COMMITMENT & INTEGRITY DRIVE RESULTS

1520 Highland Avenue
Cheshire, Connecticut 06410
www.woodardcurran.com

T 888.265.8969
T 203.271.0379
F 203.271.7952

March 25, 2016

Heidi Samokar, AICP
Director of Planning & Development
Town of Tolland
21 Tolland Green,
Tolland, Connecticut 06084

Re: Site Plan Application for Ground-Mounted Solar Photovoltaic Project, 327 South River Road
Response to Comments

Dear Heidi:

On behalf of the Applicant, WR-TGC Solar Generation XVI, LLC (TGC), we are submitting this response to comments on the Site Plan Application for the proposed solar project at 327 South River Road in Tolland, Connecticut. Comments were received via email on March 21, 2016, from Janet Carter Bernardo, PE, Senior Project Manager at Horsley Witten Group (the Town of Tolland Third-Party Reviewer). These comments have been provided below in italics, followed by our response:

1. *The Applicant has utilized a Curve Number (CN) value of 39 (>75% Grass cover, Good, HSG A) which corresponds to Open Space, lawns, parks, golf courses, etc. or to Pasture, grassland, or range – continuous forage for grazing as described in the Urban Hydrology for Small WatershedsTR-55 Manual. After reviewing the photographs provided HW would recommend that for pre-development conditions a CN value of 30 is utilized which corresponds to Meadow or Brush, while a CN value of 39 (>75% Grass cover, Good, HSG A) is appropriate for post-development conditions.*

   The HydroCAD model has been revised to utilize the recommended CN values, in addition to the revisions described in our response to Comments #5 and #6, as shown in the attached HydroCAD Reports for Pre- and Post-Development Conditions.

   The Town's Flood Protection requirement applies to projects where the post-development Runoff Curve Number (RCN) exceeds the pre-development RCN. The pre-development RCN for the project site is equal to 30 (as shown in the attached HydroCAD Report). The post-development RCN for the project site, including the proposed impervious area, is equal to 39 (as shown in the attached HydroCAD Report).

   The table below summarizes the results of the HydroCAD analysis and demonstrates that the proposed development will not result in an increase in the peak rate of runoff from the site during the 2-, 10-, and 100-year, 24-hour storms and will therefore comply with the objectives of the Flood Protection requirements:

Study Point	Peak Rate of Runoff (CFS)		
	2-year, 24-hour Storm	10-year, 24-hour Storm	100-year, 24-hour Storm
Pre-Development Conditions	6.3	6.3	6.5
Post-Development Conditions	0.0	0.0	4.5
Net Change	*-6.3*	*-6.3*	*-2.0*

2. *HW recommends that an Operation & Maintenance Plan be provided which describes how the drainage swale and stormwater basin will be maintained, including the frequency of inspections and the need to remove debris, repair gullies, and monitor the functionality of the level spreader.*

   An Operation & Maintenance (O&M) Plan is attached, which describes how the drainage swale and stormwater basin will be maintained, including the frequency of inspections and the need to remove debris, repair gullies, and to monitor the functionality of the level spreader.

3. *The Operation & Maintenance Plan should also include requirements for maintaining grass cover (e.g., revegetating areas that become barren) to reduce the potential for erosion and list the frequency the grass is to be cut annually.*

   An O&M Plan is attached, which includes requirements for maintaining grass cover (e.g., revegetating areas that become barren) to reduce the potential for erosion and specifies that the grass is to be cut annually.

4. *As the functioning of the stormwater system depends on the area beneath the solar panels being maintained as grass, it is critical that the vegetation establishes quickly and any gullies that form before then are repaired as necessary. HW recommends that a note be added to the plans requiring the contractor to water the newly seeded areas for one year and reseed barren areas and repair gullies as necessary.*

   The attached O&M Plan requirements for maintaining grass cover specifies that newly seeded areas shall be watered for one year and that barren areas will be re-seeded. As described in the O&M Plan, a Ground Lease Agreement will be executed between the Town of Tolland (Lessor) and TGC (Lessee). As the Operator of the Site, TGC will be the responsible party for implementing the O&M Plan. These requirements have also been added as Note 15 on Sheet C-101.

5. *It appears that the surface area values input for Pond 1P are not accurate. HW recommends that the Applicant verify the values provided and adjust the HydroCAD model as necessary.*

   The surface area values input for Pond 1P have been verified and the HydroCAD model has been adjusted to accurately reflect the design drawings, and the stormwater calculations have been revised as described in our response to Comment #1 above.

6. *The Applicant has noted that there is an existing 12-inch culvert which flows into a ditch that bisects the site. The proposed design includes the ditch being redirected through a drainage swale with check dams into the proposed stormwater basin. It does not appear that the*

stormwater basin has been sized to manage the additional flow from the 12-inch culvert. HW recommends that the Applicant address the quantity of flow from the culvert and how it will be directed under post-development conditions to verify that erosion does not occur on the abutting down gradient property.

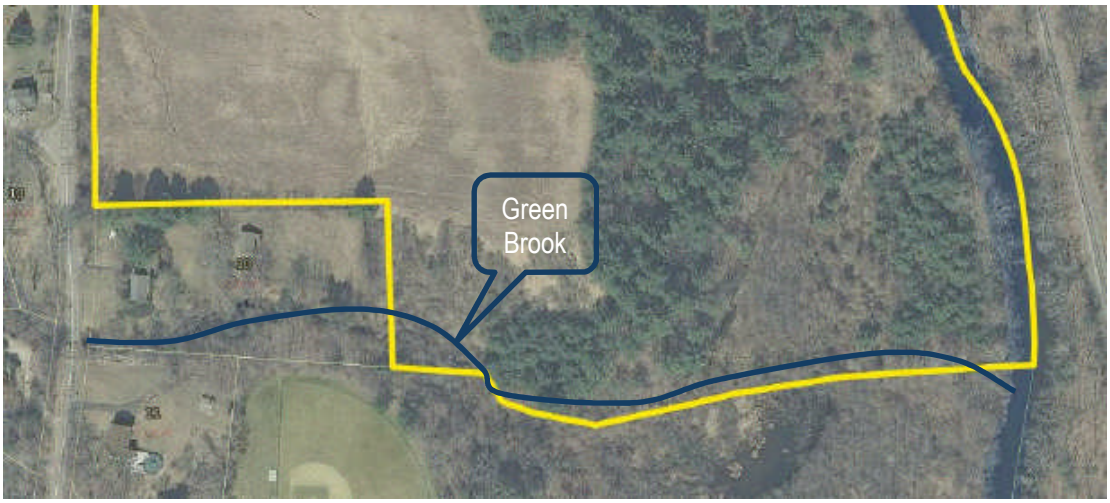
Woodard & Curran has updated the HydroCAD model to include the flow from the existing 12-inch culvert, based on the maximum flow capacity of the pipe calculated by Manning's Equation. Utilizing the conservative assumption that this culvert is flowing full and discharges flow to the proposed stormwater basin during peak flow on the Site, this flow was manually inserted into the HydroCAD model. The revised model demonstrates that the proposed basin is adequately sized to manage this additional flow while maintaining non-erosive flows onto the abutting down gradient property. The stormwater calculations have been revised as described in our response to Comment #1 above.

7. *The Applicant notes on the existing conditions plan that the 12-inch culvert pipe is silted in. HW recommends that the pipe be cleaned during the construction process and that rip rap be proposed at the outlet to protect the proposed swale against scour from high flows exiting the culvert.*

   Note 14 has been added to Sheet C-101, which specifies that the Contractor shall clean the existing 12-inch culvert. Additionally, riprap outlet protection has been noted at the outlet of the existing 12-inch culvert; a detail is provided on Sheet D-200. The revised design drawings are attached.

8. *On the USGS locus there appears to be a stream along the south property line. Green Brook appears to discharge to the Willimantic River. It appears that the parcel being developed flows towards this stream; however the proposed connection is not clear. The proposed stormwater basin is designed to overflow via a 20 foot level spreader directed towards the property at 343 South River Road. HW recommends that the Applicant verify the location of the stream on the property owned by the Town of Tolland and confirm that the proposed flow is contained within the property boundaries prior to discharging to Green Brook.*

   Green Brook crosses the property at 343 South River Road and is located along the southern edge of the property owned by the Town of Tolland prior to discharging to the Willimantic River, as shown in the following screenshot of the Town's GIS Map of the site:



The proposed project will not discharge directly to Green Brook. Under pre-development conditions, stormwater runoff from the site is conveyed via overland flow onto the property at 343 South River Road. The proposed project will continue to discharge stormwater runoff from the site onto the property at 343 South River Road. All runoff associated with the proposed development will be collected and contained within the proposed stormwater basin prior to discharging onto the abutting property. This basin fully retains stormwater volumes during the 2-year and 10-year storm events, and significantly reduces the peak rate of runoff for the 100-year event.

9. *HW recommends that the Applicant provide permanent erosion control measures along the drip line of the solar panels to decrease the likelihood of scour from sheeting stormwater runoff from the panels.*

   As described in the Soil Erosion and Sediment Control Plan previously submitted as Appendix E of the Site Plan Application, permanent erosion control measures will consist of the proposed stabilized cover of the Site. The area under the panels will be stabilized with vegetation. Based on our experience installing solar panels on similar grassed sites, and based on the proposed slopes, scour from sheeting stormwater runoff from the panels is not likely. The low end of each rack of panels will be approximately 2'-6" above grade and, as a result, stormwater runoff from the panels will not be sheeting at a high velocity. Similar projects have been completed in New England with success, and photographs of examples are provided below:

Photograph #1 – Solar panels on landfill in Concord, MA

Photograph #2 – Solar panels on landfill in Sudbury, MA

10. *HW further recommends the installation of temporary erosion control measures to effectively minimize exposed soils along the steep slopes.*

    A note has been added to Sheet C-101 requiring the installation of intermediate erosion control barriers and mulch anchors, as necessary. Furthermore, the Soil Erosion and Sediment Control Plan previously submitted as Appendix E of the Site Plan Application requires that mulch anchoring be applied as needed on slopes.

11. *HW recommends that a detail for the proposed level spreader be included on the Details sheet of the plan set. The detail should include notes on material, length, width, depth and installed top of spreader elevation.*

    A Level Spreader detail has been added to Sheet D-201, which specifies the material, dimensions, and elevation of the level spreader. The revised design drawings are attached.

12. *The Applicant has provided recharge and water quality calculations in compliance with the Town of Tolland Low Impact Development and Stormwater Management Design Manual. Per the Applicant the stormwater basin has been designed to promote infiltration. The design appears to cut approximately 3 to 5 feet of existing material to form the stormwater basin. HW did not receive any soil test pit data in the vicinity of the basin and therefore recommends that the Applicant verify that there is the necessary separation between the bottom of the basin and the estimated seasonal high ground water table beneath the basin.*

    Due to the timing of another Town of Tolland solar development that will also require test pits, we respectfully request that these test pits be conducted as a condition of approval, so that they can be conducted in conjunction with the other project. As noted, Woodard & Curran has utilized conservative assumptions in the design of the proposed basin and we do not foresee changes to the design being necessary. However, if test results indicate unforeseen groundwater conditions, Woodard & Curran is prepared to make modifications for approval prior to construction of the basin.

Enclosed, please find revised HydroCAD Reports, an O&M Plan, and the revised plan set as supporting documents for the comments that have been received. Changes within the revised plan set have been noted with a revision date, and revisions have been clouded.

If you have any additional comments or questions, please do not hesitate to reach out to us. Thank you for your help in coordinating the review of this project.

Sincerely,

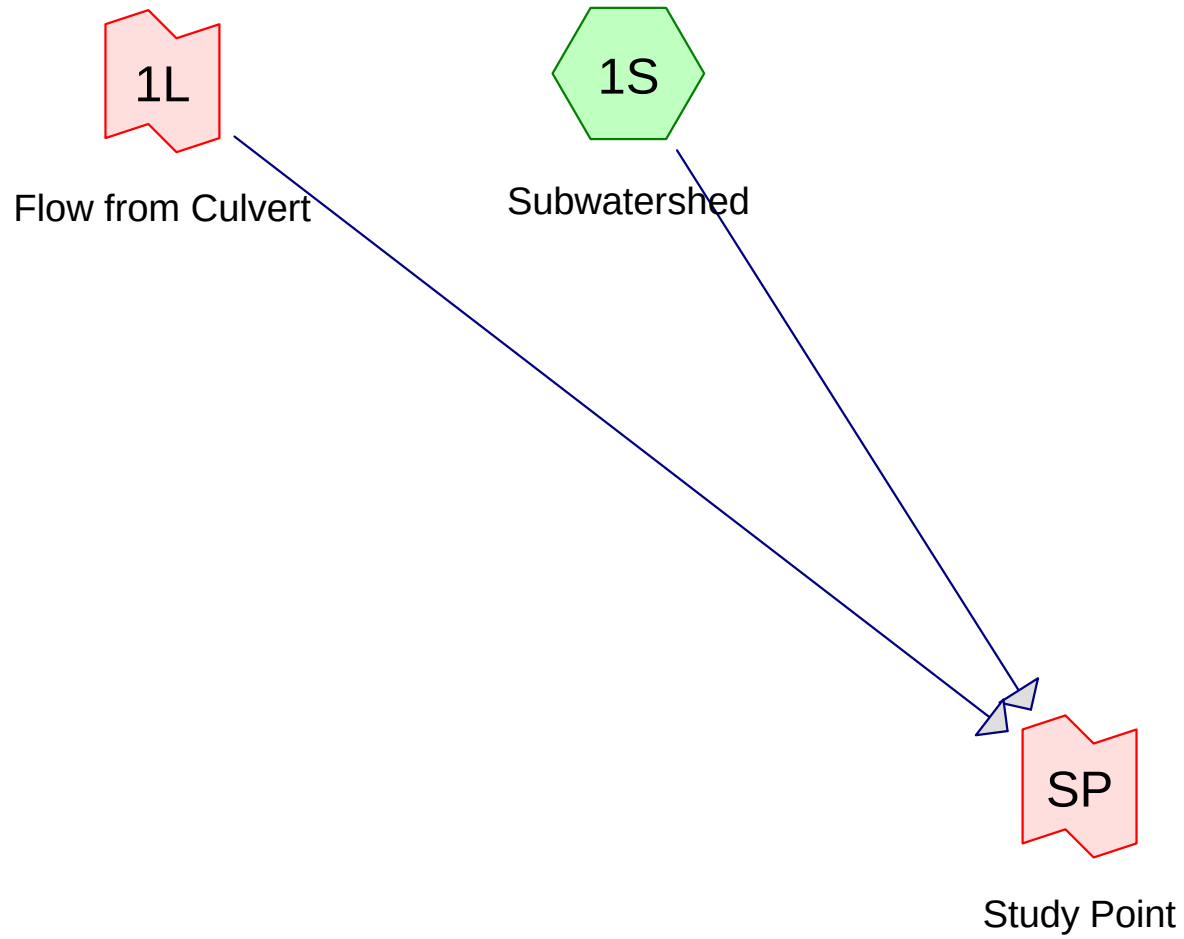
WOODARD & CURRAN INC.

Alan Benevides, PE, LSP
Senior Principal

Denise Cameron, PE
Project Manager

Enclosures: Revised HydroCAD Reports
O&M Plan
Revised Plan Set

PN: 228051.01



Subcat Reach Pond Link

Routing Diagram for 2a. Pre
Prepared by Woodard & Curran, Printed 3/24/2016
HydroCAD® 10.00-15 s/n 01204 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.142	30	Brush, Good, HSG A (1S)
0.236	32	Woods/grass comb., Good, HSG A (1S)
7.378	**30**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subwatershed Runoff Area=321,403 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=835' Tc=16.0 min CN=30 Runoff=0.00 cfs 0.000 af

Link 1L: Flow from Culvert Manual Hydrograph Inflow=6.26 cfs 0.245 af
Primary=6.26 cfs 0.245 af

Link SP: Study Point Inflow=6.26 cfs 0.245 af
Primary=6.26 cfs 0.245 af

Total Runoff Area = 7.378 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 7.378 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subwatershed

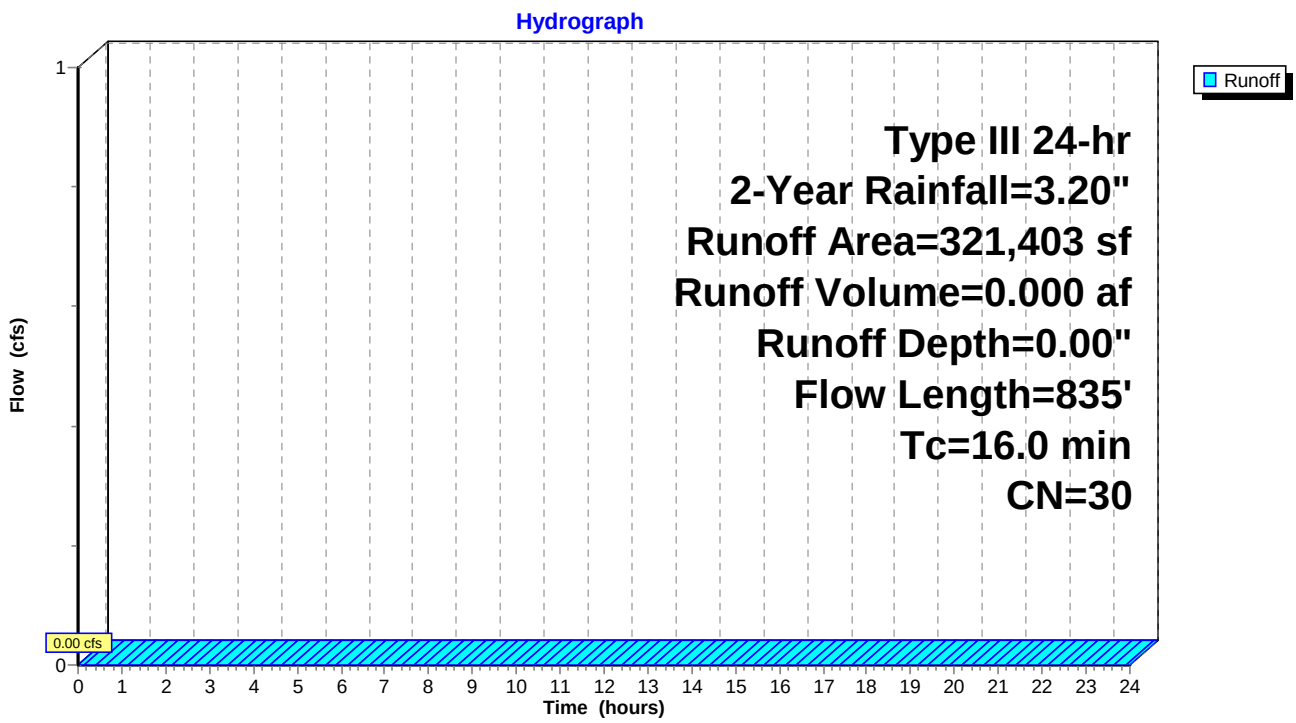
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
10,299	32	Woods/grass comb., Good, HSG A
311,104	30	Brush, Good, HSG A
321,403	30	Weighted Average
321,403		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.0900	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.16"
9.2	785	0.0410	1.42		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
16.0	835	Total			

