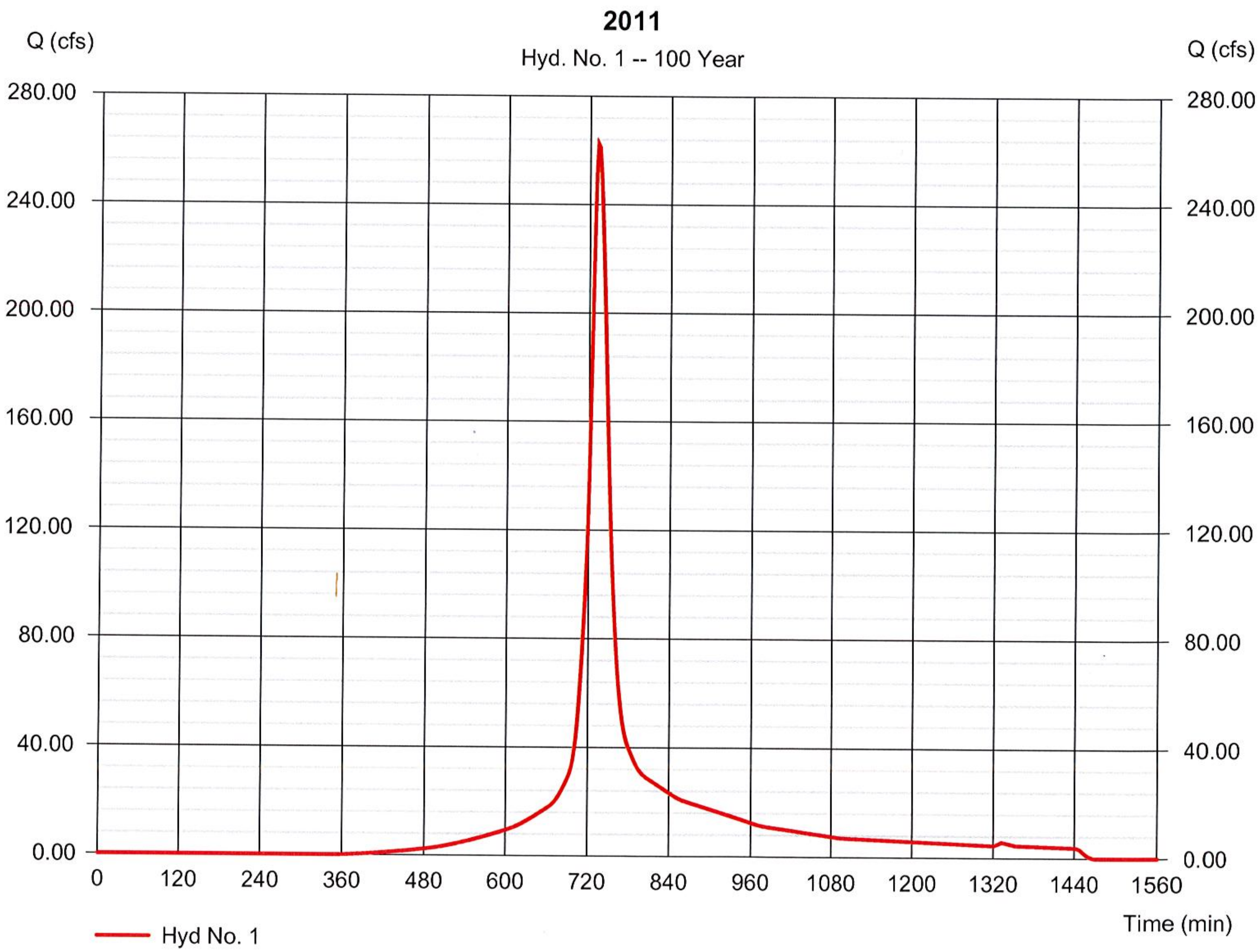
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Friday, 02 / 26 / 2016

Hyd. No. 1

2011

Hydrograph type	= SCS Runoff	Peak discharge	= 262.21 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 1,168,442 cuft
Drainage area	= 56.780 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.20 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(12.690 x 98) + (5.450 x 65) + (22.850 x 76) + (6.780 x 61) + (2.940 x 79) + (6.070 x 74)] / 56.780



Hydrograph Report

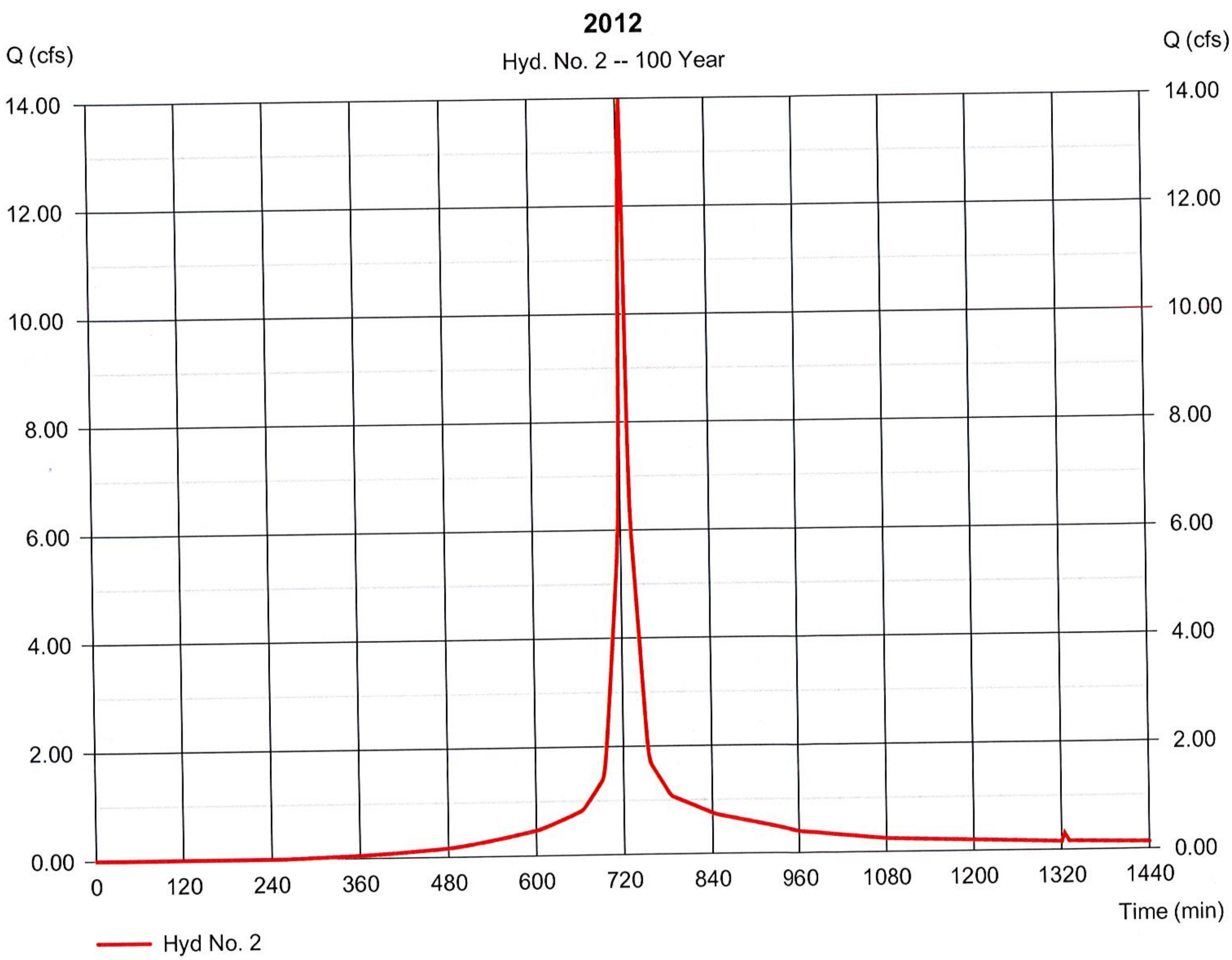
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Friday, 02 / 26 / 2016

Hyd. No. 2

2012

Hydrograph type	= SCS Runoff	Peak discharge	= 13.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 43,448 cuft
Drainage area	= 2.000 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.10 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.170 x 98) + (0.680 x 61) + (0.150 x 74)] / 2.000



Hydrograph Report

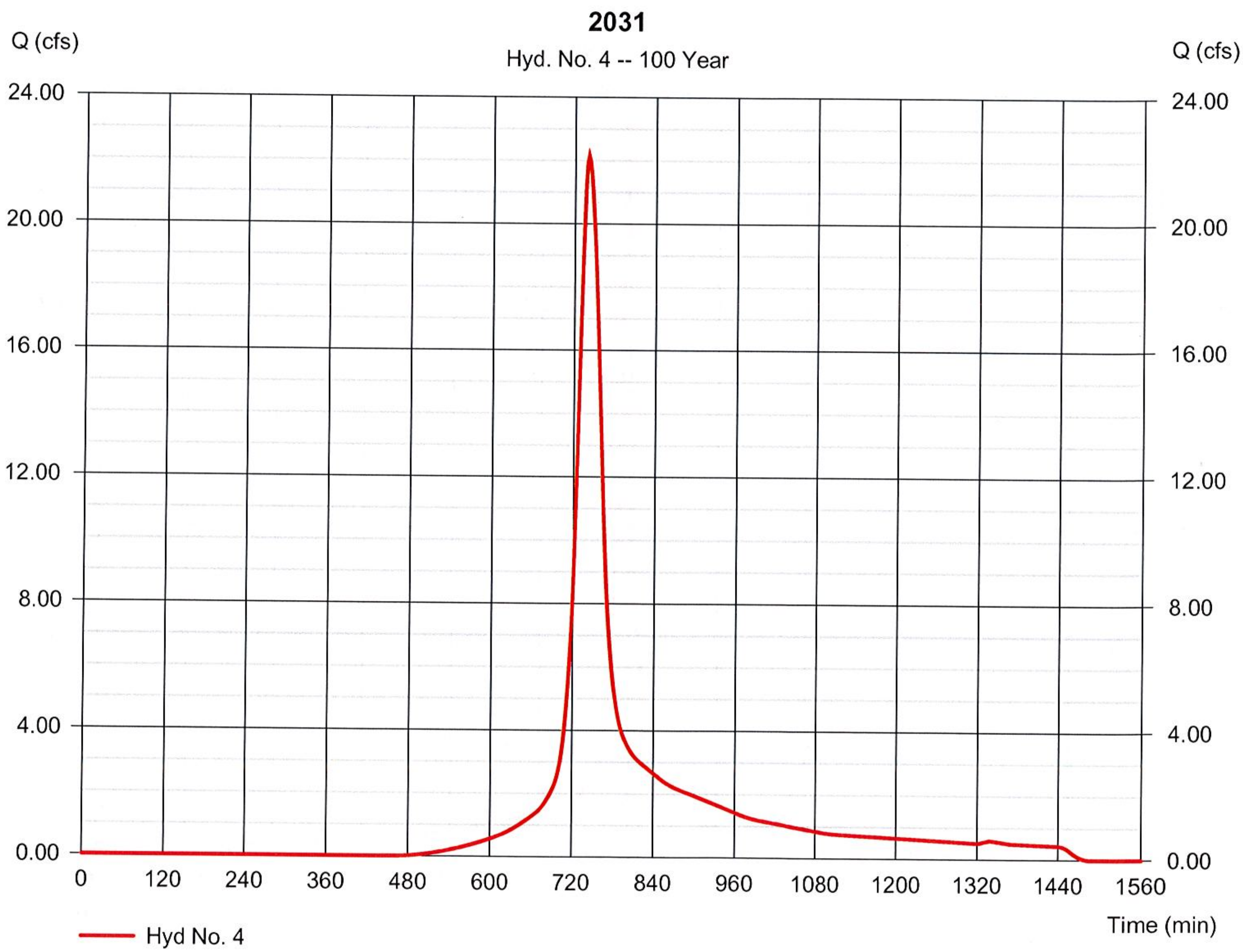
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 Friday, 02 / 26 / 2016

Hyd. No. 4

2031

Hydrograph type	= SCS Runoff	Peak discharge	= 22.13 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 115,558 cuft
Drainage area	= 6.740 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 28.30 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.050 x 98) + (0.250 x 74) + (4.300 x 61) + (1.140 x 76)] / 6.740



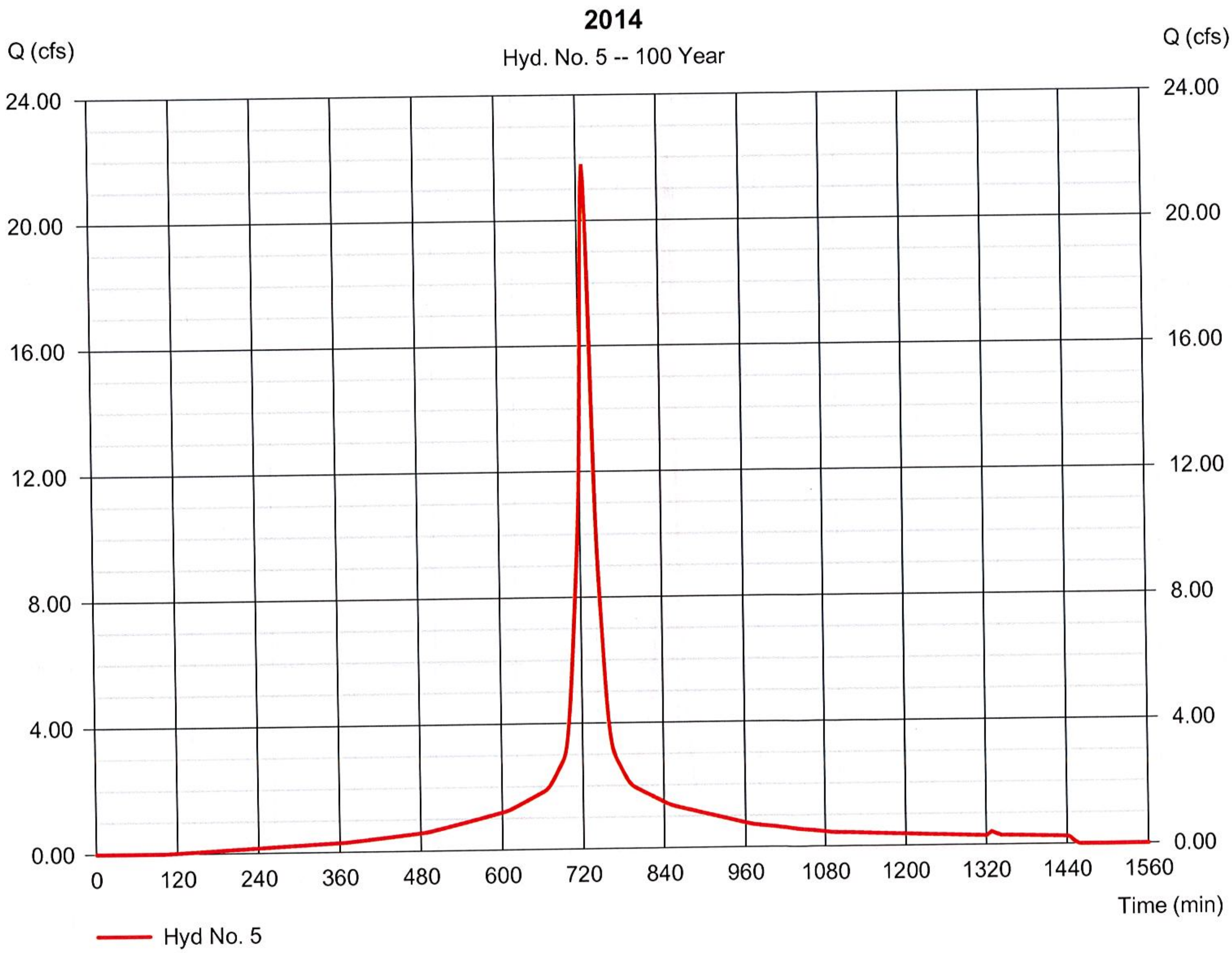
Hydrograph Report

Hyd. No. 5

2014

Hydrograph type	= SCS Runoff	Peak discharge	= 21.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 91,939 cuft
Drainage area	= 3.240 ac	Curve number	= 94*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.890 x 98) + (0.090 x 39) + (0.260 x 74)] / 3.240



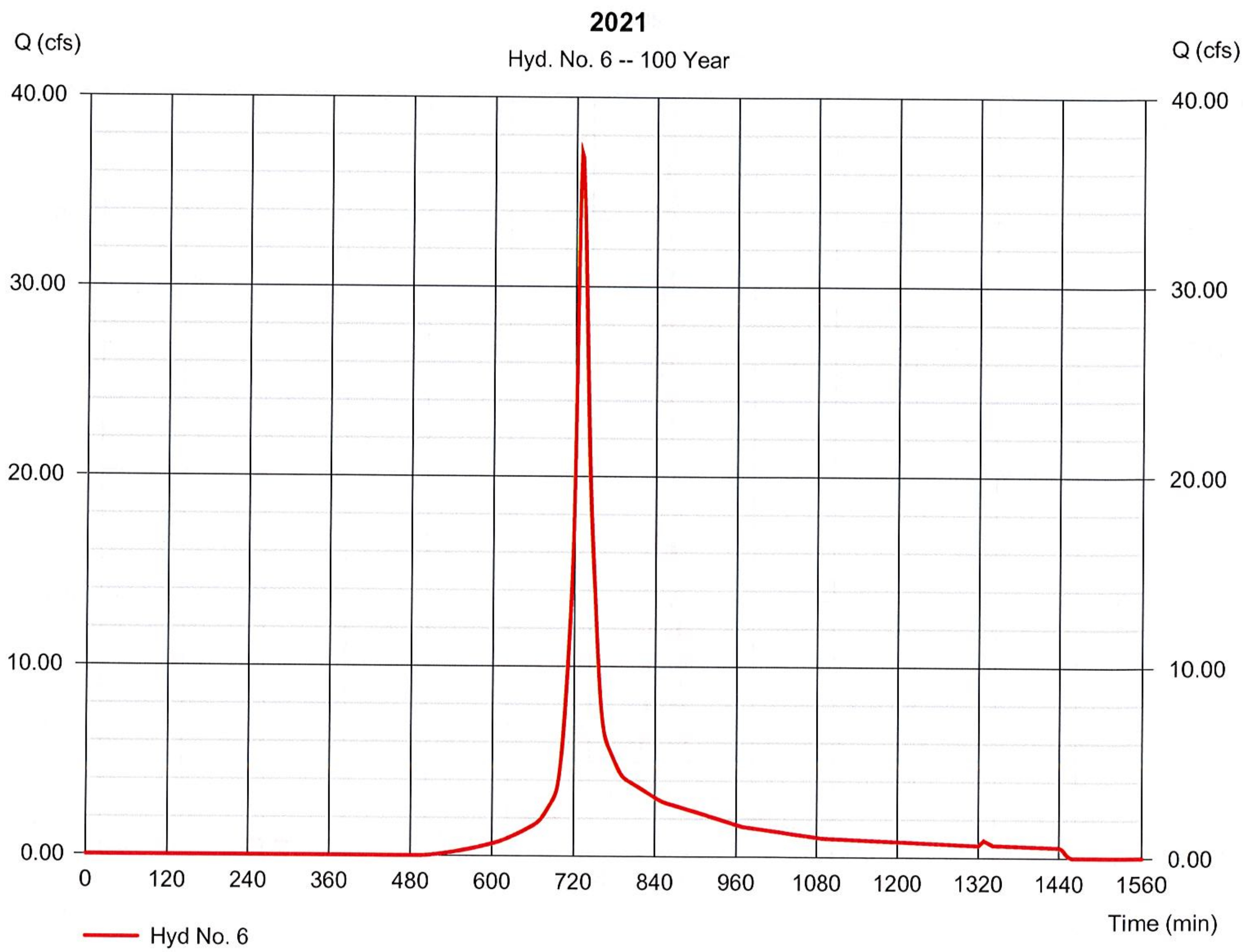
Hydrograph Report

Hyd. No. 6

2021

Hydrograph type	= SCS Runoff	Peak discharge	= 37.04 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 142,206 cuft
Drainage area	= 8.690 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 98) + (2.080 x 36) + (1.790 x 73) + (1.760 x 79) + (2.680 x 74)] / 8.690



Hydrograph Report

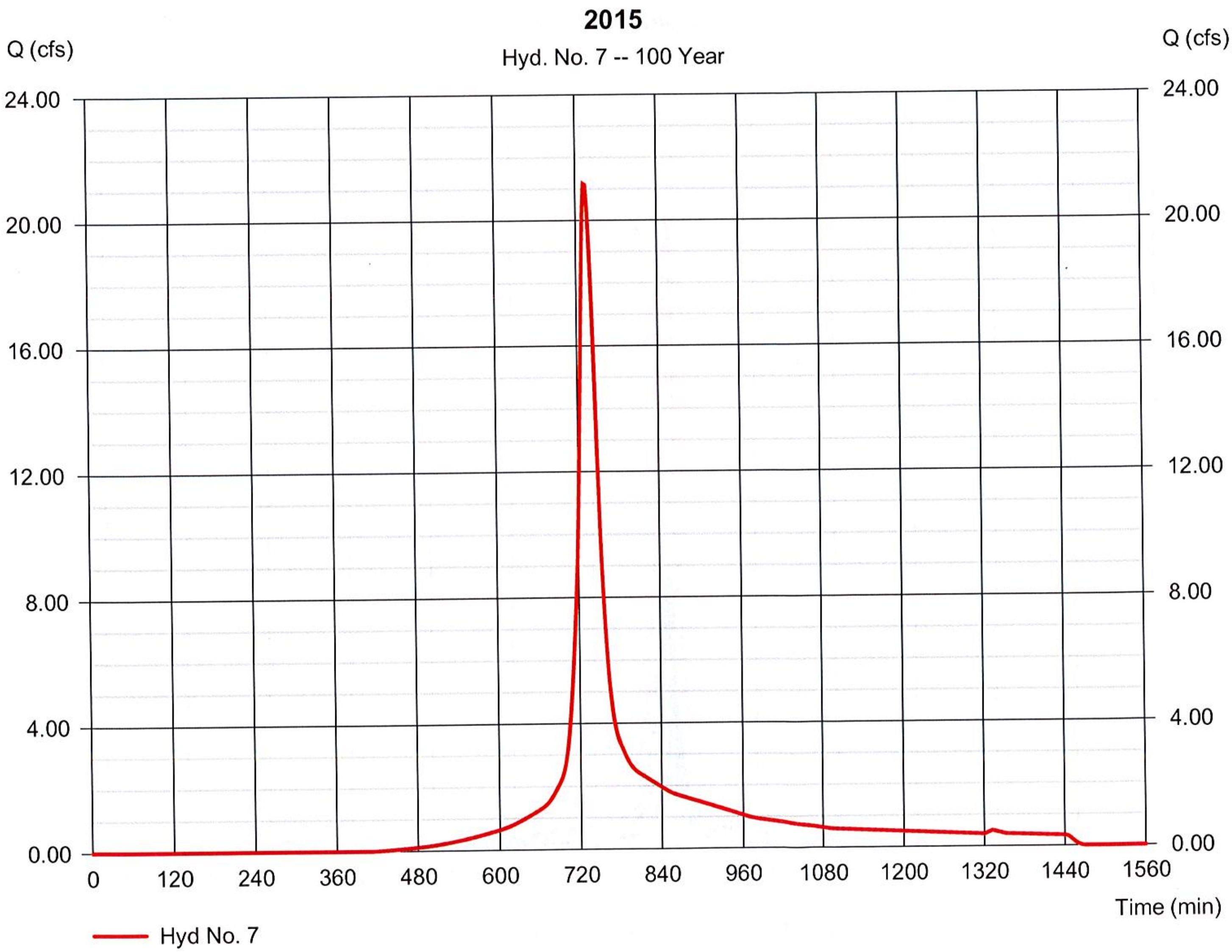
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10 — Friday, 02 / 26 / 2016

Hyd. No. 7

2015

Hydrograph type	= SCS Runoff	Peak discharge	= 21.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 93,721 cuft
Drainage area	= 4.970 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.00 min
Total precip.	= 8.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.370 x 73) + (0.490 x 36) + (2.260 x 80) + (0.530 x 74) + (0.430 x 39) + (0.890 x 98)] / 4.970

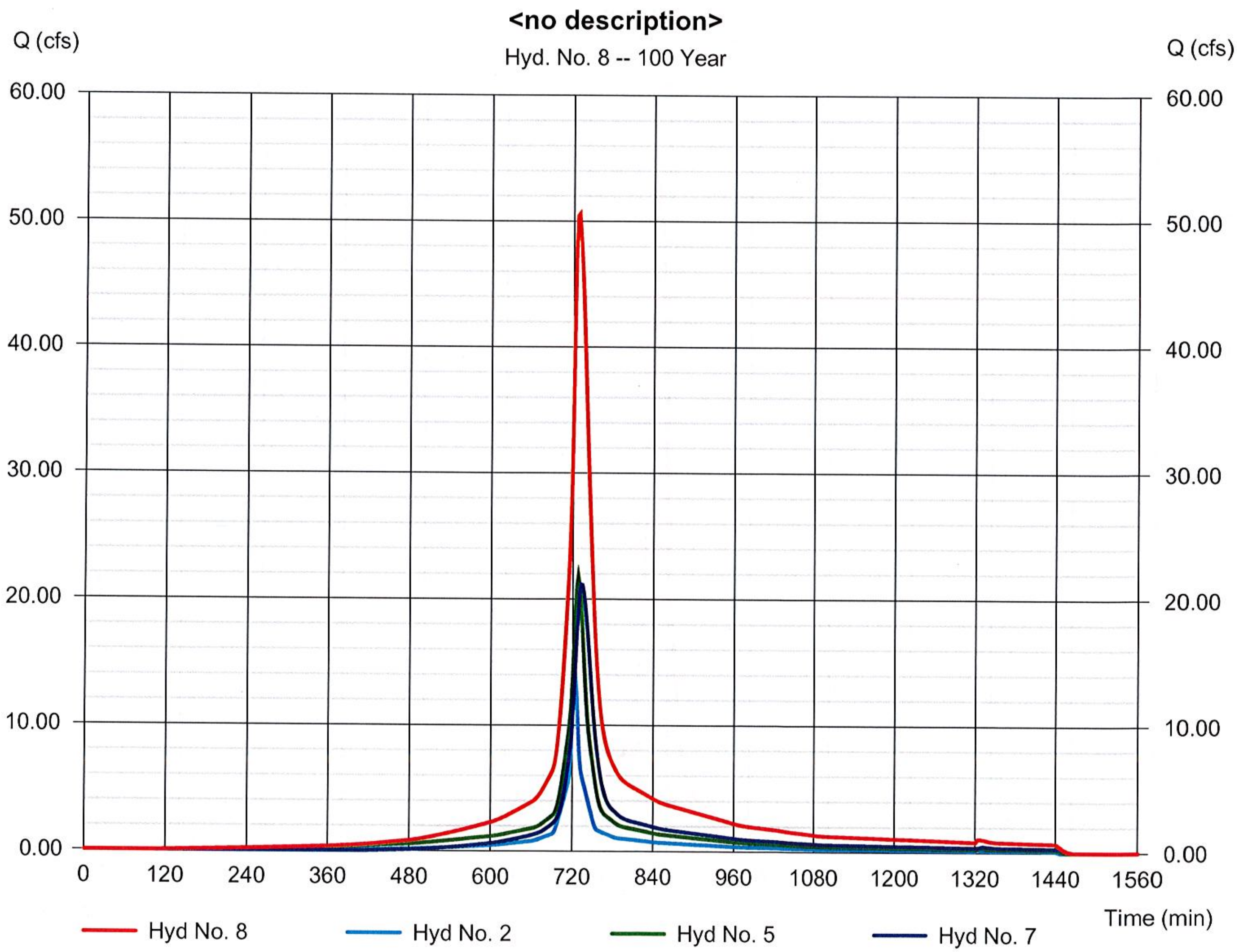


Hydrograph Report

Hyd. No. 8

<no description>

Hydrograph type	= Combine	Peak discharge	= 50.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 229,108 cuft
Inflow hyds.	= 2, 5, 7	Contrib. drain. area	= 10.210 ac

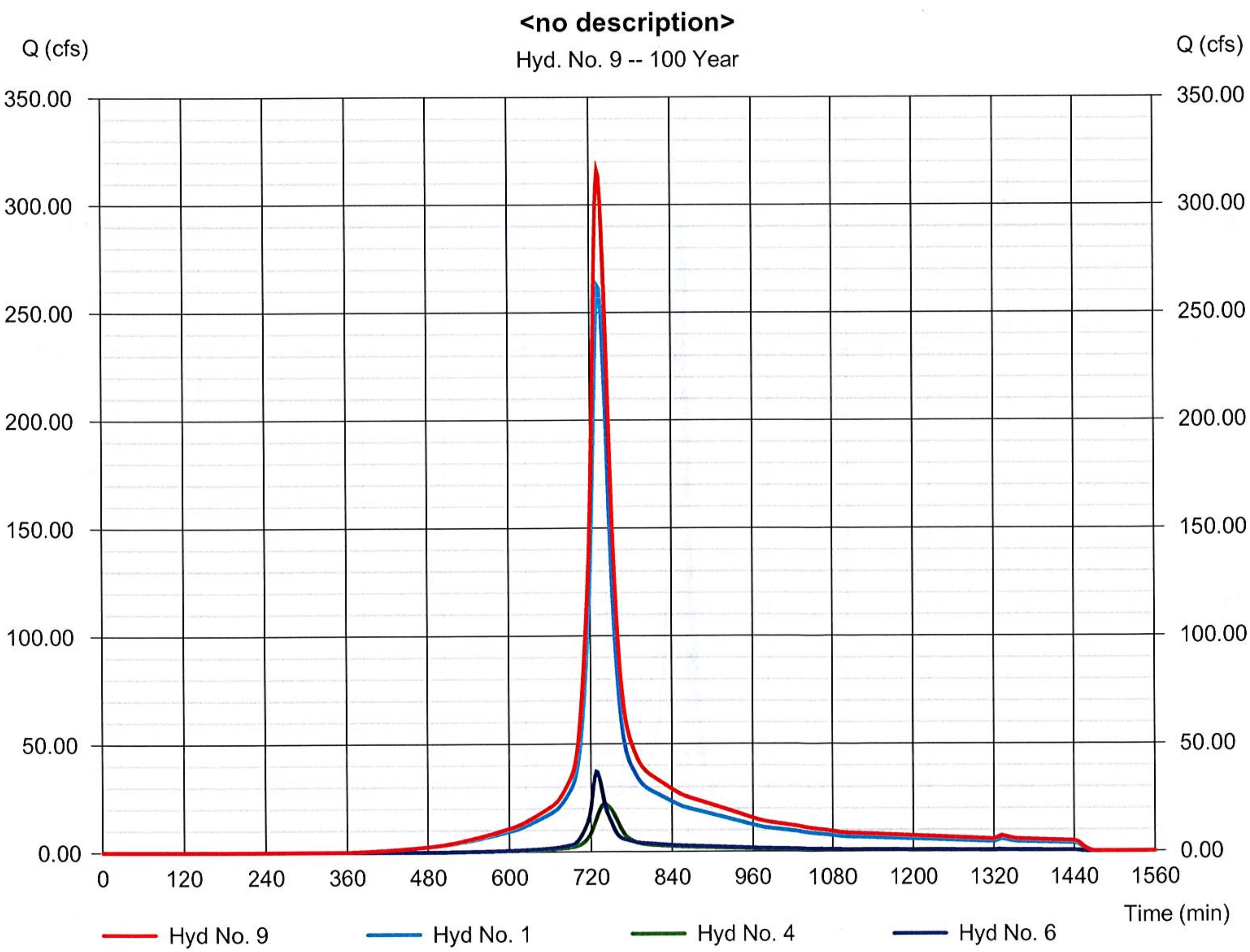


Hydrograph Report

Hyd. No. 9

<no description>

Hydrograph type	= Combine	Peak discharge	= 315.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 1,426,205 cuft
Inflow hyds.	= 1, 4, 6	Contrib. drain. area	= 72.210 ac



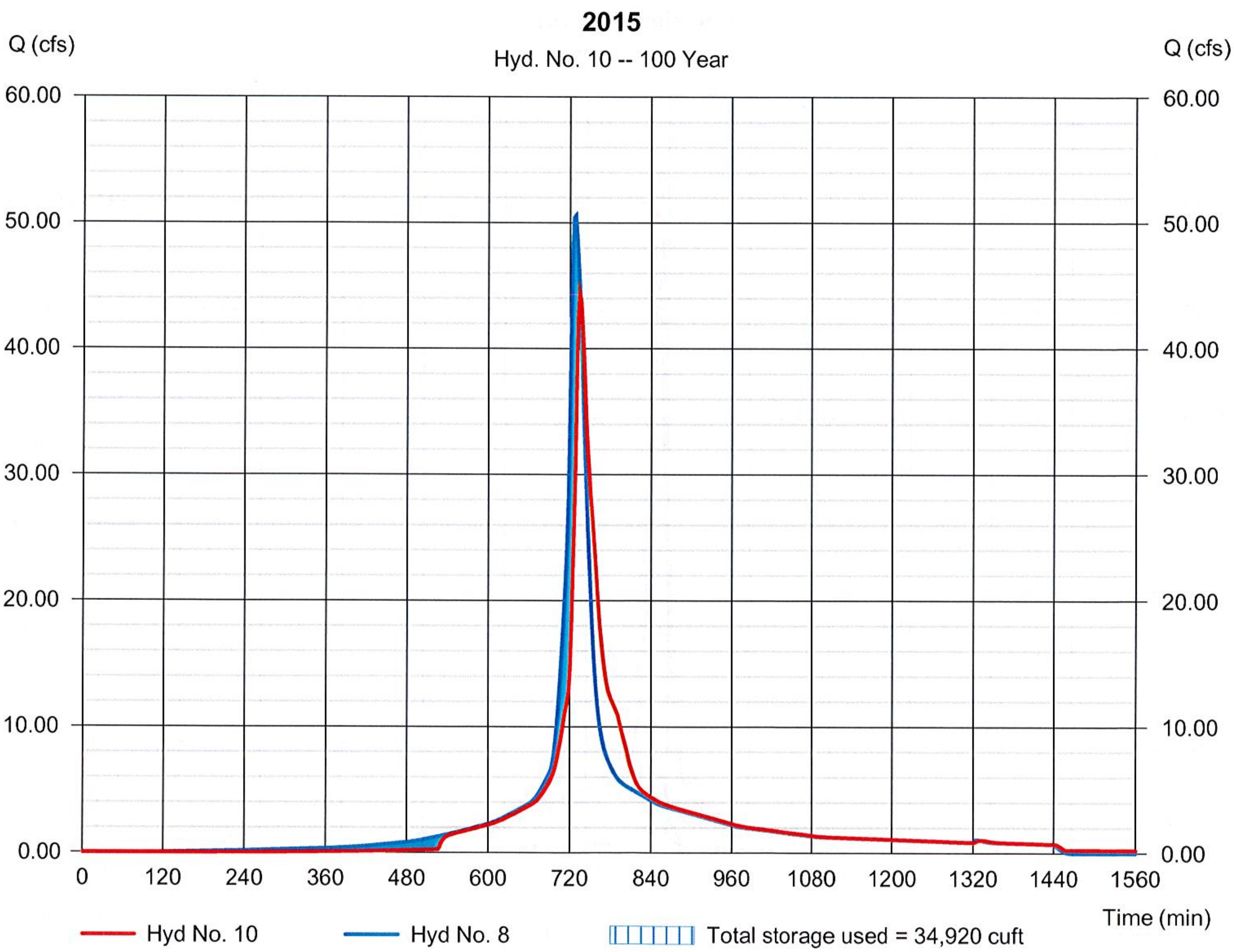
Hydrograph Report

Hyd. No. 10

2015

Hydrograph type	= Reservoir	Peak discharge	= 44.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 229,055 cuft
Inflow hyd. No.	= 8 - <no description>	Max. Elevation	= 258.82 ft
Reservoir name	= 2015	Max. Storage	= 34,920 cuft

Storage Indication method used.