Subcatchment 1S: Subwatershed



Summary for Link 1L: Flow from Culvert

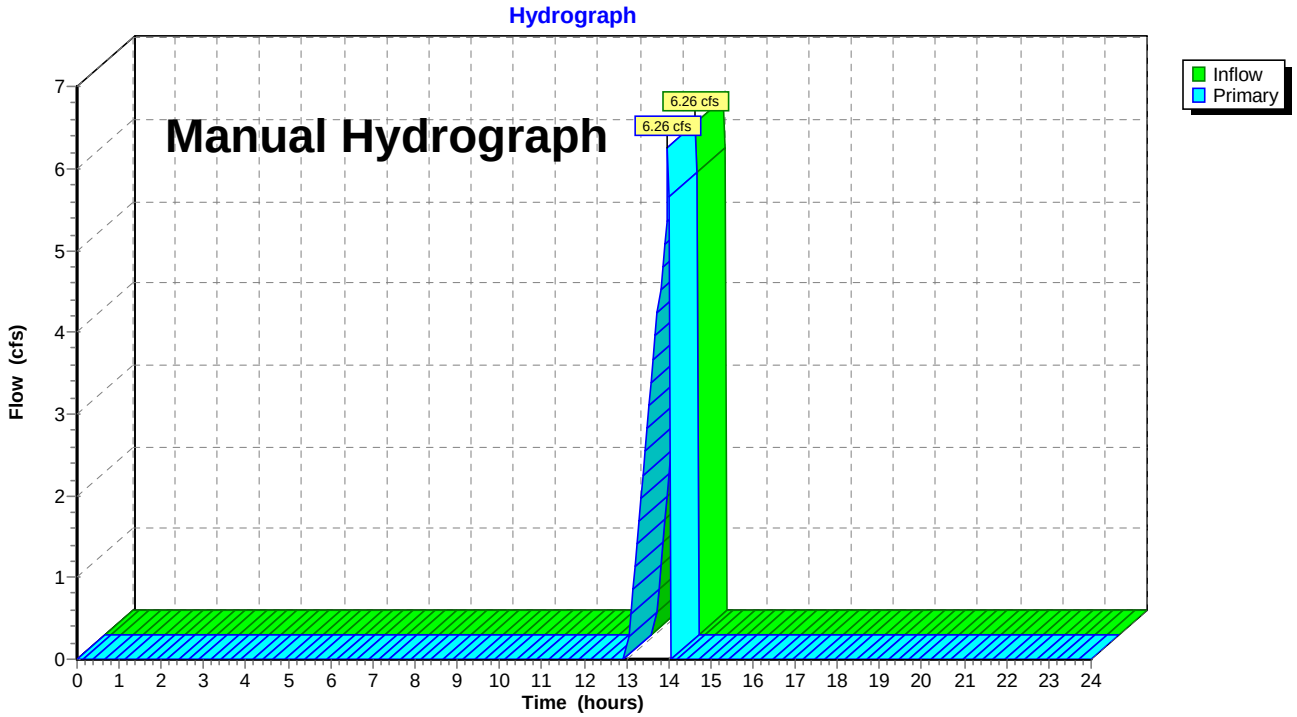
Inflow	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af
Primary	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

15 Point manual hydrograph, To= 0.00 hrs, dt= 1.00 hrs, cfs =

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.65					

Link 1L: Flow from Culvert

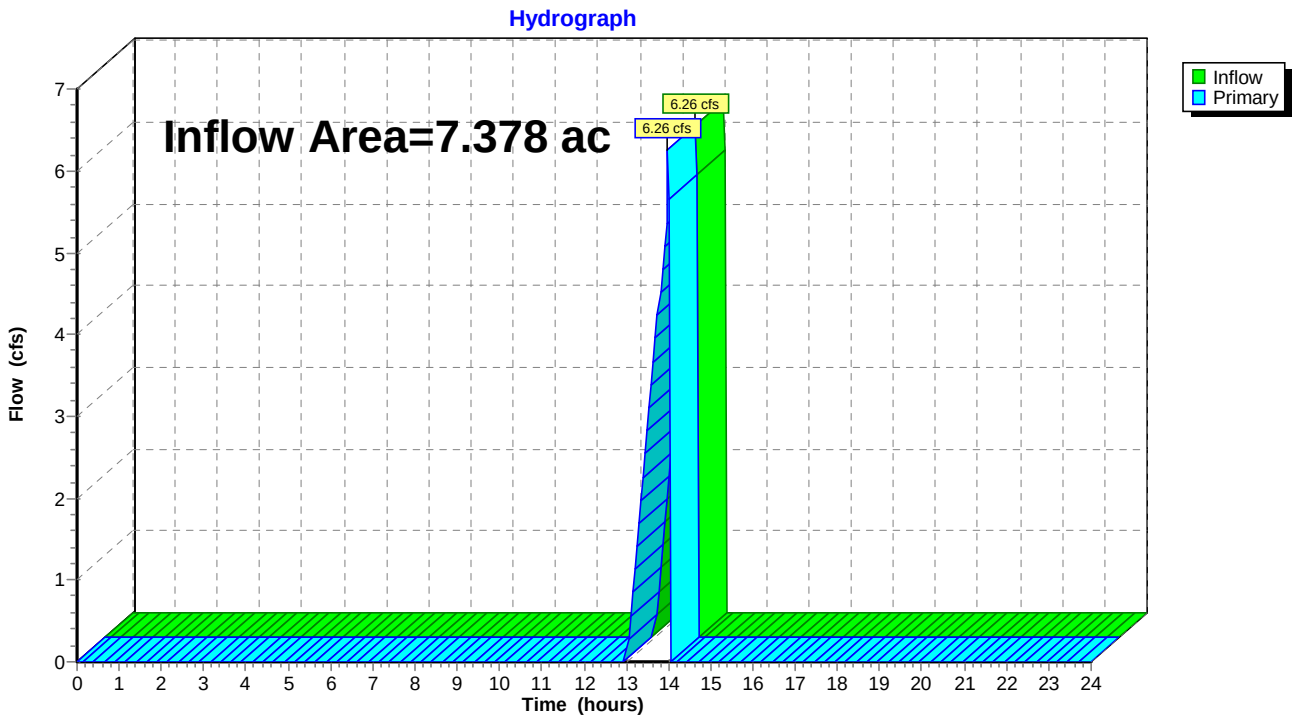


Summary for Link SP: Study Point

Inflow Area = 7.378 ac, 0.00% Impervious, Inflow Depth = 0.40" for 2-Year event
Inflow = 6.26 cfs @ 13.98 hrs, Volume= 0.245 af
Primary = 6.26 cfs @ 13.98 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link SP: Study Point



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subwatershed Runoff Area=321,403 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=835' Tc=16.0 min CN=30 Runoff=0.00 cfs 0.000 af

Link 1L: Flow from Culvert Manual Hydrograph Inflow=6.26 cfs 0.245 af
Primary=6.26 cfs 0.245 af

Link SP: Study Point Inflow=6.26 cfs 0.246 af
Primary=6.26 cfs 0.246 af

Total Runoff Area = 7.378 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 7.378 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subwatershed

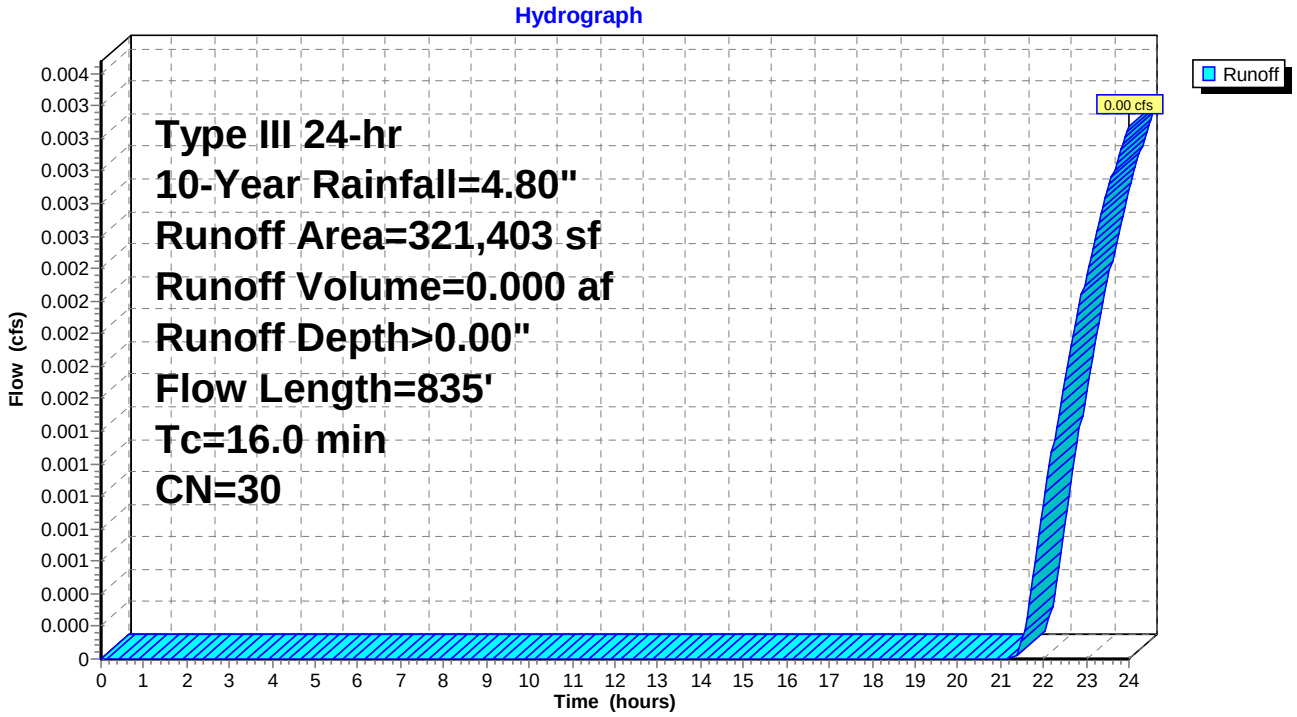
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
10,299	32	Woods/grass comb., Good, HSG A
311,104	30	Brush, Good, HSG A
321,403	30	Weighted Average
321,403		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.0900	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.16"
9.2	785	0.0410	1.42		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
16.0	835	Total			

Subcatchment 1S: Subwatershed



Summary for Link 1L: Flow from Culvert

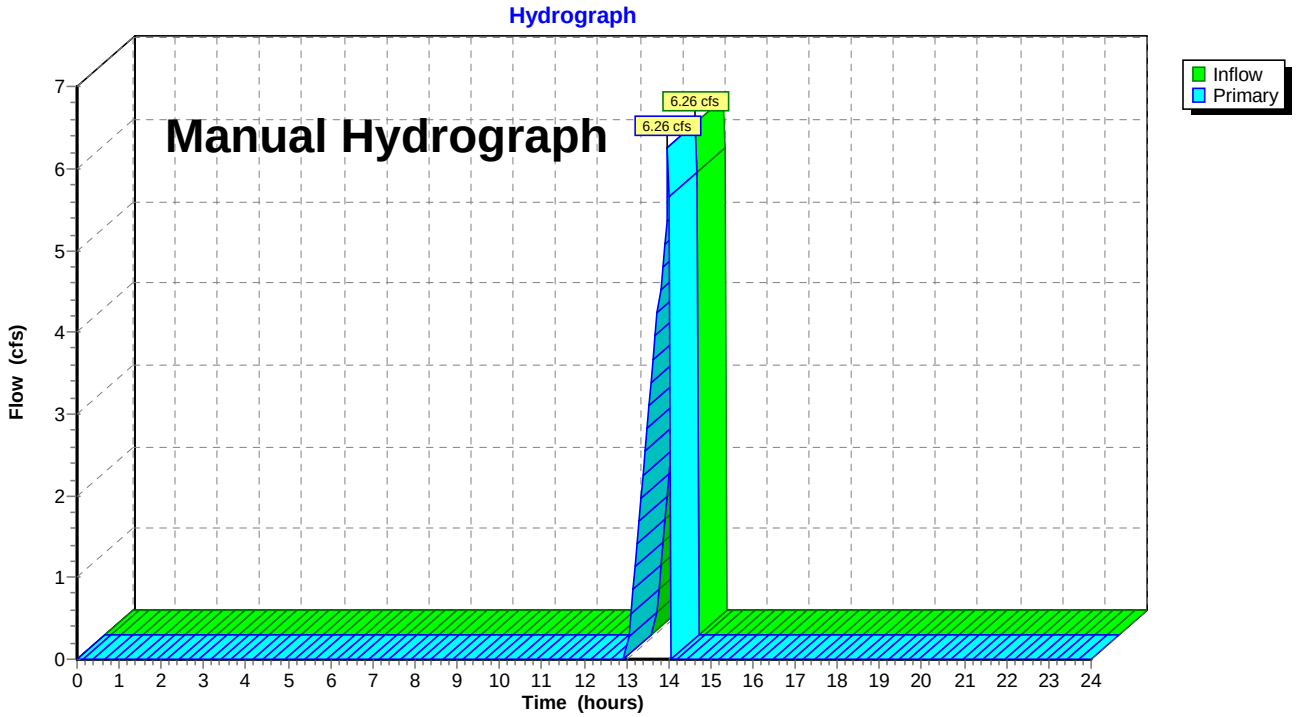
Inflow	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af
Primary	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

15 Point manual hydrograph, To= 0.00 hrs, dt= 1.00 hrs, cfs =

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.65					

Link 1L: Flow from Culvert

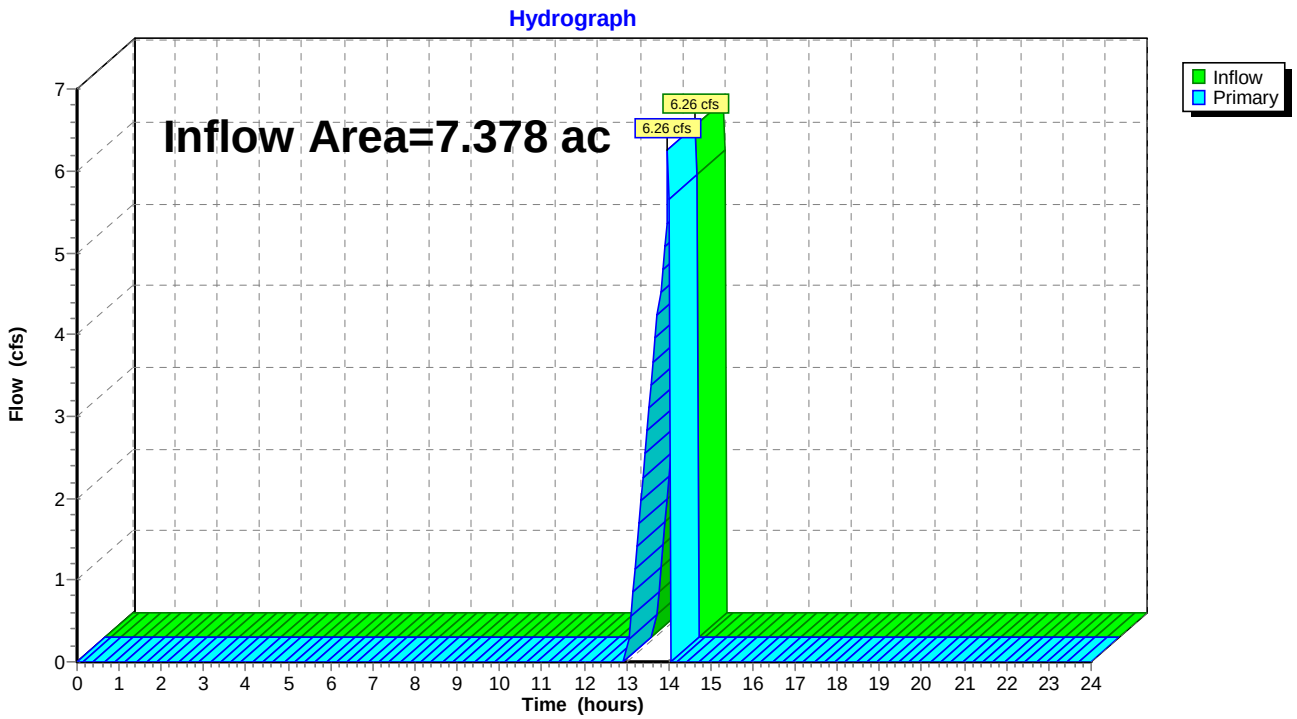


Summary for Link SP: Study Point

Inflow Area = 7.378 ac, 0.00% Impervious, Inflow Depth > 0.40" for 10-Year event
Inflow = 6.26 cfs @ 13.98 hrs, Volume= 0.246 af
Primary = 6.26 cfs @ 13.98 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link SP: Study Point



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subwatershed Runoff Area=321,403 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=835' Tc=16.0 min CN=30 Runoff=0.19 cfs 0.119 af