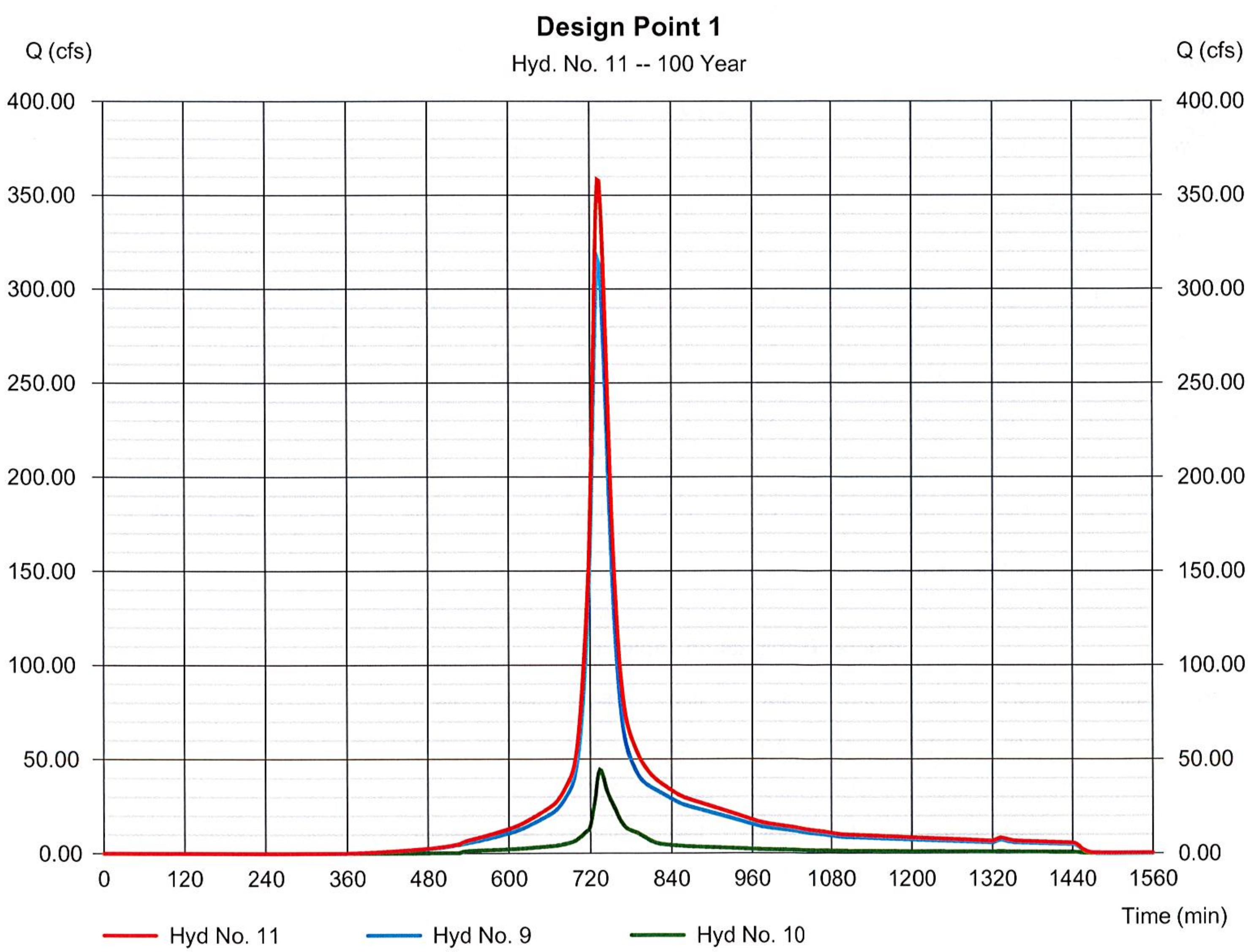


Hydrograph Report

Hyd. No. 11

Design Point 1

Hydrograph type	= Combine	Peak discharge	= 358.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 1,655,258 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

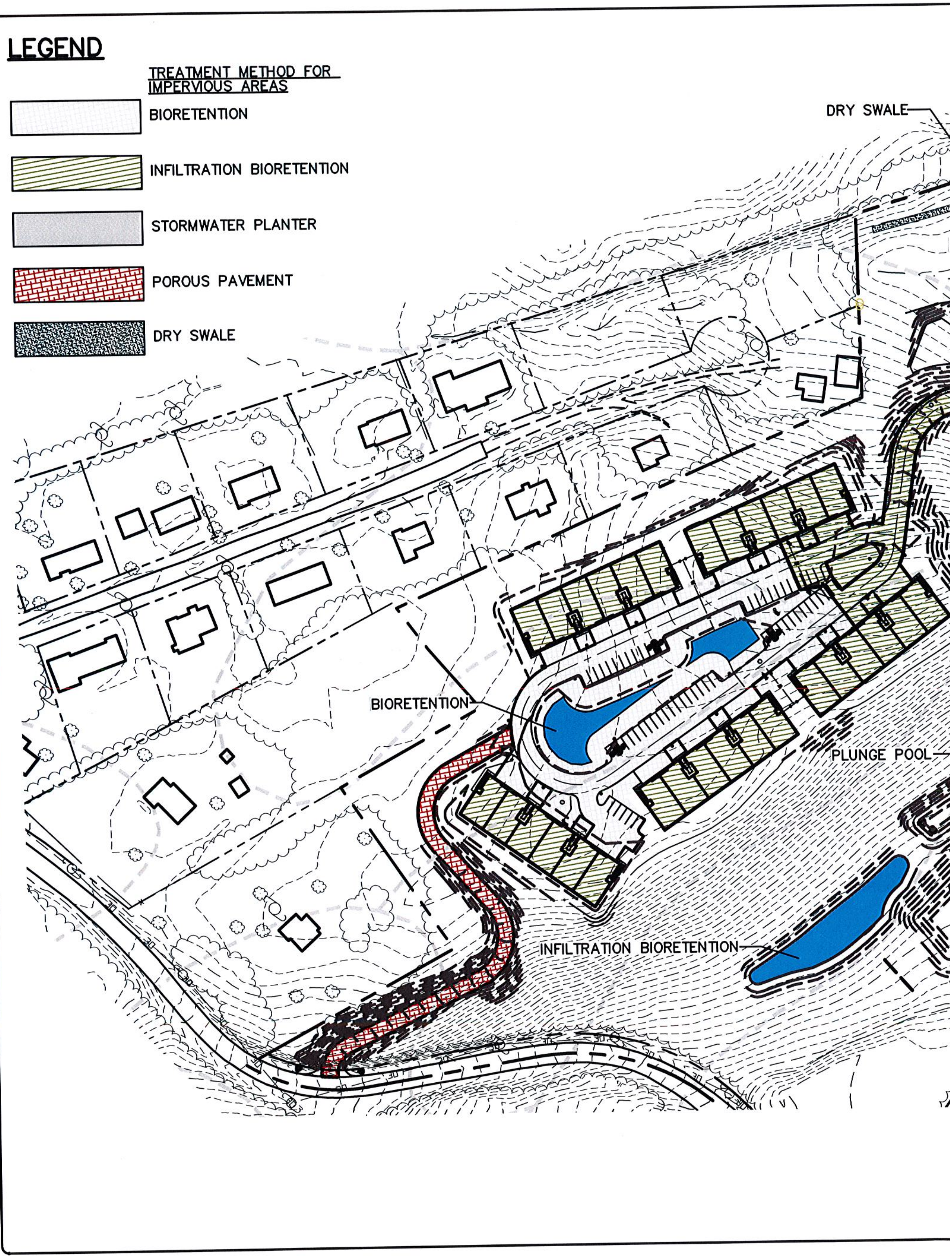
Tc = time in minutes. Values may exceed 60.

Precip. file name: Orange County.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.60	3.28	0.00	0.00	4.68	6.88	0.00	8.30
SCS 6-Hr	1.76	0.00	0.00	0.00	3.21	0.00	0.00	5.76
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix C

Water Quality Volume Calculations


LEGEND
TREATMENT METHOD FOR IMPERVIOUS AREAS
BIORETENTION
INFILTRATION BIORETENTION
STORMWATER PLANTER
POROUS PAVEMENT
DRY SWALE
DRY SWALE
BIORETENTION
PLUNGE POOL
INFILTRATION BIORETENTION

Version 1.7
Last Updated: 10/02/2015

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.........	No

Design Point:	1	
P=	1.30	inch

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft^3)	Description
1	0.30	0.30	100%	0.95	1,345	Porous Pavement
2	1.94	1.17	60%	0.59	5,427	Bioretention
3	3.41	3.29	96%	0.92	14,778	Infiltration Bioretention
4	0.31	0.31	100%	0.95	1,390	Stormwater Planter
5	0.04	0.04	100%	0.95	179	Stormwater Planter
6	0.31	0.16	52%	0.51	753	Dry Swale
7						
8						
9						
10						
Subtotal (1-30)	6.31	5.27	84%	0.80	**23,871**	**Subtotal 1**
Total	6.31	5.27	84%	0.80	**23,871**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area (Acre)	Contributing Impervious Area (Acre)	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Runoff Coefficient Rv	WQv (ft^3)
"<<Initial WQv"	6.31	5.27	84%	0.80	23,871
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**6.31**	**5.27**	84%	0.80	23,871
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	6.31	5.27	84%	0.80	**23,871**

Minimum RRv

Enter the Soils Data for the site

Soil Group	Acres	S
A	1.15	55%
B	1.70	40%
C	3.41	30%
D		20%
Total Area	6.26	

Calculate the Minimum RRv

S =	**0.37**	
Impervious =	5.27	*acre*
Precipitation	1.3	*in*
Rv	0.95	
Minimum RRv	**8,814**	***ft3***
	0.20	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	23871	*0.548*
30	Total RRV Provided	23871	*0.548*
31	Is RRv Provided ≥WQv Required?	Yes	
32	Minimum RRv	8814	*0.202*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	0	*0.000*
34	Sum of Volume Reduced & Treated	23871	*0.548*
34	Sum of Volume Reduced and Treated	23871	*0.548*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?	*Yes*	Plan Completed

Porous Pavement Worksheet

$$Ap = Vw / (n \times dt)$$

Ap	Required porous pavement surface area	*ft2*	
Vw	Design Volume	*ft3*	
n	porosity of gravel bed/resevoir		*Assume .4 for gravel*
dt	depth of gravel bed/resevoir		

Design Point:	**1**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
1	0.30	0.30	1.00	0.95	1344.92	1.30	Porous Pavement

Enter Soil Infiltration Rate

Soil Inflitration Rate	0.50	*in/hour*	

Calculate Required Surface Area

Design Volume	Vw	1,345	*ft^3*	
Are underdrains being used?		No	-	
Porosity of Gravel Bed	*n*	0.40	-	
Gravel Bed Depth	dt	0.50	*ft*	
Required Surface Area	Ap	6,725	*sf*	
Surface Area Provided		13,000	*sf*	*Dimensions of pavement can be provided here*
Storage Volume Provided		2,600	*ft^3*	

Determine the Runoff Reduction

RRv	**1,345**	*ft^3*	

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)
k	The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point: 1

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious %	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
2	1.94	1.17	0.60	0.59	5426.85	1.30	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	60%	0.59	5,427	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Soil Information

Soil Group	B		
Soil Infiltration Rate	0.00	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area

		Value	Units	Notes
WQv		5,427	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**4522**	***ft^2***	

Determine Actual Bio-Retention Area

Filter Width	300	*ft*	
Filter Length	26	*ft*	
Filter Area	7800	*ft^2*	
Actual Volume Provided	9360	*ft^3*	

Determine Runoff Reduction

Is the Bioretention contributing flow to another practice?	Yes	Select Practice	Infiltration Bioretention
RRv	3,744		
RRv applied	**3,744**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***
Volume Treated	0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*
Volume Directed	1,683	*ft^3*	This volume is directed another practice
Sizing √	OK		*Check to be sure Area provided ≥ Af*

Infiltrating Bioretention Worksheet

(For use on HSG A or B Soils without underdrains)

$WQv \leq VSM + VDL + (DP \times ARG)$

$VSM = ARG \times DSM \times nSM$

VDL (optional) = $ARG \times DDL \times nDL$

Design Point: 1

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	3.41	3.29	0.96	0.92	#######	1.30	Infiltration Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	96%	0.92	14,778	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					1,683	ft^3	

Infiltrating Bioretention Parameters				
Treatment Volume	WQv	16,461	ft^3	
Enter depth of soil Media	DSM	2.50	*ft*	*2.5 - 4 ft*
Enter depth of drainage	DDL	3.10	*ft*	*≥ 0.5 ft*
Enter ponding depth above surface	DP	0.5	*ft*	*≤ 0.5*
Enter porosity of Soil Media	nSM	0.20		*≥20%*
Enter porosity of Drainage	nDL	0.40		*≥ 40%*
Required Bioretention Area	ARG	7348	*sf*	
Bioretention Area Provided		9287	*ft2*	
Native Soil Infiltration Rate		0.50	*in/hr*	*Okay*
Are you using underdrains?		No		
Total Volume Provided		20,803	ft^3	*Sum of storage Volume Provided in each layer*
Determine Runoff Reduction				
Runoff Reduction		**16,461**	ft^3	***This is 80% of storage volume provided or WQv whichever is less***
Volume Treated		0	ft^3	*This is the portion of the WQv that is not reduced in the practice*
Sizing √		*OK*		*Check to be sure Area provided ≥ Af*

Stormwater Planter Worksheet

Af=WQv*(df)/[k*(hf+df)(tf)]

where:

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft^3)
df	Depth of the Soil Medium (ft)
k	The Hyrdaulic Conductivity (ft/day), usually set at 4 ft/day when soil is loosely ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil***
hf	Average Height of Water above planter bed (ft)
tf	The Design Time to Filter the Treatment Volume Through the Filter Media (days)

Design Point: 1

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious %	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
4	0.31	0.31	1.00	0.95	1389.75	1.30	Stormwater Planter

Calculate the Mimimum Filter Area

Parameter	Value	Units	
WQv	1,390	*ft^3*	*WQv*
Depth of Soil Media	1	*ft*	*df*
Hydraulic Conductivity	3.5	*ft/d*	*k*
Average Height of Ponding	0.5	*ft*	*hf*
Filter Time	1	*d*	*tf*
Required Area of Filter	265	*ft^2*	*Af*

Area of Filter

Width	5.1	*ft*
Length	10	*ft*
Area Provided	51	*ft^2*
Volume Provided	267.75	

Runoff Reduction

Soil Type	A
Flow Through Planter?	*Yes*

Determine the Runoff Reduction

RRv	**1,390**	*ft^3*
RRv Applied	**1,390**	*ft^3*

Stormwater Planter Worksheet

Af=WQv*(df)/[k*(hf+df)(tf)]

where:

	Af	Required Surface Area (ft2)
	WQv	Water Quality Volume (ft^3)
	df	Depth of the Soil Medium (ft)
	k	The Hyrdaulic Conductivity (ft/day), usually set at 4 ft/day when soil is loosely ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil***
	hf	Average Height of Water above planter bed (ft)
	tf	The Design Time to Filter the Treatment Volume Through the Filter Media (days)

Design Point: 1

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
5	0.04	0.04	1.00	0.95	179.32	1.30	Stormwater Planter

Calculate the Mimimum Filter Area

Parameter	Value	Units	
WQv	179	ft^3	*WQv*
Depth of Soil Media	1	*ft*	*df*
Hydraulic Conductivity	3.5	*ft/d*	*k*
Average Height of Ponding	0.5	*ft*	*hf*
Filter Time	1	*d*	*tf*
Required Area of Filter	34	ft^2	*Af*

Area of Filter

Width	6	*ft*
Length	6	*ft*
Area Provided	36	ft^2
Volume Provided	189	

Runoff Reduction

Soil Type	A
Flow Through Planter?	*Yes*

Determine the Runoff Reduction

RRv	**179**	ft^3
RRv Applied	**179**	ft^3

Af=WQv*(df)/[k*(hf+df)(tf)]

Dry Swale Worksheet

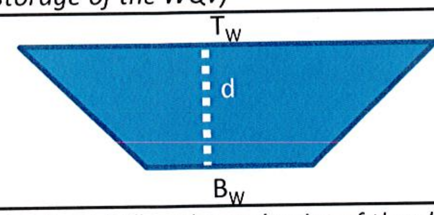
Design Point: 1

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious %	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
6	0.31	0.16	0.52	0.51	752.68	1.30	Dry Swale
Enter Impervious Area Reduced by Disconnection of Rooftops	0.00		52%	0.51	753	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	75	*ft^3*	75

Calculate Available Storage Capacity

Bottom Width	8	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	3	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	2%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.5	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	17	*ft*	
Area	18.75	*sf*	
Minimum Length	36	*ft*	
Actual Length	198	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	3,788	*ft^3*	
Soil Group (HSG)		C	

Runoff Reduction

Is the Dry Swale contributing flow to another practice?	No	Select Practice	
RRv	**753**	*ft^3*	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**
Volume Treated	0	*ft^3*	This is the difference between the WQv calculated and the runoff reduction achieved in the swale
Volume Directed	0	*ft^3*	This volume is directed another practice
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv

Appendix D

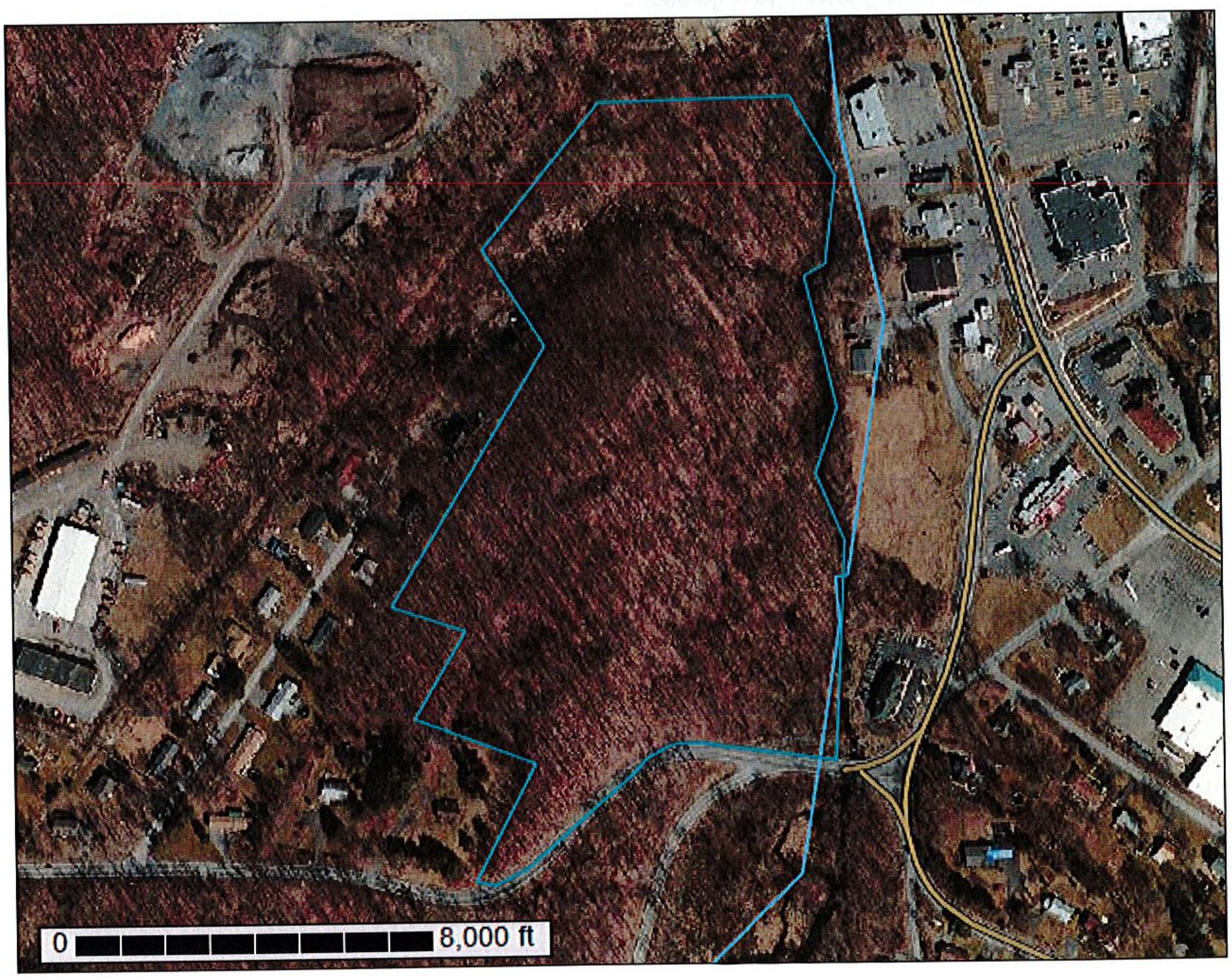
NRCS Soils Survey

United States Department of Agriculture
NRCS
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Orange County, New York

Gardner Ridge



January 19, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

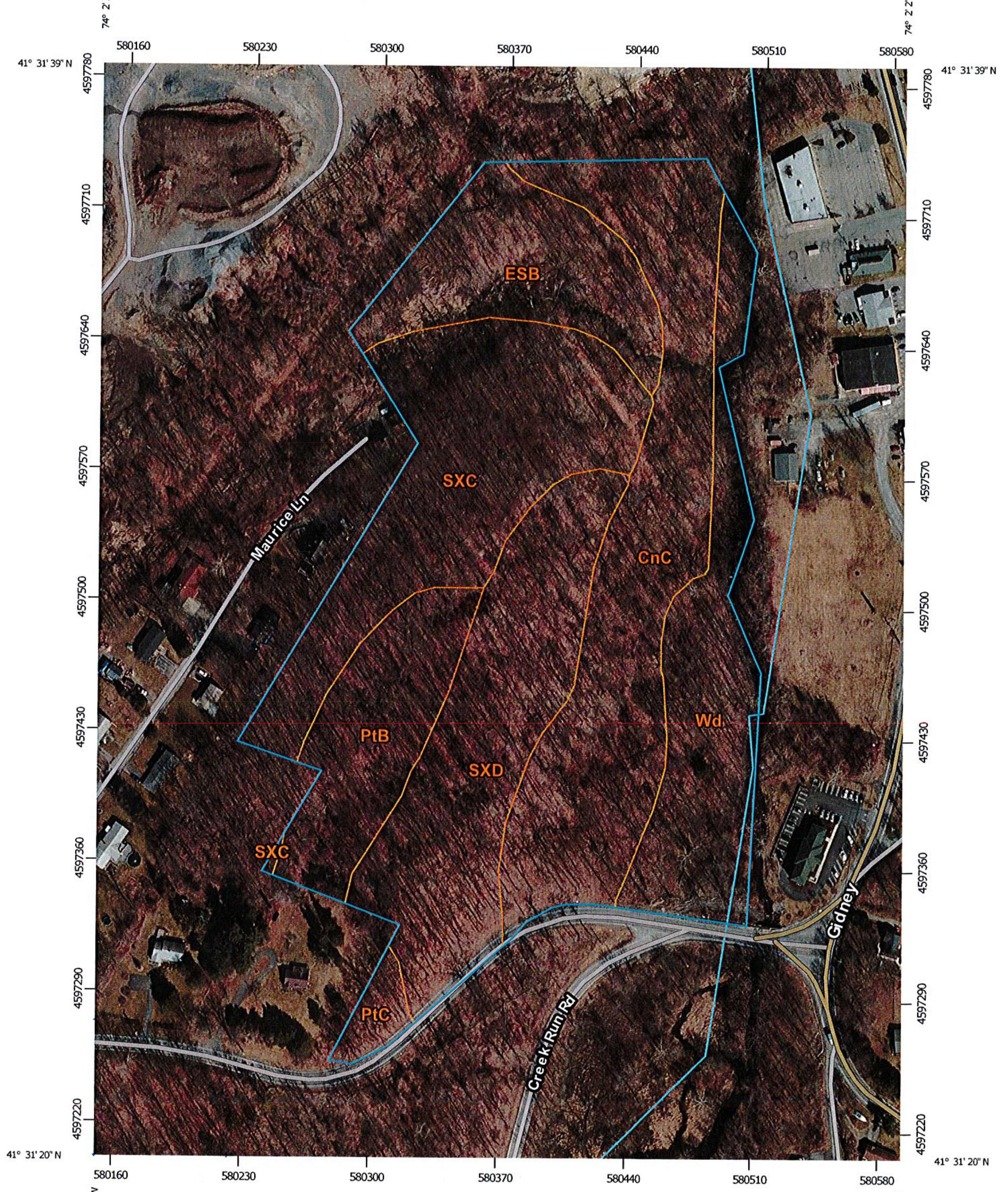
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:2,850 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, New York
Survey Area Data: Version 16, Sep 24, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2011—Apr 16, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Orange County, New York (NY071)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CnC	Chenango gravelly silt loam, 8 to 15 percent slopes	5.6	24.6%
ESB	Erie extremely stony soils, gently sloping	2.5	11.0%
PtB	Pittsfield gravelly loam, 3 to 8 percent slopes	2.2	9.7%
PtC	Pittsfield gravelly loam, 8 to 15 percent slopes	0.3	1.5%
SXC	Swartswood and Mardin soils, sloping, very stony	4.7	20.7%
SXD	Swartswood and Mardin soils, moderately steep, very stony	4.2	18.6%
Wd	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	3.2	14.0%
Totals for Area of Interest		**22.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County, New York

CnC—Chenango gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9vv3
Elevation: 600 to 1,800 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Chenango and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chenango

Setting

Landform: Terraces, valley trains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, derived mainly from sandstone, shale, and siltstone

Typical profile

H1 - 0 to 5 inches: gravelly silt loam
H2 - 5 to 26 inches: very gravelly silt loam
H3 - 26 to 60 inches: stratified very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 1 percent
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Minor Components

Allard

Percent of map unit: 5 percent

Castile

Percent of map unit: 5 percent

Hoosic

Percent of map unit: 5 percent

Otisville

Percent of map unit: 5 percent

ESB—Erie extremely stony soils, gently sloping

Map Unit Setting

National map unit symbol: 9vvb
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Erie, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Erie, Extremely Stony

Setting

Landform: Hills, till plains, drumlinoid ridges
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived from siltstone, sandstone, shale, and limestone

Typical profile

H1 - 0 to 4 inches: gravelly silt loam
H2 - 4 to 18 inches: channery silt loam
H3 - 18 to 50 inches: channery silt loam
H4 - 50 to 70 inches: channery silt loam

Properties and qualities

Slope: 3 to 8 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 10 to 21 inches to fragipan
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Minor Components

Alden

Percent of map unit: 5 percent
Landform: Depressions

Bath

Percent of map unit: 5 percent

Mardin

Percent of map unit: 5 percent

Wurtsboro

Percent of map unit: 5 percent

PtB—Pittsfield gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9vw8
Elevation: 0 to 1,000 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pittsfield and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pittsfield

Setting

Landform: Hills, till plains, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 10 inches: gravelly loam
H2 - 10 to 34 inches: gravelly loam
H3 - 34 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B

Minor Components

Bath

Percent of map unit: 5 percent

Charlton

Percent of map unit: 5 percent

Hollis

Percent of map unit: 5 percent

Mardin

Percent of map unit: 5 percent

Paxton

Percent of map unit: 5 percent

PtC—Pittsfield gravelly loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9vw9
Elevation: 0 to 1,000 feet
Mean annual precipitation: 42 to 52 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Pittsfield and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pittsfield

Setting

Landform: Hills, till plains, drumlinoid ridges
Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Calcareous loamy till

Typical profile

H1 - 0 to 9 inches: gravelly loam
H2 - 9 to 31 inches: gravelly loam
H3 - 31 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Minor Components

Bath

Percent of map unit: 5 percent

Charlton

Percent of map unit: 5 percent

Hollis

Percent of map unit: 5 percent

Mardin

Percent of map unit: 5 percent

Paxton

Percent of map unit: 5 percent

SXC—Swartswood and Mardin soils, sloping, very stony

Map Unit Setting

National map unit symbol: 2v30r
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Mardin, very stony, and similar soils: 40 percent
Swartswood, very stony, and similar soils: 40 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swartswood, Very Stony

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from quartzite, conglomerate, and sandstone

Typical profile

H1 - 0 to 3 inches: gravelly loam
H2 - 3 to 31 inches: gravelly fine sandy loam
H3 - 31 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 23 to 31 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C

Description of Mardin, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

A - 0 to 4 inches: gravelly silt loam
Bw - 4 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 8 to 15 percent

Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Minor Components

Bath, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear

Volusia, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear

Lordstown

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, concave
Across-slope shape: Linear

Wurtsboro, very stony

Percent of map unit: 5 percent
Landform: Hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex

SXD—Swartswood and Mardin soils, moderately steep, very stony

Map Unit Setting

National map unit symbol: 2v30s
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Swartswood, very stony, and similar soils: 40 percent
Mardin, very stony, and similar soils: 40 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mardin, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

A - 0 to 4 inches: gravelly silt loam
Bw - 4 to 15 inches: gravelly silt loam
E - 15 to 20 inches: gravelly silt loam
Bx - 20 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 14 to 26 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 13 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Description of Swartswood, Very Stony

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from quartzite, conglomerate, and sandstone

Typical profile

H1 - 0 to 2 inches: gravelly loam
H2 - 2 to 28 inches: gravelly fine sandy loam
H3 - 28 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 23 to 31 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C

Minor Components

Volusia, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear

Lordstown

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear, concave
Across-slope shape: Linear

Wurtsboro, very stony

Percent of map unit: 5 percent
Landform: Hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave

Across-slope shape: Convex

Bath, very stony

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear

Wd—Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2srgt
Elevation: 160 to 1,970 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Wayland and similar soils: 60 percent
Wayland, very poorly drained, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wayland

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 21 inches: silt loam
Cg1 - 21 to 28 inches: silt loam
Cg2 - 28 to 47 inches: silt loam
Cg3 - 47 to 54 inches: silt loam
Cg4 - 54 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 13.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Description of Wayland, Very Poorly Drained

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey alluvium derived from interbedded sedimentary rock

Typical profile

A - 0 to 9 inches: mucky silt loam
Bg - 9 to 21 inches: silt loam
Cg1 - 21 to 28 inches: silt loam
Cg2 - 28 to 47 inches: silt loam
Cg3 - 47 to 54 inches: silt loam
Cg4 - 54 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 13.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Minor Components

Holderton

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

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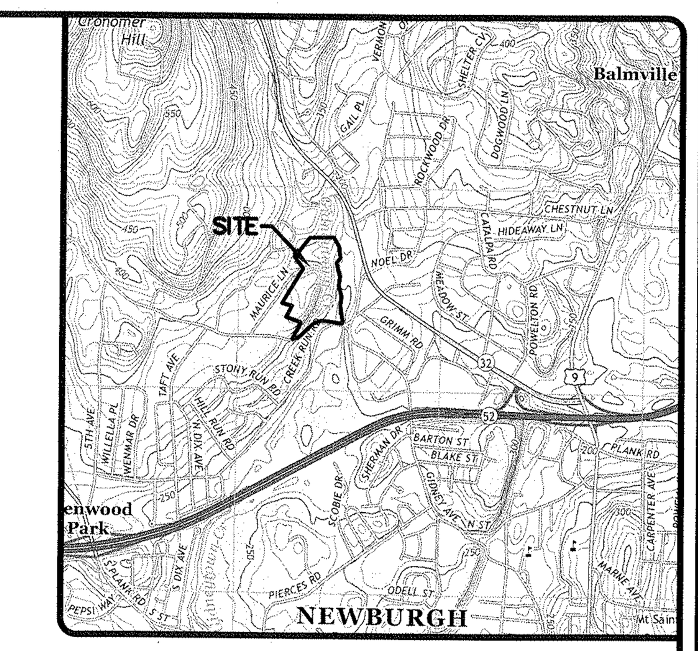
SITE PLAN
GARDNER RIDGE APARTMENTS

NYS ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

JANUARY 28, 2016



LOCATION MAP
NEWBURGH QUADRANGLE
SCALE: 1"=2000'

DENSITY CALCULATIONS:

TOTAL PARCEL AREA = 23.4± AC.
LESS WETLANDS, EASEMENTS/R.O.W.s,
100-YR FLOODPLAINS AND SLOPES 25% OR GREATER = 7.4± AC.
USEABLE AREA = 16.0± AC.

MULTIPLE FAMILY DWELLINGS MAXIMUM ALLOWABLE DENSITY= 6 DU/ACRE
ALLOWABLE NUMBER OF UNITS= 96 DWELLING UNITS

DENSITY BONUS FOR PROJECTS CONSISTING OF SENIOR CITIZEN MULTIPLE DWELLING UNITS AND NON-SENIOR- CITIZEN MULTIPLE DWELLING UNITS:

MAXIMUM DENSITY= 9 DU/ACRE
MAXIMUM ALLOWABLE UNITS= 144 UNITS
BONUS UNITS = 144 UNITS - 96 UNITS = 48 UNITS
SENIOR HOUSING UNITS REQUIRED = 48 UNITS/3 = 16 UNITS

TOTAL UNITS PROPOSED =144 UNITS
BONUS UNITS PROPOSED = 144 UNITS - 96 UNITS = 48 UNITS
SENIOR HOUSING UNITS REQUIRED = 48 BONUS UNITS/3 = 16 UNITS
NON-SENIOR APARTMENTS PROPOSED = 108 UNITS
SENIOR HOUSING PROPOSED = 36 UNITS

PARKING CALCULATIONS:

108 NON-SENIOR APARTMENTS
SPACES REQUIRED (2 SPACES/DU REQ.)= 216 SPACES

SPACES PROVIDED:
GARAGES = 72 SPACES
DRIVEWAY = 72 SPACES
PARKING LOT SPACES = 72 SPACES

NON-SENIOR APARTMENTS: SPACES PROPOSED = 216 SPACES

36 SENIOR HOUSING APARTMENTS
SPACES REQUIRED (2 SPACES/DU REQ.)= 72 SPACES

SPACES PROVIDED:
PARKING LOT SPACES = 74 SPACES

CLUBHOUSE
SPACES PROVIDED = 17 SPACES

TOTAL PARKING PROVIDED: 307 SPACES

ACCESSIBLE PARKING SPACES (NYS BUILDING CODE SECTION 1106):
SPACES REQUIRED 301 -400 SPACES = 8 SPACES
SPACES PROVIDED: 10 SPACES

SHEET INDEX

SHEET NO.	DESCRIPTION
1	EXISTING CONDITIONS
2	OVERALL SITE PLAN
3	LAYOUT & DIMENSION PLAN
4	LAYOUT & DIMENSION PLAN
5	GRADING & UTILITY PLAN
6	GRADING & UTILITY PLAN
7	EROSION & SEDIMENT CONTROL PLAN
8	EROSION & SEDIMENT CONTROL PLAN
9	ROAD PROFILES
10	ROAD PROFILES
11	DRAINAGE PROFILES
12	SITE DETAILS
13	WATER DETAILS
14	SEWER DETAILS
15	DRAINAGE DETAILS
16	EROSION CONTROL DETAILS

RECORD OWNER

GARDNER RIDGE ASSOCIATES
134 FAIRVIEW ROAD
ROCKAWAY, NJ 07866

CONSULTING ENGINEER

THOMAS B. OLLEY, PE, PLLC
152 ORANGE AVENUE
WALDEN, NY 12586
CONTACT: THOMAS B. OLLEY, PE
(845) 778-5638

SURVEYOR:

MARTIN F. ANTHONISEN JR., PLS
1422 LONG MEADOW ROAD,
TUXEDO, NY

REV.	DATE	DESCRIPTION	BY

THOMAS B. OLLEY, P.E., P.L.L.C.
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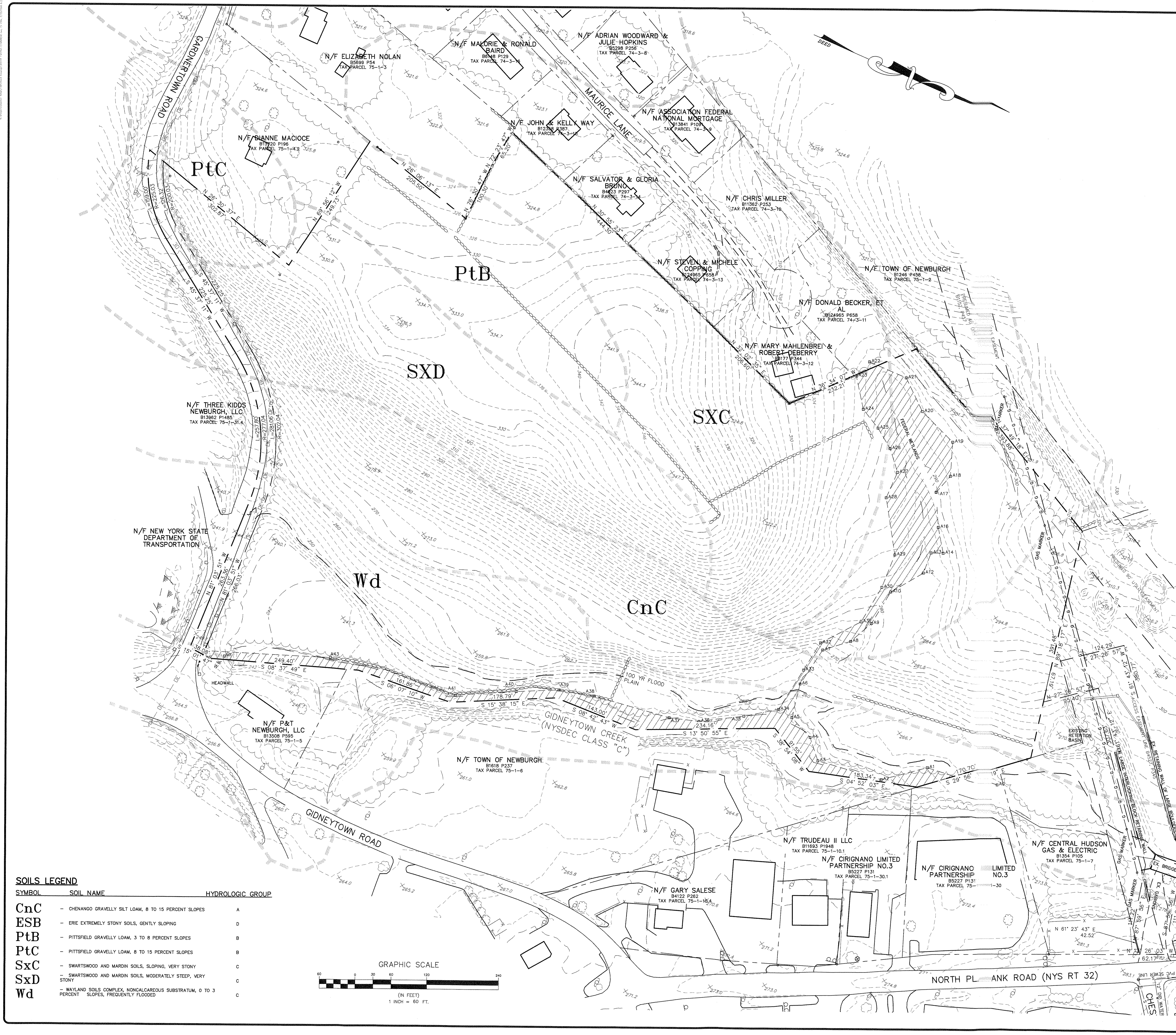
EXISTING CONDITIONS
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
CS
DATE: JANUARY 28, 2016
FILE NO.



SOILS LEGEND

SYMBOL	SOIL NAME	HYDROLOGIC GROUP
CnC	– CHENANGO GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	A
ESB	– ERIE EXTREMELY STONY SOILS, GENTLY SLOPING	D
PtB	– PITTSFIELD GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES	B
PtC	– PITTSFIELD GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES	B
SxC	– SWARTSWOOD AND MARDIN SOILS, SLOPING, VERY STONY	C
SxD	– SWARTSWOOD AND MARDIN SOILS, MODERATELY STEEP, VERY STONY	C
Wd	– WAYLAND SOILS COMPLEX, NONCALCAREOUS SUBSTRATUM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	C

GRAPHIC SCALE

(IN FEET)
1 INCH = 60 FT.

LEGEND

- EXISTING CONTOURS
- EXISTING SITE BOUNDARY LINE
- EXISTING ADJOINING PROPERTY LINE
- EXISTING STONE WALL
- EXISTING TREE LINE
- EXISTING TREES AND/OR BUSHES
- EXISTING STREAM
- EXISTING BUILDINGS
- EXISTING UTILITY POLE
- EXISTING STREET SIGN
- EXISTING WATER MAIN
- EXISTING HYDRANT
- EXISTING WATER VALVE
- EXISTING CLEANOUT
- EXISTING CURB STOP
- EXISTING SEWER MAIN AND MANHOLE
- EXISTING PAVED ROAD/DRIVEWAY
- EXISTING GRAVEL ROAD/DRIVEWAY
- SOILS BOUNDARY
- EXISTING FEDERAL WETLANDS BOUNDARY
- 100 YR FLOODPLAIN BOUNDARY

RECORD OWNER

GARDNER RIDGE ASSOCIATES, LLC
134 FAIRVIEW RD
ROCKAWAY N.J. 07866

ZONING INFORMATION:

TAX LOT DATA: 75-1-4.2

TOTAL ACREAGE: 23.4 ACRES ±
ZONING DISTRICT: R-3

NOTES:

1. BOUNDARY SURVEY SHOWN HEREON IS FROM AN ACTUAL FIELD SURVEY PREPARED BY MARTIN F ANTHONISEN JR. ON DECEMBER 24, 2015.
2. THE TOPOGRAPHIC SURVEY SHOWN HEREON IS THE RESULT OF AN ACTUAL FIELD SURVEY PREPARED BY VINCENT DOCE ENGINEERING & SURVEYING IN APRIL 2003.
3. THE PROJECT SITE IS LOCATED WITHIN THE FOLLOWING DISTRICTS:
   A. NEWBURGH SCHOOL DISTRICT.
   B. CRONOMER FIRE DISTRICT.
   C. CONSOL LT.
   D. CONSOL WATER DISTRICT 1.
   E. CONSOL WATER DISTRICT 2.
4. TOWN OF NEWBURGH SEWER AND WATER SERVICES ARE PROVIDED FOR THIS PROPERTY.

REV.	DATE	DESCRIPTION	BY

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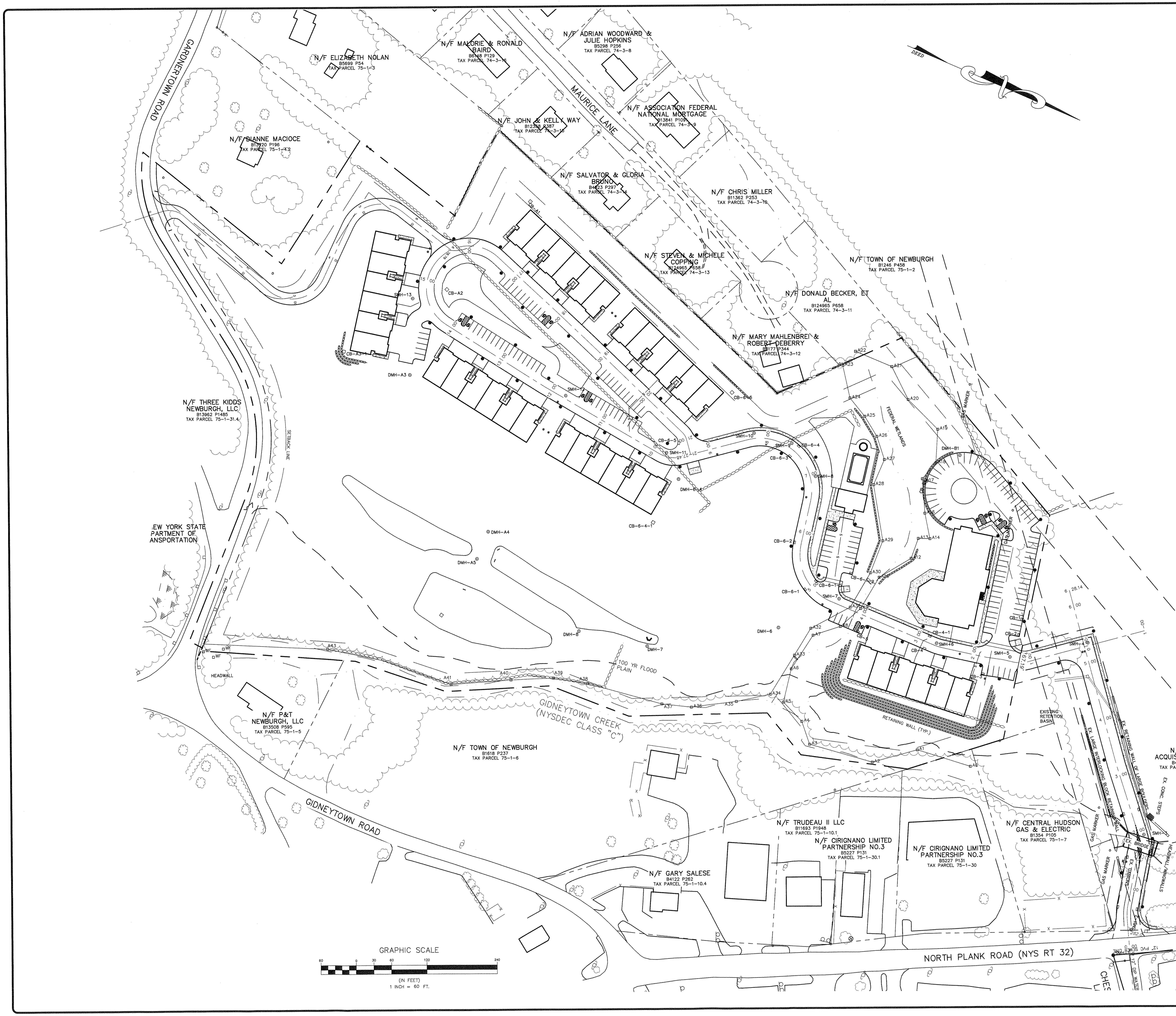
EXISTING CONDITIONS
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
1 OF 16

DATE: JANUARY 28, 2016

FILE NO.



LEGEND

- EXISTING SITE BOUNDARY LINE
- EXISTING ADJOINING PROPERTY LINE
- EXISTING STONE WALL
- EXISTING TREE LINE
- EXISTING TREES AND/OR BUSHES
- EXISTING STREAM
- EXISTING BUILDINGS
- EXISTING UTILITY POLE
- EXISTING STREET SIGN
- EXISTING WATER MAIN
- EXISTING HYDRANT
- EXISTING WATER VALVE
- EXISTING CLEANOUT
- EXISTING CURB STOP
- EXISTING SEWER MAIN AND MANHOLE
- EXISTING PAVED ROAD/DRIVEWAY
- LIMIT OF DISTURBANCE
- PROPOSED FENCE
- PROPOSED GUIDE RAIL

ZONING INFORMATION:

TAX LOT DATA: SECTION 75, BLOCK 1, LOT 4.12
TOTAL ACREAGE: 23.3 ACRES
ZONING DISTRICT: R-3

TABLE OF DIMENSIONAL REQUIREMENTS: R-3 – ZONE

	REQUIRED	PROVIDED
LOT SIZE	10.0 AC	24.3 AC
LOT WIDTH	300 FT.	550 FT.
FRONT YARD	50 FT.	185 FT.
REAR YARD	50 FT.	69 FT.
SIDE YARD (ONE SIDE)	60 FT.	63 FT.
BOTH SIDE YARDS	90 FT.	>100FT.
MAX. LOT COVERAGE	60%	<60%
MAX. BUILDING HEIGHT	35 FT.	35 FT.

REV.	DATE	DESCRIPTION	BY

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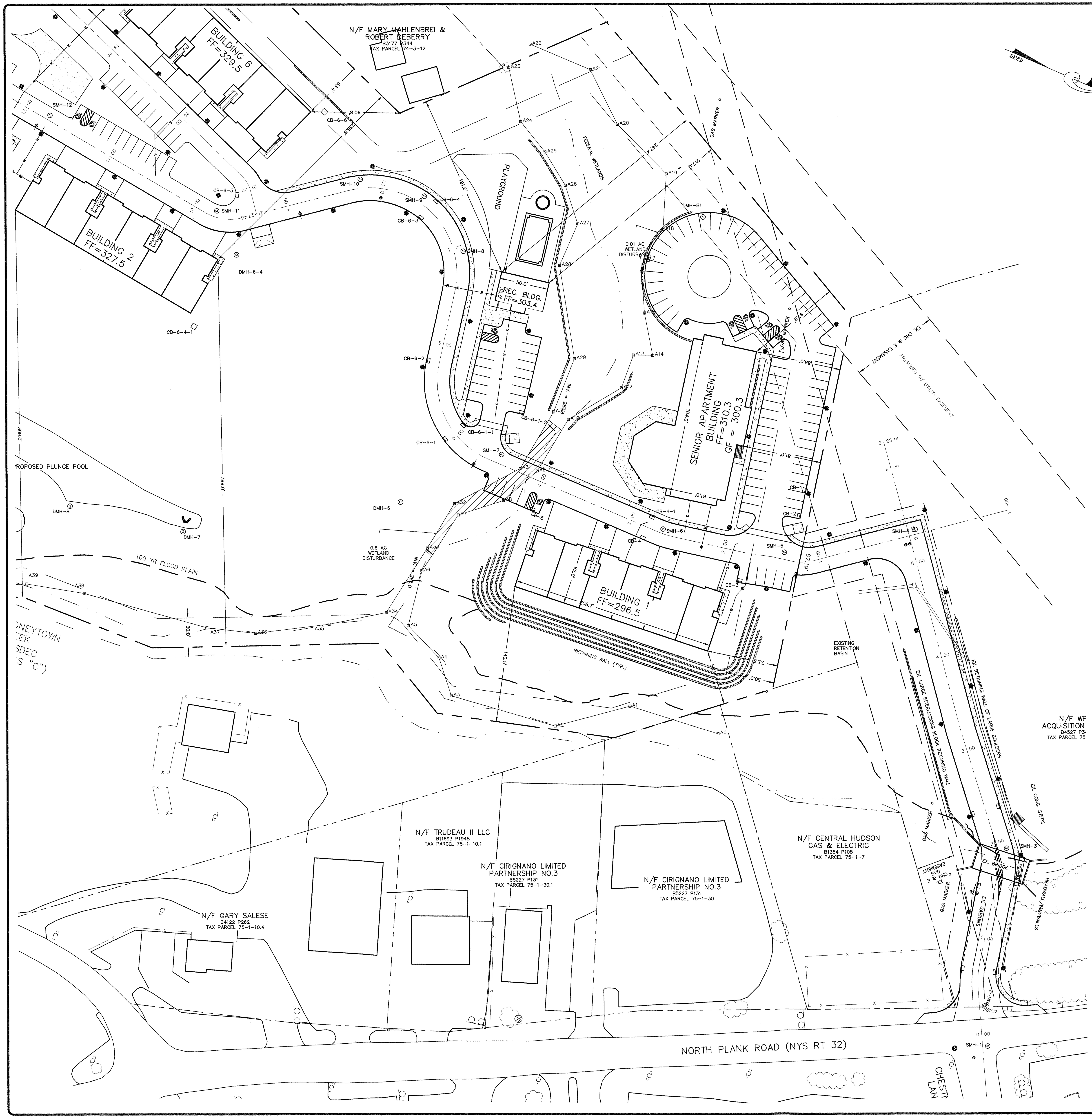
OVERALL SITE PLAN
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO. 2 OF 16
DATE: JANUARY 28, 2016
FILE NO.



LEGEND

- EXISTING SITE BOUNDARY LINE
- EXISTING ADJOINING PROPERTY LINE
- EXISTING STONE WALL
- EXISTING TREE LINE
- EXISTING TREES AND/OR BUSHES
- EXISTING STREAM
- EXISTING BUILDINGS
- EXISTING UTILITY POLE
- EXISTING STREET SIGN
- EXISTING WATER MAIN
- EXISTING HYDRANT
- EXISTING WATER VALVE
- EXISTING CLEANOUT
- EXISTING CURB STOP
- EXISTING SEWER MAIN AND MANHOLE
- EXISTING PAVED ROAD/DRIVEWAY
- LIMIT OF DISTURBANCE
- PROPOSED FENCE
- PROPOSED GUIDE RAIL

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 INCH = 40 FT.

REV.	DATE	DESCRIPTION	BY

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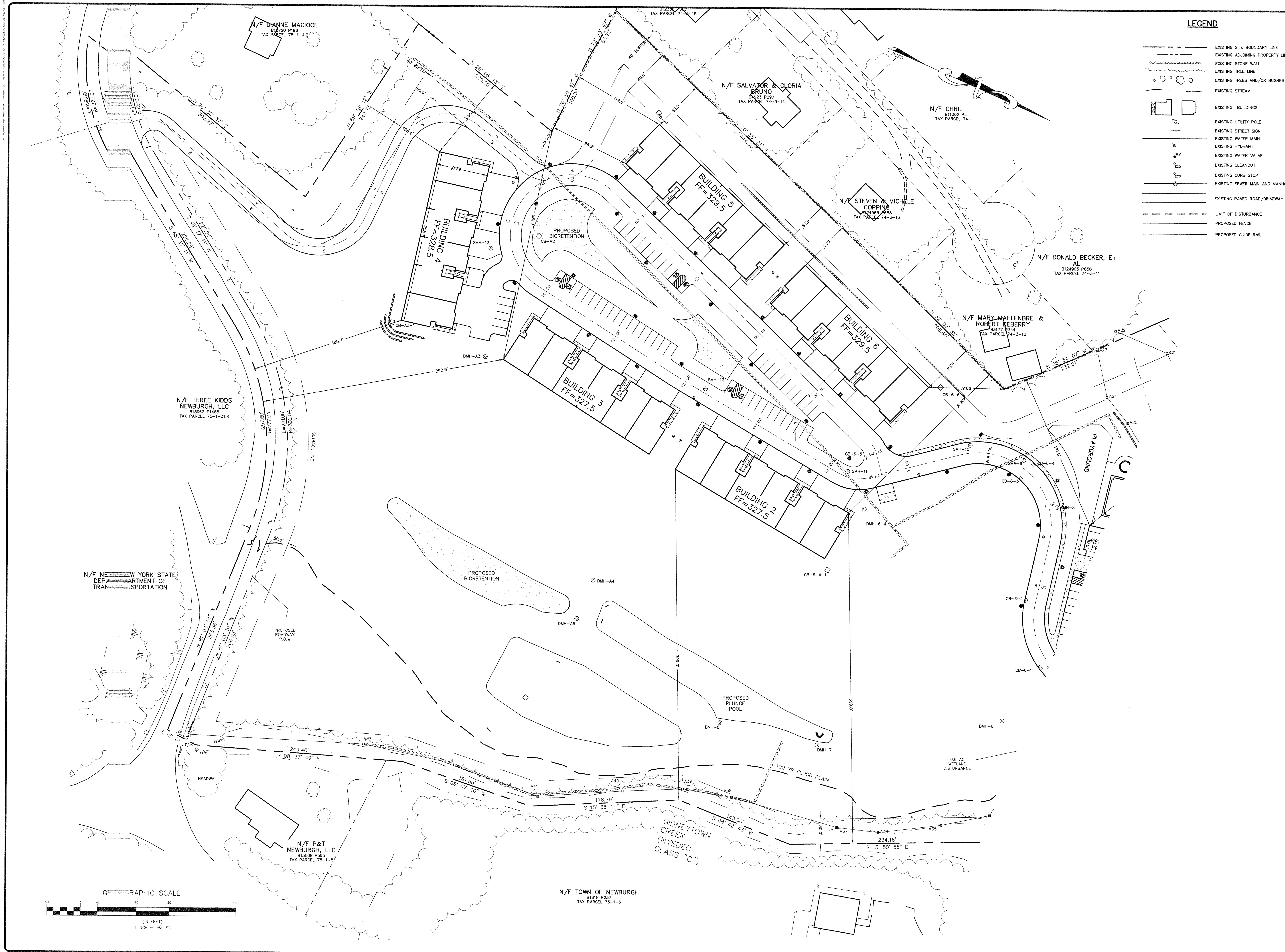
LAYOUT & DIMENSION
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
3 OF 16

DATE: JANUARY 28, 2016

FILE NO.



LAYOUT & DIMENSION

GARDNER RIDGE

ROUTE 32

TOWN OF NEWBURGH, ORANGE COUNTY, NY

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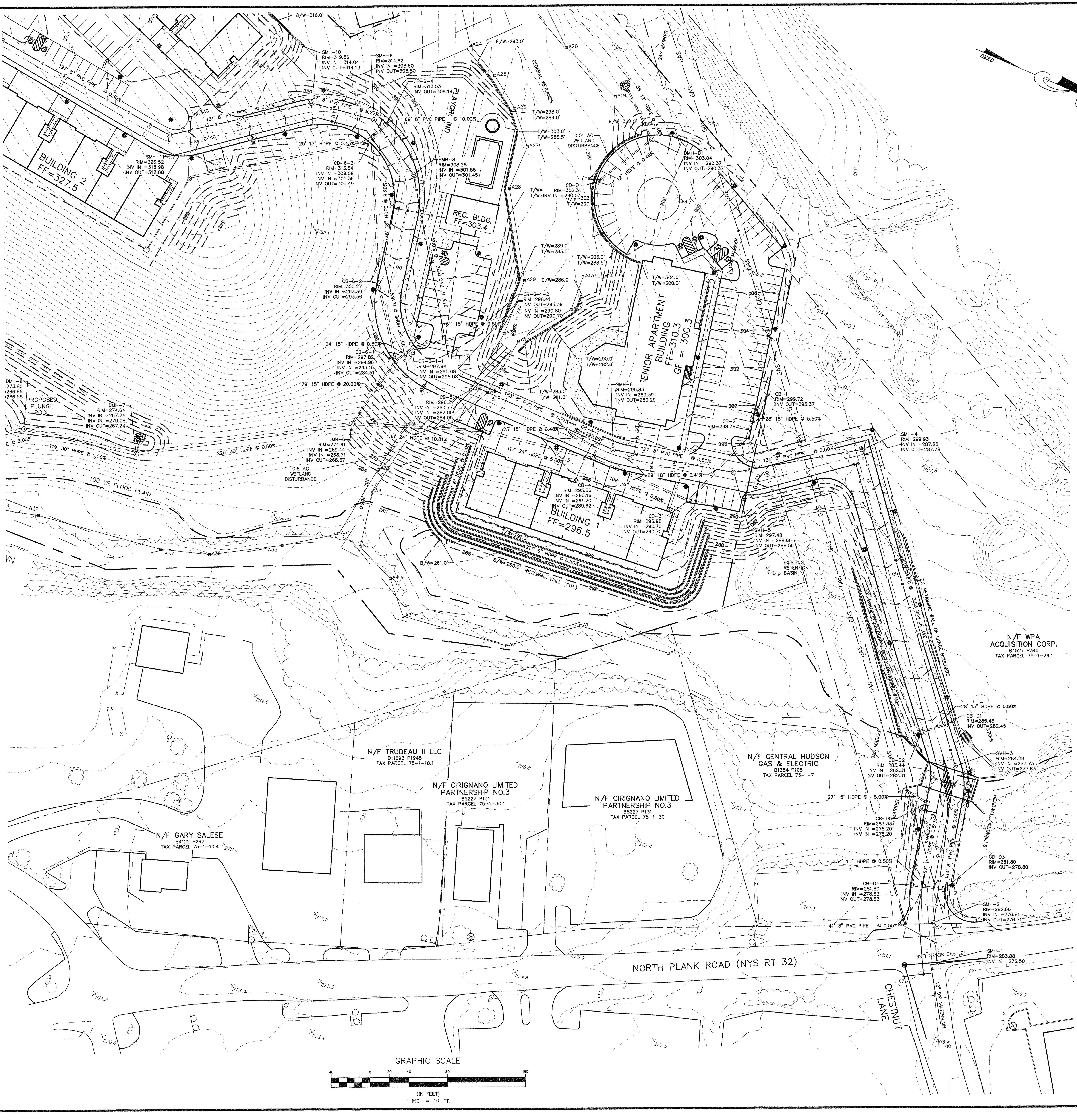
REV.	DATE	DESCRIPTION	BY

SHEET NO. 4 OF 16

DATE: JANUARY 28, 2016

FILE NO.