Link 1L: Flow from Culvert Manual Hydrograph Inflow=6.26 cfs 0.245 af
Primary=6.26 cfs 0.245 af

Link SP: Study Point Inflow=6.45 cfs 0.364 af
Primary=6.45 cfs 0.364 af

Total Runoff Area = 7.378 ac Runoff Volume = 0.119 af Average Runoff Depth = 0.19"
100.00% Pervious = 7.378 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Subwatershed

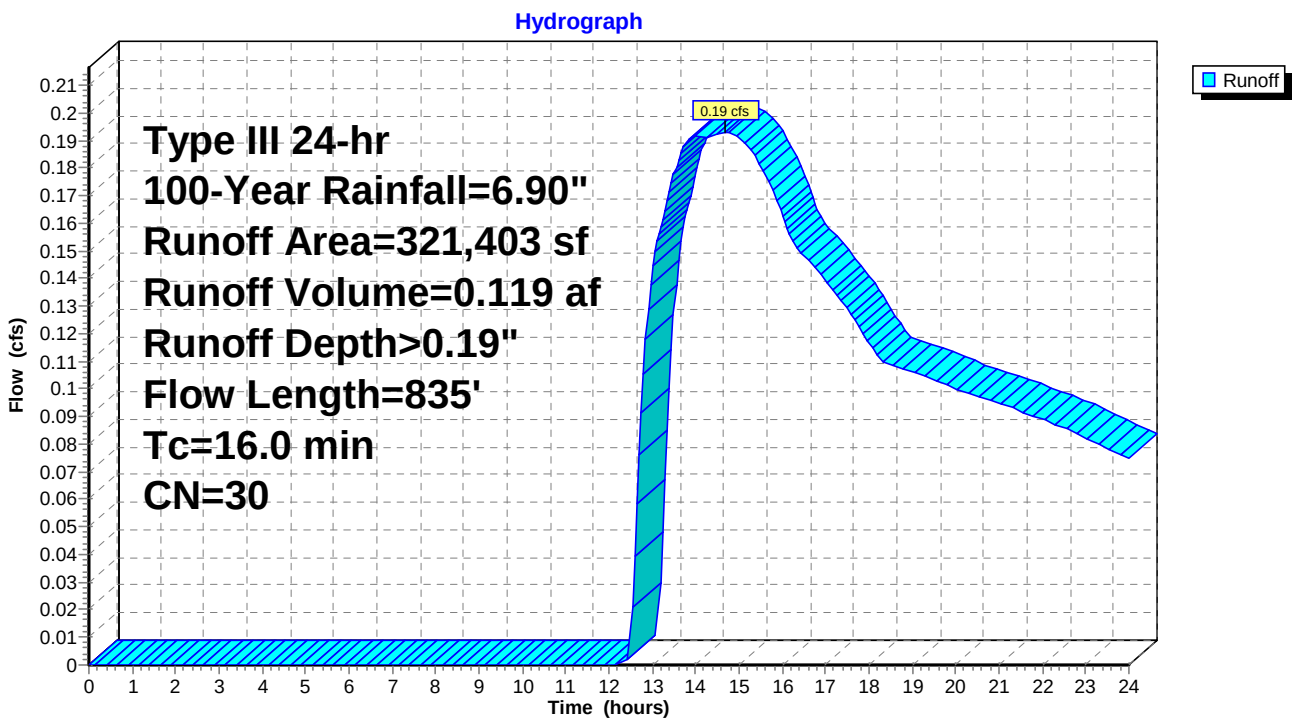
Runoff = 0.19 cfs @ 14.67 hrs, Volume= 0.119 af, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.90"

Area (sf)	CN	Description
10,299	32	Woods/grass comb., Good, HSG A
311,104	30	Brush, Good, HSG A
321,403	30	Weighted Average
321,403		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.0900	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.16"
9.2	785	0.0410	1.42		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
16.0	835	Total			

Subcatchment 1S: Subwatershed



Summary for Link 1L: Flow from Culvert

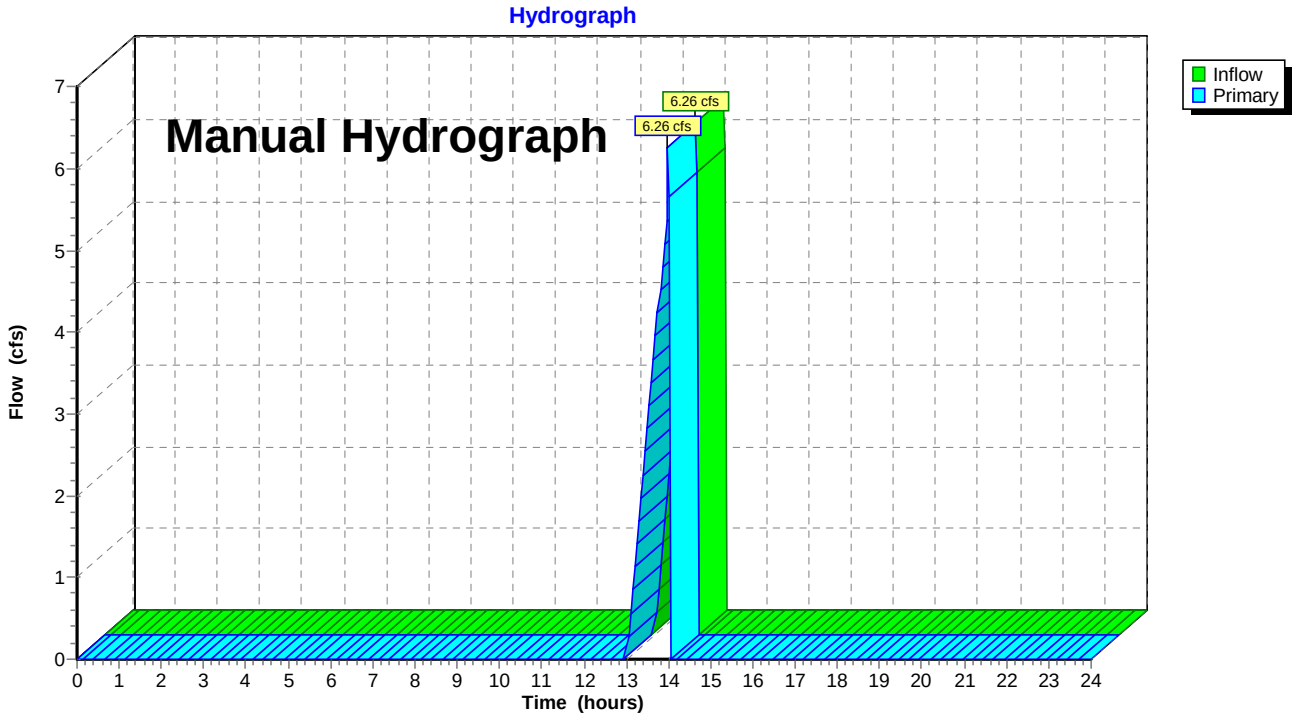
Inflow	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af
Primary	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

15 Point manual hydrograph, To= 0.00 hrs, dt= 1.00 hrs, cfs =

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.65					

Link 1L: Flow from Culvert

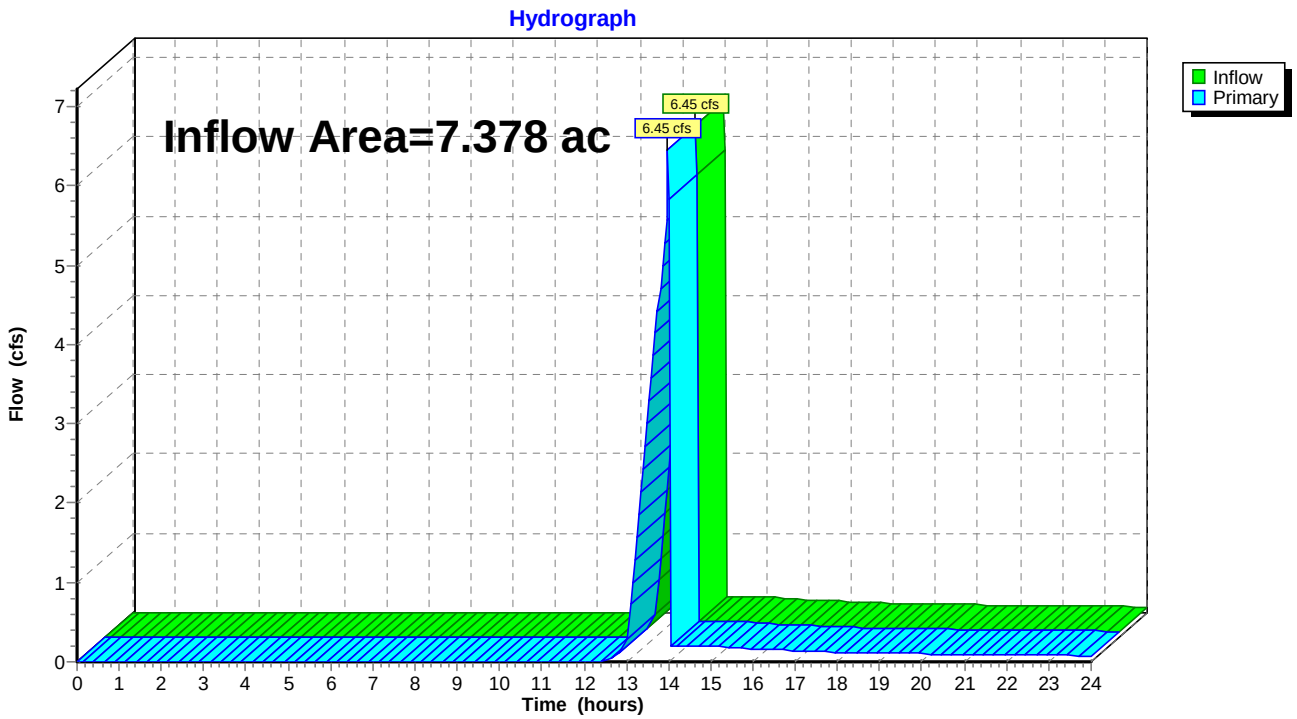


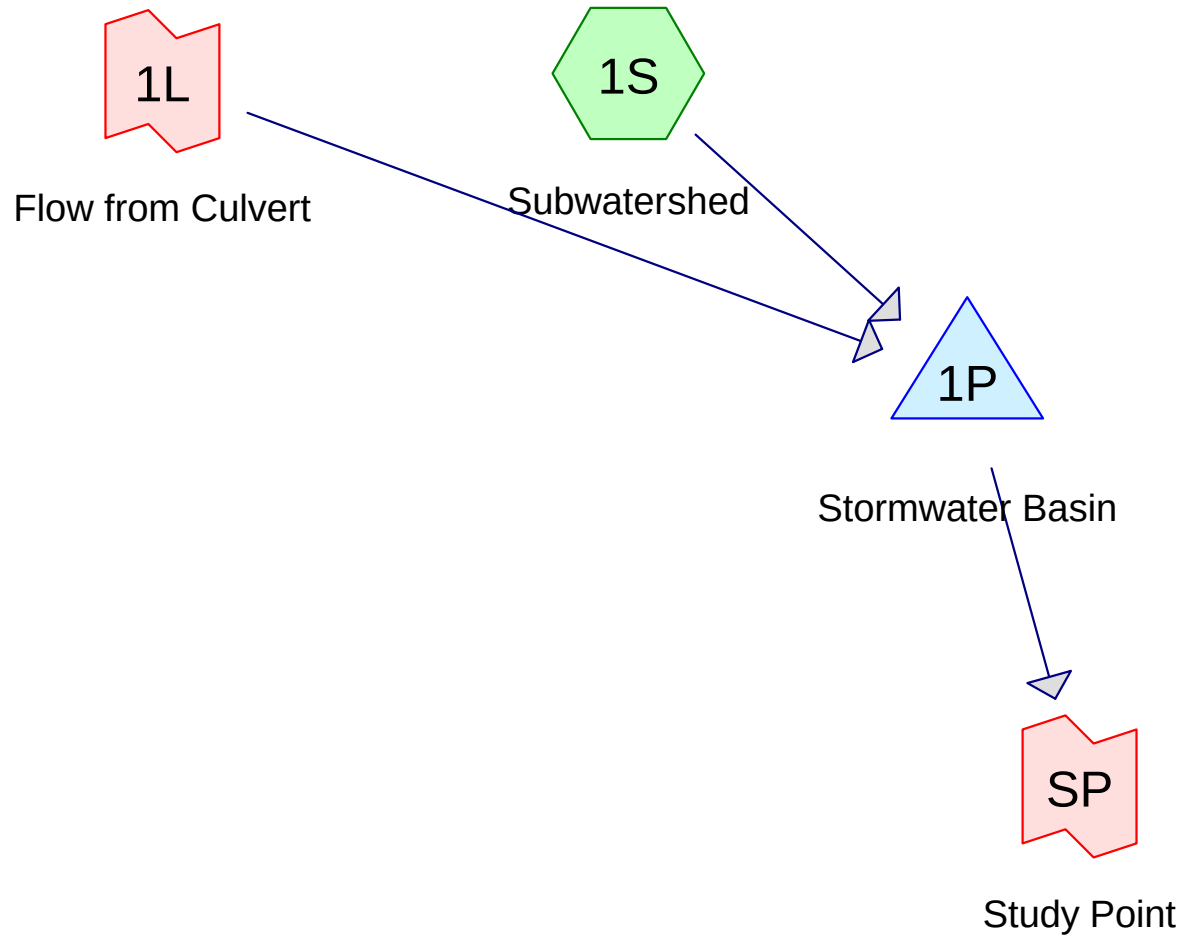
Summary for Link SP: Study Point

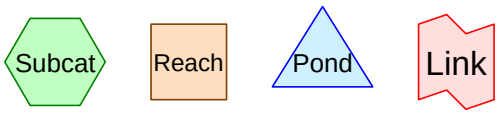
Inflow Area = 7.378 ac, 0.00% Impervious, Inflow Depth > 0.59" for 100-Year event
Inflow = 6.45 cfs @ 13.98 hrs, Volume= 0.364 af
Primary = 6.45 cfs @ 13.98 hrs, Volume= 0.364 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link SP: Study Point







Routing Diagram for 2b. Post
Prepared by Woodard & Curran, Printed 3/24/2016
HydroCAD® 10.00-15 s/n 01204 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.796	39	>75% Grass cover, Good, HSG A (1S)
0.064	98	Impervious Area (1S)
0.518	32	Woods/grass comb., Good, HSG A (1S)
7.378	**39**	**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subwatershed Runoff Area=321,403 sf 0.86% Impervious Runoff Depth>0.00"
Flow Length=725' Tc=14.1 min CN=39 Runoff=0.00 cfs 0.000 af

Pond 1P: Stormwater Basin Peak Elev=370.95' Storage=10,686 cf Inflow=6.26 cfs 0.245 af
Outflow=0.00 cfs 0.000 af

Link 1L: Flow from Culvert Manual Hydrograph Inflow=6.26 cfs 0.245 af
Primary=6.26 cfs 0.245 af

Link SP: Study Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 7.378 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
99.14% Pervious = 7.315 ac 0.86% Impervious = 0.064 ac

Summary for Subcatchment 1S: Subwatershed

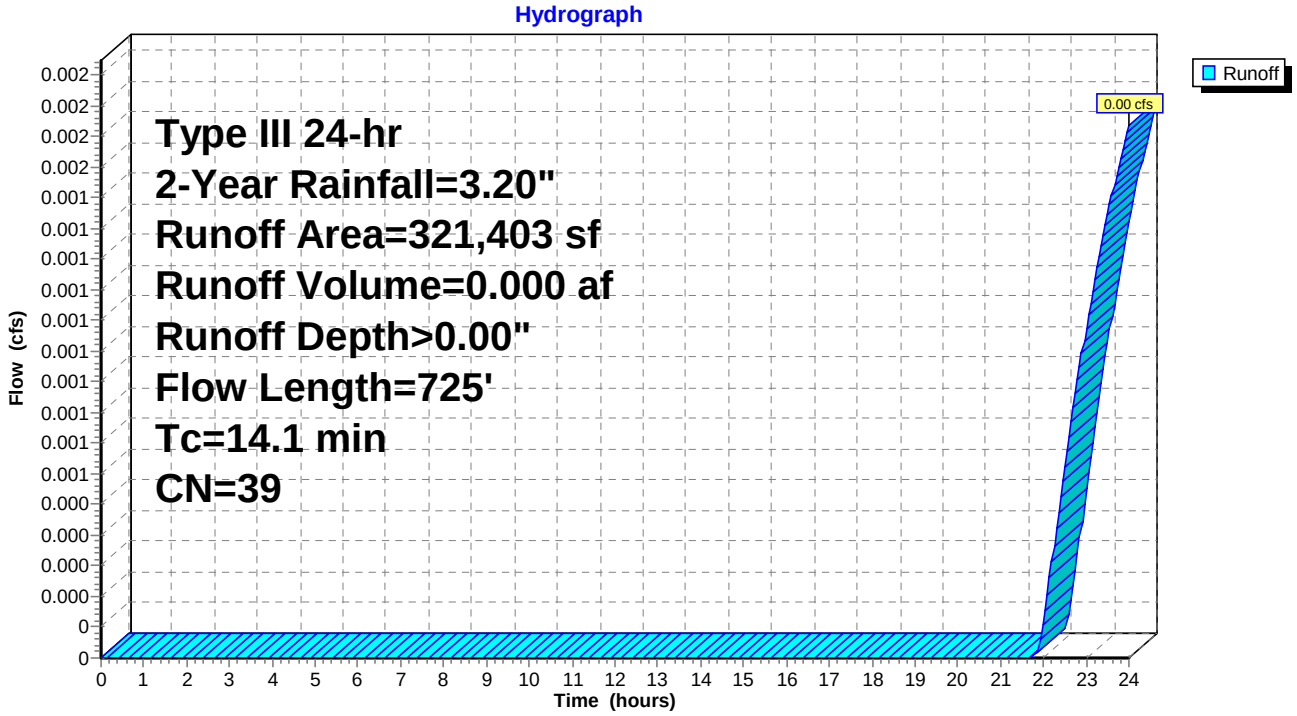
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	22,584	32	Woods/grass comb., Good, HSG A
	296,050	39	>75% Grass cover, Good, HSG A
*	2,769	98	Impervious Area
	321,403	39	Weighted Average
	318,634		99.14% Pervious Area
	2,769		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.0900	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.16"
7.3	675	0.0490	1.55		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
14.1	725	Total			