LEGEND

- EXISTING CONTOURS
- EXISTING SITE BOUNDARY LINE
- EXISTING ADJOINING PROPERTY LINE
- EXISTING STONE WALL
- EXISTING TREE LINE
- EXISTING STREAM
- EXISTING BUILDINGS
- EXISTING UTILITY POLE
- EXISTING STREET SIGN
- EXISTING WATER MAIN
- EXISTING HYDRANT
- EXISTING WATER VALVE
- EXISTING CLEANOUT
- EXISTING CURB STOP
- EXISTING SEWER MAIN AND MANHOLE
- EXISTING PAVED ROAD/DRIVEWAY
- PROPOSED EASEMENT LINE
- PROPOSED BUILDING
- PROPOSED WALKWAY
- PROPOSED CONTOURS
- PROPOSED WATER MAIN
- PROPOSED BIORETENTION
- PROPOSED WATER VALVE
- PROPOSED HYDRANT
- PROPOSED SEWER MAIN AND MANHOLE
- PROPOSED DRY SWALE
- PROPOSED DRAINAGE PIPE AND CATCH BASIN
- PROPOSED END SECTION WITH RIP-RAP
- PROPOSED SEGMENTED RETAINING WALL
- LIMIT OF DISTURBANCE
- PROPOSED FENCE
- PROPOSED GUIDE RAIL

GENERAL NOTES:

1. UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE, THEIR ACCURACY OR COMPLETENESS ARE NOT GUARANTEED BY THE ENGINEER. MARK OUTS FROM UTILITY COMPANIES AND FIELD CONFIRMATION BY CONTRACTOR MUST BE MADE PRIOR TO CONSTRUCTION SO THAT DISTURBANCE OR DISRUPTION TO THESE UTILITIES MAY BE AVOIDED. ALL EXISTING UTILITIES ARE TO BE COORDINATED WITH THE APPROPRIATE UTILITY FOR CONNECTION/DISCONNECTION WHERE NECESSARY.
2. THE CONTRACTOR SHALL DETERMINE THE LOCATION AND DEPTH OF THE EXISTING UTILITY TO WHICH THE CONNECTION IS BEING MADE BEFORE LAYING PIPE, CONDUIT, ETC. DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER. IN CASES WHERE THE CONSTRUCTION OF ITEMS MEET EXISTING STRUCTURES, SUCH AS CURB, PAVEMENT, SIDEWALK, UTILITIES, ETC. THE CONTRACTOR OR SURVEYOR STAKING SUCH ITEMS SHALL VERIFY THE ELEVATION & LOCATION OF THE EXISTING FEATURE PRIOR TO CONSTRUCTION. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
3. THE CONTRACTOR SHALL EXERCISE EXTREME CARE IN CONDUCTING EXCAVATIONS TO ESTABLISH LOCATIONS AND DEPTHS OF EXISTING UNDERGROUND UTILITIES, FACILITIES AND STRUCTURES. THE CONTRACTOR SHALL HAND EXCAVATE WHERE APPROPRIATE.
4. SANITARY SEWER SHALL BE SEPARATED FROM THE WATER MAINS BY A DISTANCE OF AT LEAST 10 FEET HORIZONTALLY OR 18 INCHES VERTICALLY IF HORIZONTAL SEPARATION IS NOT POSSIBLE.
5. ALL SANITARY SEWER PIPE LENGTHS SHOWN ARE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
6. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR CONSTRUCTION SITE SAFETY. ALL SAFETY PRECAUTIONS MUST BE UNDERTAKEN AND MAINTAINED AS REQUIRED BY LOCAL, STATE AND FEDERAL CODES.
7. THE SITE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING COMPLIANCE WITH THE NYSDEC AND TOWN OF NEWBURGH REGULATIONS REGARDING STORM WATER POLLUTION PREVENTION.
8. THE SITE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AND PROTECTION OF TRAFFIC (MPT) WHEN WORKING ON OR NEAR PUBLIC ROADS. MPT MEASURES MUST BE COORDINATED WITH THE APPROPRIATE HIGHWAY OFFICIALS (TOWN, VILLAGE, AND NYSDOT) HAVING JURISDICTION OVER EACH PARTICULAR ROADWAY.
9 IN THE EVENT THAT THE CONTRACTOR OR ITS SUBCONTRACTORS DAMAGE ANY EXISTING UTILITY, FACILITY OR STRUCTURE, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER OF THE DAMAGED PROPERTY.
10. ALL STRUCTURES AND SURFACES DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS PRE-CONSTRUCTION OR BETTER CONDITION.
11. THE CONTRACTOR SHALL REVIEW THE SITE CONDITIONS WITH RESPECT TO DRAINAGE AND GENERAL SOIL CONDITIONS IN THE AREA AND PLAN ITS WORK IN SUCH A MANNER TO WORK EFFICIENTLY AND SAFELY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE CONTROL OF SURFACE AND GROUNDWATER IN THE CONSTRUCTION AREA.
12. THE CONTRACTOR SHALL MAKE ALL NECESSARY ARRANGEMENTS FOR STAGING AREAS FOR MATERIALS AND EQUIPMENT.
13. THE CONTRACTOR SHALL ARRANGE FOR A SUITABLE AREA FOR THE STORAGE AND DISPOSAL OF EXCESS EXCAVATED SOIL MATERIALS. THE CONTRACTOR IS RESPONSIBLE FOR ANY PERMITS AND FEES ASSOCIATED WITH THE PROPER DISPOSAL OF SOIL AND OTHER MATERIALS FROM THE PROJECT.

REV.	DATE	DESCRIPTION	BY

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WALDEN, NY 12586
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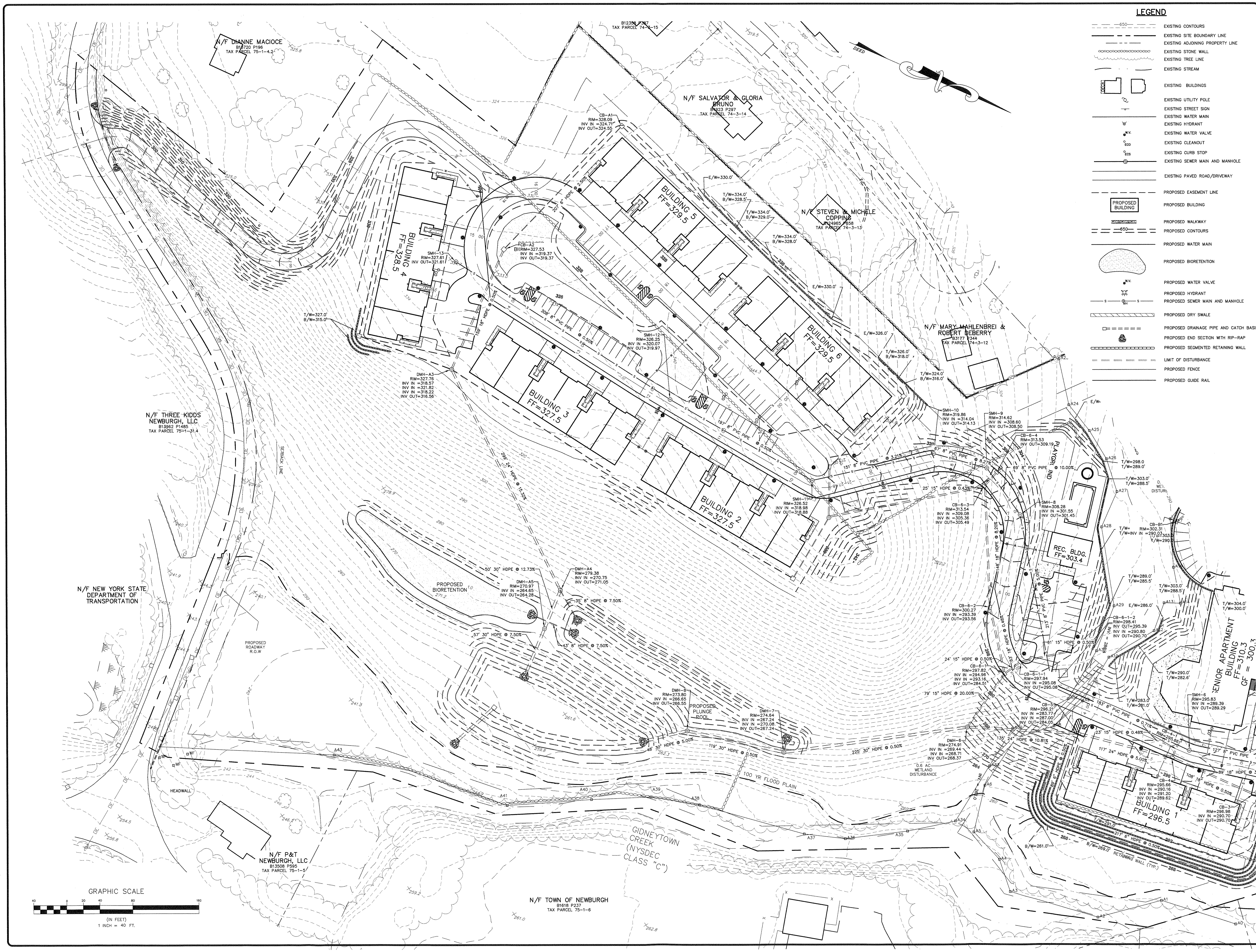
GRADING & UTILITY PLAN
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
5 OF 16

DATE: JANUARY 28, 2016

FILE NO.



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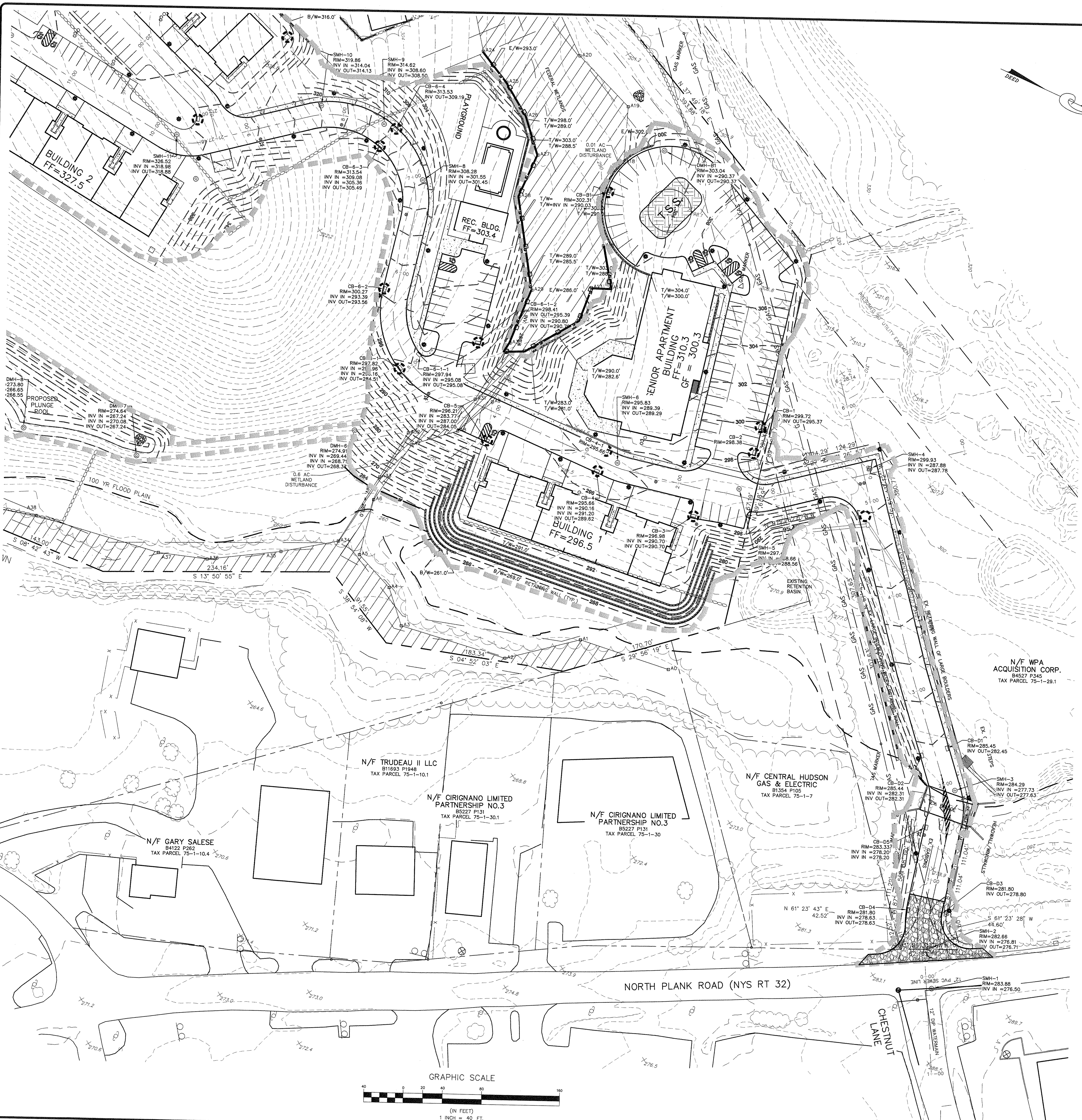
REV.	DATE	DESCRIPTION	BY

GRADING & UTILITY PLAN
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
6 OF 16

DATE: JANUARY 28, 2016
FILE NO.



EROSION CONTROL LEGEND

SF	PROPOSED SILT FENCE/ HAY BALE SEDIMENT BARRIER
	PROPOSED PERMANENT SWALE
	PROPOSED CHECK DAM
	PROPOSED CATCH BASIN STONE CHECK DAM
T.S.S.	PROPOSED TEMPORARY SOIL STOCKPILE
T.S.B.	PROPOSED TEMPORARY SEDIMENT BASIN
	PROPOSED CONSTRUCTION ENTRANCE
PHASE I / PHASE II	DISTURBANCE PHASE BOUNDARY/ LIMIT OF DISTURBANCE
	ORANGE CONSTRUCTION FENCE

CONSTRUCTION SEQUENCE:

ALL PHASES/SUBPHASES SHALL FOLLOW THE BELOW SEQUENCE

1. INSTALL ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES AS SHOWN ON PLANS AND INDICATED IN NOTES.
2. INSTALL STABILIZED CONSTRUCTION ENTRANCE(S) AS SHOWN ON THE SOIL EROSION SEDIMENT CONTROL PLANS AND DETAILS.
3. CLEAR SITE AND DEMOLISH EXISTING FEATURES AS REQUIRED AND REMOVE DEBRIS FROM SITE AND DISPOSE OF AT AN APPROVED FACILITY. SITES OTHER THAN REGULATED SOLID WASTE FACILITIES MUST BE IDENTIFIED AND APPROVED BY THE TOWN OF NEWBURGH
4. CONSTRUCT SWM BASINS WHERE INDICATED.
   a. CLEAR AND GRUB BASIN AREAS AND REMOVE DEBRIS FROM SITE AND DISPOSE OF AT AN APPROVED FACILITY. SITES OTHER THAN REGULATED SOLID WASTE FACILITIES MUST BE IDENTIFIED AND APPROVED BY THE TOWN OF NEWBURGH.
   b. CONSTRUCT OUTLET STRUCTURE AND OTHER APPURTENANCES.
   c. STABILIZE ANY STOCKPILED MATERIAL.
5. CLEAR AND GRUB AREAS SHOWN ON THE PLANS TO BE CLEARED. ROADWAY AREAS SHALL BE CLEARED FIRST FOLLOWED BY BUILDING AREAS.
6. TREE STUMPS ARE TO BE GROUND INTO CHIPS, BURNED (BY PERMIT) OR REMOVED FROM THE SITE AND DISPOSE OF AT AN APPROVED FACILITY. SITES OTHER THAN REGULATED SOLID WASTE FACILITIES MUST BE IDENTIFIED AND APPROVED BY THE TOWN OF NEWBURGH.
7. STRIP, STOCKPILE AND STABILIZE TOPSOIL AT LOCATIONS AS SHOWN ON PLANS.
8. ROUGH GRADE SITE.
9. CONSTRUCT ALL UTILITIES. SOIL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE SUPPLEMENTED AND MODIFIED AS CONSTRUCTION PROGRESSES.
10. INSTALL ROAD AND PARKING SUB-BASE AS REQUIRED.
11. CONSTRUCT PROPOSED BUILDINGS AS SHOWN ON PLAN
12. FINE GRADE AND STABILIZE ALL DISTURBED AREAS IN ACCORDANCE WITH THE MINIMUM STABILIZATION REQUIREMENTS INCLUDING MULCH ANCHORING
13. STABILIZE ANY REMAINING DISTURBED AREAS.
14. REMOVE TEMP. SWALES AFTER CONTRIBUTORY DRAINAGE AREA IS STABILIZED.
    a. REMOVE ACCUMULATED SEDIMENT FROM TEMPORARY SWALES.
    b. REMOVE CHECK DAM FILTER FABRIC (LINER) AND EXCAVATE TO SWALE SUBGRADE ELEVATION.
    c. TOPSOIL, SEED AND MULCH SWALES OR INSTALL SUBDRAINS AND FILTER MEDIA IN DRY SWALES AS NECESSARY.
15. INSTALL ALL SIGNS, FENCES, SEEDING AS SHOWN ON THE PLANS.
16. INSTALL LANDSCAPING.
17. REMOVE ALL SOIL EROSION AND SEDIMENT CONTROL DEVICES.
18. INSTALL PAVING.

REV.	DATE	DESCRIPTION	BY

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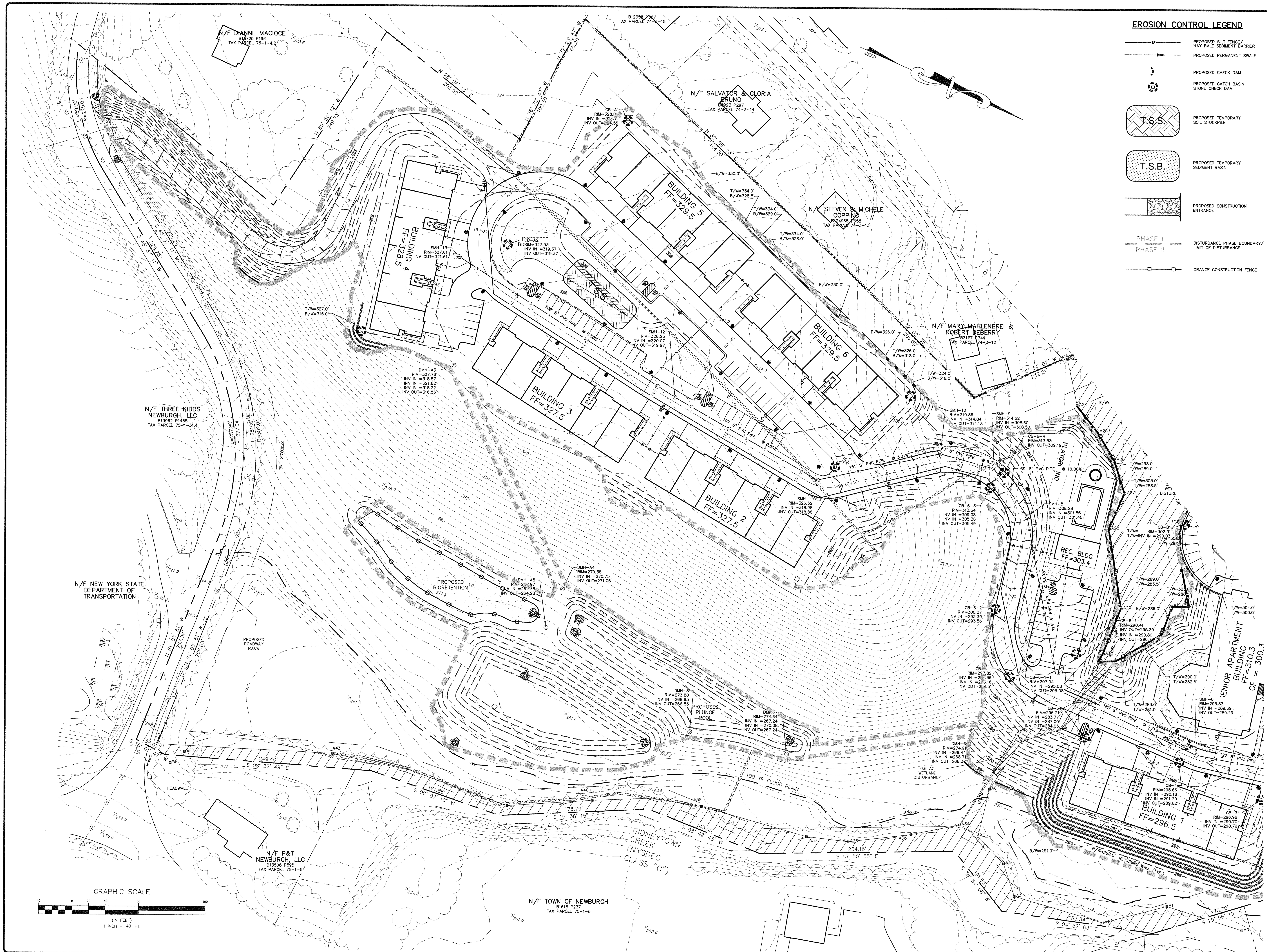
EROSION & SEDIMENT CONTROL PLAN
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
7 OF 16

DATE: JANUARY 28, 2016
FILE NO.



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EROSION & SEDIMENT CONTROL PLAN

GARDNER RIDGE

ROUTE 32

TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.

8 OF 16

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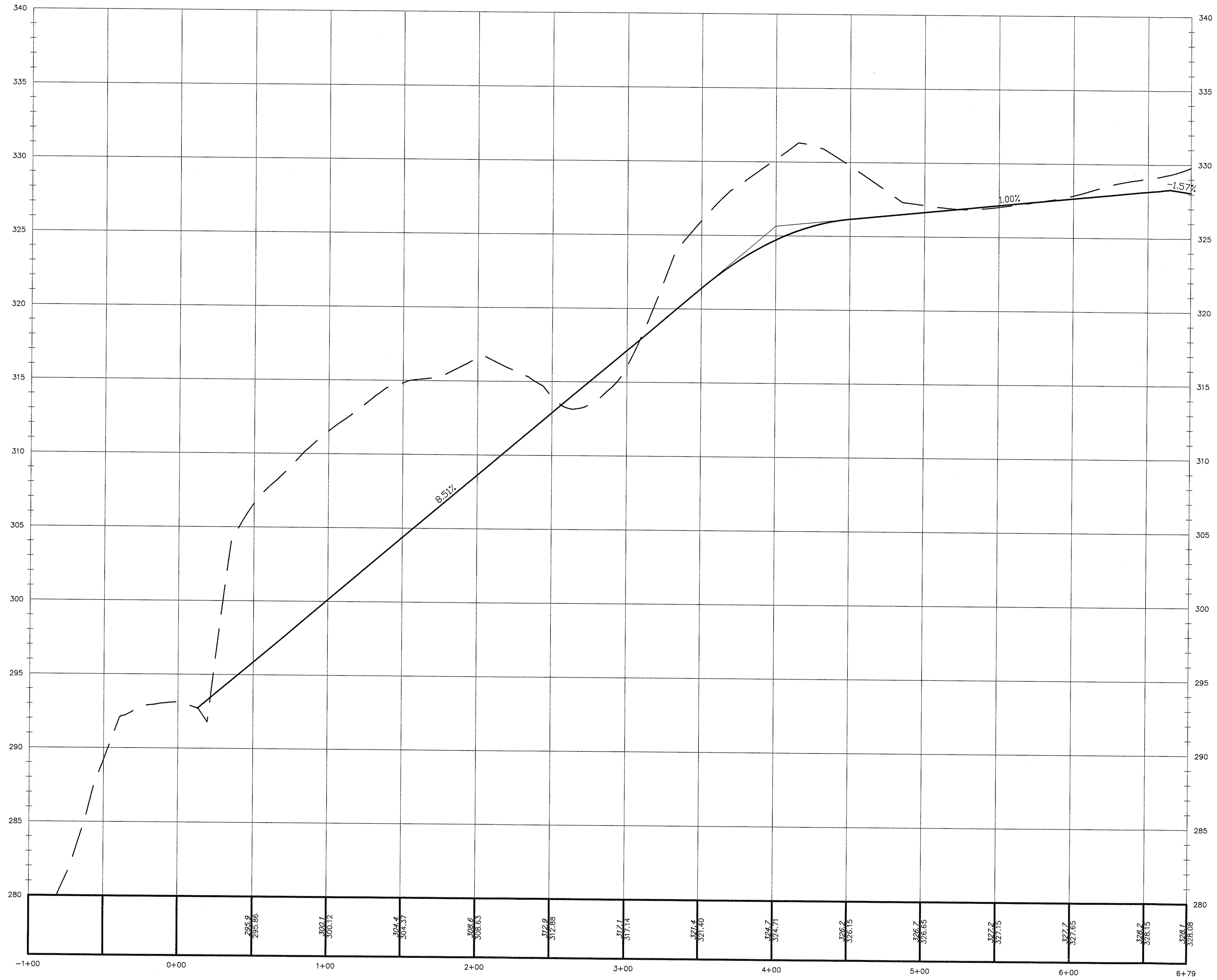
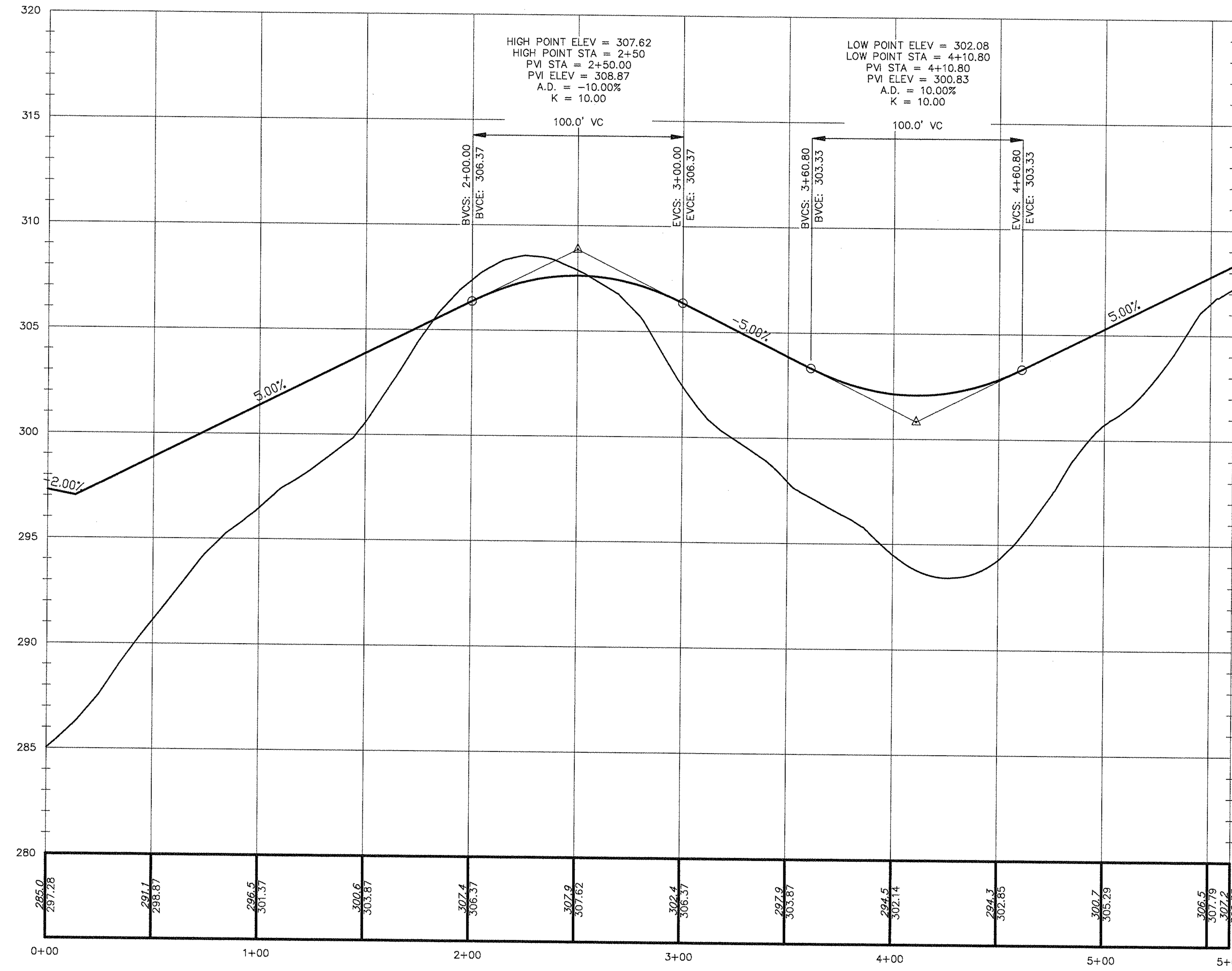


EMERGENCY ACCESS

SCALE: 1"=4' VERT.
1"=40' HOR.



SENIOR APARTMENT DRIVE

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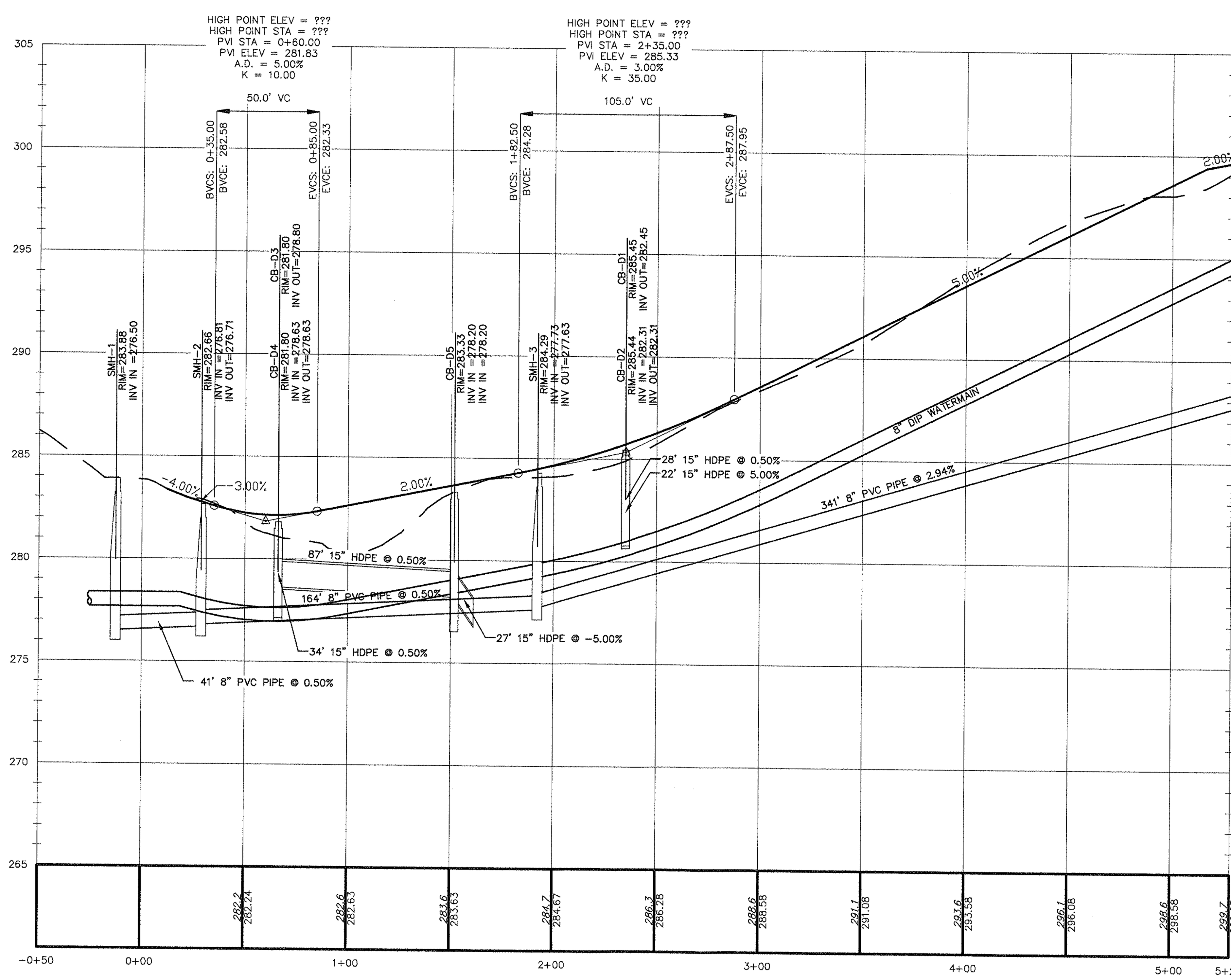

ENTRANCE ROAD

SCALE: 1"=4' VERT.
1"=40' HOR.

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ROAD PROFILES
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
9 OF 16

DATE: JANUARY 28, 2016
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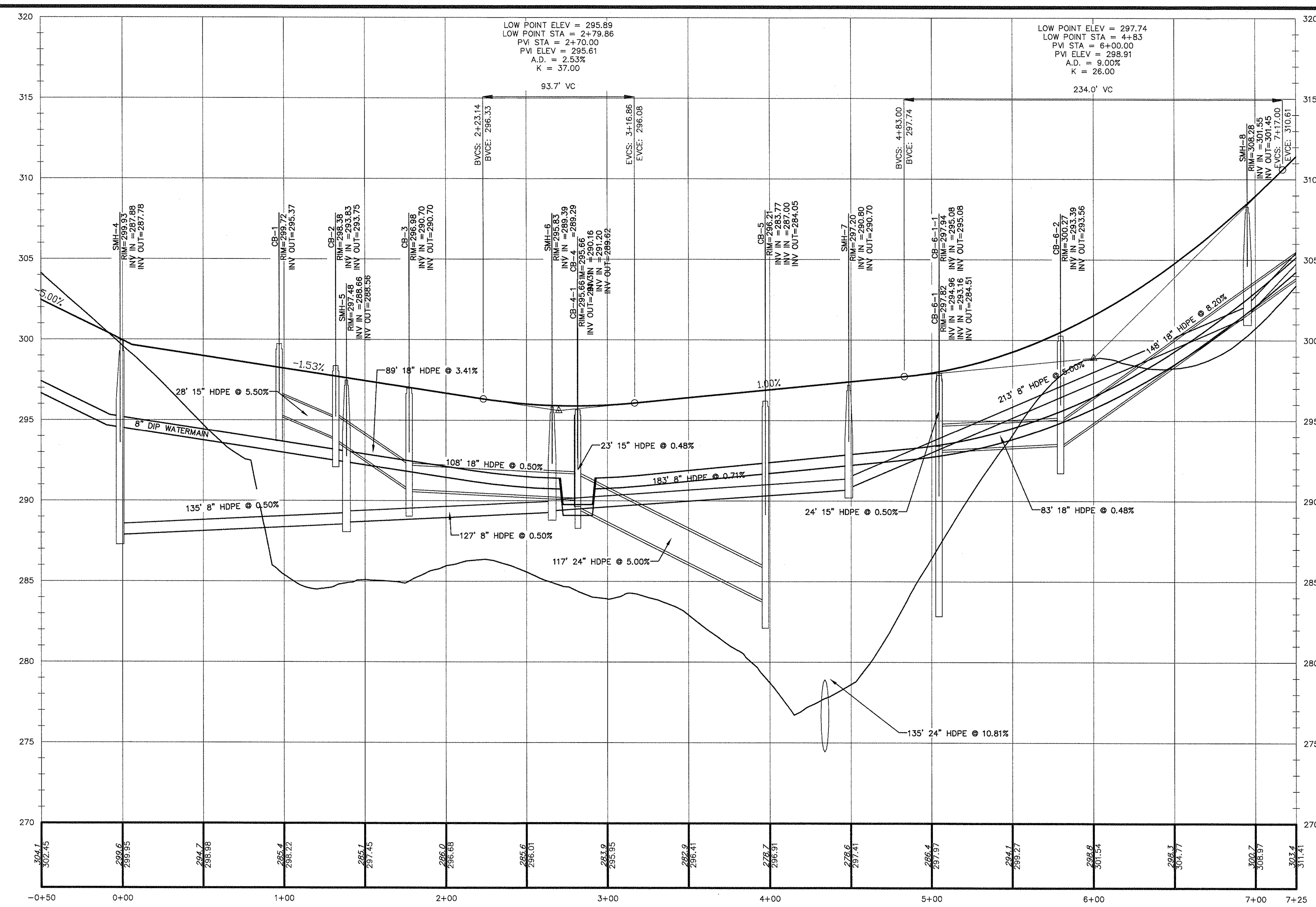

ROAD A STATION -0+50 - 7+25

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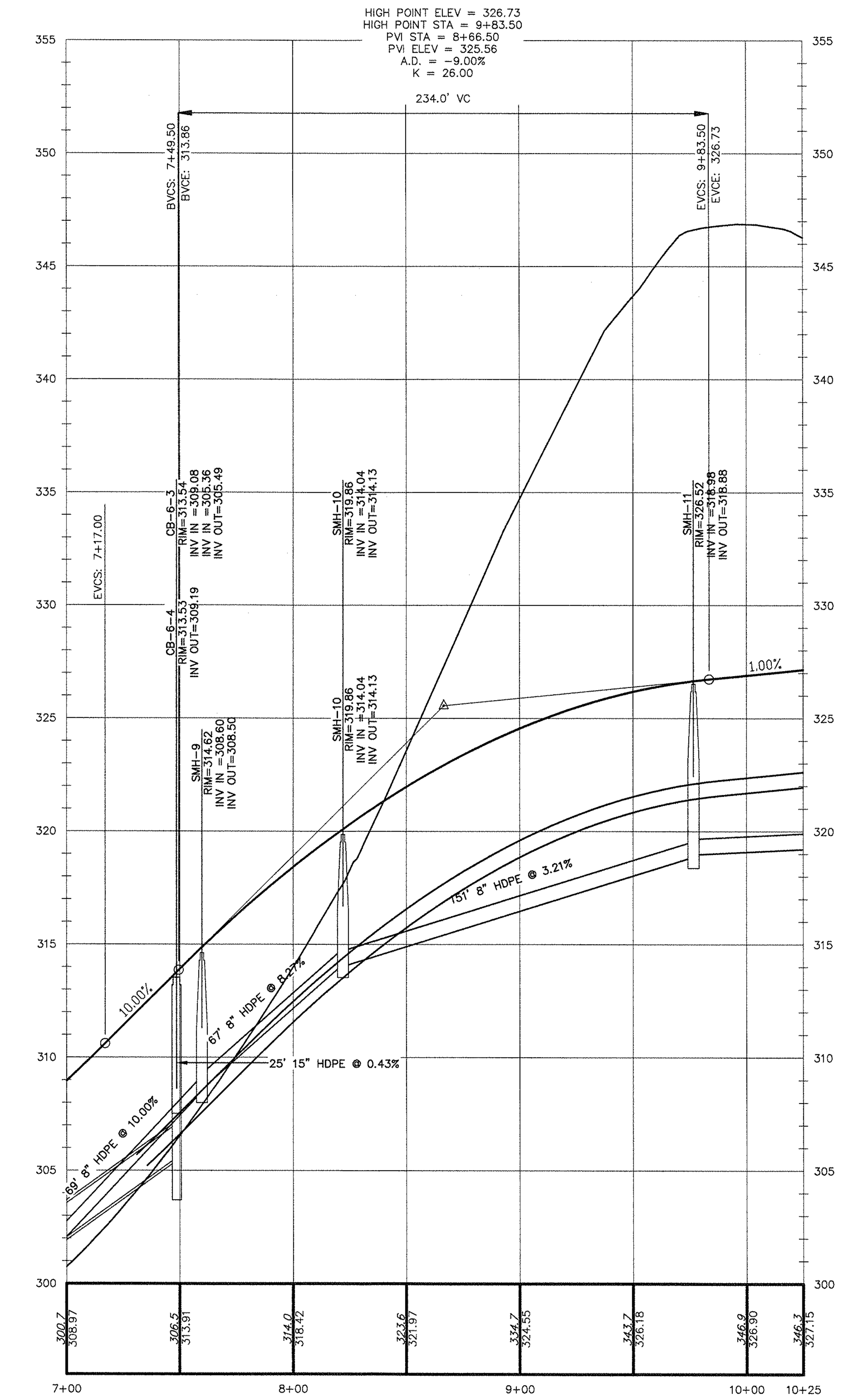
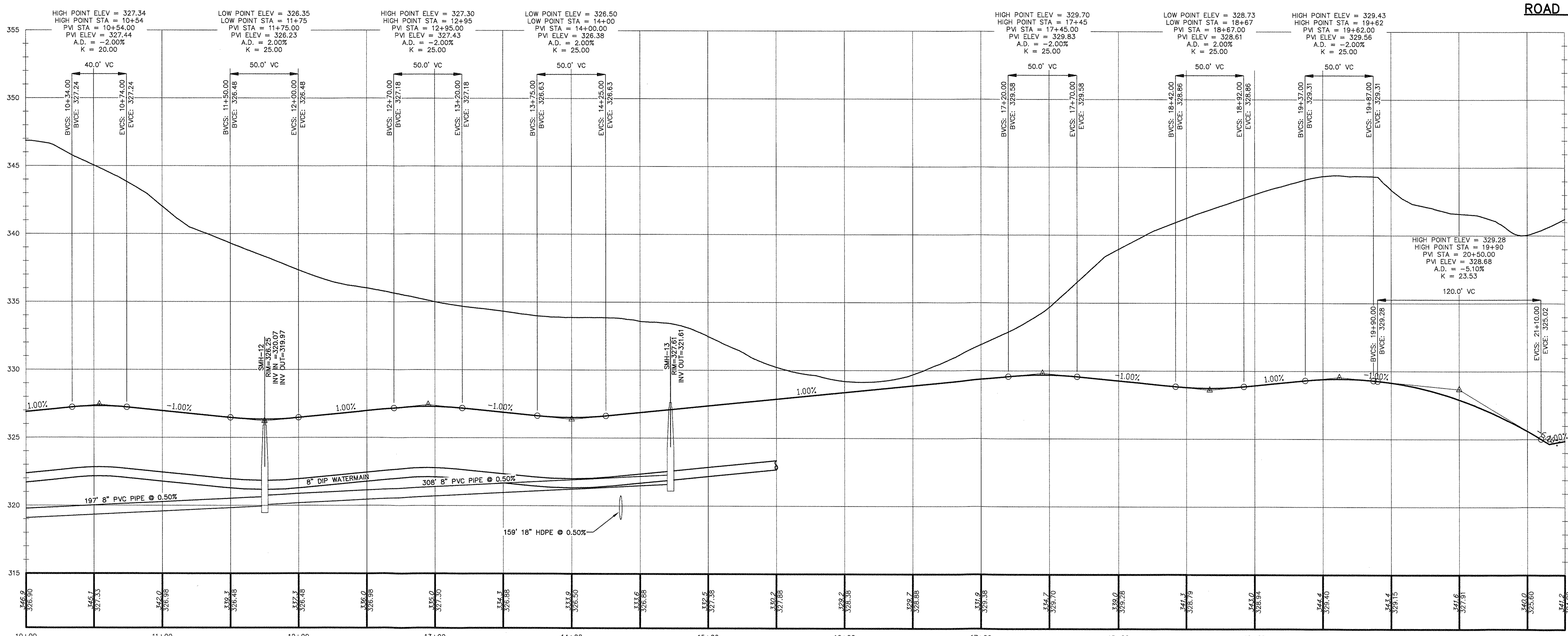
1"=40' HOR.



ROAD A STATION 7+00 - 10+25

SCALE: 1"=4' VERT.
1"=40' HOR.



ROAD A STATION 10+00 - 21+27

SCALE: 1"=4' VERT.
1"=40' HOR.

REV.	DATE	DESCRIPTION	BY

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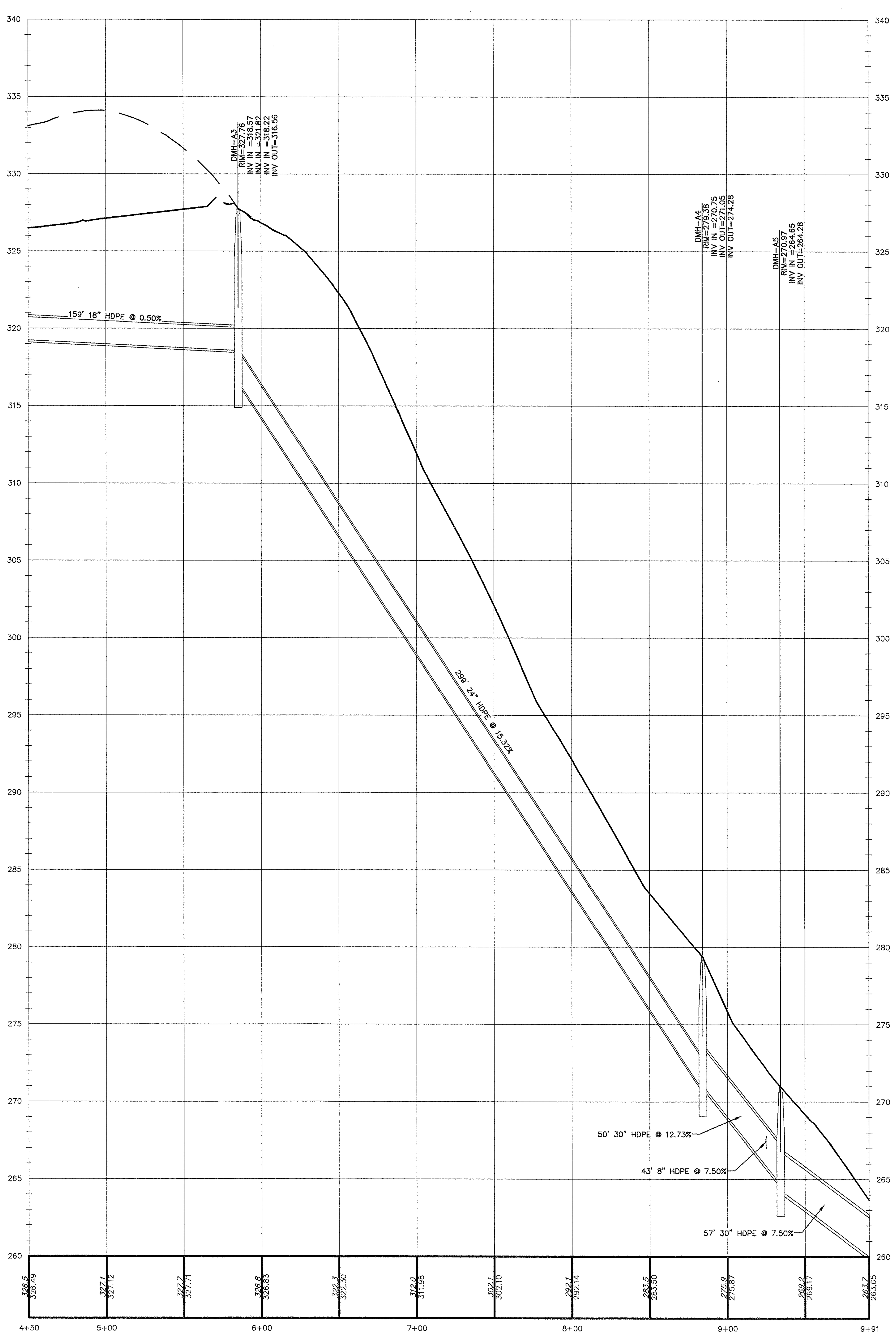
ROAD PROFILES
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

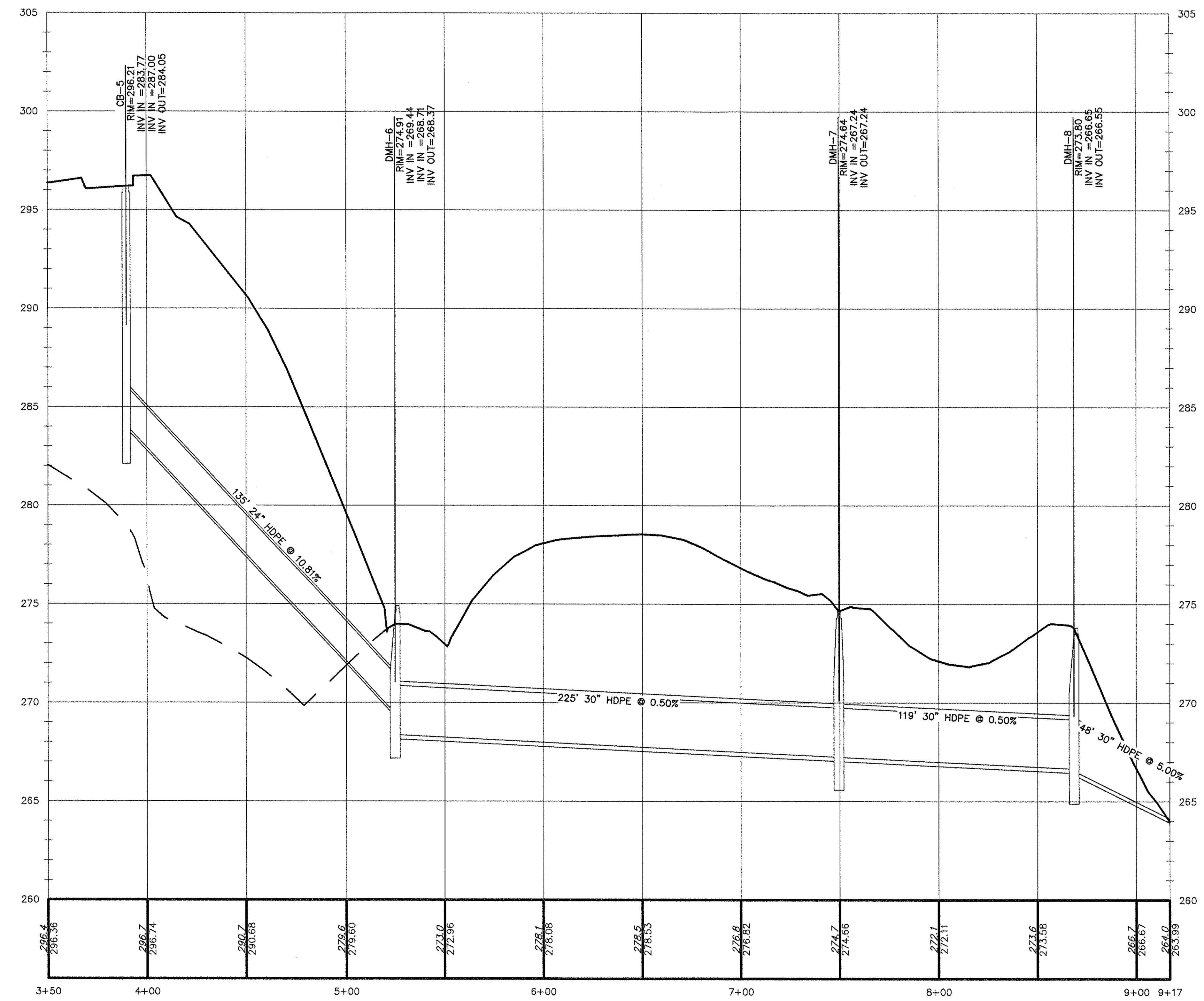
SHEET NO.
10 OF 16

DATE: JANUARY 28, 2016

FILE NO.



DMH–A3 TO DMH–A5
SCALE: 1"=4' VERT.
1"=40' HOR.



CB–5 TO DMH–8
SCALE: 1"=4' VERT.
1"=40' HOR.

REV.	DATE	DESCRIPTION	BY

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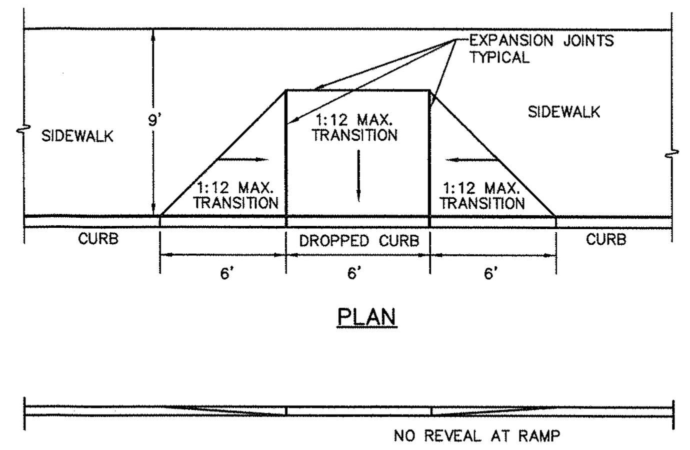
DRAINAGE PROFILES
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

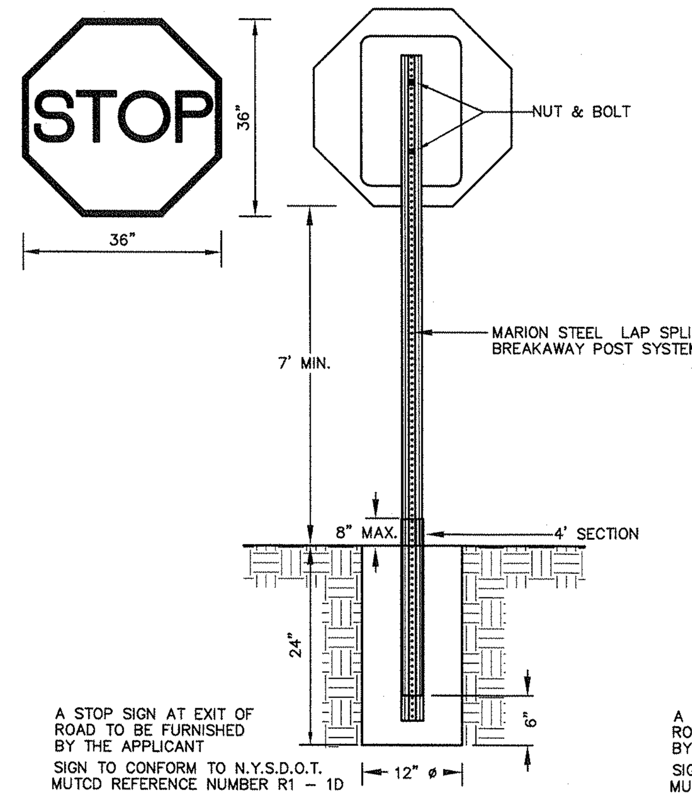
SHEET NO.
11 OF 16

DATE: JANUARY 28, 2016
FILE NO.

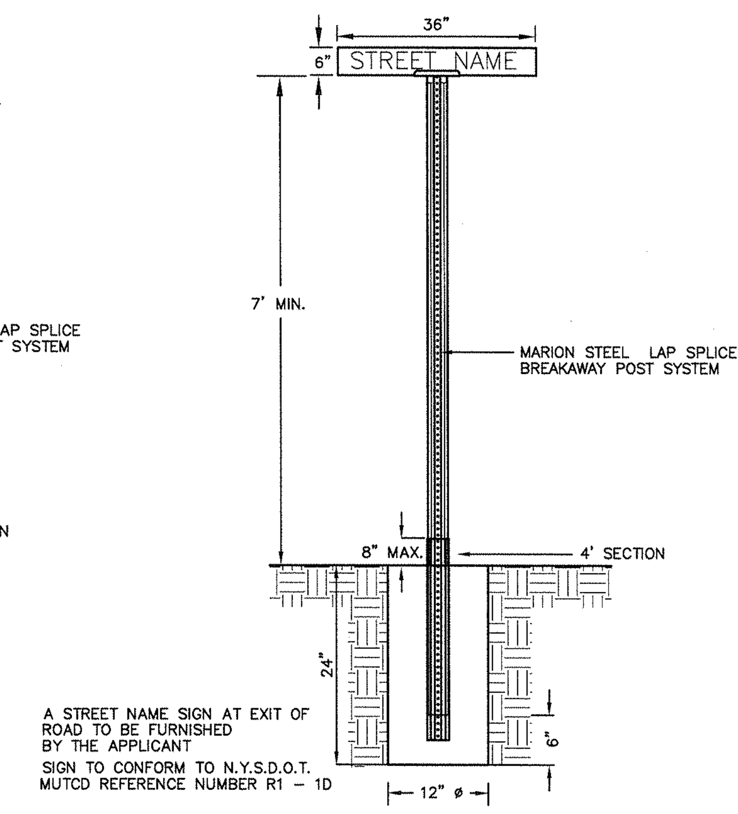


ELEVATION

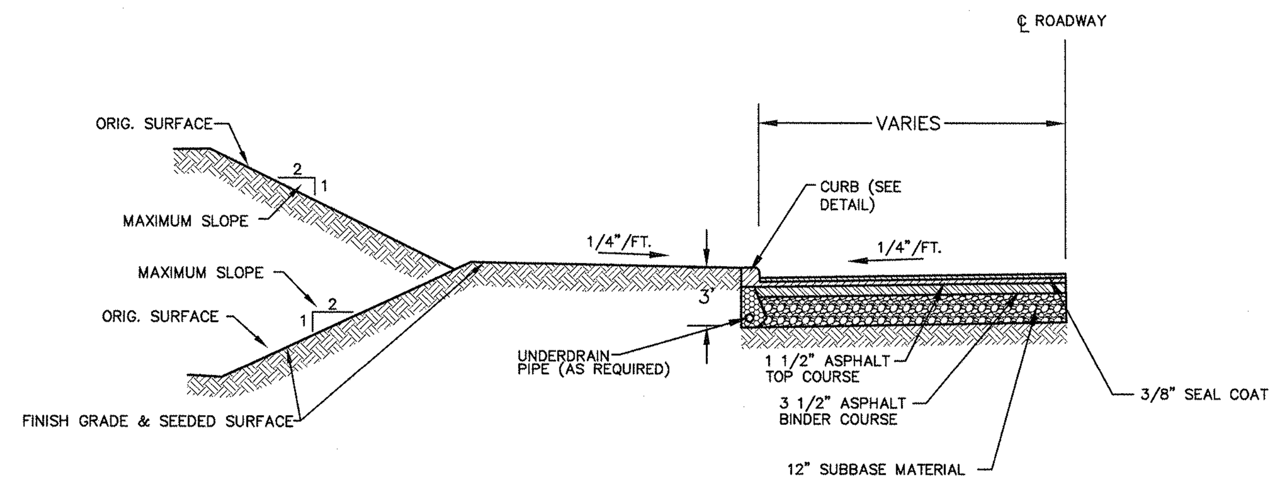
SIDEWALK RAMP
NOT TO SCALE



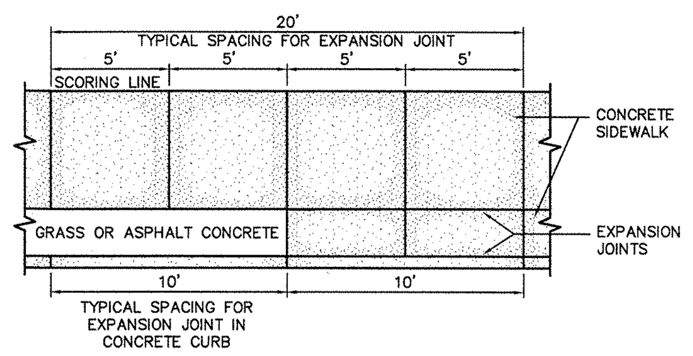
STREET SIGN INSTALLATION DETAIL
NOT TO SCALE



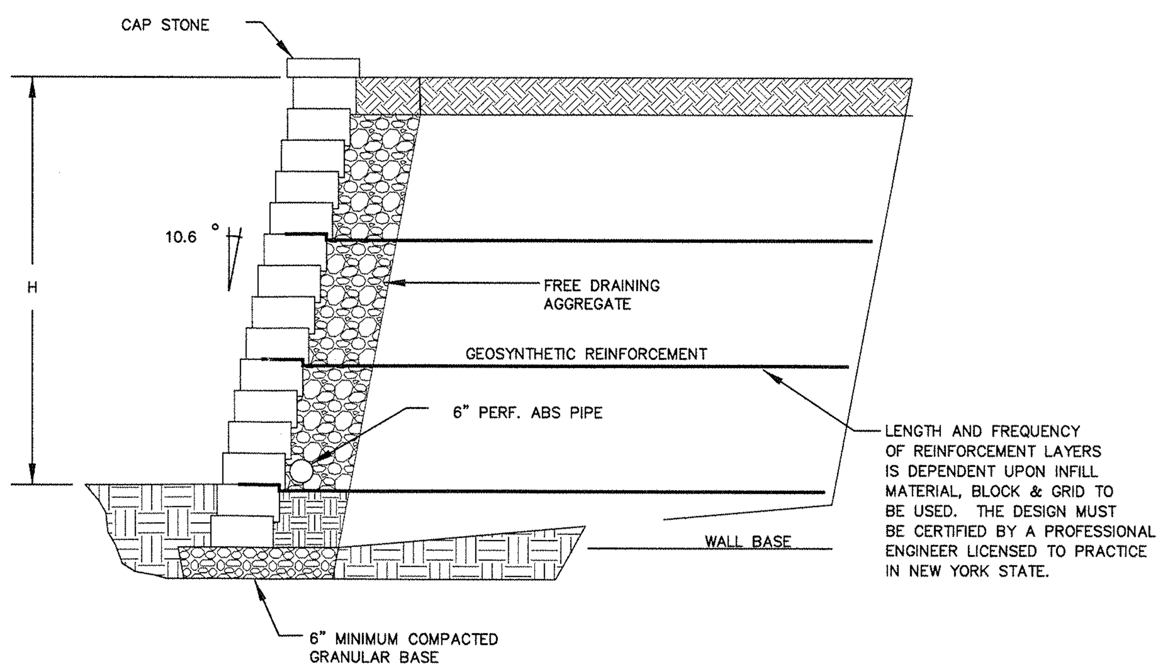
STREET SIGN INSTALLATION DETAIL
NOT TO SCALE