Subcatchment 1S: Subwatershed



Summary for Pond 1P: Stormwater Basin

Inflow Area = 7.378 ac, 0.86% Impervious, Inflow Depth > 0.40" for 2-Year event
Inflow = 6.26 cfs @ 13.98 hrs, Volume= 0.245 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 370.95' @ 24.00 hrs Surf.Area= 6,361 sf Storage= 10,686 cf
Flood Elev= 372.00' Surf.Area= 13,594 sf Storage= 20,978 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

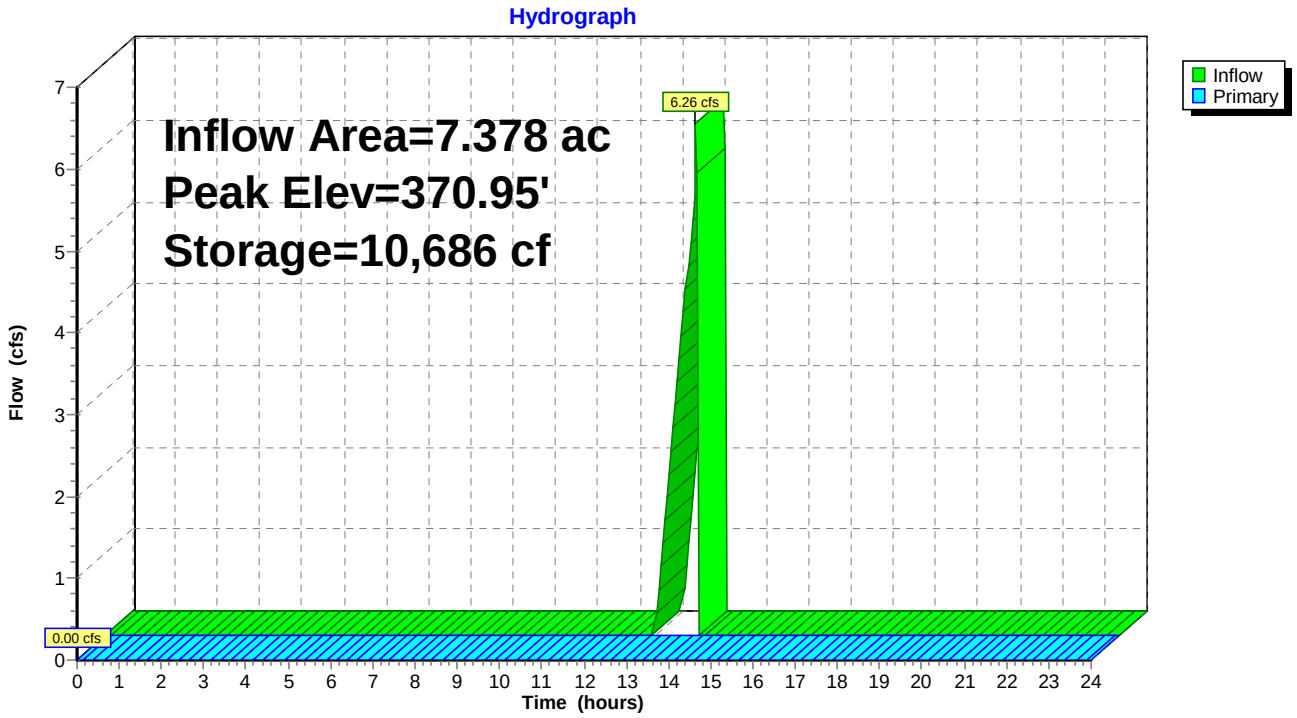
Volume	Invert	Avail.Storage	Storage Description
#1	369.00'	20,978 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
369.00	4,589	0	0
370.00	5,483	5,036	5,036
371.00	6,403	5,943	10,979
372.00	13,594	9,999	20,978

Device	Routing	Invert	Outlet Devices
#1	Primary	371.50'	**20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=369.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Stormwater Basin



Summary for Link 1L: Flow from Culvert

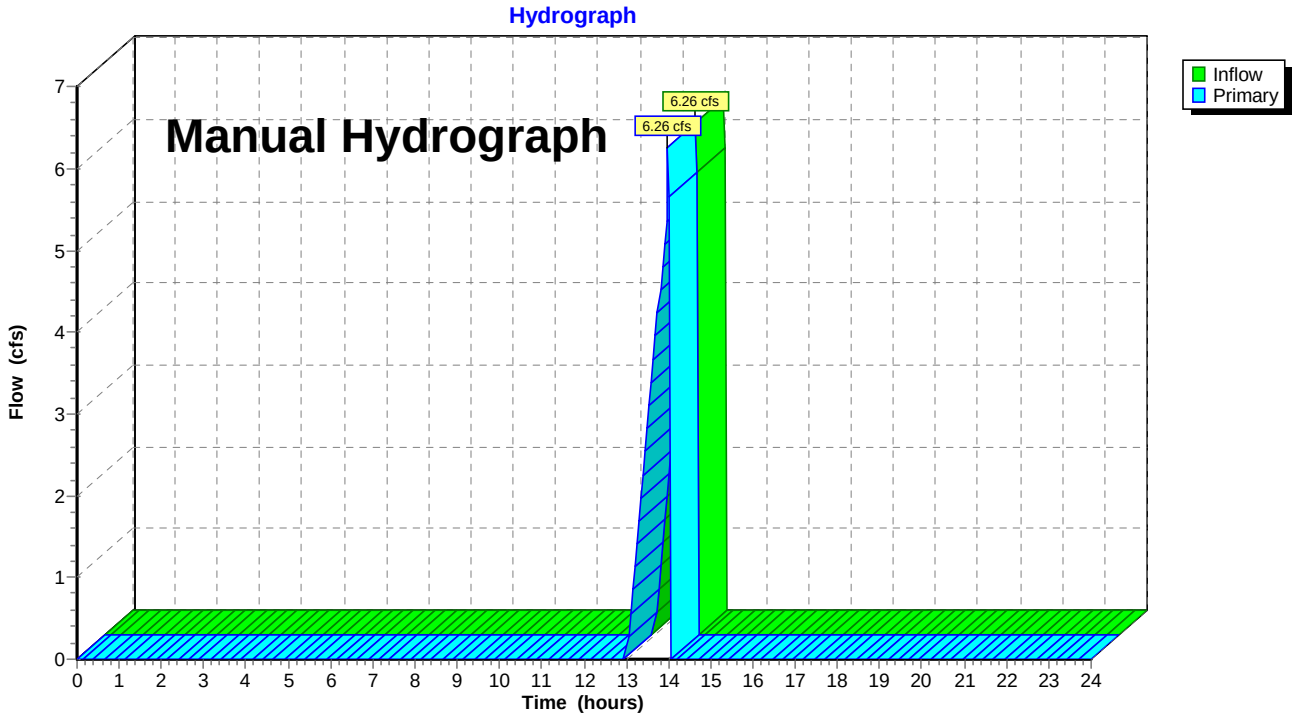
Inflow	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af
Primary	=	6.26 cfs @	13.98 hrs,	Volume=	0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

15 Point manual hydrograph, To= 0.00 hrs, dt= 1.00 hrs, cfs =

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.65					

Link 1L: Flow from Culvert

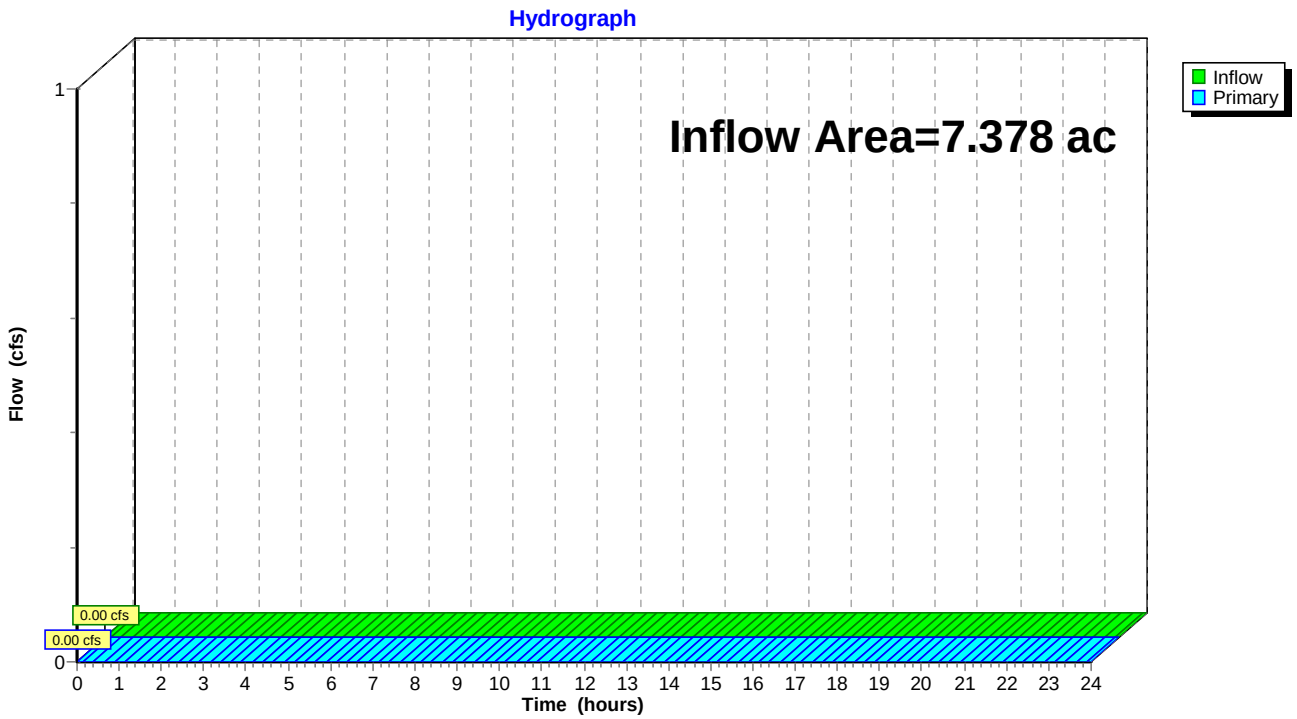


Summary for Link SP: Study Point

Inflow Area = 7.378 ac, 0.86% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link SP: Study Point



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subwatershed Runoff Area=321,403 sf 0.86% Impervious Runoff Depth>0.16"
Flow Length=725' Tc=14.1 min CN=39 Runoff=0.17 cfs 0.098 af

Pond 1P: Stormwater Basin Peak Elev=371.49' Storage=14,958 cf Inflow=6.42 cfs 0.344 af
Outflow=0.00 cfs 0.000 af

Link 1L: Flow from Culvert Manual Hydrograph Inflow=6.26 cfs 0.245 af
Primary=6.26 cfs 0.245 af

Link SP: Study Point Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 7.378 ac Runoff Volume = 0.098 af Average Runoff Depth = 0.16"
99.14% Pervious = 7.315 ac 0.86% Impervious = 0.064 ac

Summary for Subcatchment 1S: Subwatershed

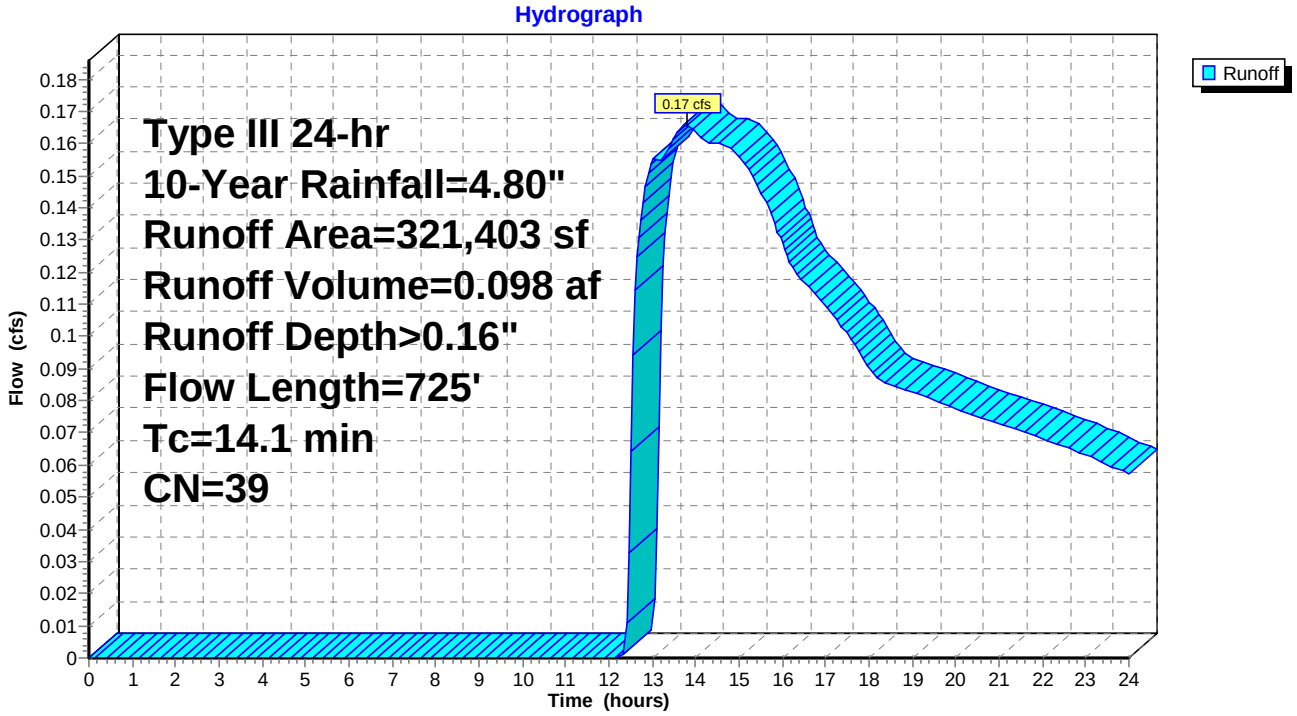
Runoff = 0.17 cfs @ 13.80 hrs, Volume= 0.098 af, Depth> 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
	22,584	32	Woods/grass comb., Good, HSG A
	296,050	39	>75% Grass cover, Good, HSG A
*	2,769	98	Impervious Area
	321,403	39	Weighted Average
	318,634		99.14% Pervious Area
	2,769		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.0900	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.16"
7.3	675	0.0490	1.55		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
14.1	725	Total			

Subcatchment 1S: Subwatershed



Summary for Pond 1P: Stormwater Basin

Inflow Area = 7.378 ac, 0.86% Impervious, Inflow Depth > 0.56" for 10-Year event
Inflow = 6.42 cfs @ 13.98 hrs, Volume= 0.344 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 371.49' @ 24.00 hrs Surf.Area= 9,911 sf Storage= 14,958 cf
Flood Elev= 372.00' Surf.Area= 13,594 sf Storage= 20,978 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

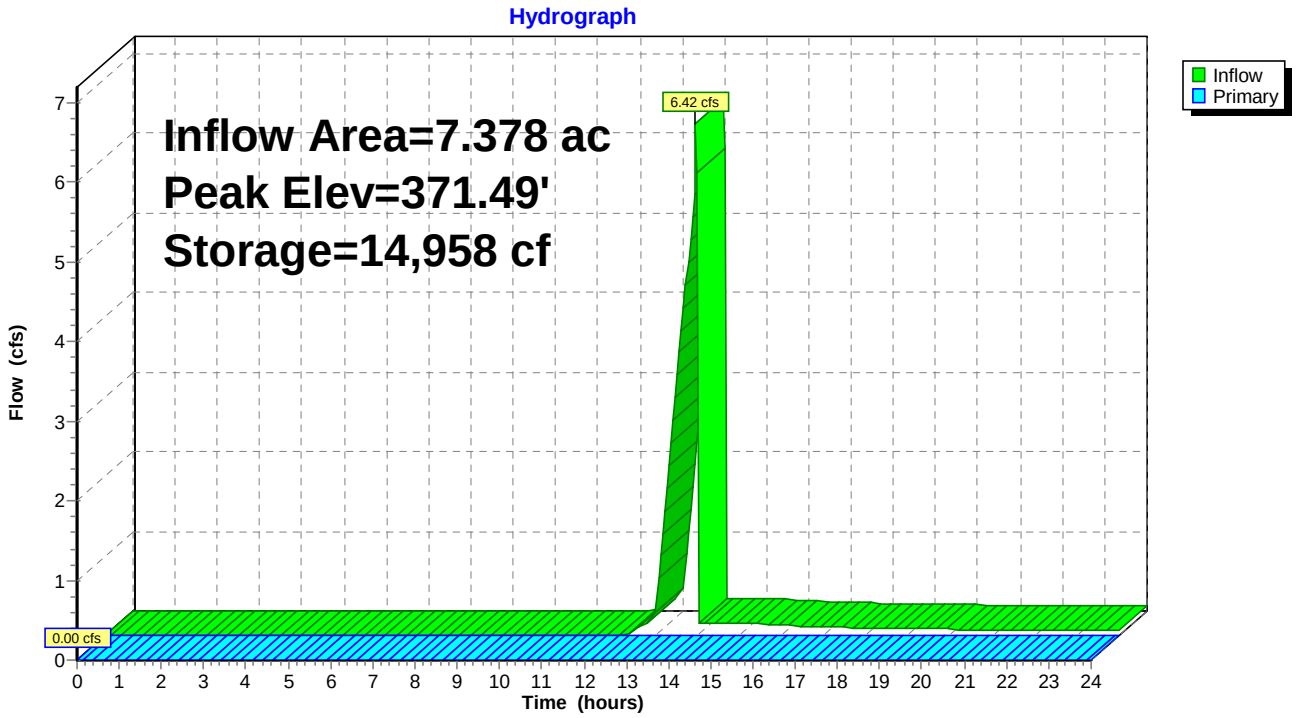
Volume	Invert	Avail.Storage	Storage Description
#1	369.00'	20,978 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
369.00	4,589	0	0
370.00	5,483	5,036	5,036
371.00	6,403	5,943	10,979
372.00	13,594	9,999	20,978