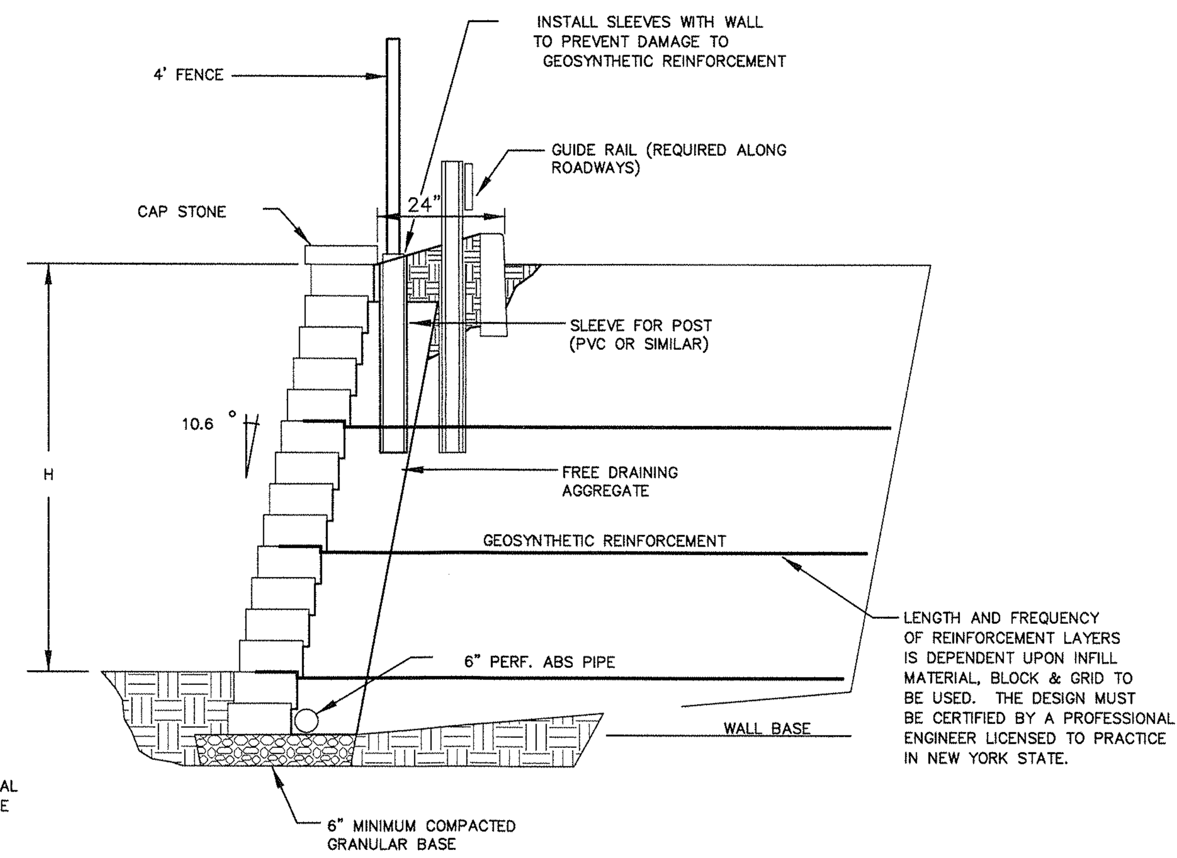
TYPICAL ROAD CROSS SECTION
NOT TO SCALE



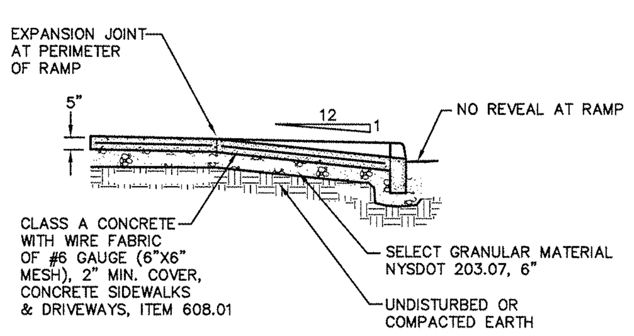
CONCRETE SIDEWALK AND CURB – PLAN OF SCORING AND EXPANSION JOINTS
NOT TO SCALE



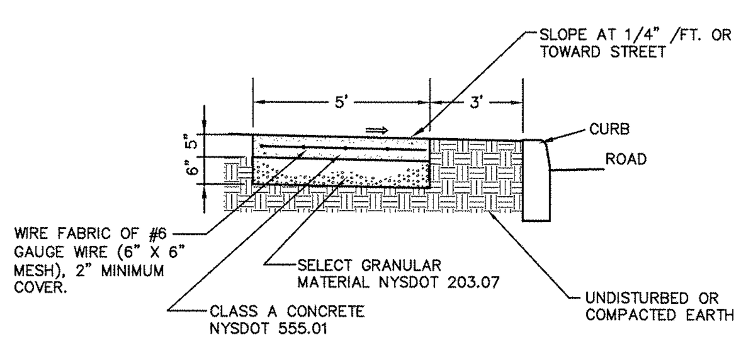
SEGMENTAL RETAINING WALL
NOT TO SCALE



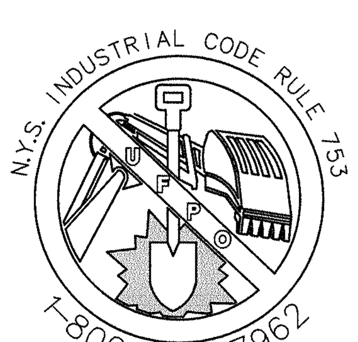
SEGMENTAL RETAINING WALL WITH GUIDE RAIL & FENCE
NOT TO SCALE



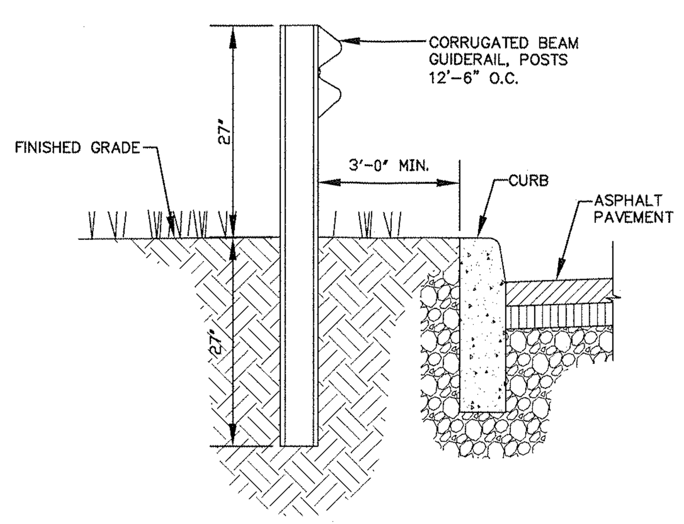
PEDESTRIAN RAMP – SECTION
NOT TO SCALE



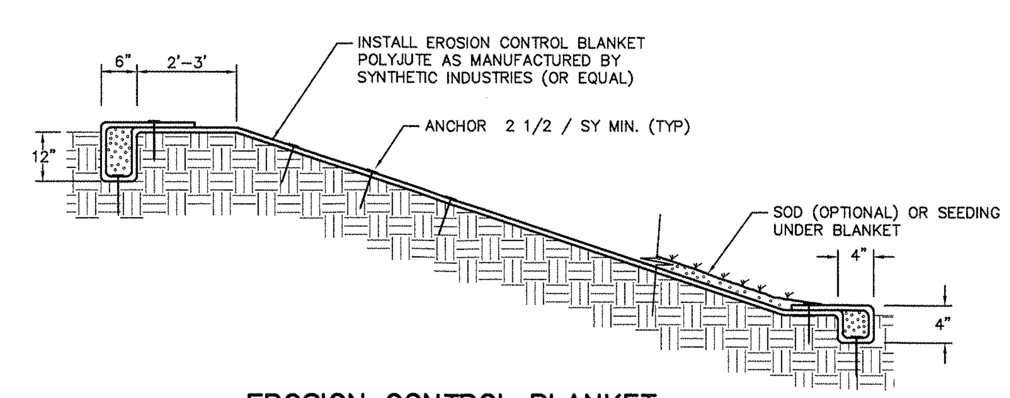
CONCRETE SIDEWALK
NOT TO SCALE



CALL BEFORE YOU DIG , DRILL OR BLAST
NO LESS THAN TWO WORKING DAYS NOTICE
IT'S THE LAW !

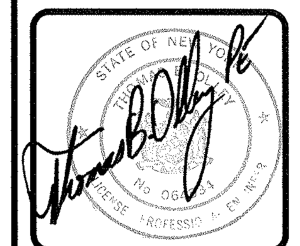


GUIDE RAIL
NOT TO SCALE



EROSION CONTROL BLANKET
NOT TO SCALE

REV.	DATE	DESCRIPTION	BY



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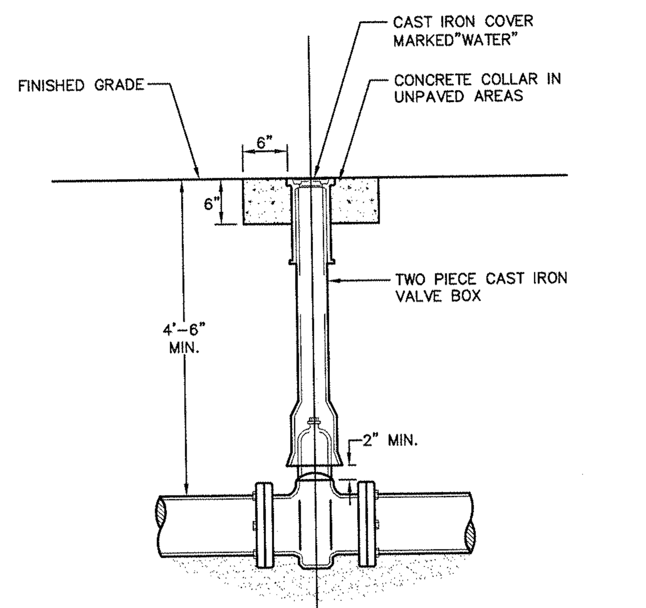
SITE DETAILS
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
12 OF 16

DATE: JANUARY 28, 2016

FILE NO.

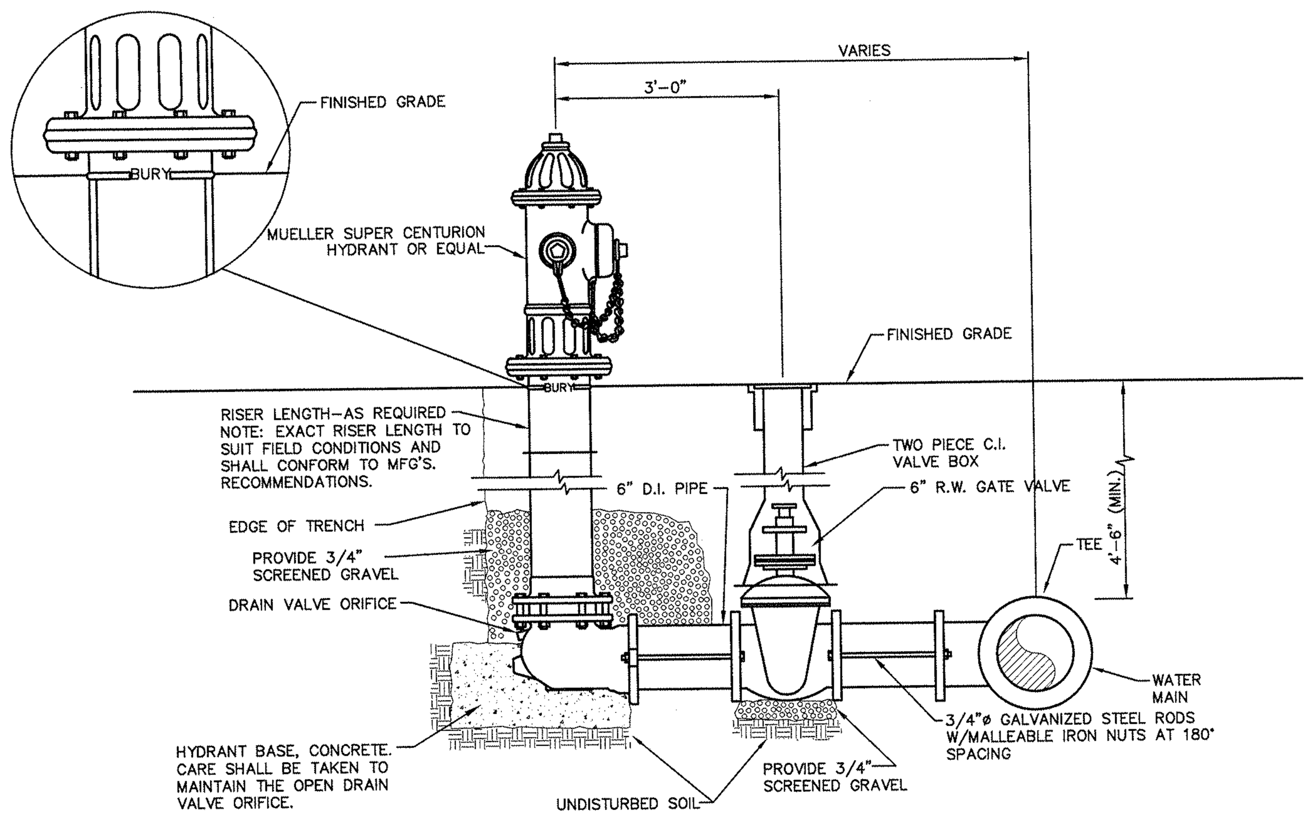


NOTES:

1. NON-RISING STEM RESILIENT WEDGE GATE VALVE, OPERATING DIRECTION AND MODEL TO CONFORM WITH WATER DEPARTMENT STANDARDS.
2. IF VALVE IS TO BE RODDED, PROVIDE VALVE WITH RODDING FLANGES OR EYEBOLTS. (2)3/4"ø GALVANIZED STEEL RODS WITH MALIABLE IRON NUTS AT 180°SPACING SHALL BE USED FOR RODDING VALVES.

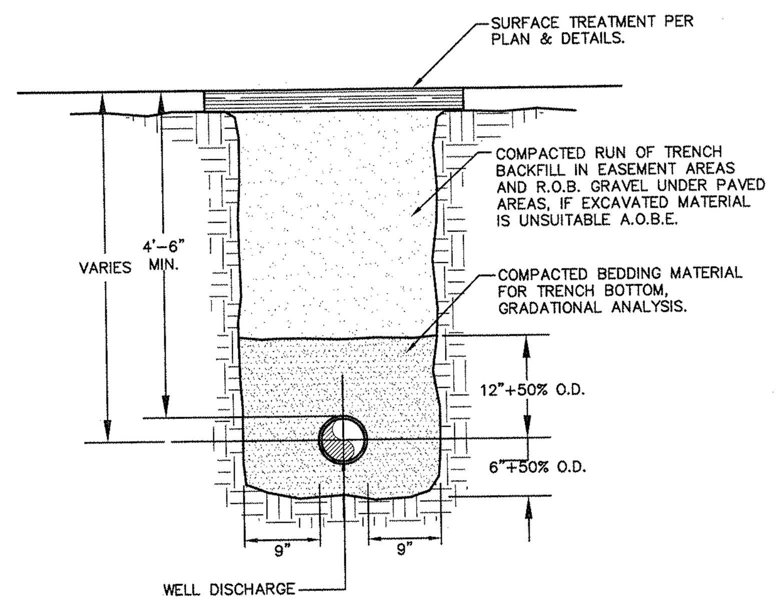
GATE VALVE DETAIL

NOT TO SCALE



HYDRANT DETAIL

NOT TO SCALE

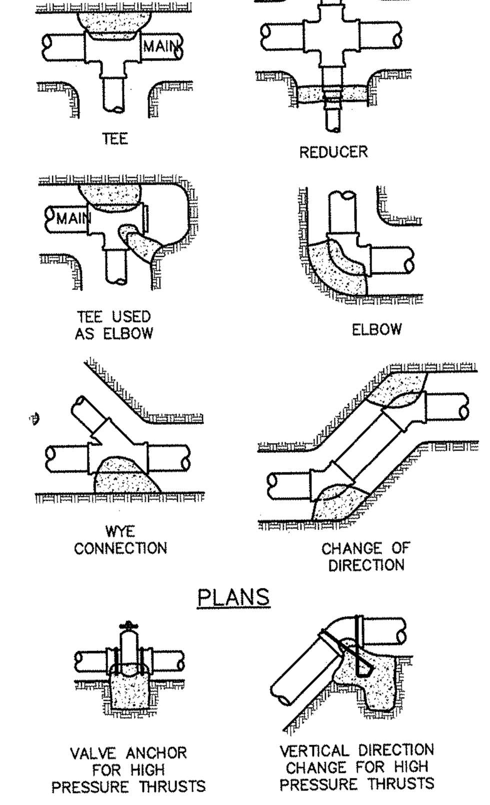


NOTES:

1. PIPE BEDDING SHALL BE A NATURAL RUN-OF-BANK (R.O.B.) SAND GRADED FROM FINE TO COARSE PARTICLES, OR A GRADED MIXTURE OF CRUSHED STONE OR CRUSHED GRAVEL. BEDDING MATERIAL OR STONE GRADATIONS USED SHALL BE APPROVED BY THE ENGINEER.
2. INSTALL CONTINUOUS DETECTABLE MARKING TAPE DURING BACKFILLING OF TRENCH FOR UNDERGROUND WATER SERVICE PIPING. LOCATE TAPE 12" BELOW FINISHED GRADE, DIRECTLY OVER PIPING.
3. THE PROPOSED WATERMAINS SHALL BE INSTALLED WITH A MINIMUM COVER OF 4.5 FEET AND SHALL BE CEMENT LINED DUCTILE IRON, CLASS 52.
4. SHEETING SHALL BE IMPLEMENTED IN ACCORDANCE WITH O.S.H.A. STANDARDS.

WATER PIPE TRENCH DETAIL

NOT TO SCALE



SIDE VIEWS

THRUST BLOCKS

NOT TO SCALE

THRUST BLOCK SIZE

WATER PRESSURE – 150 P.S.I.
SOIL – SAFE BEARING LOAD 3000 P.S.F.

PIPE SIZE		TEES & DEAD ENDS	BENDS 90°	45°	22 1/2°
12"	BEARING AREA REQ'D (S.F.)	8.5	12.0	6.5	3.4
	USE –	2.5X3.5'	3'X4'	2'X3.5'	1.5'X2.5'
10"	BEARING AREA REQ'D (S.F.)	5.9	8.4	4.6	2.3
	USE –	2'X3'	2.5'X3.5'	2'X2.5'	1.5'X2'
8"	BEARING AREA REQ'D (S.F.)	3.8	5.4	2.9	1.5
	USE –	2X2'	2'X3'	1.5'X2'	1'X1.5'
6"	BEARING AREA REQ'D (S.F.)	2.2	3.0	1.7	0.9
	USE –	1.5'X1.5'	1.5'X2'	1'X2'	1'X1'

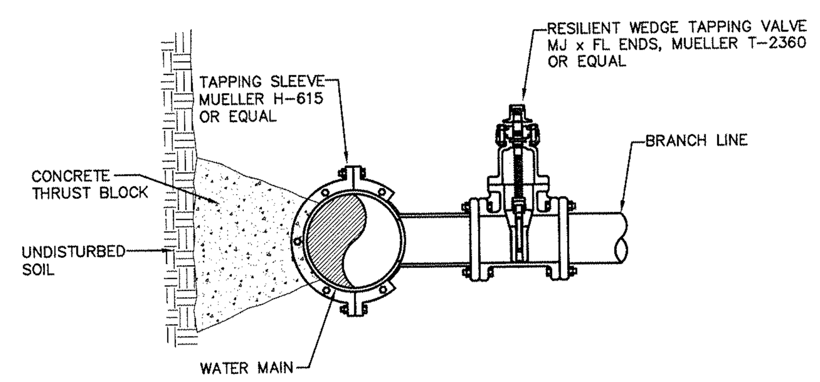
SCHEDULE OF JOINT RESTRAINT

DUCTILE IRON PIPE (DIP)
(NO. OF PIPE LENGTHS – 18' LENGTH)

PIPE SIZE (INCHES)	FITTING 90°	45°	22 1/2°	TEE	INLINE VALVE	DEAD END (SEE NOTE 3)
12"	2	1	1	4	4	4
10"	2	1	1	4	4	4
8"	2	1	1	3	3	3
6"	1	1	1	2	2	2

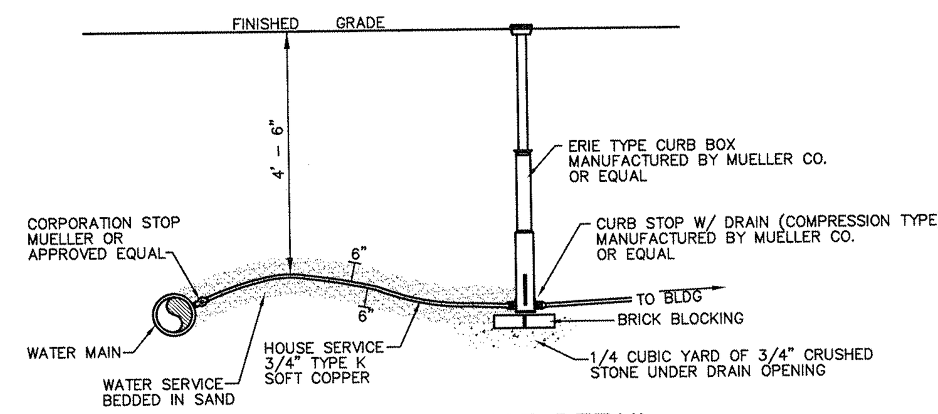
NOTE:

1. LENGTH OF PIPE TO BE RESTRAINED IS LENGTH FOR EACH SIDE OF THE FITTING, i.e., FOR A 8" PIPE A 90° BEND SHALL BE RESTRAINED 2 LENGTHS ON EACH SIDE OF THE BEND.
2. JOINTS ARE TO BE RESTRAINED TYPE USING RESTRAINED GLANDS OR TIE RODS, IN ACCORDANCE WITH THE LENGTHS SHOWN IN THE TABLE ABOVE.
3. DEAD ENDS MUST BE FULLY BACKFILLED BEFORE PRESSURE TESTING AND MUST HAVE BLOCKING (CONCRETE BLOCK) TO UNDISTURBED TRENCH WALL.
4. THIS TABLE IS FOR COMPACTED R.O.B. GRAVEL PIPE BEDDING BELOW THE PIPE TO ONE FOOT ABOVE THE PIPE (AWWA TYPE 4 OR 5 LAYING CONDITIONS).



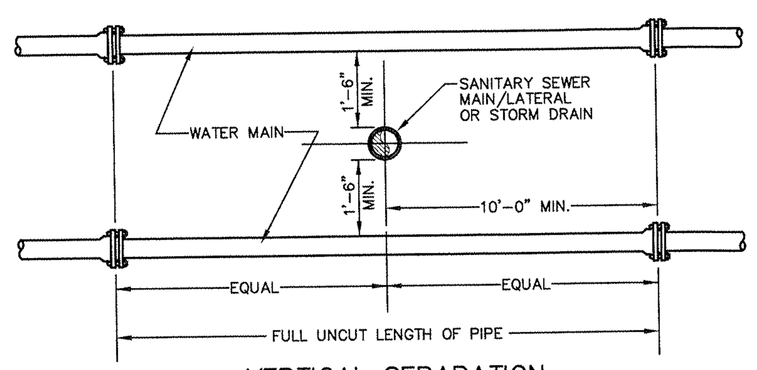
WET TAP DETAIL

NOT TO SCALE

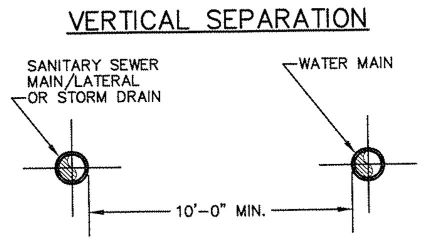


WATER SERVICE DETAIL

NOT TO SCALE



VERTICAL SEPARATION



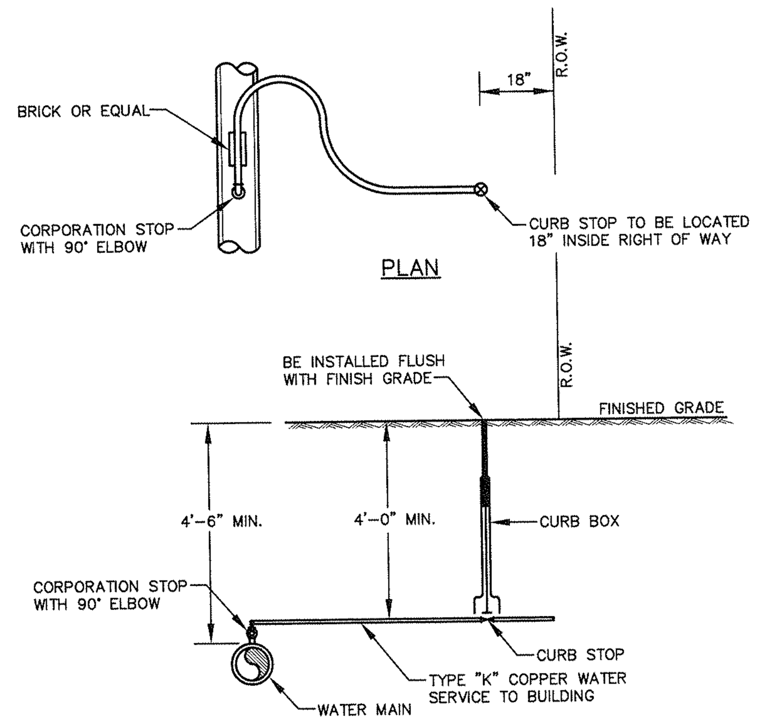
HORIZONTAL SEPARATION

NOTE:

1. NO DEVIATION IN THE SEPARATION REQUIREMENTS WILL BE PERMITTED WITHOUT THE EXPRESS APPROVAL OF THE DEPARTMENT OF HEALTH.

SANITARY/STORM SEWER–WATER MAIN SEPARATION DETAIL

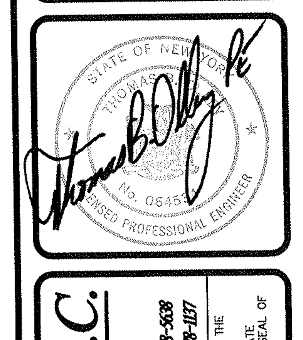
NOT TO SCALE



WATER SERVICE DETAIL

NOT TO SCALE

REV.	DATE	DESCRIPTION	BY



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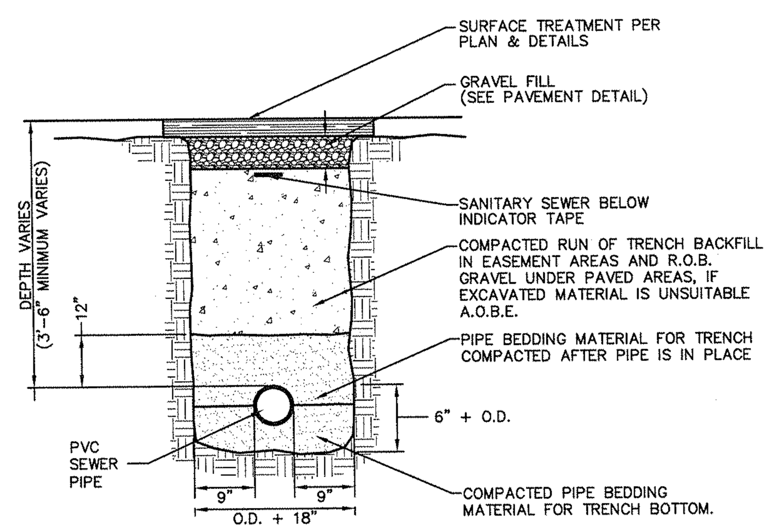
WATER DETAILS
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

DATE: JANUARY 28, 2016

FILE NO.



NOTES:

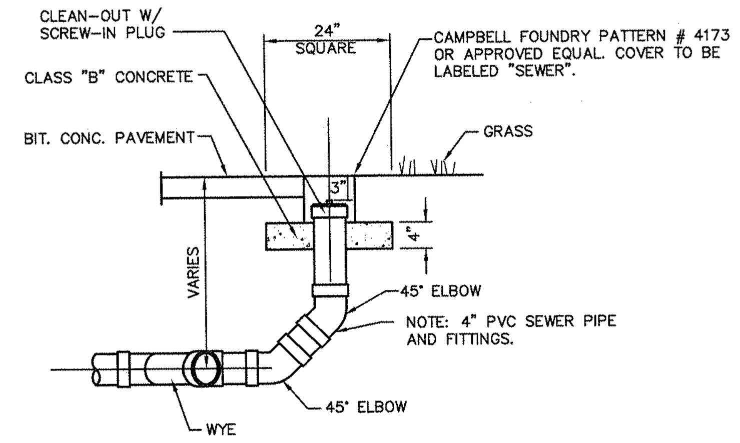
1. PIPE BEDDING MATERIAL SHALL BE COMPOSED OF CRUSHED STONE OR GRAVEL FREE OF SOFT NONDURABLE PARTICLES, ORGANIC MATERIALS AND THIN OR ELONGATED PARTICLES WITH THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE DESIGNATION	% PASSING
2"	100
1"	95 – 100
1/4"	0 – 15
No. 40	0 – 5

2. BEDDING MATERIAL SHALL BE STOCKPILED.
3. INSTALL CONTINOUS PLASTIC UNDERGROUND WARNING TAPE DURING BACKFILLING OF TRENCH FOR UNDERGROUND SANITARY SERVICE PIPING. LOCATE 12 INCHES BELOW FINISHED GRADE, DIRECTLY OVER PIPING. IN PAVEMENT AREAS PLACE TAPE UNDER FOUNDATION COURSE.

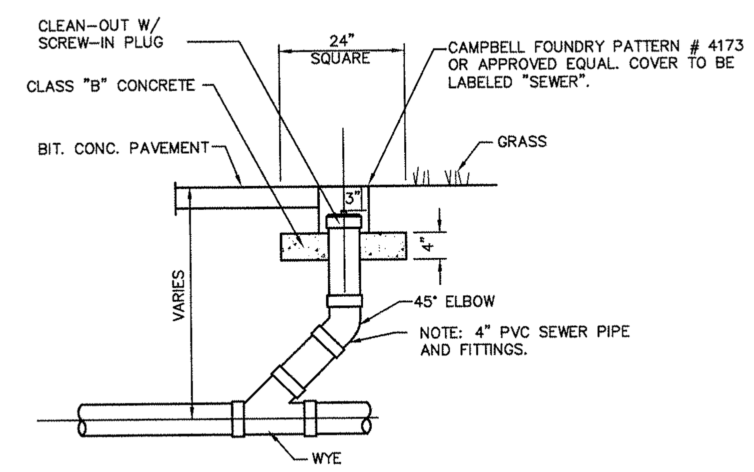
SEWER PIPE TRENCH DETAIL

NOT TO SCALE



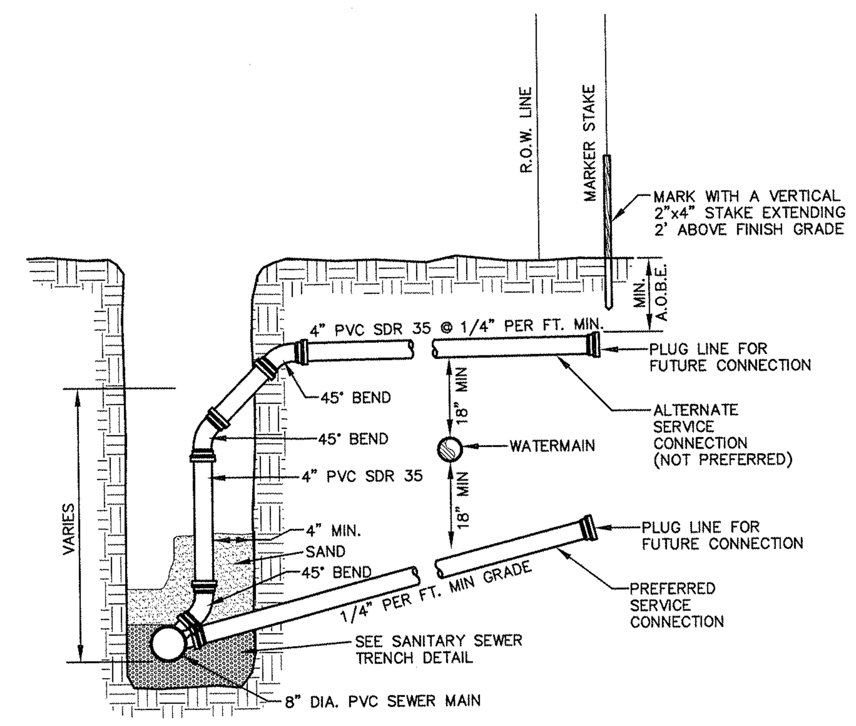
SANITARY SEWER CLEANOUT AT BEND

NOT TO SCALE

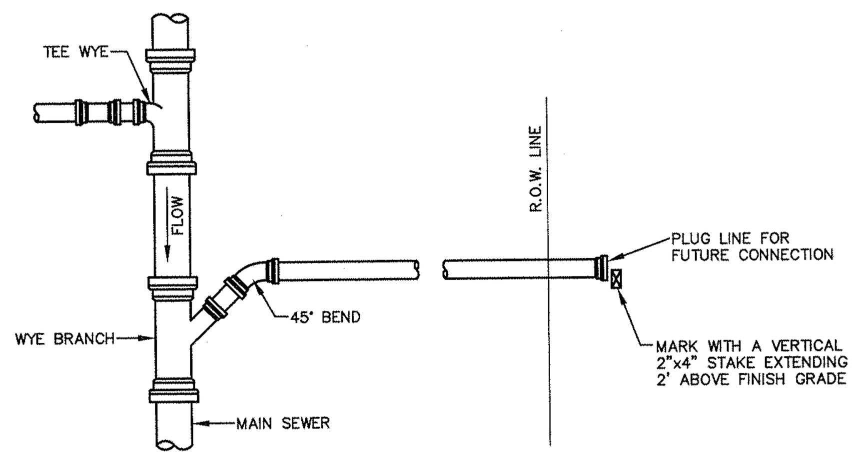


SANITARY SEWER CLEANOUT INLINE

NOT TO SCALE



SECTION VIEW



PLAN VIEW

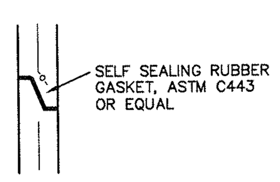
SEWER LATERAL CONNECTION DETAIL

NOT TO SCALE

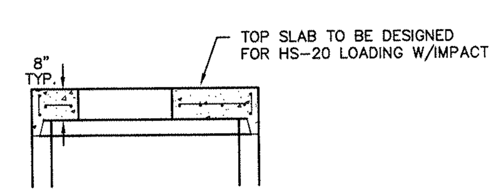
SANITARY SEWER NOTES:

1. ALL SANITARY GRAVITY PIPE SHALL BE SDR 35 OR A-2000 CORRUGATED PVC UNLESS OTHERWISE NOTED, ALL SANITARY SEWER MAINS SHALL BE SEPARATED A MINIMUM OF TEN (10) HORIZONTAL FEET FROM THE WATERMAIN. IF FOR SOME REASON, THIS SEPARATION CANNOT BE ACHIEVED, SANITARY SEWER PIPE IN THIS AREA SHALL BE DUCTILE IRON PRESSURE RATED PIPE.
2. ALL NEW SANITARY SEWER LINES SHALL PASS A LOW PRESSURE AIR TEST AND ALL NEW SANITARY SEWER MANHOLES SHALL PASS HYDROSTATIC TESTS OR VACUUM TESTING.
3. ALL NEW SANITARY SEWER MANHOLE COVERS SHALL BE 24" DIAMETER CAST IRON AND SHALL READ "SANITARY SEWER".
4. ALL SANITARY SEWER CONSTRUCTION SHALL BE SUBJECT TO INSPECTION BY THE MUNICIPAL SEWER SUPERINTENDENT PRIOR TO BACKFILLING.
5. THE DESIGN, CONSTRUCTION AND INSTALLATION SHALL BE IN ACCORDANCE WITH THIS PLAN AND GENERALLY ACCEPTED STANDARDS IN EFFECT AT THE TIME OF CONSTRUCTION WHICH INCLUDE:

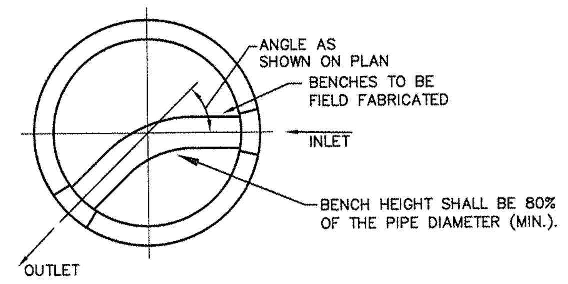
   "NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND ULSTER COUNTY DEPARTMENT OF HEALTH POLICIES, PROCEDURES AND STANDARDS."
   "ULSTER COUNTY DEPARTMENT OF HEALTH SANITARY CODE,
   "RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES, 1997", GLUMRB.
   "DESIGN STANDARDS FOR WASTEWATER TREATMENT WORKS, 1988", NYSDEC.
6. ALL WELLS AND SUBSURFACE SEWAGE DISPOSAL SYSTEMS EXISTING OR APPROVED WITHIN 200' OF THE PROPOSED WATER AND SEWAGE UTILITIES ARE SHOWN ON THIS PLAN ALONG WITH ANY OTHER KNOWN ENVIRONMENTAL HAZARDS IN THE AREA THAT MAY AFFECT THE DESIGN AND FUNCTIONAL ABILITY OF THE WATER AND SEWAGE UTILITIES.
7. NO CELLAR, ROOF OR FOOTING DRAINS SHALL BE DISCHARGED INTO THE SEWAGE SYSTEM.