Device	Routing	Invert	Outlet Devices
#1	Primary	371.50'	**20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=369.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Stormwater Basin



Summary for Link 1L: Flow from Culvert

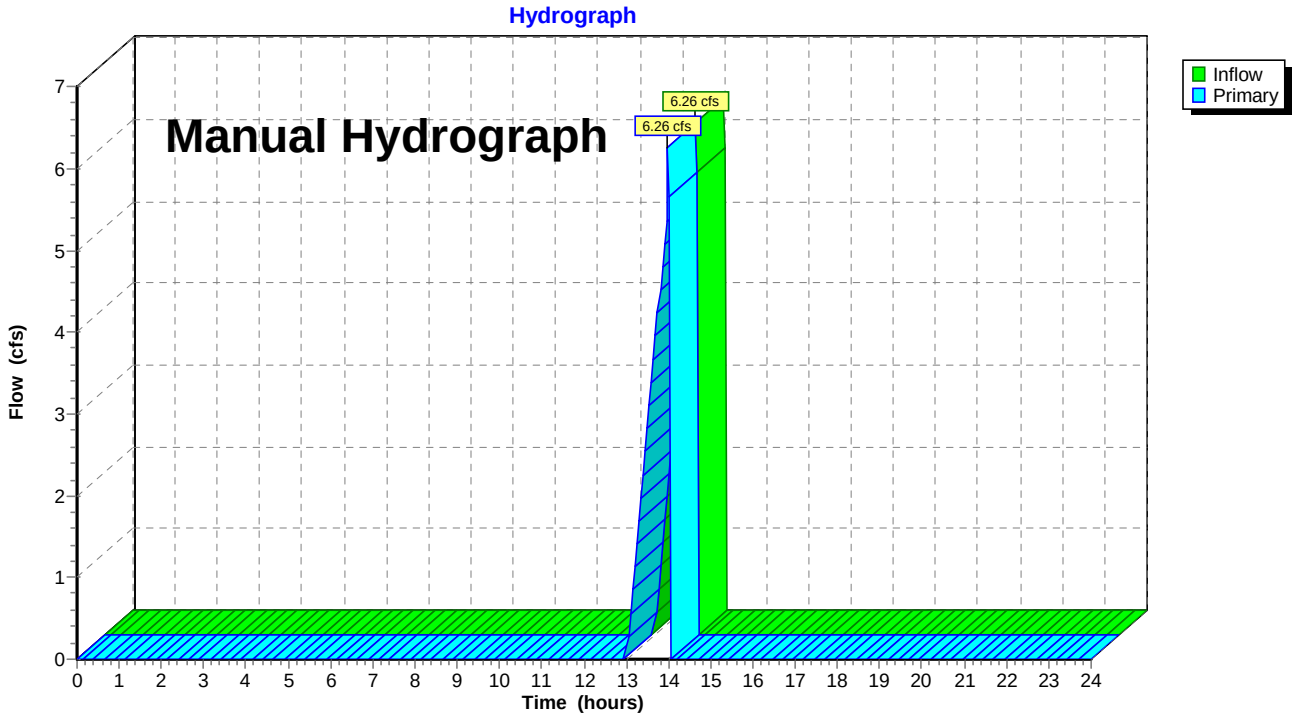
Inflow = 6.26 cfs @ 13.98 hrs, Volume= 0.245 af
Primary = 6.26 cfs @ 13.98 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

15 Point manual hydrograph, To= 0.00 hrs, dt= 1.00 hrs, cfs =

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.65					

Link 1L: Flow from Culvert

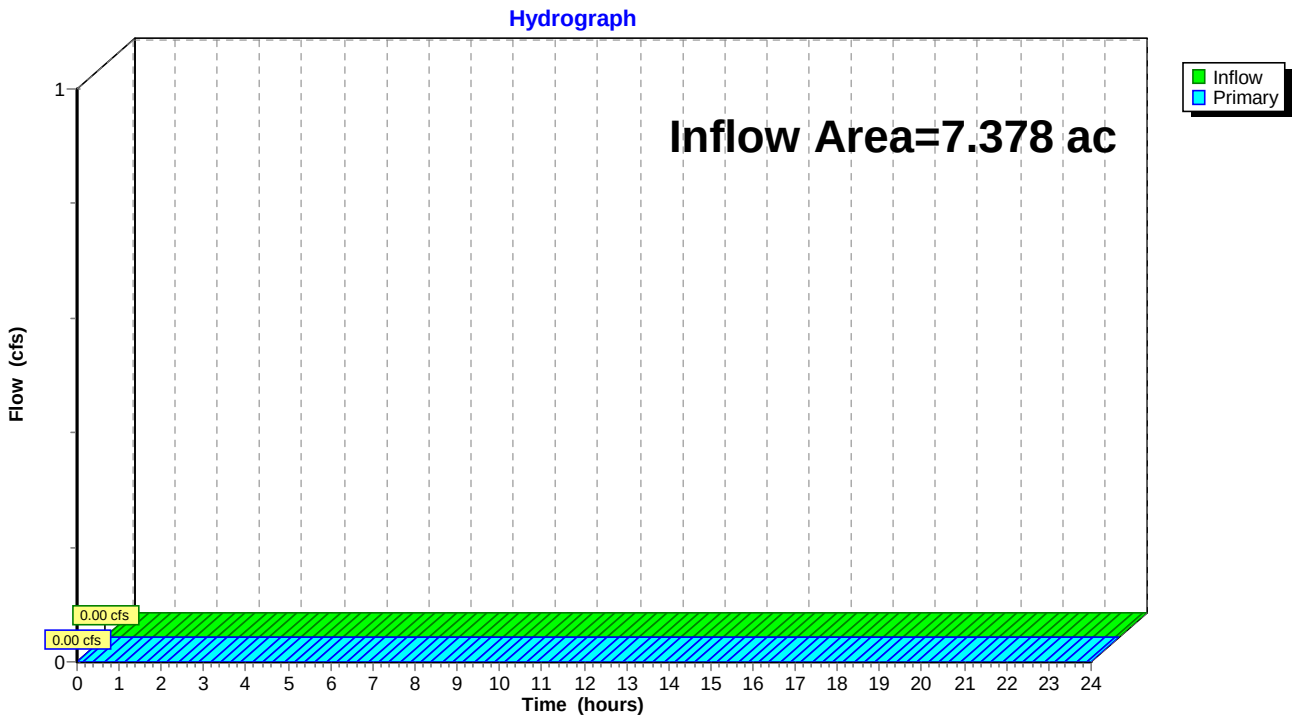


Summary for Link SP: Study Point

Inflow Area = 7.378 ac, 0.86% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link SP: Study Point



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subwatershed Runoff Area=321,403 sf 0.86% Impervious Runoff Depth>0.73"
Flow Length=725' Tc=14.1 min CN=39 Runoff=2.53 cfs 0.448 af

Pond 1P: Stormwater Basin Peak Elev=371.71' Storage=17,316 cf Inflow=6.95 cfs 0.693 af
Outflow=4.46 cfs 0.342 af

Link 1L: Flow from Culvert Manual Hydrograph Inflow=6.26 cfs 0.245 af
Primary=6.26 cfs 0.245 af

Link SP: Study Point Inflow=4.46 cfs 0.342 af
Primary=4.46 cfs 0.342 af

Total Runoff Area = 7.378 ac Runoff Volume = 0.448 af Average Runoff Depth = 0.73"
99.14% Pervious = 7.315 ac 0.86% Impervious = 0.064 ac

Summary for Subcatchment 1S: Subwatershed

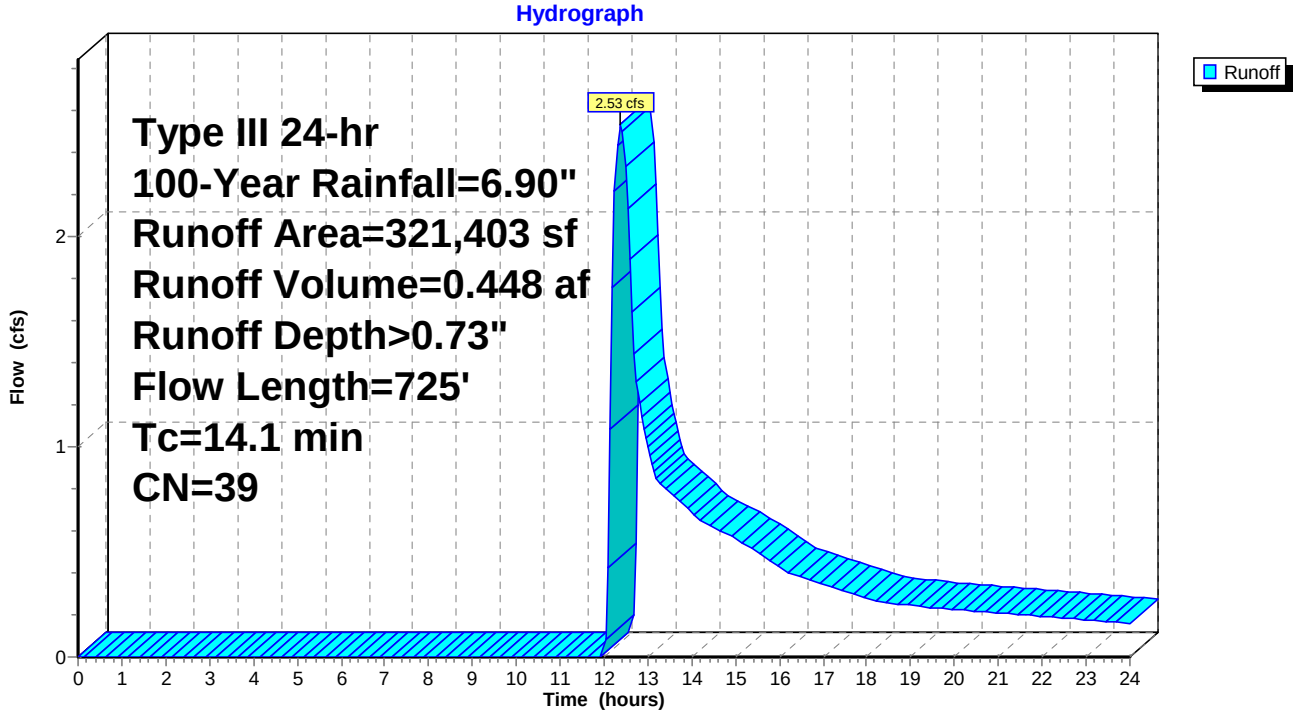
Runoff = 2.53 cfs @ 12.38 hrs, Volume= 0.448 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.90"

	Area (sf)	CN	Description
	22,584	32	Woods/grass comb., Good, HSG A
	296,050	39	>75% Grass cover, Good, HSG A
*	2,769	98	Impervious Area
	321,403	39	Weighted Average
	318,634		99.14% Pervious Area
	2,769		0.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.0900	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.16"
7.3	675	0.0490	1.55		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
14.1	725	Total			

Subcatchment 1S: Subwatershed



Summary for Pond 1P: Stormwater Basin

Inflow Area = 7.378 ac, 0.86% Impervious, Inflow Depth > 1.13" for 100-Year event
Inflow = 6.95 cfs @ 13.98 hrs, Volume= 0.693 af
Outflow = 4.46 cfs @ 14.01 hrs, Volume= 0.342 af, Atten= 36%, Lag= 2.1 min
Primary = 4.46 cfs @ 14.01 hrs, Volume= 0.342 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 371.71' @ 14.01 hrs Surf.Area= 11,495 sf Storage= 17,316 cf
Flood Elev= 372.00' Surf.Area= 13,594 sf Storage= 20,978 cf

Plug-Flow detention time= 225.1 min calculated for 0.341 af (49% of inflow)
Center-of-Mass det. time= 117.3 min (1,013.8 - 896.5)

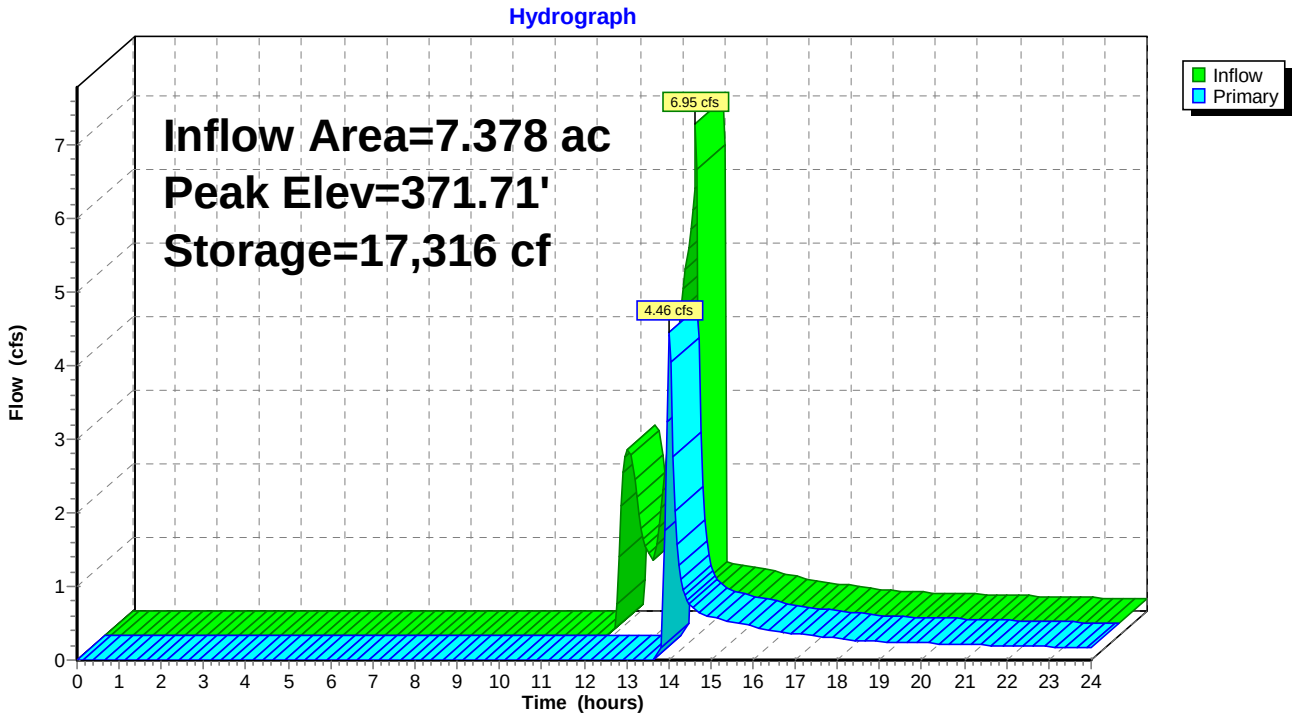
Volume	Invert	Avail.Storage	Storage Description
#1	369.00'	20,978 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
369.00	4,589	0	0
370.00	5,483	5,036	5,036
371.00	6,403	5,943	10,979
372.00	13,594	9,999	20,978

Device	Routing	Invert	Outlet Devices
#1	Primary	371.50'	**20.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.30 cfs @ 14.01 hrs HW=371.70' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 4.30 cfs @ 1.06 fps)

Pond 1P: Stormwater Basin



Summary for Link 1L: Flow from Culvert

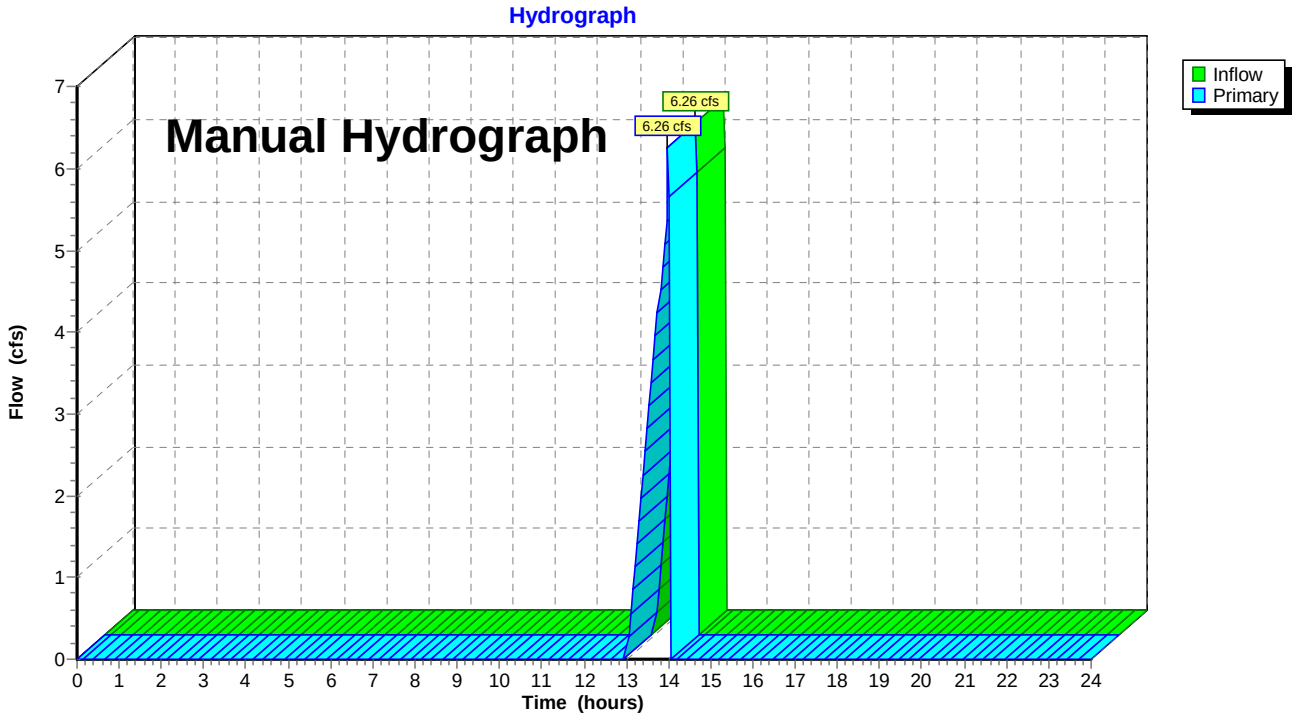
Inflow = 6.26 cfs @ 13.98 hrs, Volume= 0.245 af
Primary = 6.26 cfs @ 13.98 hrs, Volume= 0.245 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

15 Point manual hydrograph, To= 0.00 hrs, dt= 1.00 hrs, cfs =

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.65					

Link 1L: Flow from Culvert

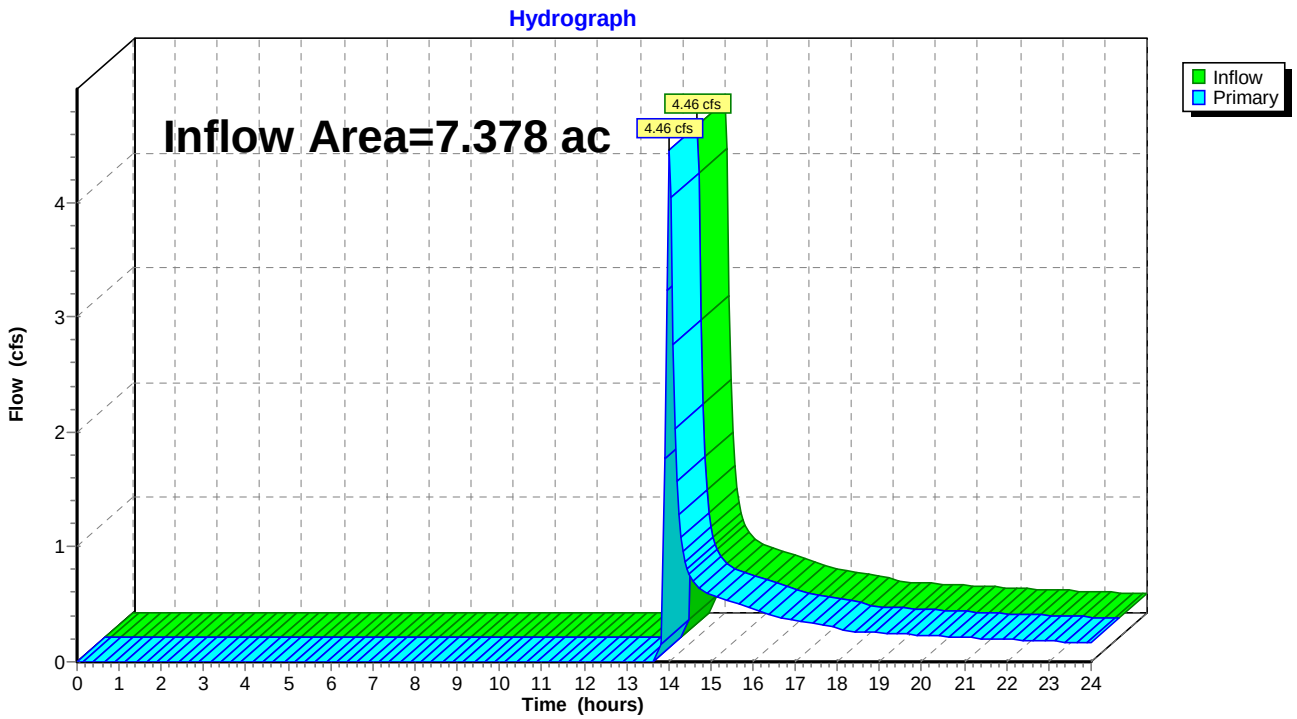


Summary for Link SP: Study Point

Inflow Area = 7.378 ac, 0.86% Impervious, Inflow Depth > 0.56" for 100-Year event
Inflow = 4.46 cfs @ 14.01 hrs, Volume= 0.342 af
Primary = 4.46 cfs @ 14.01 hrs, Volume= 0.342 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link SP: Study Point



OPERATION & MAINTENANCE PLAN

TGC – South River Road Solar Project

327 South River Road
Tolland, CT

228051.01
WR-TGV Solar Generation XVI, LLC
March 2016

woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

TABLE OF CONTENTS

SECTION **PAGE NO.**

1. INTRODUCTION 1-1

1.1 Background 1-1
1.2 Responsible Parties 1-1
1.2.1 Contact Information 1-1

2. MAINTENANCE MEASURES 2-1

2.1 Solar Photovoltaic System 2-1
2.2 Site Access 2-1
2.3 Pervious Areas 2-1
2.4 Stormwater Management System 2-1
2.4.1 Drainage Swales & Stone Check Dams 2-1
2.4.2 Stormwater Basin & Level Spreader 2-1

3. SPILL PREVENTION 3-1

1. INTRODUCTION

1.1 BACKGROUND

This Operations & Maintenance Plan (Plan) outlines measures that are essential for maintaining an effective solar facility, including site access and stormwater management systems, located at 327 South River Road in Tolland, Connecticut (the Site). Periodic and scheduled inspections and maintenance measures are recommended to prevent deficiencies and to ensure proper performance of the facility and its associated stormwater management system.

1.2 RESPONSIBLE PARTIES

A Ground Lease Agreement will be executed between the Town of Tolland (Lessor) and WR-TGC Solar Generation XVI, LLC, (TGC, Lessee) outlining the responsibilities described below. TGC is the Operator of the Site, and will be the responsible party for implementing this Plan within the limits of the leased premises, which includes the following operations and maintenance activities:

- Maintaining and monitoring the solar/electrical system;
- Maintaining the access road to the Site;
- Snow removal and plowing, as necessary to accommodate operations and maintenance activities;
- Grounds maintenance, including the maintenance of plantings and grass cover;
- Mowing of the grass cover as needed on an annual basis; and
- Inspecting, monitoring, and maintaining the drainage swales, stone check dams, stormwater basin, and level spreader.

1.2.1 Contact Information

Land Owner (Lessor): Town of Tolland
21 Tolland Green
Tolland, CT 06084
Tel: 860-871-3600

Site Operator (Lessee): WR-TGC Solar Generation XVI, LLC
18 Kings Highway North
Westport, CT 06880
Tel: 212-376-6114

2. MAINTENANCE MEASURES

Maintenance activities shall be implemented in a manner that minimizes impacts to the surrounding environment. All components of the Site shall be operated and maintained in accordance with the design plans, and as outlined below.

2.1 SOLAR PHOTOVOLTAIC SYSTEM

The Operator shall provide the labor, equipment, and software necessary to monitor, respond to, and maintain the system. The Operator will provide maintenance and monitoring of the solar/electrical equipment, including annual checks of wiring, inverters, system performance, etc. This work will be performed in addition to the work associated with the grounds maintenance as described herein. All work will be conducted in conformance with the warranties, provisions, and requirements established in the Agreement with the Town of Tolland.

The facility will be operated in compliance with prudent industry practices and in accordance with applicable law. The Operator shall obtain and maintain the required licenses and permits required to operate and maintain the system; basic services include specific activities, if any, required by the license or permit governing the operation of the system. The Operator shall provide additional system information as requested by the Owner.

2.2 SITE ACCESS

Remove snow such that the road access remains open for operations and maintenance actives.

2.3 PERVIOUS AREAS

Pervious areas include all grassed or landscaped areas associated with the Site and the stormwater management system. For one year following construction, water the newly seeded areas, reseed areas that become barren, and repair gullies to establish adequate vegetation quickly to reduce the potential for erosion and to ensure the functionality of the stormwater management system. Continue to maintain grass cover and revegetate areas that become barren after the first year. Inspect pervious areas at least annually for evidence of sediment deposition and vegetation dieback. Remove any deposited sediment and revegetate as necessary. Replace any eroded soil from the qualifying pervious area. Mow grass annually or as needed such that vegetation is maintained. Remove wooded plants which exceed one inch in diameter.

2.4 STORMWATER MANAGEMENT SYSTEM

2.4.1 Drainage Swales & Stone Check Dams

Frequently inspect the drainage swale and associated stone check dams during the first few months after construction and annually thereafter to make sure vegetation is adequate and to check for signs of rilling and gullying; remove debris, replace dead vegetation, and repair any rills or gullies. Inspections shall also check for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation. Mow and reseed drainage swales as necessary. Remove sediment and debris manually, as needed.

2.4.2 Stormwater Basin & Level Spreader

Conduct inspections and provide preventative maintenance to confirm the basin and associated level spreader is stabilized and functioning properly after every major storm during the first 3 months of operation and annually thereafter. Inspections shall check for:

- Signs of differential settlement;
- Cracking;
- Erosion;
- Leakage in the embankments;
- Tree growth on the embankments;
- Sediment accumulation; and
- The health of the turf.

Mow and remove trash and debris, grass clippings, and accumulated organic matter annually as needed. Remove sediment from the basin as necessary, but wait until the floor of the basin is thoroughly dry. Use light equipment to remove the top layer so as to not compact the underlying soil. Deeply till the remaining soil and revegetate as soon as possible.

Inspect the level spreader regularly, especially after large rainfall events. Note and repair any erosion or low spots in the spreader. Mow and reseed as necessary. Remove sediment and debris manually, as needed. The level spreader should be monitored to ensure that it is functioning as intended.

3. SPILL PREVENTION

The proposed solar development will not utilize hazardous materials on the Site. Solar panels do not require cleaning with detergents; if needed, panels shall be cleaned with water. Transformers will be housed on concrete pads.

The only potential hazards for the Site will be the occasional maintenance vehicles. Spills and leaks shall be avoided through frequent inspection of equipment. Heavy equipment and other vehicles used at the Site shall be routinely inspected for leaks and repaired as necessary. Appropriate cleanup procedures and supplies shall be made available on-site and should be clearly marked so that all personnel can locate and access these supplies quickly.

Spills shall be cleaned up immediately following proper response procedures and in accordance with any applicable regulatory requirements. At no time shall spills be cleaned and flushed down storm drains or into any environmentally sensitive area (i.e. stream, pond, wetland, etc.).

Equipment/vehicle fueling and repair/maintenance operations or hazardous material storage shall not take place on Site. Designated areas shall be approved by the Owner.

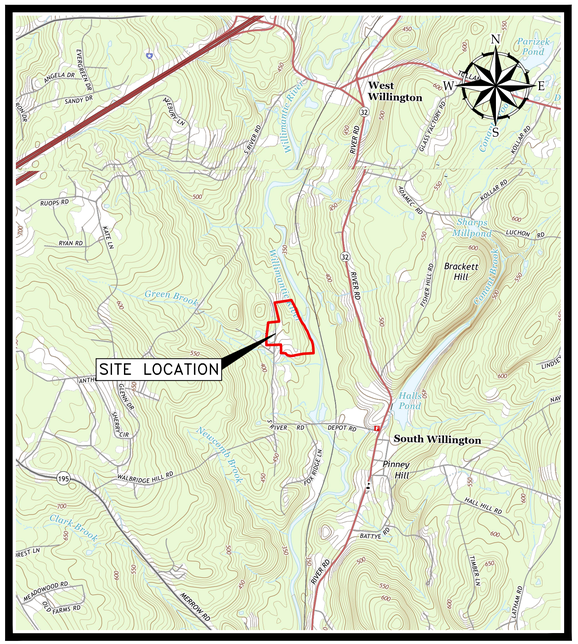
TGC SOLAR 1

327 SOUTH RIVER ROAD
TOLLAND, CT 06084

APPLICANT
WR-TGC SOLAR GENERATION XVI, LLC
C/O TRUE GREEN CAPITAL MANAGEMENT
18 KINGS HIGHWAY NORTH
WESTPORT, CONNECTICUT 06880

LAND OWNER
TOWN OF TOLLAND CONNECTICUT
21 TOLLAND GREEN
TOLLAND CONNECTICUT 06084

PROPERTY
MBLU 30/C/9/00



REFERENCE: USGS TOPOGRAPHIC MAP

SITE LOCATION MAP

SCALE: 1" = 2,000'
2,000 0 2,000 3,000
FEET

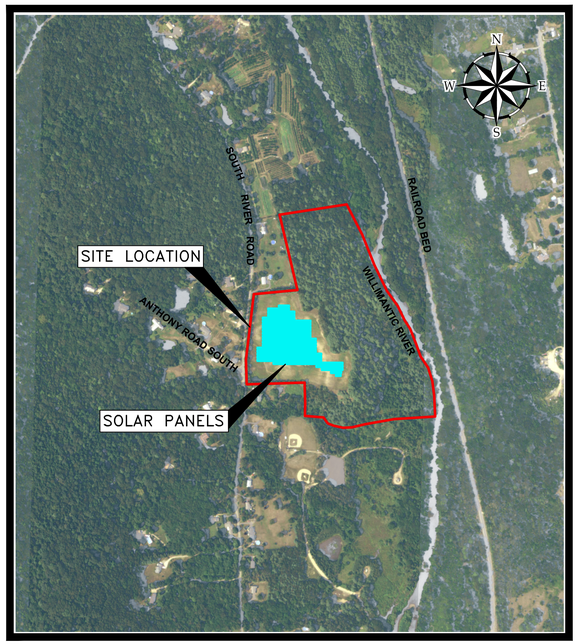
SHEET INDEX

GENERAL
G-001 COVER SHEET
CIVIL
C-100 EXISTING CONDITIONS PLAN & LEGEND
C-101 SITE PLAN, GRADING AND EROSION CONTROL
D-200 DETAILS – 1
D-201 DETAILS – 2

MARCH 2016

ENGINEER

WOODARD & CURRAN
1520 Highland Avenue |
Cheshire, Connecticut 06410
888.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS



REFERENCE: USGS NATIONAL DATABASE

SITE LOCATION AERIAL PHOTO

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

G-001

F:\Projects\228051 True Green Capital Tolland South River Road\228051.01 G001.dwg, Mar 25, 2016 – 9:18am

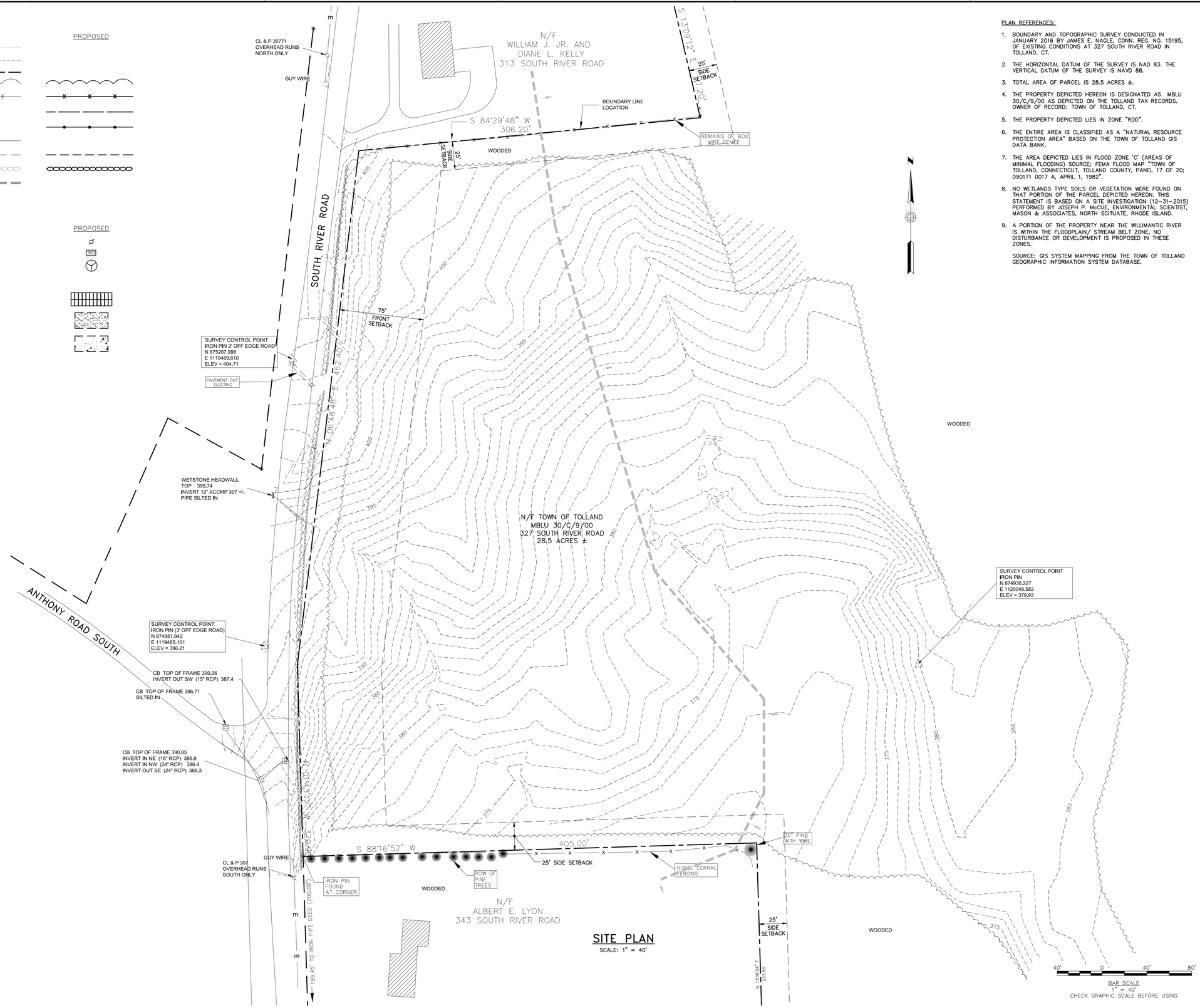
24x36 SHEET
1:1

LINE TYPES

DESCRIPTION	EXISTING	PROPOSED
CONTOUR (1' INTERVAL)	122	
CONTOUR (INDEX)	120	
PROPERTY LINE		
EDGE OF VEGETATION		
CHAIN LINK FENCE		
VINYL COATED CHAIN LINK FENCE		
EROSION CONTROL BERM		
EDGE OF PAVEMENT		
EDGE OF GRAVEL		
STONE WALLL		
ACQUIFER PROTECTION		

SYMBOLS

DESCRIPTION	EXISTING	PROPOSED
UTILITY POLE		
STONE CHECK DAM		SCD
TREE		
IRON PIN		
MONUMENTS		
SOLAR PANELS		
GRAVEL		
CONCRETE		



SITE PLAN

SCALE: 1" = 40'

PLAN REFERENCES:

1. BOUNDARY AND TOPOGRAPHIC SURVEY CONDUCTED IN JANUARY 2016 BY JAMES E. NAGLE, CONN. REG. NO. 15195, OF EXISTING CONDITIONS AT 327 SOUTH RIVER ROAD IN TOLLAND, CT.
2. THE HORIZONTAL DATUM OF THE SURVEY IS NAD 83. THE VERTICAL DATUM OF THE SURVEY IS NAVD 88.
3. TOTAL AREA OF PARCEL IS 28.5 ACRES ±.
4. THE PROPERTY DEPICTED HEREON IS DESIGNATED AS MBLU 30/C/9/00 AS DEPICTED ON THE TOLLAND TAX RECORDS. OWNER OF RECORD: TOWN OF TOLLAND, CT.
5. THE PROPERTY DEPICTED LIES IN ZONE "RDD".
6. THE ENTIRE AREA IS CLASSIFIED AS A "NATURAL RESOURCE PROTECTION AREA" BASED ON THE TOWN OF TOLLAND GIS DATA BANK.
7. THE AREA DEPICTED LIES IN FLOOD ZONE 'C' (AREAS OF MINIMAL FLOODING) SOURCE: FEMA FLOOD MAP "TOWN OF TOLLAND, CONNECTICUT, TOLLAND COUNTY, PANEL 17 OF 20; 090171 0017 A, APRIL 1, 1982".
8. NO WETLANDS TYPE SOILS OR VEGETATION WERE FOUND ON THAT PORTION OF THE PARCEL DEPICTED HEREON. THIS STATEMENT IS BASED ON A SITE INVESTIGATION (12-31-2015) PERFORMED BY JOSEPH P. McCUE, ENVIRONMENTAL SCIENTIST, MASON & ASSOCIATES, NORTH SCITUATE, RHODE ISLAND.
9. A PORTION OF THE PROPERTY NEAR THE WILLIMANTIC RIVER IS WITHIN THE FLOODPLAIN/ STREAM BELT ZONE. NO DISTURBANCE OR DEVELOPMENT IS PROPOSED IN THESE ZONES.