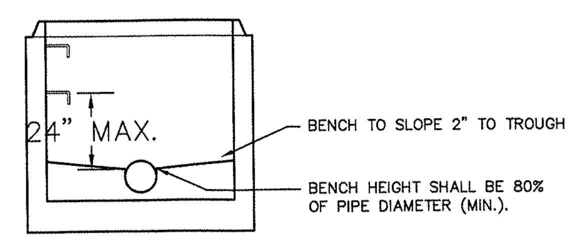
JOINT DETAIL



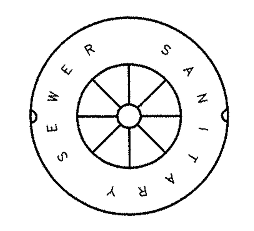
MANHOLE SLAB TOP



BENCH DETAIL

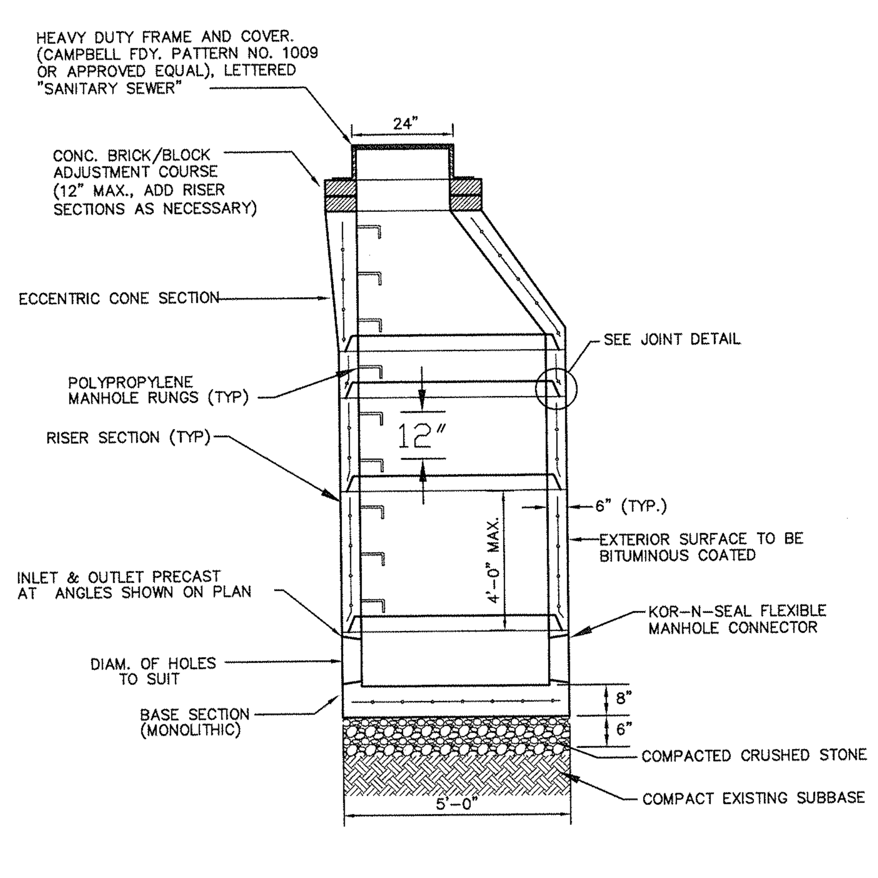


TROUGH DETAIL



SANITARY MANHOLE LID DETAIL

NOT TO SCALE



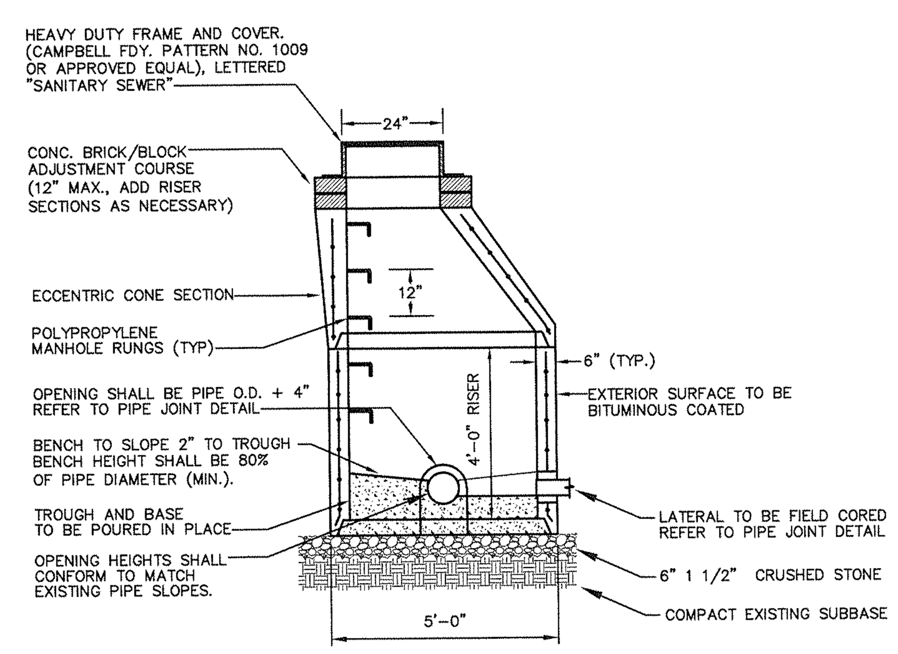
PRECAST MANHOLE

NOTES:

1. INVERTS SHALL BE POURED IN PLACE.
2. REINFORCEMENT FOR ALL COMPONENTS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN NEW YORK STATE. SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW PRIOR TO FABRICATION. STRUCTURE SHALL BE DESIGNED FOR HS-20 VEHICULAR LOADING WITH 25% IMPACT LOAD.
3. COMPRESSION STRENGTH OF CONCRETE SHALL BE 4000 P.S.I. AT 28 DAYS IN CONFORMANCE WITH A.S.T.M. C-478-68.
4. THE TROUGH (BENCH) SHALL PROVIDE A SMOOTH SWEEP BETWEEN INLET AND OUTLET. A HALF PIPE MAY BE USED FOR STRAIGHT RUNS ONLY.
5. THE MANHOLE EXTERIOR SHALL RECEIVE TWO COATS OF BITUMINOUS.
6. FRAME AND COVER SHALL BE DESIGNED FOR HS-20 VEHICLE LOADING AND 25% IMPACT LOAD. FRAMES AND COVERS TO BE INSTALLED WITHIN A FLOOD PLAIN SHALL BE WATERTIGHT (CAMPBELL FDY. NO. 1502 OR EQUAL).
7. REFER TO PLANS FOR ELEVATIONS AND ANGLES OF PIPES AND FOR RIM ELEVATIONS.
8. MANHOLE FRAMES ARE TO BE SET AT THE SAME GRADE AS THE ADJOINING PAVEMENT OR GROUND SURFACE.

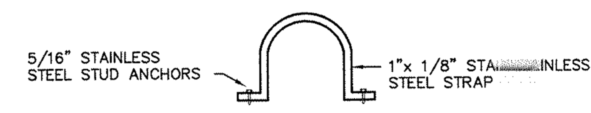
PRECAST MANHOLE DETAILS

NOT TO SCALE



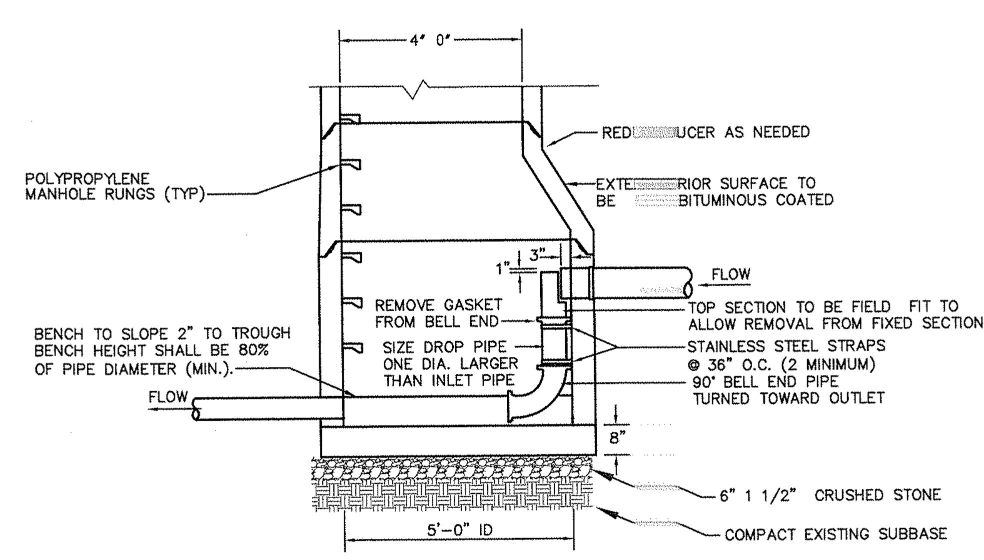
DOGHOUSE MANHOLE DETAIL

NOT TO SCALE



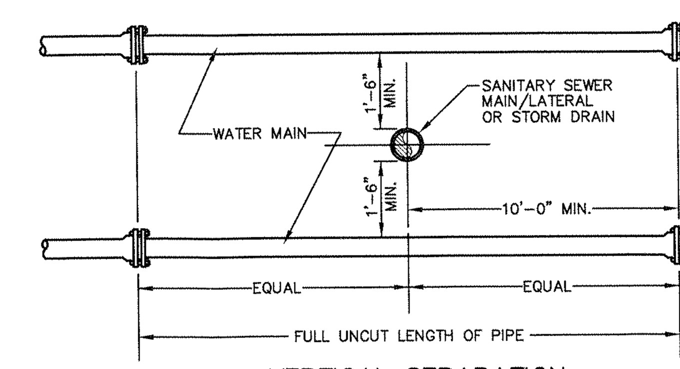
STRAP DETAIL

NOT TO SCALE

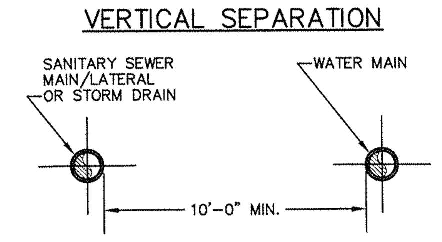


INTERIOR DROP CONNECTION PRE-CAST MANHOLE

NOT TO SCALE



VERTICAL SEPARATION



HORIZONTAL SEPARATION

NOTE:

1. NO DEVIATION IN THE SEPARATION REQUIREMENTS WILL BE PERMITTED WITHOUT THE EXPRESS APPROVAL OF THE DEPARTMENT OF HEALTH.

SANITARY/STORM SEWER-WATER MAIN SEPARATION DETAIL

NOT TO SCALE

REV.	DATE	DESCRIPTION	BY

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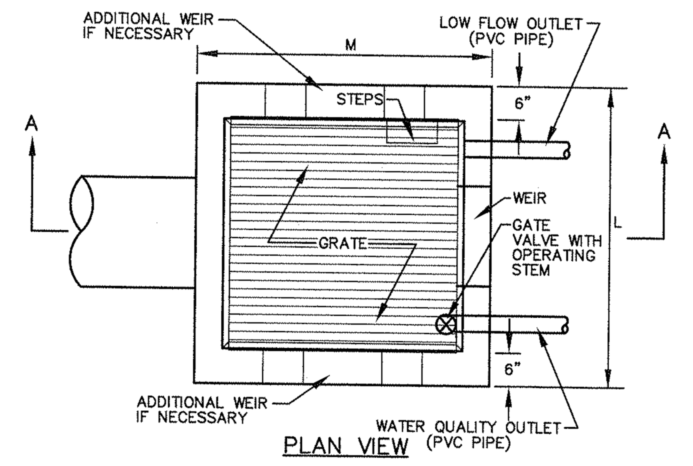
SANITARY SEWER DETAILS
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

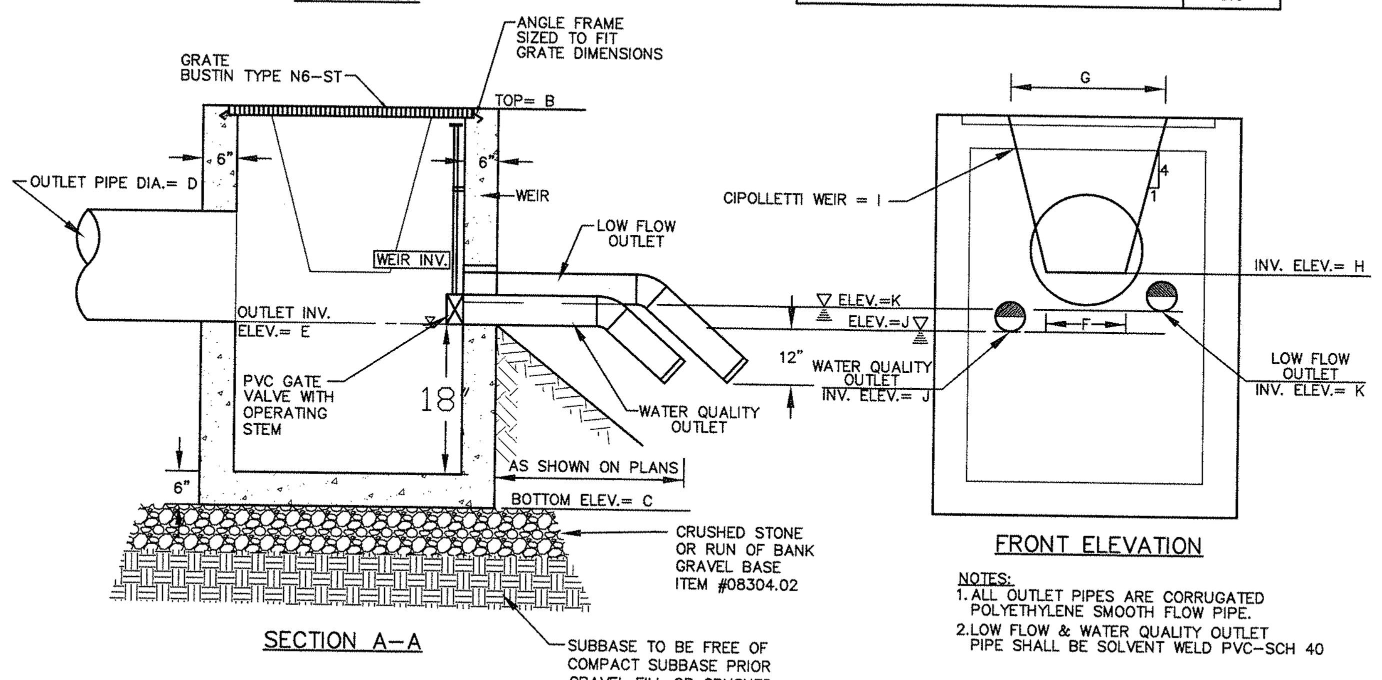
SHEET NO.
14 OF 16

DATE: JANUARY 28, 2016

FILE NO.



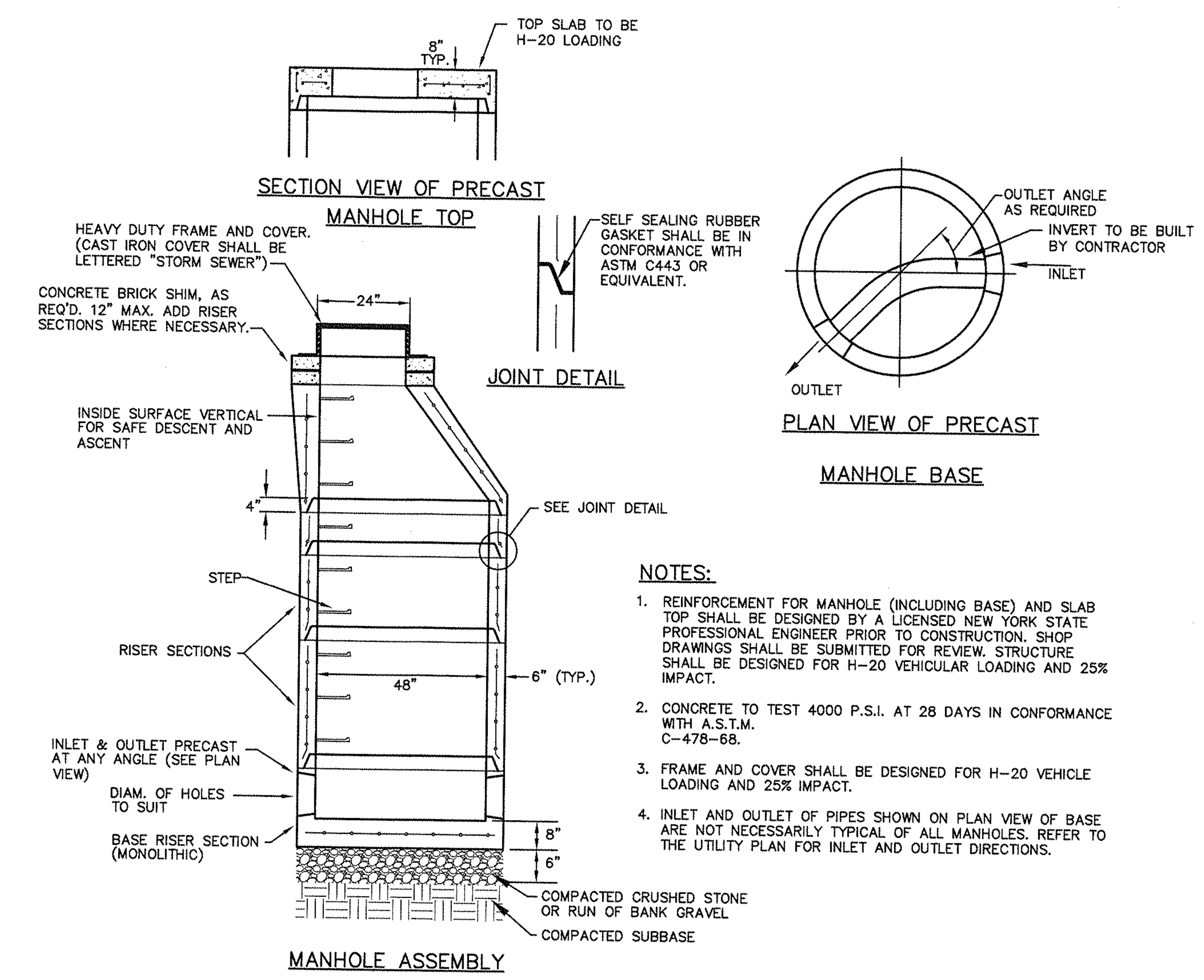
OUTLET STRUCTURE TABLE	
OUTLET STRUCTURE DIMENSIONS	OUTLET A
A. STRUCTURE HEIGHT (ITEM B – ITEM C)	0.00
B. TOP GRATE ELEVATION	0.00
C. STRUCTURE BOTTOM ELEVATION	0.00
D. OUTLET PIPE DIAMETER (IN.)	0"
E. OUTLET PIPE INVERT ELEVATION	0.00
F. WEIR CREST WIDTH (FT.)	0'
G. WEIR TOP WIDTH (FT.)	0'
H. WEIR CREST INVERT ELEVATION	0.00
I. NUMBER OF WEIRS	0
J. WATER QUALITY OUTLET INVERT ELEVATION	0.00
J. WATER QUALITY OUTLET DIAMETER (IN)	0"
K. LOW FLOW OUTLET INVERT ELEVATION	0.00
K. LOW FLOW OUTLET DIAMETER (IN)	0"
L. STRUCTURE LENGTH	0'
M. STRUCTURE WIDTH	0'
POND BOTTOM ELEVATION	0.0
TOP OF BERM	0.0



NOTES:
1. ALL OUTLET PIPES ARE CORRUGATED POLYETHYLENE SMOOTH FLOW PIPE.
2. LOW FLOW & WATER QUALITY OUTLET PIPE SHALL BE SOLVENT WELD PVC–SCH 40

STORMWATER MANAGEMENT BASIN OUTLET STRUCTURE

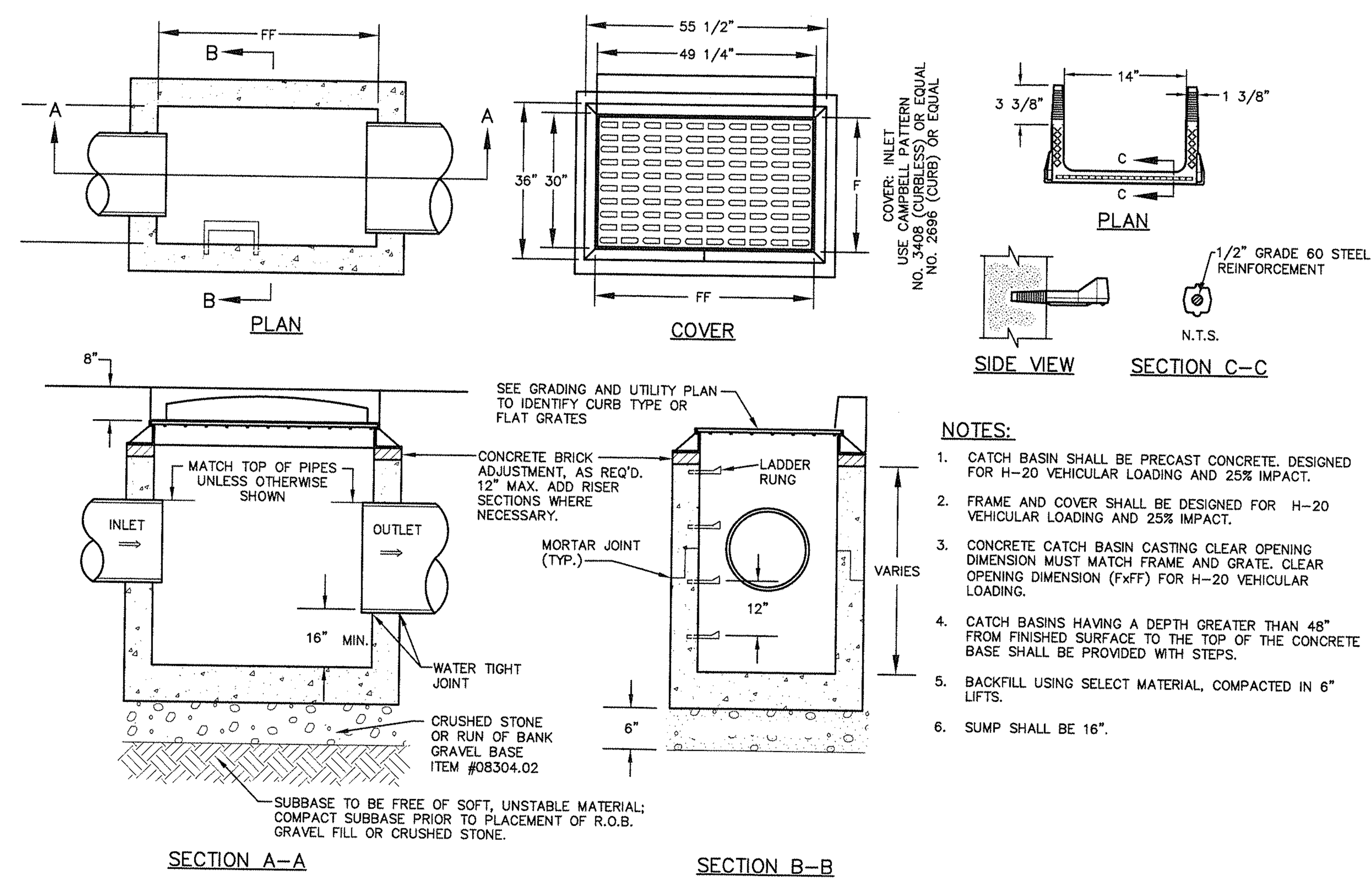
NOT TO SCALE



NOTES:
1. REINFORCEMENT FOR MANHOLE (INCLUDING BASE) AND SLAB TOP SHALL BE DESIGNED BY A LICENSED NEW YORK STATE PROFESSIONAL ENGINEER PRIOR TO CONSTRUCTION. SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW. STRUCTURE SHALL BE DESIGNED FOR H–20 VEHICULAR LOADING AND 25% IMPACT.
2. CONCRETE TO TEST 4000 P.S.I. AT 28 DAYS IN CONFORMANCE WITH A.S.T.M. C–478–68.
3. FRAME AND COVER SHALL BE DESIGNED FOR H–20 VEHICLE LOADING AND 25% IMPACT.
4. INLET AND OUTLET OF PIPES SHOWN ON PLAN VIEW OF BASE ARE NOT NECESSARILY TYPICAL OF ALL MANHOLES. REFER TO THE UTILITY PLAN FOR INLET AND OUTLET DIRECTIONS.

STORM SEWER MANHOLE

NOT TO SCALE



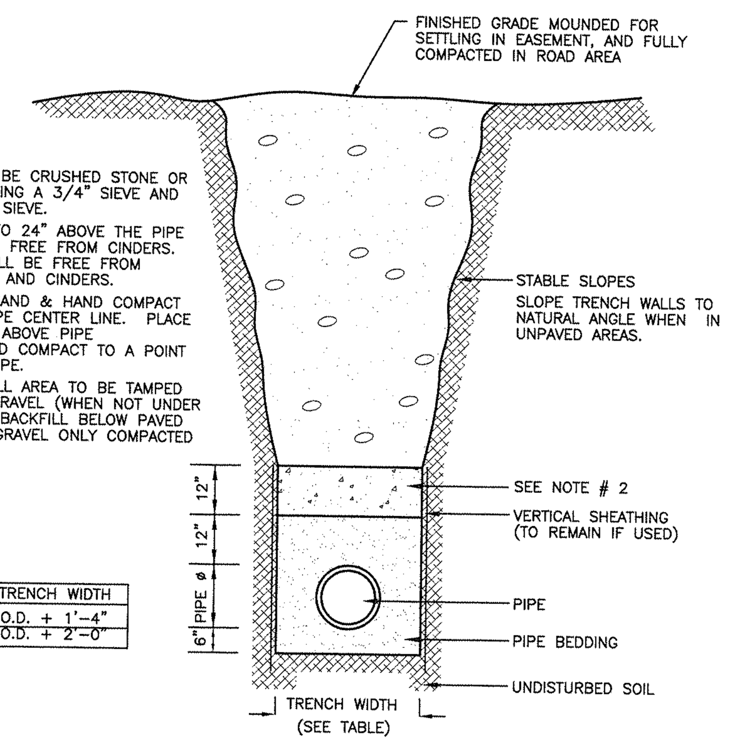
NOTES:
1. CATCH BASIN SHALL BE PRECAST CONCRETE. DESIGNED FOR H–20 VEHICULAR LOADING AND 25% IMPACT.
2. FRAME AND COVER SHALL BE DESIGNED FOR H–20 VEHICULAR LOADING AND 25% IMPACT.
3. CONCRETE CATCH BASIN CASTING CLEAR OPENING DIMENSION MUST MATCH FRAME AND GRATE. CLEAR OPENING DIMENSION (FxFF) FOR H–20 VEHICULAR LOADING.
4. CATCH BASINS HAVING A DEPTH GREATER THAN 48" FROM FINISHED SURFACE TO THE TOP OF THE CONCRETE BASE SHALL BE PROVIDED WITH STEPS.
5. BACKFILL USING SELECT MATERIAL, COMPACTED IN 6" LIFTS.
6. SUMP SHALL BE 16".

STANDARD CATCH BASIN DETAILS

NOT TO SCALE

NOTES:
1. PIPE BEDDING SHALL BE CRUSHED STONE OR WASHED GRAVEL PASSING A 3/4" SIEVE AND RETAINED ON A 3/8" SIEVE.
2. BACKFILL FROM 12" TO 24" ABOVE THE PIPE SHALL BE FINE EARTH FREE FROM CINDERS. REMAIN BACKFILL SHALL BE FREE FROM LARGE CLODS, ROCKS AND CINDERS.
3. PLACE BACKFILL BY HAND & HAND COMPACT UNDER & AROUND PIPE CENTER LINE. PLACE BACKFILL IN 6" LIFTS ABOVE PIPE CENTERLINE, AND HAND COMPACT TO A POINT 24" ABOVE TOP OF PIPE.
4. REMAINING TRENCH FILL AREA TO BE TAMPED BANK RUN SAND & GRAVEL (WHEN NOT UNDER PAVEMENT). TRENCH BACKFILL BELOW PAVED AREAS TO BE R.O.B. GRAVEL ONLY COMPACTED IN 6" LIFTS.

PIPE DIAMETER	TRENCH WIDTH
24" & SMALLER	O.D. + 1'–4"
30" & LARGER	O.D. + 2'–0"



STORM SEWER TRENCH DETAIL

NOT TO SCALE

N.Y.S. INDUSTRIAL CODE RULE 753
1-800-962-7962
CALL BEFORE YOU DIG , DRILL OR BLAST
NO LESS THAN TWO WORKING DAYS NOTICE
IT'S THE LAW !