SOURCE: GIS SYSTEM MAPPING FROM THE TOWN OF TOLLAND GEOGRAPHIC INFORMATION SYSTEM DATABASE.

1520 Highland Avenue
Cheshire, Connecticut 06410
888.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

THIS DOCUMENT IS THE PROPERTY OF WOODARD & CURRAN INC. AND ITS CLIENT. REPRODUCTION OR MODIFICATION WITHOUT WRITTEN PERMISSION IS PROHIBITED.

STATE OF CONNECTICUT
ALAN E. BEECHER
LICENSED PROFESSIONAL ENGINEER
15195

REV	DESCRIPTION	DATE

DESIGNED BY: DLC
DRAWN BY: JBC
CHECKED BY: AAB
228051.01 10X.dwg

EXISTING CONDITIONS PLAN & LEGEND

WR-TGC SOLAR GENERATION XVI, LLC
C/O TRUE GREEN CAPITAL MANAGEMENT
18 KINGS HIGHWAY NORTH
WESTPORT, CONNECTICUT 06880

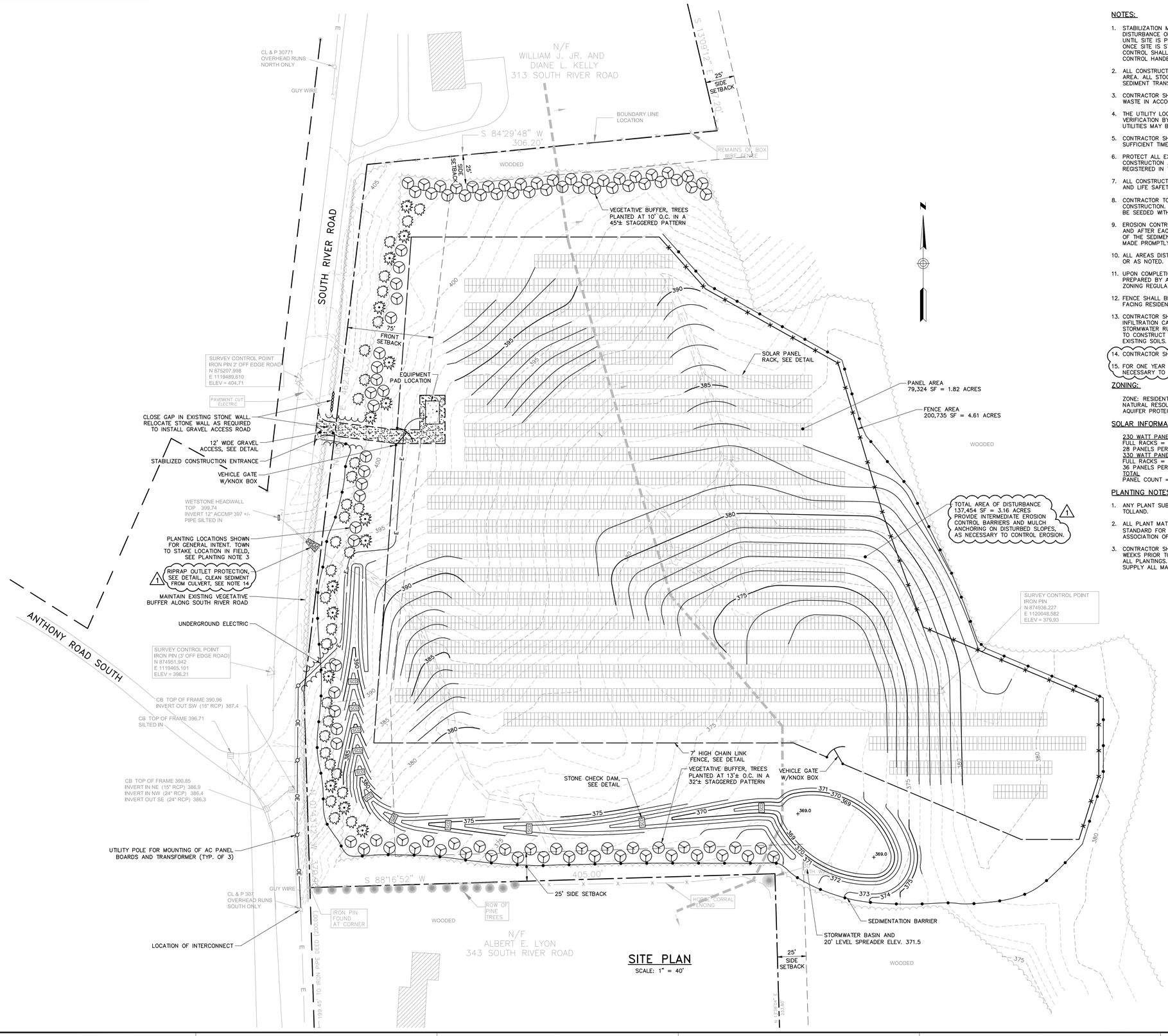
TGC SOLAR 1
327 SOUTH RIVER ROAD
TOLLAND, CT 06084

JOB NO.: 228051.01
DATE: MARCH 2016
SCALE: 1" = 40'
SHEET: 2 OF 5

C-100

F:\Projects\228051 True Green Capital Tolland South River Road\228051.01 10X.dwg, Mar 25, 2016 - 9:18am

24x36 SHEET
1:1



SITE PLAN
SCALE: 1" = 40'

NOTES:

1. STABILIZATION MEASURES (IE. EROSION & SEDIMENT CONTROL) MUST BE IN PLACE PRIOR TO DISTURBANCE OF SOILS, INSPECTED & MAINTAINED DURING CONSTRUCTION ACTIVITIES & UNTIL SITE IS PERMANENTLY STABILIZED. EROSION CONTROL BARRIERS SHALL BE REMOVED ONCE SITE IS STABILIZED & GRASS AREAS REACH 90% COVER. SOIL EROSION AND SEDIMENT CONTROL SHALL BE IN ACCORDANCE WITH THE CONNECTICUT SOIL EROSION AND SEDIMENT CONTROL HANDBOOK, AS AMENDED.
2. ALL CONSTRUCTION STAGING & MATERIAL STOCKPILES MUST BE LOCATED WITHIN THE PANEL AREA. ALL STOCKPILES SHALL BE SURROUNDED BY EROSION CONTROL DEVICES TO MINIMIZE SEDIMENT TRANSPORT DURING CONSTRUCTION.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY DISPOSING OF ALL CONSTRUCTION WASTE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
4. THE UTILITY LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION BY THE CONTRACTOR PRIOR TO CONSTRUCTION ACTIVITY. NOT ALL EXISTING UTILITIES MAY BE SHOWN.
5. CONTRACTOR SHALL NOTIFY ALL UTILITIES PRIOR TO COMMENCING WORK, ALLOWING SUFFICIENT TIME TO LOCATE AND MARK LOCATION OF BURIED UTILITIES.
6. PROTECT ALL EXISTING MONUMENTS AND PINS. PROPERTY MARKERS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE RESET BY A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF CONNECTICUT.
7. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE CONNECTICUT FIRE SAFETY CODE, AND LIFE SAFETY CODE, AS AMENDED AND MOST CURRENT.
8. CONTRACTOR TO PROVIDE 4" LOAM AND SEED AT ALL AREAS DISTURBED DURING CONSTRUCTION. AREAS DISTURBED OUTSIDE OF PANEL AREA OR DRAINAGE SWALES SHALL BE SEEDED WITH NEW ENGLAND WILDFLOWER MIX WITH BIRDS FOOT–TREFOIL.
9. EROSION CONTROL MEASURES SHALL BE INSPECTED BY CONTRACTOR ON A WEEKLY BASIS AND AFTER EACH STORM EVENT. SEDIMENT THAT HAS ACCUMULATED TO HALF THE HEIGHT OF THE SEDIMENT BARRIER SHALL BE REMOVED. REPAIR AND REPLACEMENTS SHALL BE MADE PROMPTLY AS NEEDED.
10. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO EXISTING CONDITION OR AS NOTED.
11. UPON COMPLETION OF CONSTRUCTION CONTRACTOR SHALL PROVIDE AS–BUILT DRAWINGS PREPARED BY A REGISTERED LAND SURVEYOR IN ACCORDANCE WITH THE TOWN OF TOLLAND ZONING REGULATIONS, SECTION 22–7–U.
12. FENCE SHALL BE BLACK OR GREEN VINYL ALONG SOUTH RIVER ROAD AND FOR FENCING FACING RESIDENTIAL PROPERTIES TO THE NORTH AND SOUTH.
13. CONTRACTOR SHALL CONDUCT OPERATIONS IN A MANNER WHICH WILL PROTECT THE INFILTRATION CAPACITY OF SOILS BELOW THE BASIN, DO NOT ALLOW SEDIMENT–LADEN STORMWATER RUNOFF TO ENTER THE BASIN; USE ONLY LOW GROUND PRESSURE EQUIPMENT TO CONSTRUCT THE BASIN, AND CONDUCT OPERATIONS SO AS TO AVOID COMPACTION OF EXISTING SOILS.
14. CONTRACTOR SHALL CLEAN EXISTING 12" CULVERT.
15. FOR ONE YEAR FOLLOWING CONSTRUCTION, WATER THE NEWLY SEEDED AREAS AS NECESSARY TO ESTABLISH VEGETATION AND REPAIR AREAS OF EROSION OR GULLIES. 1

ZONING:

ZONE: RESIDENTIAL DESIGN DISTRUCT (RDD),
NATURAL RESOURCE PROTECTION AREA OVERLAY
AQUIFER PROTECTION AREA

SOLAR INFORMATION

230 WATT PANELS:
FULL RACKS = 28
28 PANELS PER RACK: 784 PANELS = 0.18 MW
330 WATT PANELS:
FULL RACKS = 92
36 PANELS PER RACK: 3,312 PANELS = 1.09 MW
TOTAL
PANEL COUNT = 4,096 = 1.27 MW

PLANTING NOTES

1. ANY PLANT SUBSTITUTIONS MUST BE APPROVED BY THE OWNER AND THE TOWN OF TOLLAND.
2. ALL PLANT MATERIAL INSTALLED SHALL MEET THE SPECIFICATIONS OF THE AMERICAN STANDARD FOR NURSERY STOCK (LATEST EDITION) AS SET FORTH BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
3. CONTRACTOR SHALL NOTIFY DIRECTOR OF PLANNING AND COMMUNITY DEVELOPMENT TWO WEEKS PRIOR TO PLANTING. THE TOWN OF TOLLAND SHALL STAKE AND TAG LOCATION OF ALL PLANTINGS. CONTRACTOR SHALL FULLY COORDINATE PLANTINGS WITH THE TOWN AND SUPPLY ALL MATERIALS NECESSARY TO STAKE LOCATIONS OF PLANTINGS.

PLANT LIST

KEY	COMMON & BOTANICAL NAME	SIZE	ROOT	QTY.
	EASTERN WHITE PINE, PINUS STROBUS	6' HT. (MIN.)	B&B	24
	RED SPRUCE, PICEA RUBENS	6' HT. (MIN.)	B&B	19
	FRASER FIR, ABIES FRASERI	6' HT. (MIN.)	B&B	21
	RED MAPLE, ACER RUBRUM	8' – 10' HT.	B&B	28
	SHADBLOW SERVICE BERRY, AMELANCHIER CANADENSIS	5 GALLON	NA	15
	MOUNTAIN LAUREL, KALMIA LATIFOLIA	5 GALLON	NA	30

ZONE: RESIDENTIAL DESIGN (RDD)

VARIABLE	REQUIRED	PROPOSED
FRONT YARD	75 FT.	75 FT.
SIDE YARD	25 FT.	95 FT.±
REAR YARD	25 FT.	> 25. FT.
HEIGHT OF SOLAR	25. FT. MAX.	7.5 FT.±

NOTE: YARD SETBACKS ARE PER THE TOWN OF TOLLAND ALTERNATIVE ENERGY REGULATION (SECTION 17–8)

40' 0 40' 80'
BAR SCALE
1" = 40'
CHECK GRAPHIC SCALE BEFORE USING

1520 Highland Avenue
Cheshire, Connecticut 06410
888.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

THIS DOCUMENT IS THE PROPERTY OF WOODARD & CURRAN INC. AND ITS CLIENT. REPRODUCTION OR MODIFICATION WITHOUT WRITTEN PERMISSION IS PROHIBITED.

STATE OF CONNECTICUT
ALAN A. BERGER
29848
LICENSED PROFESSIONAL ENGINEER

REV.	DESCRIPTION	DATE
1	RESPONSE TO IWI COMMENTS ON SITE PLAN APPLICATION	1/23/2016

DESIGNED BY: DLC CHECKED BY: AAB
DRAWN BY: JRC 228051.01 10X.dwg

SITE PLAN, GRADING AND EROSION CONTROL

WR–TGC SOLAR GENERATION XVI, LLC
C/O TRUE GREEN CAPITAL MANAGEMENT
18 KINGS HIGHWAY NORTH
WESTPORT, CONNECTICUT 06880

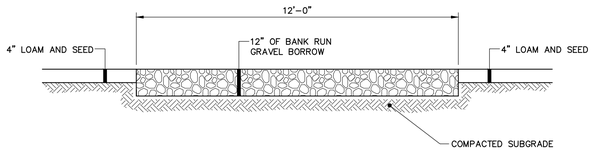
TGC SOLAR 1
327 SOUTH RIVER ROAD
TOLLAND, CT 06084

JOB NO.: 228051.01
DATE: MARCH 2016
SCALE: 1" = 40'
SHEET: 3 OF 5

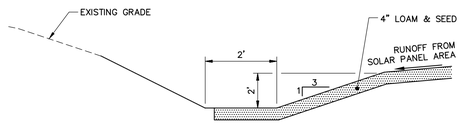
C-101

F:\Projects\228051 True Green Capital Tolland South River Road\228051.01 10X.dwg, Mar 25, 2016 – 9:18am

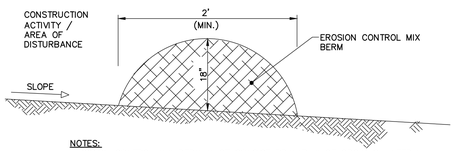
24x36 SHEET
1:1



GRAVEL ACCESS DETAIL
N.T.S.



VEGETATED SWALE
N.T.S.



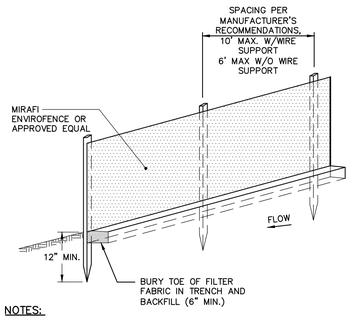
NOTES:
EROSION CONTROL MIX BERM MUST CONSIST PRIMARILY OF ORGANIC MATERIAL AND MAY INCLUDE: SHREDDED BARK, STUMP GRINDINGS, COMPOSTED BARK, OR ACCEPTABLE MANUFACTURED PRODUCTS. WOOD AND BARK CHIPS, GROUND CONSTRUCTION DEBRIS OR REPROCESSED WOOD PRODUCTS WILL NOT BE ACCEPTABLE AS THE ORGANIC COMPONENT OF THE MIX.

COMPOSITION:

EROSION CONTROL MIX SHALL CONTAIN A WELL-GRADED MIXTURE OF PARTICLE SIZES AND MAY CONTAIN ROCKS LESS THAN 4" IN DIAMETER. EROSION CONTROL MIX MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH. THE MIX COMPOSITION SHALL MEET THE FOLLOWING STANDARDS:

- THE ORGANIC MATTER CONTENT SHALL BE BETWEEN 80 AND 100%, DRY WEIGHT BASIS.
- PARTICLE SIZE BY WEIGHT SHALL BE 100 % PASSING A 6" SCREEN AND A MINIMUM OF 70%, MAXIMUM OF 85%, PASSING A 0.75" SCREEN.
- THE ORGANIC PORTION NEEDS TO BE FIBROUS AND ELONGATED.
- LARGE PORTIONS OF SILTS, CLAYS OR FINE SANDS ARE NOT ACCEPTABLE IN THE MIX.
- SOLUBLE SALTS CONTENT SHALL BE < 4.0 MMHOS/CM.
- THE PH SHOULD FALL BETWEEN 5.0 AND 8.0.

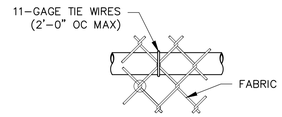
SEDIMENT BARRIER – EROSION CONTROL MIX BERM
N.T.S.



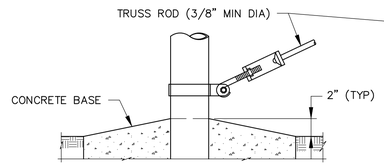
NOTES:

- INSTALL FABRIC ON UPHILL SIDE OF SUPPORT POSTS
- INSTALL SILT FENCE ACROSS SLOPES
- SILT FENCE SHALL NOT BE USED IN DRAINAGE WAYS

SEDIMENT BARRIER – SILTATION FENCE DETAIL
N.T.S.



TOP OR BRACE RAIL ATTACHMENT

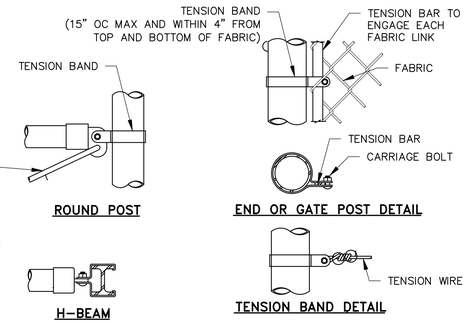


TRUSS ROD AND BAND

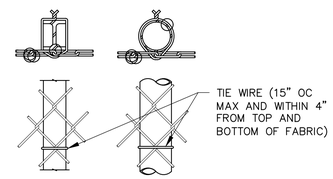
STEEL POST SCHEDULE	
USE AND SECTION	MINIMUM OUTSIDE DIMENSIONS (NOMINAL)
CORNER, END & PULL POSTS TUBULAR – ROUND	2.875" O.D.
LINE POSTS TUBULAR – ROUND	2.375" O.D.
TOP & BRACE RAILS TUBULAR – ROUND	1.66" O.D.

NOTES:

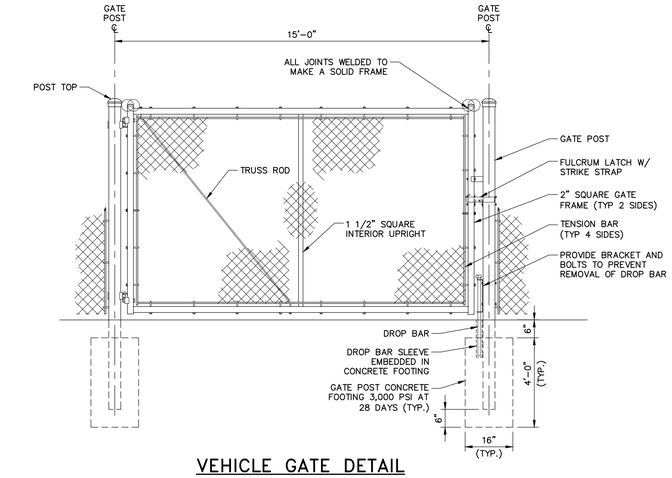
1. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPES OF FENCE SECTIONS AND METHODS OF INSTALLATION.
2. WIRE TIES, RAILS, POSTS, AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN-LINK FABRIC SHALL BE PLACED ON THE OPPOSITE SIDE OF THE SECURE AREA.



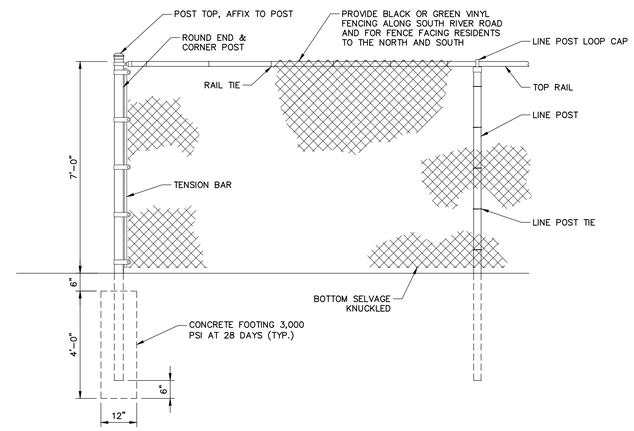
BRACE RAIL CLAMP DETAILS



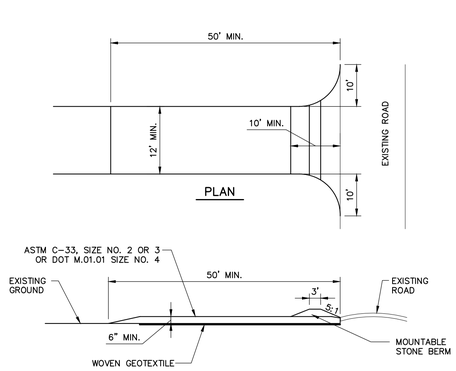
LINE POST ATTACHMENTS



VEHICLE GATE DETAIL
N.T.S.



CHAIN LINK FENCE DETAIL
N.T.S.



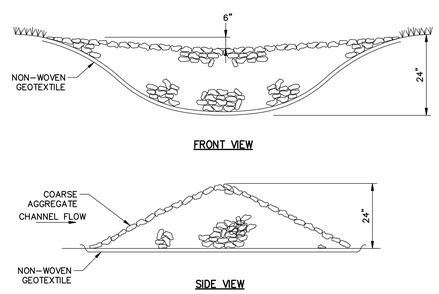
NOTES:

- CONSTRUCTION ENTRANCES MAY BE RELOCATED AS CONSTRUCTION PROGRESSES.
- WHEEL WASH PITS MAY ALSO BE USED, IF APPROVED.

MAINTENANCE: INSPECT FOR EFFECTIVE REMOVAL OF SOIL FROM VEHICLES PRIOR TO LEAVING THE SITE. SWEEP ANY SOIL FROM ADJACENT ROADWAYS.

REMOVAL: AT LEAST ONE CONSTRUCTION ENTRANCE SHALL BE MAINTAINED UNTIL ALL AREAS OF THE SITE ARE STABILIZED.

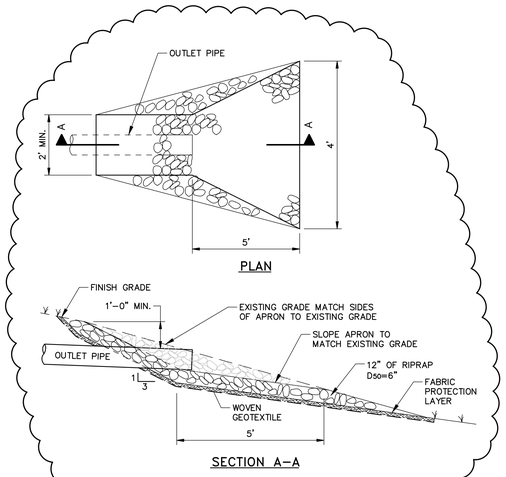
STABILIZED CONSTRUCTION ENTRANCE DETAIL
N.T.S.



NOTES:

1. SPACING BETWEEN CHECK DAMS AS SHOWN ON PLANS.

STONE CHECK DAM
N.T.S.



RIPRAP OUTLET PROTECTION
N.T.S.

1

1520 Highland Avenue
Cheshire, Connecticut 06410
888.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

THIS DOCUMENT IS THE PROPERTY OF WOODARD & CURRAN INC. AND ITS CLIENT. REPRODUCTION OR MODIFICATION WITHOUT WRITTEN PERMISSION IS PROHIBITED.

STATE OF CONNECTICUT · ALAN E. BEAUDET · 18857 · LICENSED PROFESSIONAL ENGINEER

REV.	DESCRIPTION	DATE
1	RESPONSE TO HW COMMENTS ON SITE PLAN APPLICATION	1/23/2016

DESIGNED BY: DLC
DRAWN BY: JBC
CHECKED BY: AAB
228051.01 D20X.dwg

DETAILS – 1

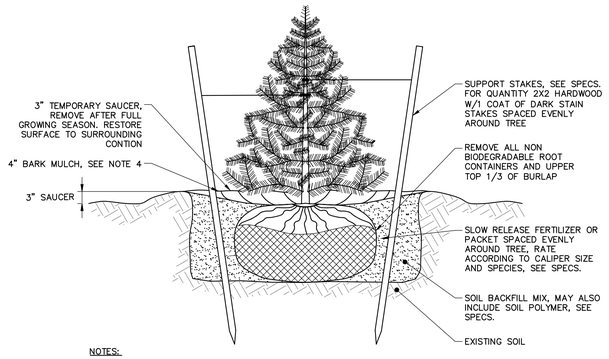
WR-TGC SOLAR GENERATION XVI, LLC
C/O TRUE GREEN CAPITAL MANAGEMENT
18 KINGS HIGHWAY NORTH
WESTPORT, CONNECTICUT 06880

TGC SOLAR 1
327 SOUTH RIVER ROAD
TOLLAND, CT 06084

JOB NO.: 228051.01
DATE: MARCH 2016
SCALE: AS NOTED
SHEET: 4 OF 5

D-200

F:\Projects\228051 True Green Capital Tolland South River Road\228051.01 D20X.dwg, Mar 25, 2016 – 9:18am

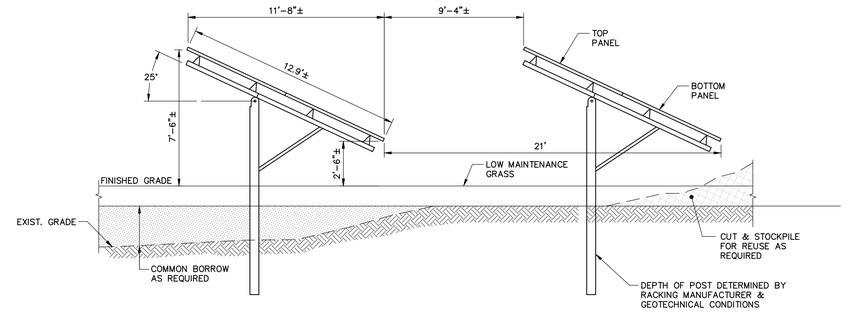


NOTES:

1. NEVER CUT OUT CENTRAL LEADER, PRUNE OUT BROKEN, DEAD OR CONFLICTING BRANCHES
2. SEE SPECS. FOR ADDITIONAL REQUIREMENTS
3. TREE GUYS SHALL BE GUYING CHAIN, WEB STRAPPING OR TIE WIRE, RUBBER HOSE AND TURNBUCKLES
4. MULCHING SHALL CONSIST OF PREMIUM TYPE #1 GRADE MULCH SUCH AS PINEBARK, CEDAR, OR HEMLOCK, AT LEAST 4" IN DEPTH. DYED OR INDUSTRIAL TYPE MULCH IS NOT PERMITTED.

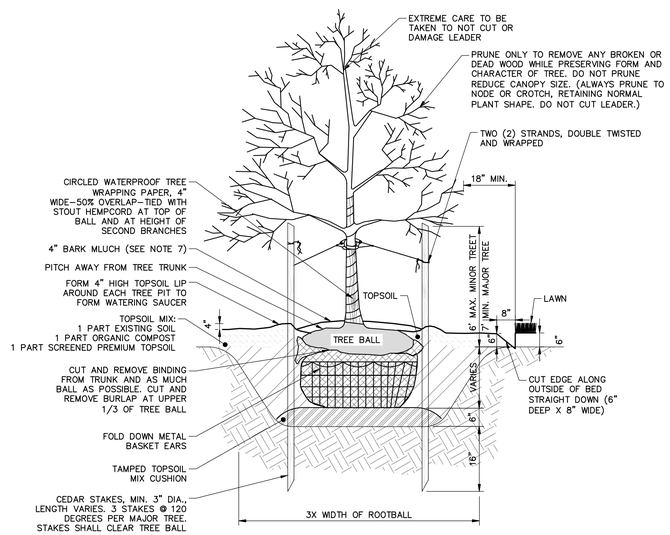
EVERGREEN TREE PLANTING AND STAKING

N.T.S.



TYPICAL SOLAR PANELS & RACK DETAIL

N.T.S.

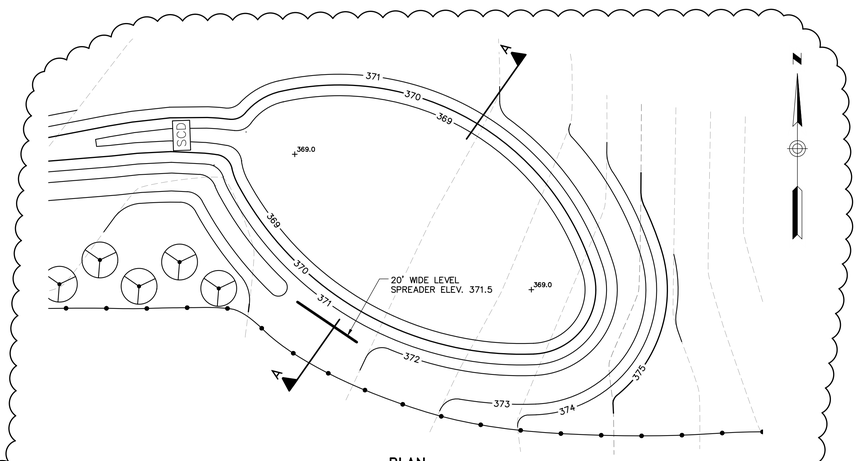


NOTES:

1. PLANT TO SCALE IN CONTAINERS MUST HAVE THE FIBROUS POTBOUND ROOTS PULLED APART TO ALLOW THE ROOTS TO SPREAD.
2. AFTER THE SHRUB HAS BEEN PLACED IN THE HOLE, THE TOPSOIL MIX SHOULD BE PLACED AROUND THE PLANT ONE-THIRD OF THE WAY UP, A SLOW RELEASE SUPER PHOSPHATE FERTILIZER WILL BE ADDED TO THE SOIL AROUND THE SHRUB, AND THEN FILL THE REMAINDER OF HOLE WITH TOPSOIL MIX. THE TOPSOIL MIX SHOULD THEN BE GENTLY COMPACTED.
3. PROVIDE 3" LAYER OF MULCH AS SPECIFIED OVER ENTIRE WATERING SAUCER AT ALL TREE PITS OR OVER ENTIRE TREE BED.
4. REMOVE EXISTING WEEDS, LAWN OR PLANT MATERIAL FROM PROPOSED BED AREA.
5. REMOVE EXISTING WEEDS, LAWN OR PLANT MATERIAL FROM PROPOSED BED AREA.
6. ALL TREES SHALL CONFORM TO THE STANDARDS FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN (A.A.N.).
7. MULCHING SHALL CONSIST OF PREMIUM TYPE #1 GRADE MULCH SUCH AS PINEBARK, CEDAR, OR HEMLOCK, AT LEAST 4" IN DEPTH. DYED OR INDUSTRIAL TYPE MULCH IS NOT PERMITTED.

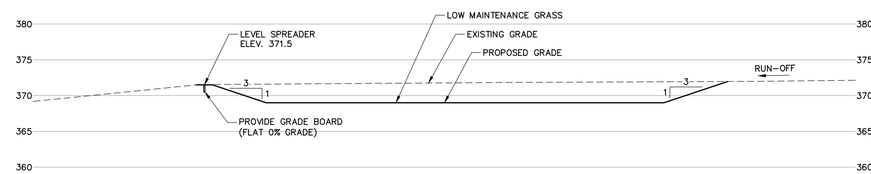
DECIDUOUS TREE PLANTING

N.T.S.



PLAN

SCALE: 1" = 20'



SECTION A-A

SCALE: 1" = 10'

NOTE:

SPREADERS SHALL BE INSTALLED WITH A LEVEL INSTRUMENT.
CONSTRUCT LEVEL LIP TO 0% GRADE TO ENSURE UNIFORM SHEET FLOW.

LEVEL SPREADER DETAIL

SCALE: AS NOTED

1

1520 Highland Avenue
Cheshire, Connecticut 06410
888.265.8969 | www.woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS
WOODARD & CURRAN

THIS DOCUMENT IS THE PROPERTY OF WOODARD & CURRAN INC. AND ITS CLIENT. REPRODUCTION OR MODIFICATION WITHOUT WRITTEN PERMISSION IS PROHIBITED.

STATE OF CONNECTICUT
AARON A. BERGER
29857
LICENSED PROFESSIONAL ENGINEER

REV.	DESCRIPTION	DATE
1	RESPONSE TO HM COMMENTS ON SITE PLAN APPLICATION	1/23/2016

DESIGNED BY: DLC
DRAWN BY: JBC
CHECKED BY: AAB
228051.01 D20X.dwg

DETAILS – 2

WR-TGC SOLAR GENERATION XVI, LLC
C/O TRUE GREEN CAPITAL MANAGEMENT
18 KINGS HIGHWAY NORTH
WESTPORT, CONNECTICUT 06880

TGC SOLAR 1
327 SOUTH RIVER ROAD
TOLLAND, CT 06084

JOB NO.: 228051.01
DATE: MARCH 2016
SCALE: AS NOTED
SHEET: 5 OF 5

D-201

F:\Projects\228051 True Green Capital Tolland South River Road\228051.01 D20X.dwg, Mar 25, 2016 – 9:18am