REV.	DATE	DESCRIPTION	BY

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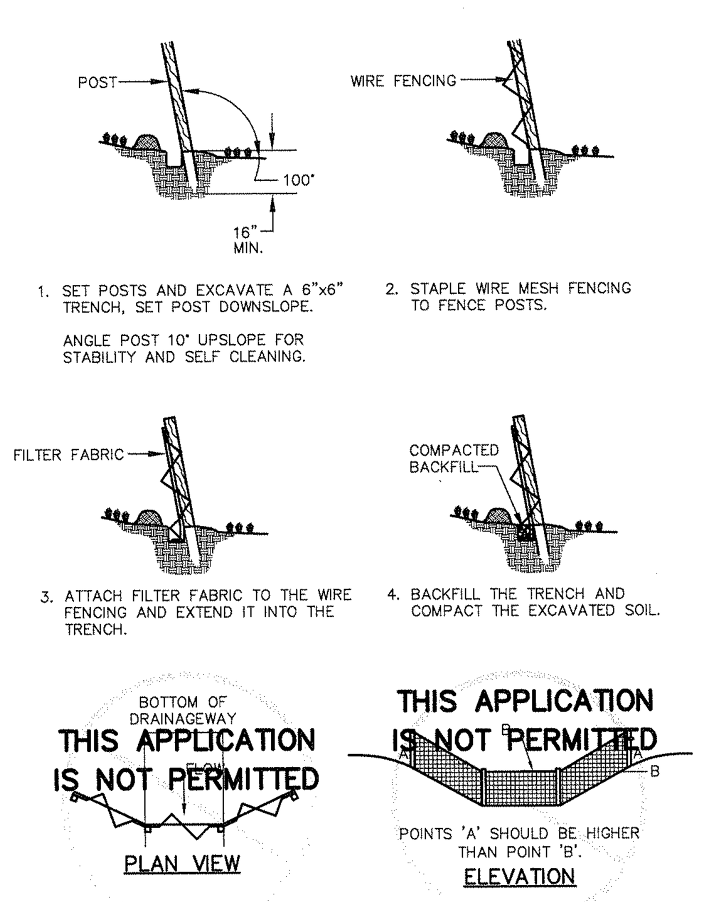
STORM DRAINAGE DETAILS
GARDNER RIDGE
ROUTE 32
TOWN OF NEWBURGH, ORANGE COUNTY, NY

SHEET NO.
15 OF 16

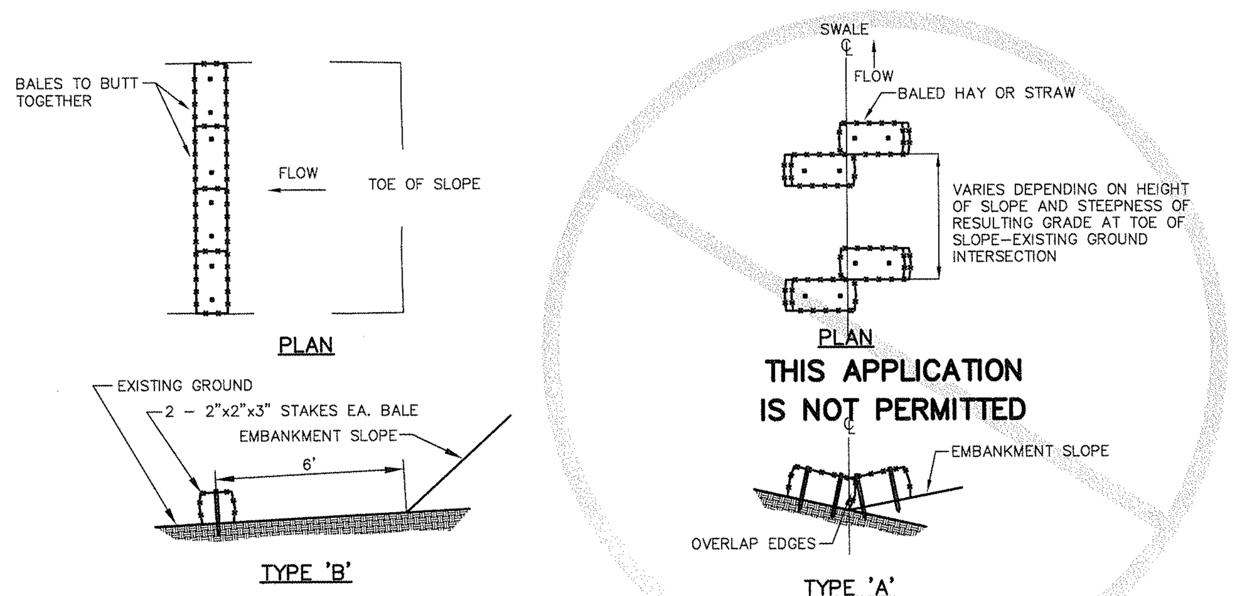
DATE: JANUARY 28, 2016
FILE NO.



1. SET POSTS AND EXCAVATE A 6"x6" TRENCH, SET POST DOWNSLOPE.
ANGLE POST 10° UPSLOPE FOR STABILITY AND SELF CLEANING.
2. STAPLE WIRE MESH FENCING TO FENCE POSTS.
3. ATTACH FILTER FABRIC TO THE WIRE FENCING AND EXTEND IT INTO THE TRENCH.
4. BACKFILL THE TRENCH AND COMPACT THE EXCAVATED SOIL.

PLACEMENT AND CONSTRUCTION OF A SILT FENCE BARRIER

NOT TO SCALE

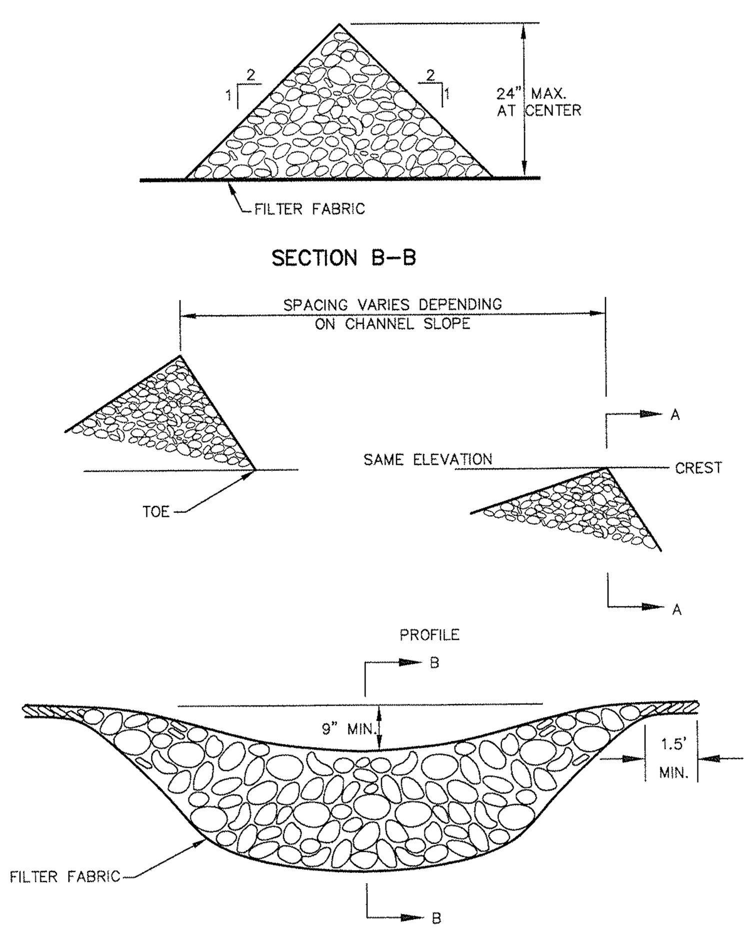


NOTE:
1. TO BE USED WHERE THE EXISTING GROUND SLOPES AWAY FROM THE TOE OF THE EMBANKMENT.

NOTE:
1. TO BE USED IN LOCATIONS WHERE THE EXISTING GROUND SLOPES IN TOWARD THE TOE OF THE EMBANKMENT

HAY BALE CHECK DAM

NOT TO SCALE

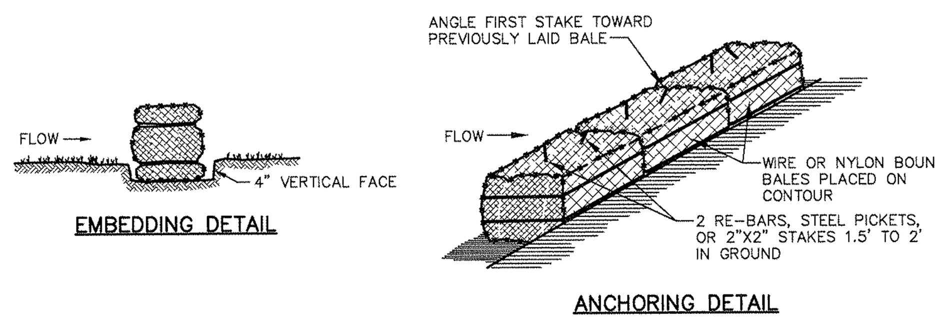


CONSTRUCTION SPECIFICATIONS :

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION.
2. SET SPACING OF CHECK DAMS TO ESTABLISH THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONES.
6. USE GRADED STONE 2 TO 15 INCHES IN SIZE (NYS-DOT LIGHT STONE FILL MEETSTHESE REQUIREMENTS).

CHECK DAM DETAILS

NOT TO SCALE

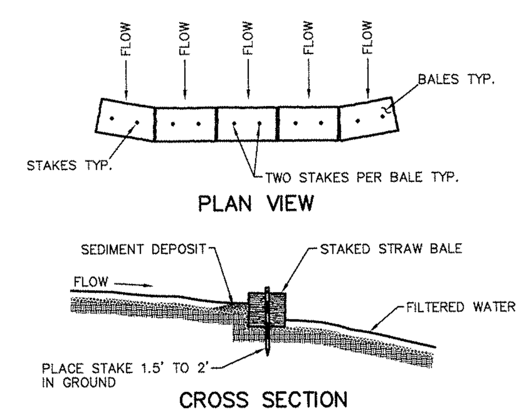


CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4".
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
6. HAYBALES SHALL BE PLACED IN ACCORDANCE WITH THE NEW YORK STATE GUIDELINES FOR URBAN EROSION AND SEDIMENT CONTROL.

HAY BALE DETAILS

NOT TO SCALE

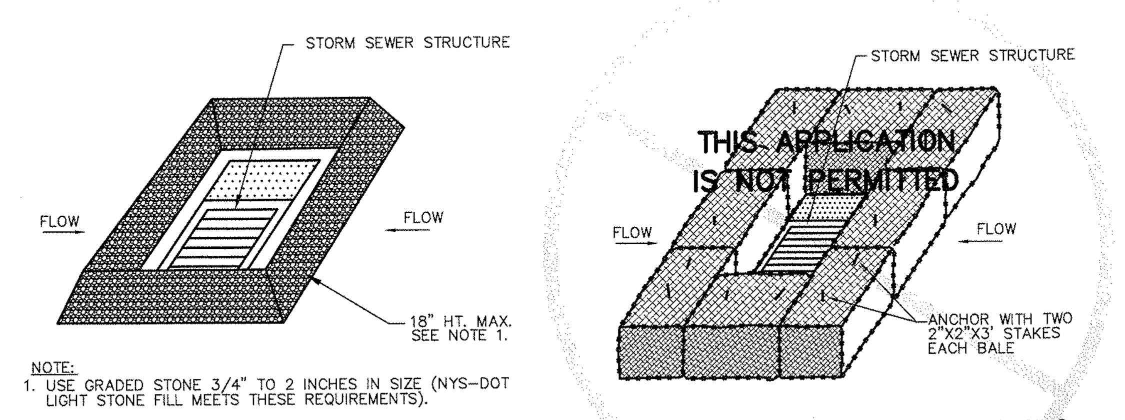


NOTES:

1. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR (4) INCHES AND PLACED SO THE BINDINGS ARE HORIZONTAL.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY TWO STAKES DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER.

HAYBALE STABILIZATION DETAIL

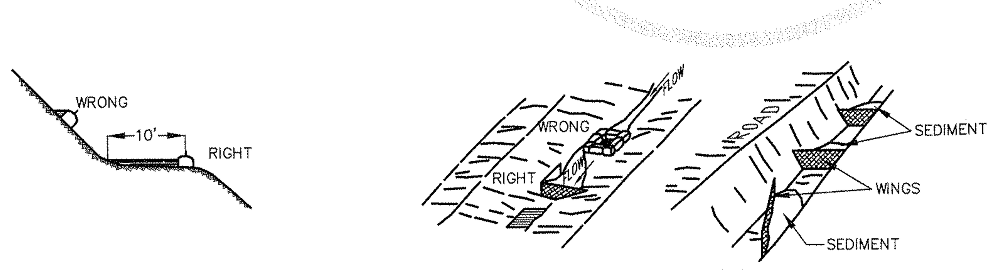
NOT TO SCALE



NOTE:
1. USE GRADED STONE 3/4" TO 2 INCHES IN SIZE (NYS-DOT LIGHT STONE FILL MEETS THESE REQUIREMENTS).

STONE CHECK INSTALLATION AT CATCH BASINS

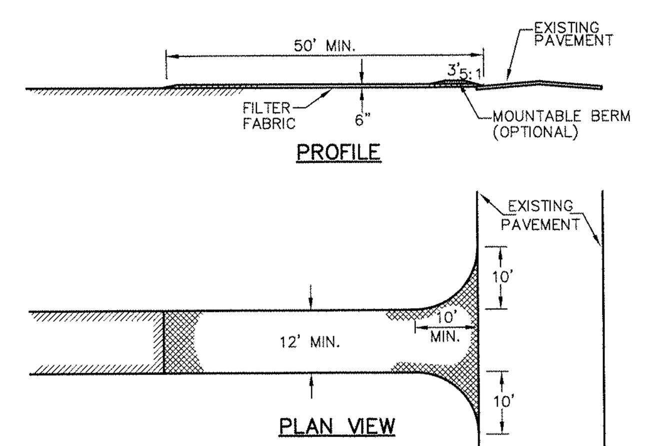
HAY BALE INSTALLATION AT CATCH BASINS



STONE CHECK DAMS

STONE CHECK DAMS

SEDIMENT CONTROL STRUCTURES



CONSTRUCTION ENTRANCE NOTES

1. SURFACE SHALL BE 2" CRUSHED STONE OR RECLAIMED/RECYCLED CONCRETE.
2. THE MINIMUM LENGTH SHALL BE 50 FEET (30' FOR A SINGLE RESIDENCE LOT).
3. THE TRACKING PAD SHALL BE A MINIMUM OF 6" DEEP STONE.
4. THE MINIMUM WIDTH SHALL BE 12 FEET.
5. A FILTER FABRIC SHALL BE PLACED UNDER THE ENTRANCE PRIOR TO PLACEMENT OF THE STONE (CONTECH C-40NW OR EQUAL).
6. SURFACE WATER SHALL BE DIVERTED AWAY FROM THE CONSTRUCTION ENTRANCE THROUGH THE USE OF DIVERSION SWALES AND PIPING. IF PIPING IS IS NOT FEASIBLE, THEN A MOUNTABLE BERM WITH 5:1 SLOPES SHALL BE USED.
7. THE STABILIZED CONSTRUCTION ENTRANCE SURFACE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOW OF MUD OR SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. PERIODIC TOP DRESSING WITH ADDITIONAL STONE WILL BE NEEDED AS CONDITIONS DEMAND. REPAIR AND CLEAN ALL MEASURES USED TO TRAP SEDIMENT. ANY SEDIMENT THAT IS TRANSPORTED ON TO THE PUBLIC RIGHT OF WAY (IN ANY MANNER) MUST BE REMOVED IMMEDIATELY.

STABILIZED CONSTRUCTION ENTRANCE

NOT TO SCALE

GENERAL CONSTRUCTION NOTES:

1. ALL CONTRACTORS SHALL COMPLY WITH THE STORMWATER POLLUTION PREVENTION PLAN WRITTEN FOR THIS PROJECT.
2. CONTRACTOR SHALL CHECK AND VERIFY ALL CONDITIONS AT THE SITE PRIOR TO THE START OF WORK. THE CONTRACTOR SHALL BE FAMILIAR WITH THE INTENT OF THIS PLAN AND ENSURE THAT WORK TO BE PERFORM IS THE SAME.
3. CONTRACTOR SHALL OBTAIN ALL REQUIRED APPROVALS, PERMITS, INSPECTION APPROVALS, ETC. FOR WORK PERFORMED FROM AGENCIES HAVING JURISDICTION THEREOF.
4. IF IN THE COURSE OF CONSTRUCTION A CONDITION EXISTS WHICH DISAGREES WITH THAT AS INDICATED ON THESE PLANS, THE CONTRACTOR SHALL STOP WORK AND NOTIFY THE ENGINEER. SHOULD HE FAIL TO FOLLOW THIS PROCEDURE AND CONTINUE WITH THE WORK, HE SHALL ASSUME ALL RESPONSIBILITY AND LIABILITY ARISING THEREON.
5. COMPACTION OF ALL FILL MATERIAL SECTIONS SHALL BE COMPLETED IN 6" LIFTS. EACH LIFT SHALL BE COMPACTED TO 95% OF THE PROCTOR DENSITY.
6. MAINTAIN POSITIVE EROSION CONTROL DURING THE OPERATION UNTIL THE SITE IS STABILIZED.
7. THE CONTRACTOR SHALL PROVIDE ADDITIONAL TOPSOIL FOR RECLAMATION PROCEDURES AS NEEDED.
8. THE ENTIRE SITE IS TO BE STABILIZED WITH VEGETATION WHEN FINAL GRADES ARE REACHED.
9. TEMPORARY SEED MIX SHALL BE PERENNIAL RYEGRASS @ 30 POUNDS/ACRE OR AS RECOMMENDED BY THE SULLIVAN COUNTY SOIL CONSERVATION DISTRICT.
10. PERMANENT SEED MIX SHALL BE THE FOLLOWING: COMMON WHITE CLOVER 8 LBS/ACRE, TALL FESCUE 20 LBS/ACRE, PERENNIAL RYEGRASS 5 LBS/ACRE OR AS RECOMMENDED BY THE SULLIVAN COUNTY SOIL CONSERVATION DISTRICT.
11. THE OPTIMUM TIME FOR SEEDING IS EARLY SPRING AND LATE AUGUST. HOWEVER SEEDING MAY BE PERFORMED AT OTHER TIMES PER YEAR IF PROPERLY MULCHED AND ADEQUATE MOISTURE PROVIDED. SEEDING IN AREAS THAT FAIL MUST BE RESEEDED DURING THE FOLLOWING OPTIMUM TIME FOR SEEDING.
12. CONTRACTORS SHALL NOTE THAT SOME OF THE SOILS LOCATED ON THE SITE ARE KNOWN TO HAVE PERCHED WATER TABLES. UPON ENCOUNTERING GROUNDWATER THE CONTRACTOR MAY MITIGATE EROSION
AND SLOPE STABILITY IMPACTS BY ANY OF THE APPLICABLE METHODS DISCUSSED IN THE STORMWATER POLLUTION PREVENTION PLAN FOR THIS PROJECT OR SCHEDULING CONSTRUCTION IN THESE AREAS SO AS TO AVOID THEM DURING WET PERIODS OF THE YEAR.

EROSION & SEDIMENT CONTROL MEASURES

1. TEMPORARY DIVERSION SWALES
TEMPORARY DIVERSION SWALES WILL BE INSTALLED IMMEDIATELY UPHILL OF AREAS SCHEDULED TO BE DISTURBED FOR THE PURPOSE OF DIVERTING STORMWATER. SWALES SHALL BE MAINTAINED UNTIL THE REGRADED SITE IS STABILIZED WITH PERMANENT SEEDING.

2. STABILIZED CONSTRUCTION ENTRANCE
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE(S) SHALL BE INSTALLED IMMEDIATELY ADJACENT TO THE EXISTING PAVEMENT. DURING WET WEATHER IT MAY NECESSARY TO WASH VEHICLE TIRES AT THIS LOCATION. THE ENTRANCE SHALL BE GRADED OFF SO THAT RUNOFF WILL BE DIRECTED TO AN EXISTING CATCH BASIN AND AWAY FROM THE PAVEMENT. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING CATCH BASINS.

3. SILT FENCE
SILT FENCES SHALL BE INSTALLED IN THE LOCATIONS SPECIFIED ABOVE, AROUND TOPSOIL STOCKPILE AREAS, AT THE BASE OF ALL DISTURBED SLOPES, AND AT INTERVALS NECESSARY TO PREVENT CONCENTRATION OF FLOW.

4. VEGETATION PROTECTION
LIMIT SOIL PLACEMENT OVER EXISTING TREES AND SHRUB ROOTS TO A MAXIMUM OF 3 INCHES. USE SOILS WITH LOAMY TEXTURES AND GOOD STRUCTURE. CONSTRUCT STURDY FENCES, WOOD OR STEEL BARRIERS, OR OTHER PROTECTIVE DEVICES TO SURROUND AND PROTECT SENSITIVE OR VALUABLE VEGETATION FROM CONSTRUCTION EQUIPMENT. PLACE BARRIERS FAR ENOUGH FROM TREES SO THAT TALL EQUIPMENT SUCH AS BACKHOES AND DUMP TRUCKS DO NOT DAMAGE TREE BRANCHES.

CONSTRUCTION LIMITS SHOULD BE IDENTIFIED AND CLEARLY MARKED TO EXCLUDE EQUIPMENT. IT IS STRONGLY RECOMMENDED THAT CONSTRUCTION FENCING BE UTILIZED TO PROTECT AREAS THAT ARE NOT TO BE DISTURBED. OBSTRUCTIVE AND BROKEN BRANCHES SHOULD BE PRUNED PROPERLY. EXISTING VEGETATION SHOULD BE PRESERVED WHERE ATTAINABLE.

5. LAND GRADING
FINISH LAND SURFACES WILL BE GRADED AS INDICATED ON THE PLANS. AT A MAXIMUM, NO MORE THAN 5 ACRES OF UNPROTECTED SOIL SHOULD BE EXPOSED AT ANY ONE TIME.

AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL. REMOVE TREES, VEGETATION, ROOTS, OR OTHER UNACCEPTABLE MATERIAL. FILL MATERIAL SHALL BE FREE OF BRUSH, RUBBISH, LOGS, STUMPS, BUILDING DEBRIS, AND OTHER ORGANIC MATERIAL. FROZEN MATERIAL SHALL NOT BE PLACED IN THE FILL NOR SHALL THE FILL MATERIAL BE PLACED ON A FROZEN FOUNDATION.

UNLESS OTHERWISE NOTED, PROVIDE TEMPORARY VEGETATION BY SEEDING BARE SOIL WITHIN 7 DAYS OF EXPOSURE UNLESS CONSTRUCTION WILL BEGIN WITHIN 14 DAYS. IF CONSTRUCTION IS SUSPENDED, ALL AREAS SHALL BE SEEDED AND MULCHED IMMEDIATELY.

FINISH GRADING SHALL BE COMPLETED SO AS TO PREVENT WATER FROM STANDING ON THE SURFACE OF LAWNS FOR MORE THAN 24 HOURS AFTER THE END OF A RAINFALL.

TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION WILL BE STOCKPILED IN THE AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED, NON-SODDED AREAS. STOCKPILES SHALL BE SEEDED IN ACCORDANCE WITH THESE PLANS.

AREAS THAT ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF THREE INCHES PRIOR TO PLACEMENT OF TOPSOIL.

6. DUST CONTROL
15 MPH CONSTRUCTION ZONE SPEED LIMIT SIGNS SHALL BE ERECTED IN ALL AREAS WHERE DUSTLESS SURFACES HAVE NOT BEEN CONSTRUCTED.

CONSTRUCTION OPERATIONS SHALL BE SCHEDULED TO MINIMIZE THE AMOUNT OF AREA DISTURBED AT ONE TIME. BUFFER AREAS OF VEGETATION SHALL BE LEFT WHERE POSSIBLE. THE SITE, INCLUDING HAUL ROADS AND ACCESS ROADS, CAN BE SPRINKLED WITH WATER UNTIL THE SURFACE IS WET. THE FOLLOWING SPRAY ADHESIVES CAN BE USED ON MINERAL SOILS:

MATERIAL	WATER DILUTION	TYPE OF NOZZLE	
ACRYLIC POLYMER	9:1	COARSE SPRAY	
LATEX EMULSION	12.5:1	FINE SPRAY	
RESIN IN WATER	4:1	FINE SPRAY	

7. TEMPORARY AND PERMANENT SEEDING
SEEDING PREPARATION INCLUDES REMOVAL OF DEBRIS, ROCKS, STUMPS AND OTHER UNACCEPTABLE MATERIALS. COMPACTED SOIL SHALL BE SCARIFIED PRIOR TO PLACEMENT OF TOPSOIL. ADJUST PH TO 6.0 WITH LIME AND FERTILIZE WITH 600 LBS OF 5-10-10 OR EQUIVALENT PER ACRE. ALL DISTURBED AREAS SHALL BE TEMPORARILY SEEDED IF CONSTRUCTION DOES NOT RESUME IN 7 DAYS. AND BEFORE ANY SIGNIFICANT STORM EVENT WHICH MAY HAVE THE POTENTIAL TO CAUSE EROSION.

ALL APPROVED STOCKPILES AND OTHER DISTURBED OR GRADED AREAS SHALL BE SEEDED WITHIN 14 CALENDAR DAYS PROVIDED CONSTRUCTION GRADING ACTIVITY IS NOT CONTINUALLY ONGOING IN THESE LOCATIONS.

APPLY TEMPORARY SEEDING CONSISTING OF QUICK GERMINATING RYEGRASS (ANNUAL OR PERENNIAL) AT 30 LBS. PER. ACRE.

PERMANENT SEEDING SHALL BE COMPLETED WITHIN 7 DAYS OF COMPLETION OF FINAL GRADING. SEED MIXTURE SHALL BE APPLIED IN ACCORDANCE WITH THESE PLANS AND/OR THE RECOMMENDATIONS OF THE LOCAL SOIL & WATER CONSERVATION DISTRICT.

THE OPTIMUM TIME FOR PERMANENT SEEDING IS IN THE SPRING FROM MARCH 21 THROUGH MAY 20, AND IN LATE SUMMER AND EARLY FALL FROM AUGUST 25 TO OCTOBER 15. PERMANENT SEEDINGS MAY BE MADE ANY TIME OF YEAR IF PROPERLY MULCHED AND ADEQUATE MOISTURE IS PROVIDED. BROADCASTING, DRILLING WITH CULTIPACK TYPE SEEDER OR HYDROSEEDING ARE ACCEPTABLE. COLD WEATHER SEEDING SHALL BE PERFORMED USING WINTER GERMINATING SEED SUCH AS WINTER RYE.

8. TOPSOIL/MULCHING
WHERE VEGETATION WILL BE ESTABLISHED, PRESERVE AND APPLY EXISTING TOPSOIL AND FRIABLE FINE TEXTURED SUBSOILS THAT ARE STRIPPED DURING EXCAVATION. COMPLETE ROUGH GRADING AND FINAL GRADING, ALLOWING FOR DEPTH OF TOPSOIL TO BE ADDED. SCARIFY ALL COMPACT, SLOW PERMEABLE, MEDIUM, AND FINE TEXTURED SUBSOIL AREAS. IN SOIL AREAS THAT ARE STEEPER THAN 5 PERCENT, SCARIFY AT APPROXIMATELY RIGHT ANGLES TO THE SLOPE. REMOVE REFUSE, WOODY PLANT PARTS, STONES OVER 3 INCHES IN DIAMETER AND OTHER LITTER.

TOPSOIL SHALL HAVE A MINIMUM OF 2 PERCENT AND A MAXIMUM OF 6 PERCENT (BY WEIGHT) OF FINE TEXTURED STABLE ORGANIC MATERIAL. TOPSOIL SHALL HAVE NOT LESS THAN 20 PERCENT FINE TEXTURED MATERIAL (PASSING THE NO. 200 SIEVE) AND NOT MORE THAN 15 PERCENT CLAY. TOPSOIL SHALL BE RELATIVELY FREE OF STONES OVER 1 1/2 INCHES IN DIAMETER.

TOPSOIL SHALL BE PLACED AT A UNIFORM DEPTH OF 4 INCHES FOR THE STEEP SLOPES, 6 INCHES FOR THE LAWN AREAS AND 2" FOR UNMOWED GRASS AREAS. TOPSOIL SHALL NOT BE PLACED WHEN IT IS PARTLY FROZEN, MUDDY, NOR ON FROZEN SLOPES OR OVER ICE, SNOW OR STANDING WATER. TOPSOIL PLACED AND GRADED ON SLOPES STEEPER THAN 5 PERCENT SHALL BE PROMPTLY FERTILIZED, SEEDED, MULCHED AND STABILIZED BY "TRACKING' WITH SUITABLE EQUIPMENT.

IF SOIL IS COMPACTED OR CRUSTED, SURFACE SHOULD BE LOOSENED TO AT LEAST TWO INCHES BY DISKING OR OTHER SUITABLE METHODS.

9. INSPECTION OF EROSION AND SEDIMENT CONTROL MEASURES
THE OWNER OR QUALIFIED REPRESENTATIVE OF THE OWNER SHALL INSPECT THE EROSION AND SEDIMENT CONTROL MEASURES AT LEAST ONCE EVERY 7 CALENDAR DAYS AT A MINIMUM, THESE MEASURES INCLUDE THE DISTURBED AREAS OF THE CONSTRUCTION SITE, THE AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO STRUCTURAL CONTROL MEASURES AND THE LOCATIONS WHERE VEHICLES ENTER AND EXIT THE SITE. WHERE PORTIONS OF THE CONSTRUCTION AREA HAVE BEEN FINALLY STABILIZED, INSPECTION OF SUCH PORTIONS SHALL BE CONDUCTED AT LEAST ONCE EVERY MONTH UNTIL THE ENTIRE SITE IS FINALLY STABILIZED.

THE TERM "FINALLY STABILIZED" MEANS THAT ALL THE SOIL DISTURBING ACTIVITIES AT THE SITE HAVE BEEN COMPLETED AND THAT A UNIFORM PERENNIAL VEGETATIVE COVER WITH A DENSITY OF 70 % FOR THE AREA HAS BEEN ESTABLISHED OR EQUIVALENT STABILIZATION MEASURES (SUCH AS THE USE OF MULCHES OR GEOTEXTILES) HAVE BEEN EMPLOYED.

10. MAINTENANCE REQUIREMENTS AND SCHEDULES
EROSION AND SEDIMENT CONTROL MEASURES ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED FOR STABILITY AND OPERATION FOLLOWING EVERY RUNOFF PRODUCING RAINFALL BUT IN NO CASE LESS THAN ONCE EVERY WEEK. ANY NEEDED REPAIRS SHALL BE MADE IMMEDIATELY TO MAINTAIN ALL MEASURES AS DESIGNED.

SEDIMENT SHALL BE REMOVED FROM BEHIND THE SILT FENCE WHEN IT BECOMES APPROXIMATELY 6 INCHES DEEP AT THE FENCE. ENSURE THAT NO CONCENTRATED FLOWS ARE DIRECTED TOWARDS THE FENCE. REPLACE THE SILT FENCE WHEN "BULGES" DEVELOP IN THE FENCE.

ALL SEEDED AREAS SHALL BE FERTILIZED, RE-SEEDED AS NECESSARY AND MULCHED TO MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.

SEDIMENT SPILLED, DROPPED OR WASHED ONTO EXISTING MACADAM ROADWAYS MUST BE MOVED IMMEDIATELY. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING THE STORM DRAINS. ADDITIONAL AGGREGATE SHALL BE ADDED TO THE STABILIZED CONSTRUCTION ENTRANCES AS REQUIRED.

MAINTAIN DUST CONTROL MEASURES THROUGH DRY WEATHER PERIODS UNTIL ALL DISTURBED AREAS ARE STABILIZED.

REV.	DATE	DESCRIPTION	BY

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SHEET NO.
16 OF 16

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FILE NO.